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HUMAN FACTORS ENGINEERING

BIBLIOGRAPHIC SERIES

VOLUME 1

1940-1959 LITERATURE

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Prepared by

THE PROJECT STAFF
DEPARTMENT OF DEFENSE
HUMAN FACTORS ENGINEERING INFORMATION ANALYSIS CENTER

Institute for Psychological Research
Tufts University

MAY 1966

HUMAN ENGINEERING LABORATORIES



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Prepared by

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THE PROJECT STAFF

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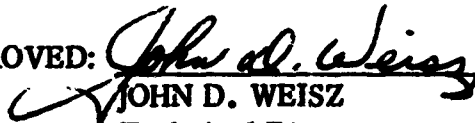
HUMAN FACTORS ENGINEERING INFORMATION ANALYSIS CENTER

Institute for Psychological Research

Tufts University

May 1966

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U. S. Air Force

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U. S. ARMY HUMAN ENGINEERING LABORATORIES

Aberdeen Proving Ground, Md.

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FOREWORD

The Department of the Army was assigned responsibility, effective 1 October 1965, for the development and maintenance of a Human Factors Engineering Information Analysis Center in accordance with the provisions of the Department of Defense Scientific and Technical Information program (DoD Instruction 5100.45). At present the Information Analysis Center is located at Tufts University under the technical guidance of the U. S. Army Human Engineering Laboratories.

The Office of Naval Research initiated the Tufts University effort over ten years ago. This volume and the two subsequent volumes, covering the human factors engineering literature from 1940 through 1965, although published by the U. S. Army Human Engineering Laboratories, is a result of the Office of Naval Research support and direction of this program during its formative years. This work was originated under ONR Contract Nonr 494 (13).

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Introduction

For several years the Human Engineering Information and Analysis Service Project (HEIAS), Tufts University, has been serving the informational needs of the human factors engineering community through the dissemination of information relevant to the field. One way in which information was distributed was via annual annotated bibliographies containing the yearly acquisitions of the project. To date, seven such bibliographies have been published.¹ The citations in these bibliographies were coded to the "Topical Outline of the Literature in Human Engineering", the main indexing scheme employed by HEIAS.

Since the publication of the last bibliography a number of changes have taken place within the project, not the least of which has been the development of a new index. Also many documents which had not been previously processed were added to the system. For these (and other reasons) the decision was made to publish a cumulative bibliography containing all previously listed citations plus any new ones, all coded to the new index. Such a document would provide users in the field with a single reference source. However, the number of accessions to be listed was so great that to contain them all in one volume would be impractical. The publication of several bibliographies, each covering specific time periods, seemed a more reasonable approach. The present bibliography is the first in this series and covers the literature from the period 1940 through 1959. The next bibliography in this series will cover the time period of 1960 through 1964 and the third, the 1965 literature. In addition, a separate bibliography containing foreign accessions will be published.

¹The seven Human Engineering Bibliographies published to date are: ONR Report ACR-24 (1955-56), ONR Report ACR-32 (1956-57), ONR Report ACR-43 (1957-58), ONR Report ACR-55 (1958-59), ONR Report ACR-69 (1959-60), ONR Report ACR-75 (1960-61), and ONR Report ACR-86 (1961-62).

As in the past the project staff was influenced by several considerations in the selection of references for inclusion in the bibliography. First, there was an attempt to select those references which reflected the broad spectrum of revealed interests of human factors personnel. Second, the documents had to be available to the project staff for examination prior to coding and abstracting. If the document was not among the acquisitions of the project, it was not included in the bibliography.

Because of the tremendous volume of literature published during this period, the project staff was not able to acquire every document of relevance. The present volume should, however, provide a useful compilation of references to the human factors engineering literature which reflect the cumulative (through 1959) acquisitions of HEIAS.

This and future volumes will be published in punched loose leaf page format. This will permit addition of new material and modification of old. Additions will be in the form of new acquisitions. Modifications will be primarily in the form of changes to the index and the resulting changes in the coding of the accessions involved. It is suggested that the user place the present volume in a notebook (or notebooks) or whatever form he finds convenient for use, or future modification.

Instruction in the Use of the Present Bibliography

General

The user should examine the index (Part I) thoroughly before attempting to locate references on a specific topic. Familiarization with the terms is essential if effective retrieval is to be realized. After examining its content, the user should be able to enter the index with the terms which are descriptive of, or synonymous with his query. Documents have been coded only to those terms or descriptors which are underlined. Having noted the terms of interest he should then go to Part II (Facsimile of Subject Matter File) and under the appropriate terms find the accession numbers of those documents which have been coded to that term. Noting these numbers he can then go to Part III (Citations and Abstracts) to find the actual references.

The Index and Its Use

The index is basically a combination and refinement of the old "Topical Outline" and "Alphabetical Indexes".² As such, it has some of the features of a hierarchical system and some of an alphabetical system. The accessions are only coded to those terms which are underlined and in cases of subheading, are coded to the lowest subcategory (i.e., to the secondary or tertiary heading, if there is one). For example, if the reader will note the category Aging, Effects of, he will find a number of secondary categories, such as vision, motor performance, etc. No references have been coded to Aging, Effects of, as such, but only to the secondary headings. In the case of Radar and other CRT Displays the reader will note the secondary heading screen and under this, various tertiary headings such as size and shape. Relevant documents, for example those dealing with the shape of radar screens or scope faces, have been coded to the lowest subcategory, in this case size and shape. No references will have been coded to screen alone.

²See previous bibliographies.

The index can, of course, be used as a hierarchical system or a coordinate index. For example, if a user were interested in articles dealing with drugs and their effects, he would examine the references listed in the category Drugs. Similarly, if he were interested in articles dealing with man's tolerance to acceleration, he would go to the category Motion, Effects of/acceleration and deceleration/tolerance. However, if he were interested in the effects of drugs on man's tolerance to acceleration forces, rather than go through all the references in the above mentioned categories, the reader should note only those accession numbers common to both categories. The loose leaf notebook form should facilitate this type of matching.

The reader is advised to look through the various general categories in making a search. These categories contain not only references of a general nature, books, bibliographies, etc., but in some cases miscellaneous articles which could not be readily coded elsewhere. Occasionally, the reader will note a secondary heading "other". These categories contain references to equipment, methods, topics, etc., not specifically listed under the main heading.

An index of this nature develops through use. All relevant terms and descriptors cannot be anticipated in its initial development and are often incorporated only after the index has been in use for some time. Therefore, if the user cannot find terms specifically descriptive of his problem he should attempt to find synonymous terms. As mentioned previously, the user should examine the whole index thoroughly before attempting to locate specific topics.

Facsimile of Subject Matter File

Part II contains those categories to which documents have been coded along with the accession numbers of the documents. In essence, it represents the index stripped to the bare essentials, i.e., minus all

cross headings and notes. The user will note that there are several categories with only a few or no references coded to them. These categories were left in the index because it is known that in the 1960-1965 bibliographies, there will be a number of references coded to them.

Citations and Abstracts

Part III contains the actual citations and abstracts listed in numerical order by accession number. This section was compiled by filming the actual 3x5 citation and abstract cards from the files of HEIAS. In some cases the reference material was on a 5x8 card. This presented layout problems and in an attempt to conserve as much space as possible some cards had to be placed sideways for filming. While we realize this presents somewhat of an inconvenience for the reader, we feel the conservation of space was worth it.

The format of the citations is generally in keeping with the recommendations of the Publication Manual of the American Psychological Association. In some instances, however, variation in the amount and type of information in the original document has introduced some variation in the final citation. The content of the citation tries to maximize the amount of information to assist the user in acquiring a copy of the document.

The abstracts for the most part are descriptive only and do not contain results. However, in the future results will be included. It was simply too great a task to go back and re-abstract documents for this bibliography. The letter codes found at the end of the abstract, the T, I, G, and R designations indicate that the document contains: T-tables, I-illustrations, G-graphs, and R-references (e.g., R-7 means that 7 references were cited). A list of abbreviations used in the abstracts is given on the next page.

The documents cited are not available from Tufts University, but are held in repository at HEIAS and may be examined on the project's premises.

KEY TO ABBREVIATIONS

a.c.	alternating current	g	acceleration of normal pull of gravity
AD	average deviation	G	gravitational force acting upon an object
AFSET	Armed Forces General Classification Test	GCA	Ground Control Approach
AGCT	Army General Classification Test	GSR	galvanic skin response
AL	adaptation level		
amp.	ampere	Hg	mercury
ANIP	Army-Navy Instrument Program		
AP	action potentials	i	intensity
AR	acoustic reflex	IBM	International Business Machine
AVID	Advanced Visual Information Display	i.e.	that is
		ILS	Instrument Landing System
bit	unit of information	in.	inch
BMR	basal metabolic rate	IQ	Intelligence Quotient
C	centigrade	j n.d.	just noticeable difference
ca	about or approximately		
cc	cubic centimeter	kc	kilocycle
CCC	Coast Control Center	kg	kilogram
cff	critical flicker frequency	KR	knowledge of results
CIC	Combat Information Center		
clo	measure of protective value of fabrics	L	lambert
cm	centimeter	LL	loudness level
CNS	central nervous system	lb.	pound
CO	carbon monoxide		
CO ₂	carbon dioxide	m	meter
cpm	cycles per minute	M	mean
cps	cycles per second	ma	milliampere
CR	critical ratio	Mc	megacycle
CRT	cathode ray tube	Mdn	median
cu. ft.	cubic foot	mg	milligram
		mi.	mile
db	decibel	min.	minute
d.c.	direct current	ML	millilambert
df	degrees of freedom	mm	millimeter
DL	difference limen	MOS	Military Occupational Specialty
		mph	miles per hour
E, Es.	experimenter, experimenters	msec.	millisecond
EEG	electroencephalogram	mu	micron
e.g.	for example	μsec.	microsecond
EKG or ECG	electrocardiogram		
EMG	electromyogram	N	number of
ERG	electroretinogram	°	degree
et. al.	and others	O	observer
etc.	and so forth	O ₂	oxygen
Exp.	experiment	OCS	Officers' Candidates School
		OR	Operations Research
f	frequency		
F	fahrenheit, F-ratio	p	probability level
ft.	foot	PB	phonetically balanced
ft-c	foot-candle	PERT	Program Evaluation and Review Technique
ft-L	foot-lambert	PCR	psychogalvanic skin response
ft-lbs	foot-pounds	PI	photo interpretation
ft/sec	feet per second	PPI	Planned Position Indicator
		pps	pulses per second
		psi	pounds square inch

ABBREVIATIONS

PSS	Personnel Subsystem concept (USAF)	t	t-test
PEB	Personnel and Equipment Data file	TTS	temporary threshold shift
HE	verifying Human Engineering design Standards	vs.	versus
QCPBI	Qualitative and Quantitative Personnel Requirements Information	VTOL	Vertical Takeoff and Landing Aircraft
PSTE	Personnel Subsystem Test and Evaluation		
TC	Training concepts		
TEG	Training Equipment Development program		
TEPI	Training Equipment Planning information		
TOM	Technical Orders and Manuals		
TP	Training Plans		
r	roentgen, correlation coefficient	χ^2	chi square
rad	absorbed dose of radiation	%	per cent
REM	Roentgen equivalent in man	>	more than
RBE	relative biological effectiveness	<	less than
ROTC	Reserve Officers Training Corps	=	equal
rpm	revolutions per minute	ΔI	change in intensity
RT	reaction time	μ	micron
		σ^2	variance
S, Ss	subject, subjects		
SAGE	Semi Automatic Ground Environment		
SD	standard deviation		
SDT	signal detection theory		
sec.	second		
S/N	signal-to-noise ratio		
SPL	sound pressure level		
S-R	stimulus-response		
SUBIC	Submarine Integrated Control		

Symbols:

INDEX TO THE HUMAN FACTORS ENGINEERING LITERATURE

A

- Ability Testing--see Tests and Testing (proficiency)
- Absolute Judgments--see Coding; for method see Psychophysics
- Absolute Pitch--see Audition (pitch)
- Acceleration and Deceleration--see Motion, Effects of
- Acceptability of Equipment and Tasks--see Individual Factors, etc.
- Accessibility--see Work Place Design; also Maintenance (design for)
- Accidents--see Safety
- Acclimatization--see Environmental Conditions and Effects; also Physiological Capacities
- Accommodation and Convergence--see Visual
- Accuracy of Movement--see Motor Performance
- Acoustic
- design--see also Ambient Noise (reduction and control)
 - engineering--see design, above
 - measurement--see Ambient Noise (measurement of)
 - reflex--see Audition (aftereffects)
 - shielding--see Ambient Noise (reduction and control)
- Action Potential--see Physiological Capacities (muscle potential)
- Activity Analysis--see Methods and Techniques, etc.
- Acuity
- auditory--see Audition (thresholds)
 - sensory, other--see specific sensory categories
 - visual--see Visual (acuity)
- Adaptation
- auditory--see Audition (aftereffects of stimulation)
 - perceptual--see Perception (general)
 - theory--see Perception (theory)
 - visual--see Visual (adaptation)
- Adjustment, Method of--see Psychophysics (methods)
- Aerial Observations--see Visual (search and detection)
- A-Frames--see Packs and Carriers
- After Images--visual, see Visual (aftereffects, afterimages); Audition (aftereffects)
- Aging, Effects of
- audition
 - general references
 - motor performance
 - vision
 - work capacity
- Aiding--see Tracking
- Aiming--see Motor Performance
- Air Conditioning--see Work Place Design (atmospheric control)
- Air Crews--see Groups
- Air Reconnaissance--see Visual (search and detection)
- Air Sickness--see Motion, Effects of
- Air Traffic Control Systems
- communication and information flow--see also Language Design (control tower; Speech)
 - control problems
 - equipment (displays, etc.)
 - general references
 - layout and workplace design
 - operator variables
 - traffic flow
 - training and simulation
- Airblast--see Environmental Conditions and Effects (windblast, airblast, windchill)
- Airborne Equipment--see Aircraft (related equipment)

Aircraft

accidents--see Safety
collision--see Safety
communication systems--see Speech (communication systems)
controls--see Controls
design--see also Helicopters; VTOL, STOL
general references
instrument panel arrangement--see Panel and Console Design
landing and landing systems--see also Carrier Approach Light System
lighting, exterior
lighting, interior--see Work Place Design (illumination)
noise--see Ambient Noise (noise levels)
related equipment
visibility and recognition--see Visual (search and detection)

Airfield Lighting--see Lighting Systems (outdoors)

Airspeed Indicators--see Displays

Alarms and Auditory Warning Devices--see Auditory; (displays)

Alcohol--see Drugs

Alertness--see Individual Factors, etc.

Allocation of Functions--see Assignment of Function

Alphanumeric Displays--see Radar; also Displays (types)

Altimeters--see Displays

Altitude Chamber--see Environmental Conditions and Effects (equipment and methods)

Altitude, Effects of--see Environmental Conditions and Effects

Ambient Noise

accidents--see effects on performance, below
composition--see measurement
control--see reduction and control, below
criteria for buildings--see reduction and control, below; also Acoustic (design)
deafness--see hearing loss, below
effects on performance (includes industrial efficiency)
general references
hearing loss--see also Audition (aftereffects)
injury--see hearing loss, above
level of
 aircraft
 airport
 background, general
 equipment, general
 industrial environments
 office
 rockets, missiles
 submarines and ships
 vehicle (motor)
 weapons
measurement of (e.g., spectral analysis, critical band analysis)
reduction and control
 acoustic shielding
 general references
 hearing conservation program
 noise reducing devices and systems
 personal equipment (e.g., earplugs)--see Auditory devices
 standards of tolerance and annoyance
speech interference level--see Speech (masking)
variable level--see reduction and control, above

Amplifiers--see Auditory (equipment)

Anchoring Effects--see Perception (general); also Psychophysics (methods)

Anechoic Chambers--see Audition (equipment and methods)

Angle, Perception of--see Visual (perception)

Ankle Dimensions--see Anthropometric Measures

Anomalies

auditory--see Audition

sensory, other--see the specific sensory categories

visual--see Visual

Anoxia--see Environmental Conditions and Effects (oxygen requirements)

Anthropometric Measures

arm and leg dimensions

biomechanical analysis

body density

body size and dimensions

centers of gravity

equipment and methods

extent and flexibility of limb movement

general references

hand and foot dimensions

head dimensions

locomotion

muscular strength and endurance

posture

somatotyping

space requirements

Anti-g-Suits--see Clothing (high altitude)

Anxiety--see Individual Factors, etc. (emotion)

Anxiety, Tests of--see Tests and Testing (personality)

Aptitude--see Individual Factors, etc.

Aptitude Testing--see Tests and Testing

Aqua Lung--see Underwater (breathing apparatus)

Arctic Climate Clothing--see Clothing (arctic ensembles)

Arm

dimensions--see Anthropometric Measures

movement--see Anthropometric Measures; also Motor Performance

strength--see Anthropometric Measures (muscular strength and endurance)

Armored Vehicle--see Vehicles

Armored Vests--see Clothing (body armor)

Articulation Testing--see Speech; Communications Systems (evaluation)

Artificial Intelligence (biosimulation)

Artificial Limbs--see Prosthetics

Asbestos Suits--see Clothing (thermal protection)

Aspiration, Level of--see Individual Factors, etc. (Motivation)

Assignment of Function to Men and Machines in Systems

Assignment of Personnel--see Personnel

Atmosphere--see Environmental Conditions and Effects; also Work Place Design

Attention--see Individual Factors, etc.

Attention Span--see Individual Factors, etc. (attention)

Attenuators--see Auditory (equipment)

Attitude Indicators--see Displays

Attitude Toward Task--see Individual Factors, etc. (acceptability, etc.)

Audible Phrases--see Language Design

Audiogenic Effects--see Orientation in Space, Factors Determining; also Perception (illusions)

Audiometry--see Speech; also Audition (equipment and methods)

Audio-Visual Aids--see Training Aids and Devices

Audio-Visual Interaction--see Sensory (interaction)

Audio-Visual Monitoring--see Sensory (comparison); Vigilance and Monitoring (sharing)

Audio-Warning Devices--see Auditory (displays); also Warning Devices

Audition

aftereffects of stimulation (e.g., acoustic reflex, fatigue, pitch shifts, time errors, etc.)

aging--see Aging; also Auditory (norms)

Audition (cont'd)

anomalies and individual differences

auditory patterns and meaning (e.g., flutter discrimination, melodic and temporal)

binaural vs. monaural stimulation

equipment and methods (e.g., anechoic chambers, audiometric devices, communication simulators, techniques of audiometry)

general references:

norms

physiological mechanisms

psychophysical scales (e.g., mel scale, sone scale)

recruitment

repetitive stimulation

sound localization

standards and specification

stimulus characteristics

frequency and pitch

intensity and loudness

other (e.g., brightness, duration, timbre, vocality)

stimulus mixture (e.g., harmonics, beats, combination tones, modulations)

threshold

training, non-verbal--see Training

Auditory

acuity--see Audition (thresholds)

adaptation--see Audition (aftereffects)

detection--see skills, below

devices

ear defenders (e.g., plugs, pads, etc.)

enhancement devices (e.g., hearing aids, guidance for blind, etc.)

displays; non-verbal (for systems utilizing verbal communication--see Speech/communication systems)

flight guidance systems (flybar)

intermittent warning and signaling devices (e.g., sirens, bells, radio range)

multi-channel

sonar and other underwater sound systems

telegraphic systems

equipment

input devices (e.g., microphones, vibration pickups)

output devices (e.g., earphones, loudspeaker)

transmission devices (e.g., amplifiers, attenuators, frequency modulators, scramblers)

fatigue--see Audition (aftereffects)

feedback--see signals, below

flight guidance systems--see displays, above

localization--see Audition (sound localization)

masking (for speech masking--see Speech)

noise--see Ambient Noise

numerosity--see signals, below

patterns--see Audition

reaction time

search--see skills, below

signals

channel capacity for

characteristics of (general)

coding

detection--see skills, below

feedback

to-noise ratio

skills

discrimination

monitoring

search and detection

Auditory (cont'd)

skills (cont'd)

sonar listening

tracking--see Tracking

training--see Training (specific types)

vs. visual presentation--see Sensory Comparison

Aural Harmonics--see Audition (stimulus mixture)

Aural Reading Devices--see Auditory (devices)

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Autokinetic Effects--see Visual (perception)

Automatic

checkout systems

control systems--see Controls

learning devices--see Training Aids and Devices

maintenance--see Maintenance

Automation (general)

Automobiles--see Vehicle

Automobile Accidents--see Safety

Automobile Design--see Vehicle

Aviation Medicine--see Environmental Conditions and Effects (general references)

B

Backlighting--see Instrument Lighting (rear)

Back Rests--see Seats and Seating

Ballistic Vests--see Clothing (body armor)

Band Compression Speech--see Speech (distortion)

Barometric Pressure--see Environmental Conditions and Effects (atmospheric pressure)

Basic Training--see Training (specific types)

Beacon Lights--see Warning and Signal Lights

Bearing Information Aids--see Radar and other CRT Displays

Beats--see Audition (stimulus mixture)

Bells--see Auditory (displays)

Belts, Harnesses and other Restraining Devices--see also Clothing (belting)

Bends--see Environmental Conditions and Effects (atmospheric pressure)

Betting Behavior--see Subjective Probability

Bibliographies--see General and Comprehensive References; also bibliographies are included
in general references under major topics

Binaural Discrimination--see Audition (binaural vs. monaural)

Binaural Stimulation--see Audition

Binocular Disparity--see Visual, perception (depth)

Binocular Field--see Visual (field)

Binoculars--see Optical Aids

Biodynamics--see also Anthropometric Measures; Motor Performance

Bioelectric Methods and Equipment--see Physiological Equipment and Methods

Bio-Instrumentation--see Physiological Equipment and Methods

Bio-kinetic Analysis--see Motor Performance and Skills (equipment and methods)

Biomechanical Analysis--see Anthropometric Measures

Bionics

Biosimulation--see Artificial Intelligence

Bisectioning Movements--see Motor Performance (positioning movements)

Black Light--see Light (special types)

Blackout--see Motion, Effects of (acceleration and deceleration, tolerance for)

Blindness--see Visual (anomalies, etc.)

Blindness, Flash--see Flash

Blinking--see Motor Performance (involuntary reflexes)

Blinking Signal Lights--see Warning and Signal Lights; also Flash (rate)

Blink Rate--see Flash; also Motor Performance and Skills (involuntary reflexes)

Body

armor--see Clothing
build--see Anthropometric Measures
density--see Anthropometric Measures
movement, perception of--see Perception
size and dimensions--see Anthropometric Measures
supports--see Belts, Harnesses, and other Restraining Devices
temperature--see Physiological Capacities
Bone Conduction, Audition--see Audition (physiological mechanisms)
Books in Human Factors Engineering--see General and Comprehensive References
Boredom--see Individual Factors, etc. (motivation)
Braille Systems--see Tactile Coding
Breathing Capacity--see Physiological Capacities
Breathing Devices and Equipment--see also Masks; also Underwater
Brightness
 comfort relation--see Visual (comfort and fatigue)
 discrimination--see Visual (brightness discrimination)
 sky--see Light (natural)
Broad Band Blue Illumination--see Light (special types)
Buffeting--see Vibration (whole body)

C

Cabs, Trucks--see Vehicle
Caffeine, Effects of--see Drugs
Caloric Intake--see Diet, Food and Nutrition
Calorimetry--see Physiological Equipment and Methods (metabolic measurement)
Camouflage or Concealment
Cardio Vascular Indices--see Physiological Capacities
Cards, Design of (e.g., data processing cards, E-Z Sort, etc.)
Cargo Handling Systems--see Supply Systems
Carrier Approach Light Systems--see Aircraft (landing and landing systems); also Lighting Systems (airfields)
Carriers--see Packs and Carriers
Cathode-Ray-Tube Display--see Radar and other CRT Displays
Centers of Gravity--see Anthropometric Measures
Centrifuge--see Motion, Effects of (equipment and methods)
Channel Capacity--see Auditory (signals); Visual; Sensory (comparison)
Characters, Symbols, Design of--see Numerals, Letters, and Characters, Design of
Charts, Design of--see Maps and Charts
Check Lists--see Job Performance Aids
Chest Measurement--see Anthropometric Measures
Choice Behavior--see Individual Factors, etc. (thought processes)
Chopping--see Speech (distortion)
Chronophotography--see Motor Performance (equipment and methods)
Cinematography--see Motor Performance (equipment and methods)
Click-Pitch Threshold--see Audition (pitch) and Auditory (signals)
Climatic Chamber--see Environmental Conditions and Effects (equipment and methods)
Clipping--see Speech (distortion)
Clothing
 Arctic ensembles and cold weather
 belting
 body armor
 equipment and methods
 fabrics
 fasteners
 flight
 footgear

Clothing (cont'd)

general references

handgear

headgear

high altitude and anti-g

noxious agents, protection (e.g., rocket fuel, liquid oxygen, etc.)

radiation protection

restrictive effects of

sizing, techniques of measurement

space suits

tests of--see equipment and methods, above

thermal protection

tropical ensemble

underwater ensemble--see Underwater

Cochlear Response--see Audition (physiological mechanisms)

Cockpit Lighting--see Work Place Design (illumination)

Cockpits--see Aircraft, Design of

Coding

auditory signals--see Auditory (signals)

controls--see Controls

lights--see Lights

tactile--see Tactile

visual--see Visual

Cognitive Processes--see Individual Factors, etc. (thought processes)

Cold Environments--see Environmental Conditions and Effects

Cold Weather Protective Clothing--see Clothing

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Color--see also Vision (color vision)

coding--see also Lights

filters--see Vision (equipment and methods); Optical Aids

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phenomena--see Vision (color vision)

preference--see Vision (color vision)

smokes--see Signaling Systems

systems (e.g., abridged systems, international XYZ system, etc.)--see Vision (standards)

Colorimetry--see Vision (equipment and methods)

Combat Information Centers, CIC--see Command and Control Systems

Combination Tones--see Audition (stimulus mixture)

Comfort--see also Seats and Seating

Command and Control Systems

Communication and Information Theory

general

information assessment and processing

redundancy, uncertainty

Communication Systems

general

group--see Groups

nonverbal--see Auditory (display); Tactile Coding

speech--see Speech

techniques for evaluation

Comparison of Sensory Channels--see Sensory Comparisons

Compatibility, Stimulus-Response--see Sensory (general); also Control-Display Dynamics

Compensatory Tracking--see Tracking

Complex Tones--see Audition (stimulus mixture)

Complexity of Work or Task--see Work and Task Performance

Compression and Expansion, Speech--see Speech (distortion)

Computers

data processing systems

design

general

man interaction

models and programs

simulation

systems component

Concept Formation--see Individual Factors, etc. (thought processes); Training (basic learning data)

Confinement--see Prolonged Confinement

Console Design--see Panel and Console design

Constant Error--see Mathematical and Statistical Techniques

Constant Stimuli--see Psychophysics (methods)

Contact Analog Displays--see Displays (other)

Containers and Packaging

Contaminated Environments--see Environmental Conditions and Effects

Controls

adjustments--see setting, precision, etc.

aided--see Tracking

aircraft controls

automatic

backlash, deadspace, and response lag

coding

combined (e.g., pushbutton on stick, ganged controls)

comparison of types

eye (as control mechanism)

force to activate

general references

handgrips and handles

industrial (e.g., on machinery or equipment)

labelling--see Labels, Design of

linear movement

levers and sticks

pedals and rudder bars

push buttons and toggle switches

loading--see resistance, below

location and positioning

multiple-axis

remote handling

resistance (damping, inertia, friction, torque, etc.)

rotary movement

cranks and wheels

knobs

sensitivity and amplification--see Control-Display Dynamics (movement ratio)

setting, precision

ship and submarine controls

three-axis--see multiple-axis, above

vehicle controls, (e.g., automobiles, tanks, etc.)

Control-Display Dynamics

compatibility and motion stereotype

feedback--see Tracking

general

integration

movement ratios

quickening--see also Tracking.

Controller, Human--see Human (controller)

Control Tower
 design of workspace--see Air Traffic Control Systems
 language--see Language Design
 speech--see Speech (communication systems)
 systems--see Air Traffic Control Systems
 Convergence (of eyes)--see Visual (accommodation and convergence)
 Correlation Techniques--see Mathematical and Statistical Methods
 Cost Effectiveness Analysis--see Systems (techniques of analysis)
 Counters--see Displays (digital)
 Crane Cabs--see Industrial Equipment, Design of; also Controls (industrial)
 Cranking Movement--see Motor Performance (repetitive movement)
 Cranks--see Controls (rotary)
 Crash Impact and Survival--see Safety
 Creativity--see Individual Factors, etc. (thought processes)
 Crews--see Groups
 Critical
 band analysis--see Ambient Noise (measurement of); Speech
 flicker frequency--see Flicker
 incident technique--see Methods and Techniques, etc.
 Cross Modality Matching--see Psychophysics (methods); also Sensory (interaction)
 CRT Displays--see Radar and other CRT Displays
 Cursors--see Radar and other CRT Displays (range and bearing scales)
 Cushions--see Seats and Seating
 Cutaneous Communication Systems--see Tactile Coding
 Cutaneous Sense--see Touch
Cybernetics

D

Damping--see Ambient Noise (reduction and control); Controls (resistance)
 Dark Adaptation--see Visual (adaptation)
 Data
 analysis--see Mathematical and Statistical Methods
 presentation--see Mathematical and Statistical Methods; also Printed Material, etc.
 processing systems--see Computers
 Daylight--see Light (natural)
 Dazzle--see Flash
 Deafness--see Ambient Noise (hearing loss)
 Deceleration--see Motion, Effects of (acceleration and deceleration)
 Decibel Loss--see Ambient Noise (hearing loss); Audition (aftereffects of stimulation)
 Decision Analysis--see Method and Techniques, etc., also Game and Decision Theory
 Decision-Making--see Individual Factors, etc. (thought processes)
 Decision Theory--see Game and Decisions Theory
 Decompression Sickness--see Environmental Conditions and Effects (decompression)
 Density of Tones--see Audition
 Depth Perception--see Visual (perception of)
 Desert--see Environmental Conditions and Effects (hot); also Clothing
 Detection, Auditory--see Auditory (skills)
Detection Theory
 Detection, Visual--see Visual (search and detection)
 Dial and Scale Design--see Displays
 Dial Setting--see Motor Performance
Diet, Food and Nutrition
 Difference and Summation Tones--see Audition (stimulus mixture)
 Digital Displays--see Displays (other)
 Dimensions
 body--see Anthropometric Measures
 furniture--see Furniture Design
 work place--see Work Place Design

Discriminability Scaling--see Psychophysics
Display-Control Dynamics--see Control-Display Dynamics

Displays

dial and scale design

general references

location--see Panel and Console Design

pointer design

richened--see Control-Display Dynamics

reading and interpretation problems

size

type

airspeed indicators

altimeters

attitude indicators

combined displays (integrated)

comparison of types (e.g., outside-in vs. inside-out)

heading indicators

indicator and warning

integrated displays--see combined displays, above

large displays (for viewing by more than one person, e.g., plot boards)

other (e.g., digital, kinalog, matrix, etc.)

polar coordinate

radar--see Radar and other CRT Displays

television--see Television

Disorientation--see Orientation in Space

Distance Perception--see Visual (perception of)

Distorted Vision--see Visual (field)

Diurnal Cycles

Doors and Doorways--see Work Place Design (passageways)

Door Handles--see Controls

Doppler Displays--see Auditory (displays)

Driving

analysis of

performance and skills

safety--see Safety

Drugs

Dummy and Manikin Design

Dye Markers--see Signaling Systems, Visual

Dynamic Acuity--see Visual (acuity)

E

Ear

damage--see Ambient Noise (injury)

defenders--see Auditory (devices)

muffs--see Auditory (devices)

plugs--see Auditory (devices)

protectors--see Auditory (devices)

EEG--see Physiological Methods and Equipment (electroencephalograph)

Ego-Involvement--see Individual Factors, etc. (motivation)

Ejection Capsule

Ejection Seats--see Seats (ejection)

Elastic Resistance--see Controls (resistance)

Electrical Coding--see Tactile Coding

Electrocardiogram--see Physiological Methods and Equipment

Electrodes--see Physiological Methods and Equipment

Electroencephalograph--see Physiological Methods and Equipment

Electroluminescence--see Instrument Lighting
 Electromyography--see Physiological Methods and Equipment
 Electroretinogram--see Physiological Methods and Equipment
 Emergency Lights--see Warning and Signal Lights
 Emotion--see Individual Factors, etc.
 Empty Field Myopia--see Visual (unusual environments)
 Energy Expenditure--see Physiological Capacities
 Engine Mufflers--see Ambient Noise (reduction and control)
 Engine Noise--see Ambient Noise
 Entrances--see Work Place Design (passageways)
Environmental Conditions and Effects
 air conditioning--see Work Place Design (atmospheric control)
 air velocity
 atmospheric pressure (high altitude)
 climatic chamber--see equipment and methods, below
 cold
 decompression
 equipment and methods used in study of
 evaporative cooling
 general references
 heating
 hot (includes both desert and tropical environments)
 humidity
 ionized air
 oxygen requirements
 radiation
 temperature
 thermal radiation
 tolerance, adaptation, acclimatization
 altitude and pressure
 cold
 heat
 toxic environments
 ventilation
 water--see also Underwater
 windblast, airblast, windchill
Equipment
 arrangement--see Work Place Design
 design and evaluation (includes equipment not covered elsewhere, e.g., electronic equipment)
 noise--see Ambient Noise
Equipment Used in Human Factors Research (general)
 Ergometer--see Equipment Used in Human Factors Research
Error
 analysis--see Mathematical and Statistical Methods
 equipment
 human
Escape from
 aircraft--see also Ejection
 other places
 submarines
Exercise and Performance
 Exits and Entrances--see Workplace Design (passageways)
 Expanders and Limiters--see Auditory (equipment)
 Experimental Method--see Research Techniques in Human Factors Engineering
 Explosive Decompression--see Environmental Conditions and Effects (decompression)
 Exponential Lag--see Controls (backlash)

Exposure Time

auditory effects--see Audition (duration); Audi (signals)
visual performance--see Vision (signal characteristic)

Eye

blink--see Motor Performance (involuntary reflexes)
as Control Mechanism--see Controls (eye)

dominance

fixation--see Panel and Console Design (spatial dynamics); Printed Material, etc.

movement

F

Face-to-Face Communication--see Speech (communication)

Face Masks--see Masks

Facial Measurements--see Anthropometric Measures

Facilitation of Reception--see Sensory (interaction)

Facilities (Human Engineering)

Factor Analysis--see Mathematical and Statistical Methods

Factory Lighting--see Work Place Design (illumination)

Fallout, Radioactive--see Environmental Conditions and Effects (radiation)

Fatigue--see Work and Task Performance; also Auditory (aftereffects); Visual (comfort and fatigue); Exercise and Performance

Fear--see Individual Factors, etc. (emotion)

Feedback

delayed auditory--see Auditory (signals)

delayed speech--see Speech (distortion)

sensory feedback--see Sensory (feedback)

theory--see Cybernetics

tracking--see Tracking (feedback)

Field of View, Work Place--see Work Place Design (visibility)

Figural Aftereffects--see Visual (aftereffects)

Films

display use

general, human factors--see General and Comprehensive References, etc.

research, use in--see Research Techniques, etc.

training--see Training Aids and Devices

Filters

auditory--see Auditory (equipment)

optical--see Vision (equipment and methods); Optical Aids

Fire Fighting

clothing--see Clothing (thermal protection)

equipment--see also Vehicle

Fitness, Physical--see Physical Fitness

Fixtures, Lighting--see Work Place Design (illumination)

Flares--see Lighting Systems (outdoors); also Warning and Signal Lights

Flash

blindness

rate

visibility

Flesch Reading Ease Formulas--see Printed Material, etc. (readability, assessment of)

Flexibility of Movement--see Anthropometric Measures

Flicker

Flight

control systems--see Controls

guidance systems

performance and skills

simulation (includes spaceflight)

testing

training--see Training (specific types)

Floodlights--see Lighting Systems (outdoors)
 Flow Analysis--see Methods and Techniques, etc.; also Work Place Design
 Flow Process Chart--see Methods and Techniques, etc.
Fluorescent and Luminous Materials
 Flutter--see Audition (auditory pattern)
 Flybar--see Auditory (displays)
Fog, Haze, Smog and Smoke
 Food--see Diet, Food, and Nutrition
 Food containers--see Containers and Packaging
 Foot
 dimensions--see Anthropometric Measures
 gear--see Clothing
 Form Perception--see Visual (perception of)
 Free Fall--see Motion, Effects of (acceleration and deceleration/types of)
 Frequency
 distortion--see Speech (distortion)
 modulators--see Auditory (equipment, transmission devices)
 sensitivity to--see Audition (pitch)
 Frictional Resistance--see Controls (resistance)
 Frostbite--see Environmental Conditions and Effects (temperature)
 Function Analysis--see Methods and Techniques, etc.
Furniture Design--see also Seats and Seating

G

G Forces--see Motion, Effects of (acceleration and deceleration)
 Gain--see Control-Display Dynamics (movement ratio)
 Galvanic Skin Response--see Physiological Capacities
 Galvanometer--see Physiological Equipment and Methods
Game or Decision Theory
 Ganzfeld--see Vision (effects of unusual environments)
 Gases--see Environmental Conditions and Effects (toxic environments)
 Gas Masks--see Masks
General and Comprehensive References in Human Factors Engineering
 articles and reports
 bibliographies
 books
 films
 handbooks
 symposia and conferences
 Glare--see Visual (comfort and fatigue); Light (physical characteristics)
 Glasses--see Optical Aids
 Gloves--see Clothing (handgear)
Graphs and Tables, Design of
 Gravitational Forces--see Motion, Effects of (acceleration and deceleration)
 Gravity, Centers of--see Anthropometric Measures
 Grenades--see Weapons (handheld)
 Grips--see Controls
 Grip Strength--see Anthropometric Measures (muscular strength)
Ground Support Equipment
Groups
 air crews
 communication
 effectiveness
 evaluation
 general references
 infantry squads
 interaction

Groups (cont'd)

leadership

missile crews

morale

problem solving

productivity

research techniques

selection

ship and submarine crews

size

space crews

structure

tank crews

theory

training--see Training

Grouping of Components--see Panel and Console Design

Gunnery Training--see Training (specific programs)

Gust scale--see Smell and Taste

Gustation--see Smell and Taste

H

Hand

dimensions--see Anthropometric Measures

grips--see Controls

signals--see Signaling Systems, Visual

strength--see Anthropometric Measures

tools, design of--see Tools, Design of

wheels--see Controls

Handbooks--see General and Comprehensive References

Handbooks, Manuals, Texts, Design of

Handedness--see Motor Performance

Hand grenades--see Weapons (handheld)

Handles--see Controls

Handgear--see Clothing (handgear)

Hats--see Clothing (headgear)

Headphones--see Auditory (equipment, output devices)

Head Size--see Anthropometric Measures

Hearing

aids--see Auditory (devices)

conservation program--see Ambient Noise (reduction and control)

general--see Audition; Auditory

loss--see Ambient Noise; also Speech (audiometric testing)

Heart Rate--see Physiological Capacities

Heat--see Environmental Conditions and Effects

Heat Loss--see Physiological Capacities (temperature)

Heated Suits--see Clothing (thermal protection)

Heating--see Environmental Conditions and Effects

Helicopters

Helmets--see Clothing (headgear)

High Altitude--see Environmental Conditions and Effects

Highly Audible Phrases--see Language Design

Highway Lighting--see Lighting Systems (outdoors)

Highway Research--see also Traffic

Hot Weather Clothing--see Clothing (hot weather)

Hot Weather Environments--see Environmental Conditions and Effects

Houses, Dwellings and Shelters, Design of

Hue--see Vision (color vision)

Human

controller--general discussion of man as a control mechanism

error--see Error

information processing capabilities (includes reception and transmission)

transfer functions

Human Factors Engineering--see General and Comprehensive References

Humidity--see Environmental Conditions and Effects

Hyperopia--see Visual (anomalies)

Hypodynamics--see Sensory (deprivation)

Hypoxia--see Environmental Conditions and Effects (oxygen requirements)

I

ICAO Phonetic Alphabet--see Language Design

Ideal Observer--see Detection Theory; also Psychophysics (theory)

Illumination--see Light; Lighting Systems; Vision; Visual; Work Place Design; Instrument Lighting

Illusions, Perceptual--see Perception (illusions)

Image Interpretation, Photography--see Photographs, Photography and Photointerpretation

Immersion Suits--see Underwater (clothing)

Impaired Hearing--see Ambient Noise (hearing loss)

Incentives--see Individual Factors, etc. (motivation)

Indicator and Warning Lights--see Displays; also Warning and Signal Lights

Indicators and Scales--see Displays (dial and scale design)

Individual Factors Affecting Performance

acceptability of and attitude toward equipment and tasks

alertness

aptitude and intelligence

attention

emotion

fatigue and behavior decrement--see Work and Task Performance

general

motivation and morale

personality

retention--see Retention

set

thought processes

vigilance--see Vigilance

Industrial

deafness--see Ambient Noise (hearing loss)

equipment, design of

noise--see Ambient Noise

Industry and Business, Human Factors Oriented Studies--see also Work and Task Performance

Inertial Resistance--see Controls (resistance)

Infantry

squads--see Groups

training--see Training (specific types)

Information

analysis--see Communication and Information Theory; also Speech (basic characteristics)

processing, human--see Human

reception, human--see Human

storage and retrieval systems

theory--see Communication and Information Theory

transmission, human--see Human

infrared Devices--see Light (special types)

Inhibition of Reception--see Sensory (interaction)

Injuries, Analysis of--see Safety

Input Channel, Comparison--see Sensory (comparison)

Input Channel, Interaction--see Sensory (interaction)

Instructions, Effects on Task Performance--see Individual Factors, etc. (set);
also Training (basic learning data)

Instrument Lighting

color and intensity of illumination

direct lighting and floodlighting

edge and ring

electroluminescent

general

rear (transillumination)

Integrated Display Panels--see Displays; Control-Display Dynamics

Intelligence--see Individual Factors, etc.

Intelligence Testing--see Tests and Testing (intelligence)

Intelligibility--see Speech

Interaural Phase Cues--see Audition (sound localization)

Intercom Systems--see Speech (communication systems)

International Language--see Language Design

Intersensory Effects--see Sensory (interaction)

Interval Scaling--see Psychophysics (scaling)

Interview Technique--see Method and Techniques, etc.

Involuntary Reflexes--see Motor Performance

Ionized Air--see Environmental Conditions and Effects

Irradiation, Cosmic and Nuclear--see Environmental Conditions and Effects (radiation)

Isolation--see Sensory Deprivation

J

Job Description and Analysis--see Methods and Techniques, etc.

Job Performance Aids

Judgment--see Individual Factors, etc. (thought processes)

Judgment, Psychophysical--see Psychophysics (methods)

K

Keyboard Design--see Panel and Console Design

Kinesiology--see Anthropometric Measures (equipment and methods, biomechanical analysis)

Kinesthesia

coding

general references and basic data

Knapsacks--see Packs and Carriers

Knobs--see Controls (Rotary)

Knobs, Setting Accuracy--see Motor Performance and Skills (positioning movement)

Knowledge of Results--see Training (basic data)

L

Labels, Design of

Landing Systems--see Aircraft (landing systems)

Language Design (includes special alphabets and languages, context, synthetic speech and equipment)--see also Speech

Lateral G--see Motion (acceleration and deceleration)

Layout, Panels and Consoles--see Panel and Console Design

Leadership--see Group

Learning--see Training

Legibility--see Numerals, Letters, and Characters, Design of; also Signs, Design of; Printed Materials, etc.

Leg Measurement--see Anthropometric Measures

Lenses--see Optical Aids

Letter Design--see Numerals, Letters, and Characters, Design of

Levers--see Controls (linear)

Life Jackets

Life Support Systems--see Space Systems

Lifting--see Anthropometric Measures (muscular strength and endurance)

Light

adaptation--see Visual (adaptation)

coding--see also Warning and Signal Lights; Aircraft (lighting); Ship (lighting)

colored

general

low level--see Vision (low level illumination)

measurement and specification--see also Vision (equipment and methods)

natural (i.e., daylight, high altitude, sky brightness, etc.)

physical characteristics

signal--see Warning and Signal Lights

special types (i.e., black, broad band blue, infrared, polarized, ultraviolet)

Lighting Systems

indoors--see Work Place Design (illumination)

instrument--see Instrument Lighting

outdoors

airfields

flares

floodlights and searchlights

general

highway and street

workplace--see Work Place Design (illumination)

Limb Coordination--see Motor Performance

Limb, Flexibility--see Anthropometric Measures

Linearity of Human Operator--see Human (transfer function)

Linguistic Context--see Language Design

Linguistics--see Speech (basic characteristics)

Link Analysis--see Methods and Techniques, etc.

Listening, to speech--see Speech (perception)

Load Carrying--see Anthropometric Measures (muscular strength); also Work and Task Performance (capacity)

Load Stress--see Work and Task Performance

Localization, Auditory--see Audition (sound localization)

Loudness--see Audition (stimulus characteristics)

adaptation--see Audition (aftereffects)

binaural vs. monaural--see Audition (binaural vs. monaural)

coding--see Auditory (signals)

level discrimination--see Audition (stimulus characteristics)

recruitment phenomena--see Audition (recruitment)

scales--see Audition (psychophysical scales)

summation--see Audition (stimulus characteristics)

Loudspeakers--see Auditory (equipment)

Low Level, High Speed Flight

Low Level Illumination--see Vision

Luminosity Curves--see Visual (thresholds)

M

Machine Noise--see Ambient Noise

Machine Translation--see Translating Devices

Magnitude Estimation--see Psychophysics (methods)

Maintenance (maintainability)

behavior, strategies

design for

diagrams--see Job Performance Aids

equipment, used in

Maintenance (maintainability) (cont'd)

general references

systems

training--see Training (specific types)

Man-Assist

Man vs. Machines--see Assignment of Function to Man and Machines

Management--see Systems Design

Mannikin Design--see Dummy and Mannikin Design

Manuals, Design of

Manual Controls--see Controls

Manual Dexterity--see Motor Performance

Maps and Charts, Design of

Marksmanship--see also Training (specific types, gunnery and marksmanship)

Masking

auditory--see Auditory; also Speech

odor--see Smell and Taste

visual--see Visual (masking and interference)

Masks

Master Slave Manipulator--see Controls (remote)

Mathematical Models--see Mathematical and Statistical Methods

Mathematical and Statistical Methods

Melodic Patterns--see Audition (auditory patterns)

Mel Scale--see Friction (psychophysical scaling)

Memory--see Retention

Message Transmission--see Communications Systems; also Speech

Metabolic Rate--see Physiological Capacities

Methods and Techniques for Study and Analysis of Tasks, Operations, and Systems

critical incident technique

decision analysis

experimental methods--see Research Techniques

general references

job and task description and analysis

operations research

other methods

photographic techniques

queueing

system analysis--see System Design (techniques of analysis)

task description and analysis--see job, above

time and motion study

Micro Motion Study--see Methods and Techniques, etc.

Microphones--see Auditory (equipment, output devices)

Mid-Air Collision--see Safety (air)

Military Standards and Specifications

Miniaturization, Equipment

Minimum Perceptible Acuity--see Visual (acuity)

Minimum Separable Acuity--see Visual (acuity)

Missile Noise--see Ambient Noise (levels of)

Missiles--see Weapons

Mittens--see Clothing (handgear)

Mock-Ups--see Simulators

Monaural Stimulation--see Audition (binaural vs. monaural)

Monitoring Performance--see Vigilance and Monitoring Performance

Monotonous Environments--see Sensory (deprivation)

Monte Carlo Methods--see Mathematical and Statistical Techniques

Morale--see Individual Factors, etc. (motivation and morale)

Morse Code Training--see Training (specific types)

Motion, Effects of

acceleration and deceleration

general references

Motion, Effects of

acceleration and deceleration (cont'd)

protection for

tolerance for

types of

amplitude and frequency

equipment and methods

general references

oscillatory

perception of--see Perception

rotation

sickness

vestibular functioning

vibration, whole body--see Vibration

Motion Pictures--see Films

Motivation--see Individual Factors, etc.; also Training (basic learning data)

Motor Performance and Skills

aiming

coordination of limbs

dimensional analysis

equipment and methods used in study of

general references

handedness

involuntary reflexes

learning--see Training (specific types, tracking and motor)

manual dexterity

positioning movements

reaction time--see Reaction Time

repetitive movements (includes cranking and tapping)

serial movements

speed and precision

steadiness (and tremor)

tests of--see Tests and Testing

throwing

tracking--see Tracking

Movement

perception

bodily--see Perception

visual--see Visual (perception of)

ratio, controls--see Control-Display Dynamics

restrictive effects of clothing--see Clothing (restrictive effects)

stereotypes--see Control-Display Dynamics

Multi-Channel Listening--see Speech (communication systems, perception); Auditory (display)

Multiple Image Photography--see Methods and Techniques, etc. (photographic techniques)

Muscle Potential--see Physiological Capacities

Muscular Endurance--see Anthropometric Measures; also Work and Task Performance

Muscular Strength--see Anthropometric Measures

N

Narcosis, Deep Sea Divers--see Underwater (environments, oxygen requirements)

NATO Phonetic Alphabet--see Language Design

Natural Ambient Illumination (daylight)--see Light (natural)

Navigation Aids and Systems

Negative G--see Motion (acceleration and deceleration)

Neural Theory

Night Blindness--see Visual (anomalies)

Night Vision--see Vision (low level illumination)

Noise

auditory--see Ambient Noise

field--see Ambient Noise (measurement of)

masking--see Auditory; Speech

meters--see Ambient Noise (equipment and methods)

reduction--see Ambient Noise

visual--see Visual (masking and interference)

Noxious Odors--see Environmental Conditions and Effects; also Smell and Taste

Nuclear Operated Equipment and Systems, Problems of

Numerals, Letters, and Characters, Design of

Nystagmus--see Eye Movement; Vision (unusual environments)

O

Obstacle Perception by Blind--see Audition (sound localization)

Oculogravic Effect--see Orientation in Space; Perception (illusions)

Oculogyral Illusion--see Orientation in Space; also Perception (illusions)

Odorants--see Smell and Taste

Office Lighting--see Work Place Design (illumination)

Olfaction--see Smell and Taste

Operations Research--see Methods and Techniques, etc.; also Systems Design

Operator Opinion--see Methods and Techniques, etc.; Individual Factors, etc.
(acceptability, etc.)

Operator Position, Effects on Work Space Design--see Work Place Design

Opinion Survey--see Tests and Testing (opinion)

Optical Aids

binoculars

glasses, spectacles, and goggles

lenses and filters

periscopes

range finders

sights and reticles

telescopes

visors

Orientation in Space, Factors Determining

Outdoor Lighting Systems--see Lighting Systems (outdoor)

Overlays--see also Radar

Oxygen

consumption--see Physiological Capacities

masks--see Masks

requirements--see Environmental Conditions and Effects

toxicity--see Environmental Conditions and Effects

P

Pace--see Anthropometric Measures (locomotion)

Paced Work--see Work and Task Performance (pacing)

Packaging--see Containers and Packaging; for food--see Diet, Food, and Nutrition

Packboards--see Packs and Carriers

Packs and Carriers

Pain

Paints, Finishes, and Surfaces

Palmar Resistance--see Physiological Capacities

Panel and Console Design

aircraft and spacecraft

general references

keyboard design

layout (includes grouping of components, orientation to operator, visual factors, limits of work area, etc.)

ships and submarines

spacing between components--see layout, above

spatial dynamics, frequency of use of components, and order of use

vehicles

Parachutes

Parallax--see Displays (reading and interpretation problems)

Passageways--see Work Place Design

Pattern Perception--see Visual (perception of)

Patterns of Communication--see Communication Systems

Pedals--see Controls (linear)

Pear Rating--see Personnel (assessment)

Perception

of body movement and position--see also Orientation in Space

general references

illusions

isolation--see Sensory (deprivation)

sensory, other--see specific sensory categories

theory

Performance Aids--see Job Performance Aids

Peripheral Vision--see Visual (field)

Periscopes--see Optical Aids

Personality and Performance--see Individual Factors, etc.

Personnel--see also Tests and Testing; Training

assessment

classification and assignment

evaluation--see assessment

general references

management

selection

subsystem concepts

PERT (Program Evaluation and Review Technique)--see Systems (management)

Pharmacology--see Drugs

Phonetic Alphabet--see Language Design

Phonetic Analysis--see Speech (basic characteristics)

Phoria--see Visual (anomalies)

Phosphenes--see Vision (signal characteristics); Visual (thresholds)

Photic driving--see Repetitive Stimulation (visual); also Physiological Methods and Equipment (electroencephalograph)

Photographs, Photography and Photo Interpretation

Photometry--see Vision (equipment and methods)

Physical Fitness and Performance

Physical Stress--see Stress

Physiological Capacities

acclimatization--see also Environmental Conditions and Effects

breathing

cardio-vascular indices

energy expenditure

galvanic skin response

general references

heart rate

metabolic rate

Physiological Capacities (cont'd)

muscle potential

oxygen consumption

physical fitness

temperature, body (also includes sensitivity, heat loss)

Physiological Equipment and Methods

electrocardiogram

electroencephalograph

electromyography

electroretinogram

galvanometer

gaseous reference

metabolic measurement (includes calorimetry, respiratory, pulmonary, blood composition, heat balance, etc.)

other methods and equipment

telemetry

Physique--see Anthropometric Measures

Pictorial Displays--see Displays

Pitch--see Audition (stimulus characteristics)

coding--see Auditory (signals)

shifts--see Audition (aftereffects)

Plane of Controls Relative to Operator--see Panel and Console Design

Plotting Boards, Design of--see Displays (size, large scale)

Pointer Design--see Displays

Polarization, Light--see Light (special types)

Portability, Design for

Positioning of Components on Panels and Consoles--see Panel and Console Design

Positioning Movements--see Motor Performance

Positive G--see Motion, Effects of (acceleration and deceleration)

Posture--see Anthropometric Measures

PPI Display--see Radar and other CRT Displays

Predictor Instrument--see Displays

Preferences--see Individual Factors, etc. (acceptability of equipment and tasks)

Preference Testing--see Tests (preference)

Pressure Chambers--see Environmental Conditions and Effects (equipment and methods)

Pressure Suits--see Clothing

Printed Material, Legibility, and Readability

general references

readability, assessment of

see also

cards

check lists

graphs and tables

handbooks and manuals

maps and charts

numerals, letters, and characters

photographs

Probabilistic Model--see Mathematical and Statistical Methods

Probability Learning--see Training (basic learning data/theories)

Probability Theory--see Mathematical and Statistical Methods

Problem Solving Behavior--see Individual Factors, etc. (thought processes); also Group

Process Charts--see Methods and Techniques, etc.

Proficiency Testing--see Tests and Testing

Programmed Instruction--see also Training Aids and Devices (teaching machines)

Prolonged Confinement--see also Sensory (deprivation)

Prolonged Performance--see Work and Task Performance (length of work period, fatigue)

Prolonged Performance, Visual--see Visual (comfort and fatigue); also Vigilance

Prosthetics

Protective Clothing--see Clothing

Protective Devices, Visual--see Optical Aids

Pseudophones--see Audition (equipment and methods)

Psychogalvanic Response--see Physiological Capacities

Psychogalvanometer--see Physiological Methods and Equipment

Psycholinguistics--see Speech (basic characteristics); also Language Design

Psychological Stress--see Stress

Psychomotor Skills--see Motor Performance and Skills

Psychopharmacology--see Drug

Psychophysical Scaling--see Psychophysics

Psychophysics

general references

methods

scaling

theory

Public Address Systems--see Speech (communication systems)

Punch Cards, Design of--see Cards, Design of

Pursuit Apparatus--see Motor Performance, etc. (equipment and methods); also Tracking
(equipment and methods)

Push Buttons--see Controls (linear)

Q

Q-Sort--see Tests and Testing (personality)

Quality Control

Quantitative and Qualitative Personnel Requirements information (QQPRI)--see Personnel
(subsystem concepts)

Questionnaires--see Tests and Testing

Queueing Theory--see Methods and Techniques, etc.

Quickening--as a principle--see Control-Display Dynamics; used for Tracking--see Tracking

R

Radar and other CRT Displays

detectability, signal

fatigue--see Visual

general references

noise and clutter

operator performance--see also Visual (search and detection, target detection); also
Vigilance and Monitoring

overlays

range and bearing scales and aids

screen

brightness

orientation and angle of mounting

size and shape

signal characteristics (e.g., pip brightness)

simulation

symbology

television--see Television

types of (e.g., three dimensional, alphanumeric, etc.)

Radar Room Lighting--see Work Place Design (illumination); Lighting (special types)

Radar Training--see Training (specific types)

Radial Acceleration--see Motion, Effects of (acceleration and deceleration)

Radiation--see Environmental Conditions and Effects
 Radiation Protective Clothing--see Clothing (radiation protection)
 Radio Range--see Auditory (displays)
 Radio Systems--see Speech (communication systems)
 Railroads--see Transportation Systems
 Range Finder--see Optical Aids
 Rate-Aided Controls--see Tracking
 Rating Scales--see Methods and Techniques, etc.; as a psychophysical technique--see Psychophysics (scaling)
 Ratio Scales--see Psychophysics (scaling)
 Rations--see Diet, Food, and Nutrition
 Reach--see Anthropometric Measures
 Reaction Time and Refractory Period--see also Auditory; Visual
 Readability, Assessment of--see Printed Material, etc.
 Reading Devices for Blind--see Auditory (devices)
 Recognition Threshold--see Visual (threshold)
 Reconnaissance--see Visual (search and detection)
 Recruitment Phenomena--see Audition
 Red Illumination--see Light (special types)
 Redout--see Motion, Effects of (acceleration and deceleration, tolerance for)
 Refractory Period--see Reaction Time
 Reliability
 equipment
 human
 systems
 Remote Handling--see Controls
 Repetitive and Rhythmic Movements--see Motor Performance and Skills
 Repetitive Stimulation, Effects of
 auditory--see Audition (repetitive stimulation)
 other
 visual--see also Flicker
 Repetitive Work--see Work and Task Performance (complexity)
 Rescue Equipment--see also Sea (rescue)
 Research Techniques in Human Factors Engineering--see also Mathematical and Statistical Methods; Methods and Techniques, etc.; Systems

 Respiration--see Physiological Capacities
 Respiratory Measurement Devices--see Physiological Equipment and Methods
 Rest Periods--see Work and Task Performance
 Retention--see also Training (basic learning data)
 long-term
 short-term
 Reward--see Individual Factors, etc. (motivation)
 Rifle Recoil--see Weapons (handheld)--see also Stress
 Rifles--see Weapons (handheld)
 Risk Taking Behavior--see Individual Factors, etc. (thought processes)
 Rocket Noise--see Ambient Noise (level of)
 Rotary Movement Controls--see Controls
 Runway Markers--see Aircraft (landing systems)

S

Safety (and accidents)--see also Escape from
 accidents, analysis of
 air
 crash impact
 general references

Safety (cont'd)

industrial

motor vehicle and highway

sea

shielding

Sampling Theory--see Mathematical and Statistical Methods

Scale Design--see Displays (dial and scale design)

Scaling, Psychological--see Psychophysics (scaling)

Scheduling--see Methods and Techniques, etc. (queueing)

Scotopic Vision--see Vision (low level illumination)

Scramblers--see Auditory (equipment, transmission devices)

Sea

craft, design of--see also Ship; Submarine

markers--see Signaling Systems

rescue--see also Visual (search and detection, air to sea)

sickness--see Motion, Effects of

Search, auditory--see Auditory (skills)

Search, Visual--see Visual

Searchlights--see Lighting Systems (outdoors)

Seats and Seating

belts--see Belts, Harnesses and other Restraining Devices

body supports (includes bedding)

comfort

ejection

general references

Selection--see Personnel (selection)

Self-Paced Work--see Work and Task Performance

Sensation Scales--see Psychophysics (methods)

Sensory

comparison (i.e., comparison of one input channel with another)

deprivation

facilitation and inhibition of reception

feedback

general references

interaction (i.e., effects of stimulation in one modality on perception in another)

overload--see comparison, above

stimulus compatibility--see general, above

Sequence Diagrams--see Methods and Techniques, etc.

Serial Movements--see Motor Performance and Skills

Servo Theory--see Cybernetics

Set--see Individual Factors, etc.; Training (basic learning data)

Sex, Comparison of

Shape Coding--see Tactile Coding; also Controls (coding)

Shelters--see Houses, Dwellings, and Shelters, Design of

Shielding--see Safety (and accidents)

Ship

communication systems--see Speech; Auditory (display)

crews--see Groups

design--see Sea (craft)

instrument panel design--see Panel and Console Design (ships)

lighting systems

exterior

interior--see Work Place Design (illumination)

noise--see Ambient Noise

Shivering--see Motor Performance and Skills (involuntary reflexes)
 Shoes--see Clothing (footgear)
 Sickness, Motion--see Motion, Effects of (sickness)
 Sidetones--see Speech (distortion)
 Sights and Reticles, Design of--see Optical Aids
 Signal Detection Theory--see Detection Theory
 Signal Lights--see Warning and Signal Lights
 Signal-to-Noise Ratio--see Auditory (signals)
Signaling Systems, Visual (e.g., hand signals, flags, smokes, dyes, flares)
 Signals, Rate of Presentation--see Work and Task Performance (complexity)
Signs, Design of--see also Traffic (signs)
Simulation and Simulators
 Sirens--see Auditory (displays)
 Size Perception--see Visual (perception)
 Skin Temperature--see Physiological Capacities (temperature, body)
 Slave Manipulator--see Controls (remote)
 Sleep Deprivation--see Sleep and Performance
Sleep and Performance
Sleeping Bags
 Small Groups--see Groups
Smell and Taste
 Smoke
 concealment--see Fog, Haze, Smog, and Smoke
 signaling devices--see Signaling Systems, Visual
 Smoking, Effects of--see Drugs
Social Interaction
 Sociometric Assessment--see Personnel (assessment)
 Somatotyping--see Anthropometric Measures
 Somesthetic Sense--see Touch; also Kinesthesia; Pain
 Sonar--see Auditory (displays)
 listening--see Auditory (skills)
 training--see Training (specific types)
 Sone Scale--see Audition (psychophysical scaling)
 Sonic Vibrations, Effects on Man--see Ambient Noise (effects on performance)
 Sorting Systems--see Mathematical and Statistical Methods
 Sound
 absorbers--see Ambient Noise (reduction and control)
 localization--see Audition (sound localization)
Space Flight Systems
 capsule design
 closed ecological system--see sealed cabin, below
 communication
 control system
 crews--see Groups
 general references
 ground support
 navigation
 sealed cabin
 simulation--see Flight
 suits--see Clothing
 telemetry
 training--see Training (specific types)
Space Travel--see also Motion, Effects of; Weightlessness
 behavioral effects
 biomedical problems
 equipment and tools

Space Travel (cont'd)

general references

maneuvers (docking, controlled flight, re-entry, etc.)

physiological effects

visual problems

Span of Attention--see Individual Factors, etc. (attention)

Spatial Orientation--see Orientation in Space

Speaking, Individual Differences

general

nationality

sex

Speech

articulation and intelligibility tests

audiometric testing

basic characteristics

information analysis

phonetic and phonemic analysis

spectral analysis

communication systems

aircraft

face-to-face

general

intercom, radio, and telephone

multi-channel

other

ship

vehicle

distortion effects

amplitude modulation

chopping, clipping

compression and expansion

delayed feedback

environmental effects (e.g., high altitude)

equipment, effects on (e.g., masks)

frequency distortion

sidetones

signal-to-noise

equipment and methods for study of

general references

intelligibility--see articulation and intelligibility testing, above; perception, below

masking by

noise

pure tone

simultaneous speech

perception

recognizers

training--see Training (specific types)

Speed and Acceleration--see Motion, Effects of

Speed of Movement--see Motor Performance and Skills

Speed Stress--see Work and Task Performance

Statistical Methods--see Mathematical and Statistical Methods

Stature--see Anthropometric Measures

Steadiness--see Motor Performance and Skills

Stereophonic Sound--see Audition (sound localization)

Stereoscopic Acuity--see Visual (acuity)

Stereoscopic Vision--see Visual (perception of / depth, field/binocular)

Stereotypes, Motion--see Control-Display Dynamics (compatibility and motion stereotypes)
Stick Controls--see Controls (linear)
Stick Forces--see Controls (resistance)
Stimulus Compatibility--see Sensory (interaction)
Stimulus Order and Spacing--see Psychophysics (general)
Strategies--see Game and Decision Theory
Stochastic Methods and Models--see Mathematical and Statistical Methods
Storage, Design for--see Work Place Design (storage)
Street Lighting--see Lighting Systems (outdoors)
Strength--see Anthropometric Measures (muscular strength and endurance)

Stress

general

physiological indices

psychological indices

Subjective Magnitude--see Psychophysics (methods)

Subjective Probability

Submarine

controls

crews--see Groups

displays

escape systems

general references

habitability

Suits--see Clothing

Supine Position, Effects on Work Space Design--see Work Place Design (body orientation)

Supply Systems

Supports, Body--see Belts, Harnesses and other Restraining Devices; also Seats and Seating

Surface Electrodes--see Physiological Method, and Equipment

Surveillance Systems

Survey Methods--see Tests and Testing

Survival

equipment

in unusual environments

rations--see Diet, Food and Nutrition

Swing Test--see Motion, Effects of

Switches--see Control

Symbolic Displays--see Displays

Symbols, Design of--see Numerals, Letters, and Characters, Design of

Symposia and Conferences--see General and Comprehensive References

Synthetic Speech--see Language Design

Systems Design

components--see specific categories, e.g., Aircraft, Computers; Communication Systems; Radar, etc.

general references

techniques of analysis--see also Methods and Techniques, etc.; Mathematical and Statistical Methods

evaluation

general

management and cost--see also PERT

reliability--see Reliability (systems)

simulation--see Simulation and Simulators

theory--see also specific categories, e.g., Communication Theory; Game and Decision Theory, etc.

I

Tables and Graphs--see Graphs and Tables

Tactile Coding

Tank Crews--see Groups

Tanks--see Vehicles

Tapping Movements--see Motor Performance (repetitive movements)
 Target Detection
 auditory--see Auditory (skills)
 visual--see Visual (search and detection)
 Task Description and Analysis--see Methods and Techniques, etc.
 Task Performance--see Work and Task Performance
 Taste--see Smell and Taste
 Teaching Machines--see Training Aids and Devices; also Programmed Instruction
 Teams--see Groups
 Telegraphic Systems--see Auditory (displays)
 Telemetry--see Physiological Methods and Equipment; also Space Flight Systems
 Telephone Systems--see Speech (communication systems)
 Telescopes--see Optical Aids
Television Displays--see also Training Aids and Devices
 Temperature--see Environmental Conditions and Effects
 body--see Physiological Capacities
 sensitivity--see Physiological Capacities
 Temporal Characteristics of Light--see Lights; also Flash; Flicker
 Temporal Discrimination--see Time Perception
 Temporal Patterns, Sound--see Audition (auditory patterns)
 Tents--see Houses, Dwellings and Shelters, Design of
 Terrain Features--see Environmental Conditions and Effects (general)
Tests and Testing
 ability--see proficiency, below
 aptitude and intelligence
 construction
 general references
 motivation and opinion
 personality and sociometric
 preference
 proficiency (e.g., job skill tests)
 psychomotor abilities
 selection
 Textbooks in Human Factors Engineering--see General and Comprehensive References
 Texts, Design of--see Handbooks, Manuals, and Texts
 Texture Coding--see Tactile Coding
 Thermal
 environments--see Environmental Conditions and Effects
 protective ensembles--see Clothing
 radiation--see Environmental Condition and Effects
 sensitivity--see Physiological Capacities
 Thought Processes--see Individual Factors, etc.
 Throwing--see Motor Performance and Skills
 Tilt, Perception of--see Vestibular (functioning)
 Timbre--see Audition (stimulus characteristics)
Time
 delay constants--see Controls (backlash, deadspace, and response lag)
 error (audition)--see Audition (aftereffects)
 motion study--see Methods and Techniques, etc.
 perception (perspective)
 sharing
 Tinnitus--see Audition (aftereffects)
 Tobacco--see Drugs
 Toggle Switches--see Controls (linear)

Tonal Saps--see Audition (thresholds)

Tones (pure and complex)--see Audition

Tools, Design of

Torque--see Controls (resistance)

Torque, Amount Exerted--see Anthropometric Measures (muscular strength)

Touch

coding--see Tactile Coding

general references and basic sensory data

Toxic Environments--see Environmental Conditions and Effects (toxic environments)

Tracking

aided controls

auditory

compensatory

controls

display factors

effects of environmental factors on

equipment and methods; see also Motor Performance and Skills (equipment and methods)

feedback (augmented, delayed, etc.)

general references

operator performance

pursuit

quic'ened display

signal characteristics

training--see Training (specific types)

transfer function--see Human (transfer function)

visual vs. auditory

Traffic

air--see Air Traffic Control Systems

lights--see Warning and Signal Lights

motor vehicle

safety--see Safety

signs and signals--see also Signs, Design of

Training

basic learning data

characteristics of the learner

characteristics of material or task (includes degree of simulation)

distribution of practice

general

knowledge of results (also includes reinforcement, feedback)

length of training

motivation

retention

set and attention (includes effects of instructions)

theories of learning

transfer

whole vs. part

comparison of methods

evaluation of programs

general references

instructor behavior

specific types

basic (military)

code

flight

gunnery and marksmanship

Training

specific types (cont'd)

infantry

maintenance

other

radar

sonar

space

tracking and motor skills

voice communication and language

Training Aids and Devices

audio-visual aids

auditory aids

computers

display boards and other graphic materials

films

general references

manuals--see also Handbooks, Manuals, and Texts, Design of

mock ups and models

other

slides and transparencies

teaching machines--see also Programmed Instruction

television

trainers and simulators

Tranquillizers--see Drugs

Transverse G--see Motion, Effects of (acceleration and deceleration)

Transfer Function--see Human (transfer function)

Translating Devices

Transmission Lag--see Controls (backlash, deadspace, and response lag)

Transportation Systems

Tremor--see Motor Performance and Skills (steadiness)

Troubleshooting Behaviors--see Maintenance (behavior, strategies)

Trucks--see Vehicle

Tumbling--see Motion, Effects of (acceleration and deceleration/types of)

Twilight Conditions--see Vision (low level illumination)

Type Face and Legibility--see Printed Material, etc.; also Numerals, Letters and Characters, Design of

Typewriter Design--see Panel and Console Design (keyboard)

Typewriting--see Motor Performance and Skills (serial)

U

Underwater

breathing apparatus

clothing and equipment

environmental effects

oxygen requirements

pressure requirements

operational efficiency

sound systems (e.g., ASDIC and Sonar)--see Auditory (displays)

speech--see Speech (distortion/environmental effects)

targets, visual detection--see Visual (search and detection)

Ultraviolet Light--see Light (special types)

Veg Scale, Apparent Weight--see Kinesthesia; also Psychophysics
 Vehicle (automobile, tank, trucks, etc.)

design

general references

handling qualities

Instrument panel--see Panel and Console Design (vehicles)

Lighting systems--see also Work Place Design (illumination)

Velocity--see Visual (perception of)

Ventilated Clothing--see Clothing (thermal protection)

Ventilation--see Environmental Conditions and Effects

Vernier Acuity--see Visual (acuity)

Vertigo--see Orientation in Space

Vestibular Function

general references and basic data

motion, effects on--see Motion, Effects of; Orientation in Space

Vests

ballistic--see Clothing (body armor)

life--see Life Jackets

Vibration

general references

pickup--see Auditory (equipment)

whole body

Vibratory Communication Systems--see Tactile Coding

Vibratory and Electrical Coding--see Tactile Coding

Vibrotactile Display--see Tactile Coding

Vigilance and Monitoring

general

performance

theory

Visibility Threshold--see Visual (threshold)

Vision

color vision

effects of unusual environments

acceleration

high altitude

other

vibration

zero "g"

equipment and methods used in study of

general references

illumination level

low level illumination

physiological mechanisms

psychophysical scales (e.g., brill scale)

signal characteristics (exposure time, duration)

tests of

theories

Visors--see Clothing (headgear); also Optical Aids

Visual

accommodation and convergence

Visual (cont'd)

acuity

adaptation level and

brightness contrast and ratio

colored illumination

general references

illumination and

types of

dynamic

static

adaptation, pre-adaptation and pre-exposure

after-effects, after-images

aging--see Aging

anomalies and individual differences (e.g., color blindness, presbyopia, night blindness, etc.)

brightness discrimination

coding

comfort and fatigue (includes glare)

defects--see anomalies, above

enhancement devices--see Optical Aids

eye movement--see Eye Movement

field

binocular

distorted

monocular

peripheral vision (includes comparisons of peripheral and foveal)

flicker--see Flicker

illusions--see Perception

information processing (includes channel capacity)

masking and interference

perception of

angle

depth and distance

form and contour

movement (real and apparent)

number

pattern

size

velocity

protective devices--see Optical Aids

reaction time

requirements (for space flight, industrial, military, etc.)

search and detection

air to air

air to ground

air to sea--see also Sea (rescue)

general

ground to air

target detection

underwater targets

standards and specifications (includes Munsell, CIE diagram, etc.)

thresholds (e.g., visibility, recognition)

Visual vs. Auditory Channel--see Sensory Comparisons

Vocality--see Audition (stimulus characteristics)

Decoder--see Translating Circuit
Voice Communication--see Speech Communication Systems;
Voice Communication Training--see Training (specific types)
VTC, STW Aircraft

K

Kar Games--see Game or Decision Theory
Keckh Discrimination--see Physiological Capacities (temperature sensitivity)
Warning Devices
Warning and Signal Lights
Workkeeping Performance--see Vigilance and Monitoring
Water Environments--see Environmental Conditions and Effects; also Underwater
Weapons Noise--see Ambient Noise
Weapons Systems, Design of
 general references
 handheld
 intermediate sized systems (e.g., turrets, anti-aircraft, machine guns)
 large scale systems (e.g., missile)
Weight Body--see Anthropometric Measures (body size and dimensions)
Weight Discrimination--see Kinesthesia (general references)
Weight Lifting--see Anthropometric Measures (muscular strength and endurance); also
 Exercise and Performance
Weightlessness--see also Space Travel
Whiteout--see Vision (effects of unusual environments)
Whole Body Vibration--see Vibration (whole body)
Windblast--see Environmental Conditions and Effects
Windshields
 aircraft--see Aircraft (design of)
 evaluation of
 motor vehicle--see Vehicle (design of)
Words--see Language Design; Speech
Work Place Design
 acoustics
 area requirements (e.g., accessibility, clearances)
 arrangement of equipment and men
 atmospheric control
 general references
 humidity and temperature--see atmospheric control, above
 illumination
 aircraft lighting (cockpits, cabins)
 command centers
 factory and office
 general references
 home
 lighting fixtures
 other facilities requiring special lighting conditions
 radar room
 ship and submarine
 specifications--see Light (measurement and specifications)
 vehicle
 passageways
 seating arrangements
 visibility, field of view
Work Place Evaluation (specific place)
Work and Task Performance
 accuracy and speed requirements
 capacity for production
 complexity (load, rate difficulty)
 fatigue and behavior decrement
 general references

Work and Task Performance (cont'd)

length and distribution of work and rest periods

method of study and measurement--see also Methods and Techniques, etc.

motion analysis--see Motor Performance and Skills (dimensional analysis); also Methods and Techniques, etc.

pacing

physiological measures

space requirements--see Work Place Design

work-rest cycle--see length and distribution, above

FACSIMILE OF SUBJECT MATTER FILE

A

ACOUSTIC

DESIGN

1820	3894	8578	9757	9778	9829	10,282	10,283	10,291	10,334
10,335	10,336	10,337	10,341	10,342	10,756	10,899	11,107	12,582	13,074
14,428									

AGING, EFFECTS OF

ADDITION

2055	5119	10,165	13,101						
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GENERAL

592	835	1527	3157	3941	4804	5011	5123	5261	5442
5483	5665	5961	6258	6408	9851	9853	9866	9867	9895
9896	10,132	10,133	10,134	11,369	11,894	11,942	12,263	12,850	12,851
12,995	13,101	13,111	13,709	14,257	14,931				

MOTOR PERFORMANCE

249	592	2828	2829	5105	5122	5644	6077	9862	9865
9866	10,132	10,476	10,505	13,041	13,379				

VISION

1915	2716	5118	5121	5124	5125	5258	5482	5634	5645
5836	6814	6815	6816	6817	8764	9471	9503	10,108	10,557
10,731	11,538	12,160	12,442	12,576	12,852	12,860	13,032	13,166	13,419
13,428	14,380	15,887							

WORK CAPACITY

1905	2094	5011	5123	5483	5961	6797	9862	9865	9866
10,210	10,476	10,509	10,685	10,859	11,936	12,855			

AIR TRAFFIC CONTROL SYSTEMS

COMMUNICATION AND INFORMATION FLOW

1683	2181	2386	3304	3307	3402	3403	3757	4510	6159
6166	6525	6651	10,036	10,043	11,173	11,201	11,319	11,535	11,537
11,614	12,317	12,427	16,279						

CONTROL PROBLEMS

2532	5787	6166	6261	6459	6539	6724	9966	10,023	10,036
10,043	11,467	11,468	11,532	11,535	11,614	11,968	12,030	12,072	12,330
12,555	14,151	14,242	15,128	16,032					

EQUIPMENT

1666	1801	1958	2707	3267	3505	3630	3757	3912	3972
4387	4441	5787	6166	6403	6459	6502	10,010	11,018	11,069
11,130	11,173	11,199	11,251	11,281	11,283	11,308	11,449	11,471	12,030
12,164	12,317	12,330	12,505	12,529	12,626	12,678	12,711	14,151	14,427
14,554	14,679	14,838	14,839	15,033	15,084	16,278	16,455	18,969	

GENERAL REFERENCES

268	2707	3097	3304	3473	3505	3630	4430	4440	5787
6166	6458	6651	6724	6781	6782	6849	6968	8061	9966
10,010	11,173	11,296	11,308	11,764	11,927	12,021	12,023	12,355	12,419
12,446	12,447	12,505	12,518	12,640	12,689	12,743	13,200	13,336	14,317
14,338	14,398	14,454	14,473	14,544	14,761	14,817	14,818	15,252	16,159
16,838	16,895								

LAYOUT AND WORKPLACE DESIGN

1821	5787	5877	6403	11,614	14,328	14,351	14,581	14,244	
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AIR TRAFFIC CONTROL SYSTEMS (CONT'D)

OPERATOR VARIABLES

665	1417	2358	2532	2546	2707	4117	5707	9966	10,023
11,018	12,072	14,282	15,126	15,253	16,423				

TRAFFIC FLOW

2532	3757	5707	6166	6459	6533	6724	6805	8140	9966
10,036	11,199	11,201	11,410	11,968	12,023	12,072	14,242	15,033	18,959

TRAINING AND SIMULATION

2532	3057	3132	4117	4532	6159	11,130	11,195	11,532	11,828
12,164	14,338	14,396	14,402	14,628	15,016	16,455			

AIRCRAFT

DESIGN

947	1395	1396	1741	1745	1747	1749	1750	1756	1758
1759	1777	1807	1863	1941	1979	1991	2040	2061	2367
2409	2535	2598	2967	2976	3206	3553	3776	3783	3784
3945	4300	4431	4677	4678	4686	4755	5138	5252	5255
5255	5860	5901	6153	6182	6186	6194	6195	6300	6636
6709	6942	8137	8327	8359	8368	8542	8547	8548	8549
8550	8555	8560	9091	9223	9226	9548	9609	9956	9961
9962	9963	10,018	10,020	10,035	10,042	10,051	10,062	10,080	10,278
10,289	10,312	10,357	10,721	11,156	11,208	11,227	11,253	11,260	11,277
11,294	11,313	11,355	11,441	11,494	11,545	11,572	11,743	11,938	12,070
12,138	12,202	12,512	12,567	12,650	12,741	12,846	13,183	13,271	14,537
14,769	14,903	15,142	15,306	15,583	15,714	21,054	21,056	21,057	21,059

GENERAL REFERENCES

426	523	957	1576	1620	1755	1818	1819	3206	3369
3892	4774	5221	5690	6150	6151	6300	6310	8359	8367
8411									
10,694	10,718	11,741	11,765	11,847	12,269	12,414	12,583	13,122	14,369

LANDING AND LANDING SYSTEMS

798	810	852	940	963	975	981	1009	1029	1186
1368	1731	1781	1927	2059	2359	2471	2561	2640	2950
2974	2988	3103	3123	4296	4364	4510	4752	4767	4769
5583	5772	6031	6179	6193	6502	6768	6772	8541	8925
9125	9380	9582	9594	9615	9958	10,044	10,070	10,086	11,053
11,056	11,279	11,287	11,288	11,296	11,361	11,432	11,437	11,540	11,641
11,713	11,733	11,759	11,771	11,794	11,954	11,978	11,979	12,030	12,167
12,291	12,328	12,606	12,785	12,827	13,109	14,151	14,249	14,758	14,773
14,777	14,824	14,853	15,156	15,225	15,322	15,323	15,433	16,107	16,275
16,489	16,741	18,092	18,969	19,918					

LIGHTING, EXTERIOR

3539	4295	4803	5195	5363	5950	6136	6197	6198	6199
8371	11,093	11,282	11,693	11,978	11,979	12,163	12,166	12,942	12,973
12,999	14,757	14,809							

RELATED EQUIPMENT

250	947	2438	4041	4125	5501	9119	10,018	10,085	10,715
11,588	11,973	12,770	12,815	12,983	14,151	14,757	16,280	16,382	

AMBIENT NOISE

EFFECTS ON PERFORMANCE

235	237	318	323	327	571	797	1162	1439	1447
1556	1595	2427	2489	2578	2637	2663	2750	2962	2993
3025	3199	3488	3813	3894	4188	5206	5207	5454	5552
5782	5993	6231	6340	6386	6428	6478	6556	6564	8054
8098	8473	8518	8718	8787	9291	9530	9758	9802	9999
10,027	10,295	10,326	10,332	10,333	10,341	10,819	11,017	11,090	11,300
11,355	11,784	11,852	11,853	11,859	11,860	11,882	12,003	12,084	12,524
12,537	12,670	12,746	12,794	12,828	13,001	13,049	13,081	13,260	13,361
14,352	16,153								

AMBIENT NOISE (CONT'D)

GENERAL REFERENCES

516	3125	3447	4020	4789	5289	5511	6478	6480	6554
6555	6518	8438	8914	8919	8920	8921	8927	9640	11,300
11,376	11,425	11,480	12,548						

HEARING LOSS

100	323	537	1439	1593	1703	1798	2798	2799	2800
3052	3148	3239	3771	4215	5935	5993	6324	6325	6749
6850	6934	8547	8787	8864	8901	8917	8984	8985	9476
9530	9652	9749	9751	9762	9787	9645	9917	9950	10,122
10,180	10,220	10,221	10,315	10,340	10,375	10,378	10,576	10,588	10,824
11,299	11,501	11,560	12,050	12,575	12,558	12,746	12,778	12,803	12,806
12,828	13,105	13,211	14,208	14,209	14,401	14,442	14,474	14,759	14,871
14,889	15,141	16,323	18,137	10,826					

LEVEL OF

AIRCRAFT

255	721	1291	1686	1696	1699	1700	1718	1920	1993
2403	2489	2518	2663	2778	2799	2810	3387	5032	5680
6088	6147	6173	6472	6478	6850	8547	8909	8928	8929
8966	9212	9652	9758	10,190	10,312	10,316	10,326	10,375	10,588
11,211	11,227	11,293	11,560	11,650	11,782	11,935	12,191	12,301	12,828
13,211	13,262	14,307	14,352	14,401	14,625	14,661	14,871	15,346	16,806
16,826	2798								

AIRPORT

3418	5758	6850	11,374	11,393	12,614	12,882	13,074		
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BACKGROUND, GENERAL

9967	10,319								
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EQUIPMENT, GENERAL

5032	9028	10,105	10,317	10,333	12,339				
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INDUSTRIAL ENVIRONMENTS

1669	6712	8787	8898	8917	9028	9530	9745	9756	9950
10,000	10,001	10,176	10,220	10,315	10,316	10,325	11,300	12,575	12,778
14,474	16,153								

OFFICE

1730	9629	10,291	10,328	11,265					
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POCKETS, MISSILES

11,522	12,794	16,243							
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SUBMARINES AND SHIPS

2686	3239	3352	4215	11,168	11,211	12,339	15,336		
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VEHICLE

255	1679	2403	2663	3387	8947	10,339	11,591	12,524	12,787
16,826									

WEAPONS

3107	5993	5994	14,360	14,442					
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MEASUREMENT OF

1718	2043	2055	2501	2518	2952	3125	3352	4166	4818
5608	5748	6094	6173	6712	6850	8139	8912	8915	8947
8961	8968	8971	9028	9212	9640	9749	9757	9758	9845
9974	10,135	10,311	10,317	10,325	10,328	10,333	11,168	11,211	11,227
11,300	11,476	11,542	11,581	11,639	11,782	12,191	12,765	12,776	14,414
15,336	16,996								

REDUCTION AND CONTROL

ACOUSTIC SHIELDING

3884	5120	8850	8855	8929	8948	8959	10,334	10,336	10,337
10,341	10,670	10,756	10,810	11,591	14,362				

AMBIENT NOISE (CONT'D)

REDUCTION AND CONTROL (CONT'D)

GENERAL REFERENCES

323	324	529	7273	4550	6088	6555	8858	8915	8985
9028	9530	9755	9756	9757	9787	9950	9972	10,001	10,051
10,105	10,175	10,222	10,223	10,312	10,315	10,324	10,332	10,335	10,341
10,756	11,055	11,107	11,211	12,339	15,352	16,244			

HEARING CONSERVATION PROGRAM

537	9749	9755	9756	9757	9950	10,175	10,220	10,221	10,327
10,330	10,331	10,340	10,342	10,574	11,033	11,300	12,118	12,778	12,803

NOISE REDUCING DEVICES AND SYSTEMS

3314	3488	5289	8399	9758	9761	9845	9958	10,001	10,339
10,588	10,577	10,508	11,667	12,514	12,787	12,262	13,074	15,805	

STANDARDS OF TOLERANCE AND ANNOYANCE

521	2586	3125	5580	6147	6386	6555	8139	8951	8909
8965	8968	8984	9212	9758	9829	10,221	11,065	11,227	12,375
13,262	14,428	14,452	15,138	16,882					

ANTHROPOMETRIC MEASURES

ARM AND LEG DIMENSIONS

11,207	12,829	13,220							
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BIOMECHANICAL ANALYSIS

2096	2968	6953	9818	10,307	10,777	11,144	11,431	11,801	12,055
12,656	13,181								

BODY DENSITY

518	1720	3220	3301	4549	5467	9901	11,143	11,529	12,654
12,762	13,219								

BODY SIZE AND DIMENSIONS

204	215	518	849	947	1141	1345	1593	1760	2098
2099	2102	2141	2723	2853	2858	2897	3301	3924	4284
4320	4369	4399	4455	4551	4582	5262	5880	6061	6063
4467	6579	6586	6587	6676	6689	6692	6853	6866	10,702
10,704	11,020	11,143	11,147	11,188	11,297	11,314	11,511	11,527	11,630
11,830	12,341	12,812	12,856	13,220	13,296	14,232	14,460	14,464	14,690
14,800	15,263	20,273							

CENTERS OF GRAVITY

1745	3220	3428	4466	11,630					
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EQUIPMENT AND METHODS

2667	2853	2897	2976	3440	4565	4566	4567	4570	5958
11,590	12,363	12,364	12,654	13,219	13,296	14,558	14,719	14,919	16,420
17,522	17,524	20,348							

EXTENT AND FLEXIBILITY OF LIMB MOVEMENT

2969	4566	4569	4570	10,159	10,160	11,801	17,574		
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GENERAL REFERENCES

1481	1482	2868	2897	4551	4561	4582	5880	6061	6063
6676	6851	6853	6953	8927	9876	9879	10,012	10,367	10,504
10,704	10,756	11,067	11,143	11,314	11,524	11,854	11,938	11,953	11,987
12,256	12,527	12,758	13,180	15,300					

HAND AND FOOT DIMENSIONS

605	1343	1346	1487	2808	3096	4272	6415	11,040	11,187
11,527	11,938	12,065	15,104						

HEAD DIMENSIONS

5820	5858	6499	11,447	12,363	12,364	12,825	14,233	14,285	
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LOCOMOTION

524	455	9818	11,760	14,243	15,103	17,521	17,522		
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ANTHROPOMETRIC MEASURES (CONT'D)

MUSCULAR STRENGTH AND ENDURANCE

518	602	1337	2070	2832	2833	4026	4284	4565	4566
4567	4569	4570	4663	5105	6079	6410	6698	6705	6852
8678	9469	9536	10,143	10,155	10,161	10,227	10,304	10,306	10,307
10,308	10,360	10,361	10,493	10,664	10,692	10,777	11,226	11,250	11,611
11,682	11,778	11,779	11,780	11,856	11,987	12,334	12,883	13,185	13,190
13,220	14,413	15,113	15,425	22,756	6699				

POSTURE

5440	6851	9465	9908	10,156	10,733	11,795	13,031	13,058	14,267
18,778	19,145								

SOMATOTYPING

515	3220	4572	5549	6848	14,159	21,055			
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SPACE REQUIREMENTS

1747	1749	1750	1760	2868	2967	2976	6078	10,704	11,143
11,187	11,188	14,785	14,806	15,408	21,054	21,056			

ARTIFICIAL INTELLIGENCE

8183	8317	10,279	16,248	16,811	16,829				
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ASSIGNMENT OF FUNCTION TO MEN AND MACHINES IN SYSTEMS

2041	4190	5011	6344	9005	9073	10,037	10,064	10,577	11,305
11,306	11,659	13,292	14,408	14,582	18,013	18,770	18,848		

AUDITION

AFTERAFFECTS OF STIMULATION

95	99	100	336	729	736	738	741	760	761
853	903	1990	2076	2240	2434	2481	2554	2569	2744
2799	3092	3190	3233	3318	3326	3724	4603	4705	4706
4806	5001	5142	5143	5156	5608	5638	5673	5844	5845
5955	5958	6005	6006	6324	6325	6867	6934	8187	8479
8821	9476	9786	9817	10,115	10,221	10,476	10,517	10,821	10,824
10,826	11,335	11,860	12,114	12,131	12,203	12,207	12,405	12,406	12,472
12,725	13,075	13,083	13,105	13,170	13,255	14,350	14,622	14,625	14,627
14,798	15,138	15,265	16,882						

ANOMALIES AND INDIVIDUAL DIFFERENCES

732	733	755	905	1061	1478	1740	1968	2796	2797
2800	3170	3771	5957	8973	10,118	10,125	10,244	10,427	10,434
10,441	10,445	10,451	10,625	11,566	13,171	13,439	14,481	18,151	

AUDITORY PATTERNS AND MEANING

1287	2316	2645	9780	9766	9830	9847	13,046	13,156	
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BINAURAL VS. MONAURAL STIMULATION

1082	2104	2118	2481	3140	3143	4169	4463	5702	5703
8914	8953	9502	9774	10,130	10,280	10,281	10,495	10,520	10,646
10,820	10,821	10,834	12,190	12,537	13,227	13,257			

EQUIPMENT AND METHODS

101	102	719	726	733	734	735	737	753	754
755	762	776	894	1118	1309	1669	1976	2432	2472
2796	2797	2798	2799	2800	3021	3133	3147	3174	3500
3737	4301	4470	4478	4480	4603	4676	5293	5294	5387
5846	5847	5848	5866	5955	5956	5957	6390	6405	6428
6649	6668	6712	6749	6828	8893	8895	8924	8935	9008
9756	9757	9759	9762	9792	9840	10,114	10,118	10,131	10,181
10,280	10,321	10,323	10,329	10,441	10,445	10,451	10,514	10,617	10,629
10,807	10,809	11,001	11,052	11,136	11,230	11,237	11,238	11,264	11,299
11,304	11,469	11,505	11,615	11,616	11,642	11,643	11,800	11,878	11,912
11,958	12,084	12,412	12,453	12,659	12,682	12,730	12,765	12,772	12,776
12,806	13,087	13,172	13,414	14,354	14,414	14,466	14,646	14,678	14,693
14,849	14,973	15,047	18,743	21,014	22,579	732	3024	3025	

AUDITION (CONT'D)

GENERAL REFERENCES

324	562	718	785	790	1428	1488	1951	3500	4330
4829	5438	5868	6658	8597	9756	9830	9834	9837	9847
9967	10,126	10,321	10,505	10,811	10,815	11,376	11,513	11,837	12,425
12,548	12,570	12,710	12,792	12,799	12,800	12,904	13,127	14,718	16,413
18,385	18,829								

NORMS

719	755	776	3268	5367	6749	9834	10,272	10,516	13,135
14,208	14,543	14,545	14,995						

PHYSIOLOGICAL MECHANISMS

98	170	324	562	760	790	1309	3138	3737	4330
4538	5331	5868	5871	5935	5958	8597	8752	8901	8908
8975	8977	9476	10,114	10,126	10,127	10,505	10,520	10,831	11,388
12,131	12,391	12,722	12,723	12,724	12,799	12,800	12,930	13,087	14,225
14,347	14,480	14,481	14,567	14,580	14,759	14,849	15,323	16,494	18,035
18,177	19,892								

PSYCHOPHYSICAL SCALES

319	322	1130	2064	2065	3144	3722	4818	4819	5126
5706	6750	6793	8020	8961	8965	8967	10,995	11,470	12,404
12,900	14,135	14,507	14,673	14,710	14,978	18,182	19,466		

RECRUITMENT

94	104	718	1061	3140	9816	10,116	10,119	10,123	10,434
10,514	13,171								

REPETITIVE STIMULATION

1079	1081	1093	1127	2637	2919	5537	5608	8479	10,129
12,406	12,662	13,045	14,360	14,474	15,138	15,352	16,882	20,347	

SOUND LOCALIZATION

141	149	243	264	766	901	1950	2137	2139	2326
2502	3131	3134	3141	4462	4464	5108	5438	8021	8237
8464	8588	8918	8924	9558	9492	9830	9838	9842	9847
10,130	10,206	10,281	10,820	11,225	11,510	11,995	12,001	12,088	12,384
13,095	13,224	13,403	14,225						

STANDARDS AND SPECIFICATIONS

324	3133	9834	12,765	12,772	12,775	13,105	15,138		
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STIMULUS CHARACTERISTICS

FREQUENCY AND PITCH

97	101	102	219	715	717	720	730	733	735
751	752	754	762	780	1061	1082	1055	1118	1127
2029	2044	2050	2118	2123	2970	3106	3176	3309	3722
3772	4806	4829	5005	5128	5282	5696	5868	5871	6419
6668	8020	8271	8871	8931	8945	8960	9504	9509	9513
9786	9911	10,527	10,552	10,822	10,834	12,033	12,111	13,158	13,227
14,543	19,466								

INTENSITY AND LOUDNESS

94	104	319	321	322	528	716	718	736	737
780	1061	1081	1093	1115	1118	1130	1285	2104	2412
2430	2744	2952	3092	3106	3125	3144	3325	3894	3930
4819	4913	5103	5331	5401	5458	5702	5847	5848	6607
6790	6797	8746	8871	8935	8945	8967	9816	9843	10,095
10,281	10,284	10,285	10,652	11,001	11,052	11,254	11,304	11,390	11,391
12,048	12,205	12,210	12,405	12,939	13,045	13,046	13,073	13,076	13,102
13,110	13,206	13,227	13,256	13,257	13,414	14,507	14,671	14,710	15,352
18,151	18,182								

AUDITION (CONT'D)**STIMULUS CHARACTERISTICS (CONT'D)****OTHER**

1081	1082	1095	1896	1897	1955	2123	2291	3129	5374
5608	5604	9786	10,822	12,405	12,672	13,227	13,256	13,257	

STIMULUS MIXTURE

2030	4806	5846	8914	9839	10,815	12,537	12,662	13,158	13,267
13,414	14,347	13,268							

THRESHOLD

93	97	101	102	715	716	720	723	725	735
736	737	751	752	753	754	752	905	1074	1955
1968	2743	2749	2795	2796	2797	2798	3024	3111	3140
3143	4240	4645	5001	5003	5103	5155	5323	5331	5958
6005	8031	8187	8237	8870	8897	8967	9476	9502	9504
9638	9704	9731	9792	9834	9643	10,093	10,096	10,126	10,127
10,129	10,181	10,527	10,529	10,807	10,822	10,828	11,136	11,237	11,299
11,515	11,516	11,542	11,543	11,578	11,897	11,912	12,195	12,203	12,207
12,384	12,391	12,412	12,453	12,575	12,662	12,672	13,085	13,102	13,110
13,133	13,156	13,171	13,206	13,235	13,256	13,266	14,277	14,466	14,646
15,132	15,352	18,035	18,151	18,743					

AUDITORY**DEVICES****EAR DEFENDERS**

255	1308	2411	2953	3314	4550	4791	4805	5279	5420
5521	5992	5994	6177	6585	6759	8406	8899	8901	8903
9761	9845	9998	10,677	10,808	11,006	11,328	11,333	11,389	11,667
11,701	11,800	12,118	12,411	12,836	12,888	14,361	14,577	15,077	

ENHANCEMENT DEVICES

141	528	734	1171	1986	2481	3725	3727	8924	10,515
11,464	11,536	11,610	11,669	11,958	12,772	13,225	14,491	16,457	16,490
18,033									

DISPLAYS; NON-VERBAL**FLIGHT GUIDANCE SYSTEMS**

1142	2985	3126	3550	4734	12,221	12,742			
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INTERMITTENT WARNING AND SIGNALING DEVICES

670	949	1075	3562	4817	5226	6468	6778	6932	5967
11,302	11,925	12,215	14,507	14,709					

MULTI-CHANNEL

243

SONAR AND OTHER UNDERWATER SOUND SYSTEMS

848	3500	4214	4698	5438	5506	5695	6716	8638	11,716
11,721	11,898	11,972	11,975						

TELEGRAPHIC SYSTEMS

12,429	12,760								
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EQUIPMENT**INPUT DEVICES**

560	693	3174	4443	8954	10,281	10,283	10,810	11,251	
11,372	11,622	11,612	12,198	12,748	12,921	14,644			

OUTPUT DEVICES

98	264	435	683	2293	3133	3174	3263	3725	4443
8578	8868	8876	8932	8954	8955	8974	9908	9639	10,281
10,283	11,251	11,295	11,324	11,372	11,622				

TRANSMISSION DEVICES

3725	3727	8954	19,277						
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AUDITORY (CONT'D)MASKING

730	905	1286	1685	1955	1989	2001	2430	2554	2778
3111	3135	3145	3233	3894	4283	4705	5142	5143	5298
5604	5598	5703	5846	5958	5993	6679	8867	8871	9774
9844	9974	10,096	10,127	10,427	10,495	10,520	16,820	10,823	10,830
11,243	11,258	11,304	11,508	11,675	11,967	12,039	12,472	12,672	12,740
13,076	13,085	13,226	13,228	13,235	13,258	13,266	13,267	16,996	

REACTION TIME

2055	5119	9467							
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SIGNALSCHANNEL CAPACITY FOR

570	1692	1949	2645	5224	5225	5657	8974	10,827	12,016
12,297	13,045								

CHARACTERISTICS OF GENERAL

528	5657	6680	8043	8480	8758	8908	9786	9830	10,520
10,815	11,136	11,185	11,240	11,241	11,242	11,486	11,912	13,073	13,076
13,094	13,102	13,261	13,263	14,671	14,926	15,132	16,850		

CODING

256	8480	8945	9777	9786	9839	9847	10,095	10,096	10,638
10,652	10,811	10,931	10,834	11,241	11,242	11,618	12,297	13,045	16,278

FEEDBACK

9838	10,485	10,657	11,865	13,127	14,531	14,532	14,533	15,403	
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TO-NOISE RATIO

730	1692	3412	5698	9772	9797	9842	10,820	10,830	13,085
13,104	15,026								

SKILLSDISCRIMINATION

256	264	528	715	716	717	721	723	730	751
752	2952	2970	3176	3721	3722	3772	5005	5128	5458
6334	6606	6607	8931	8960	9797	9844	10,662	10,822	10,831
11,090	11,240	11,241	11,304	12,111	12,190	12,429	12,760	13,082	13,261
13,409	13,414	14,135	14,585	14,926					

MONITORING

5224	5225	9638							
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SEARCH AND DETECTION

256	1701	4698	6334	9638	9844	10,827	10,830	11,185	11,240
11,871	12,039	12,102	12,111	12,472	12,536	12,566	13,104	13,263	14,661
15,026	16,350	16,996							

SONAR LISTENING

714	716	717	721	723	727	756	774	856	2320
4214	4301	5695	12,472	13,268	15,195				

AUTOMATICCHECKOUT SYSTEMS

16,595

AUTOMATION (GENERAL)

850	2996	9005	11,306	15,411					
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BELTS, HARNESSES AND OTHER RESTRAINING DEVICES

731	740	1751	3149	4045	5938	8335	8352	8366	8494
9912	10,292	10,579	10,590	11,339	11,946	12,533	12,909	12,930	14,231

BIODYNAMICS

9818	9857	10,013	11,590	12,622	12,696	13,031	14,243	14,413	14,719
17,521	17,522	17,524							

BIONICS

6911	16,764								
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BREATHING DEVICES AND EQUIPMENT

413	1887	3278	6468	6501	6542	6571	6994	10,706	11,571
11,598	12,054	13,065							

CAMOUFLAGE OR CONCEALMENT

1049	2910	5633	6514	6520	8749	11,039	11,403	11,644	11,843
12,282	14,555	16,980							

CARDS, DESIGN OF

3615	12,363	12,364	20,238						
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CLOTHINGARCTIC ENSEMBLE AND COLD WEATHER

742	1802	3288	3388	4548	5033	6719	6722	9550	9645
9659	10,137	11,101	11,149	11,188	11,577	11,601	11,651	11,999	12,113
12,323	12,346	12,426	12,456	12,552	12,554	12,782	14,567	14,717	14,937
14,997									

BELTING

4465	12,917								
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BODY ARMOR

2229	3514	4398	8412	12,368	16,734				
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EQUIPMENT AND METHODS

583	648	742	2646	2647	2651	2760	5033	6543	9870
11,101	11,102	11,155	11,485	11,609	11,645	11,651	11,662	11,674	11,781
12,181	12,214	12,514	12,791	14,268	14,527	14,566	16,141	16,186	18,973

FABRICS

4281	6397	9550	11,329	12,703	14,327	16,301	18,973	21,486	21,595
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FASTENERS

6696	12,791								
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FLIGHT

1746	1797	2839	5938	6259	9662	10,015	10,056	10,594	11,155
11,262	11,609	12,452	14,232	15,072					

FOOTGEAR

1343	1346	1797	2641	2608	3289	3935	4217	4277	4278
4403	11,103	11,674	11,980	12,243	12,338	12,426	12,617	14,377	14,472
14,566	15,104								

GENERAL REFERENCES

742	948	1332	1333	1675	3537	4171	4465	4576	5889
6434	6543	9995	10,015	11,102	11,144	11,147	11,149	11,645	11,648
11,854	12,590	12,591	12,592	14,258	14,332	14,599	14,613	14,717	

HANDGEAR

240	2619	3096	6448	6748	10,362	10,541	11,187	11,226	11,407
11,527	11,596	11,679	11,862	12,113	12,303	12,323	12,509	12,554	13,364
14,155	14,547	14,567	15,105	15,106					

HEADGEAR

766	1171	1380	1729	1797	2293	2742	3161	3278	3454
4283	4374	4528	4550	4791	6585	8405	8406	8412	9738
9858	9870	9960	9996	9997	9998	10,002	10,038	10,366	10,370
10,595	11,006	11,086	11,498	11,650	11,701	11,745	12,219	12,484	12,649
12,836	12,959	14,900	15,123	16,225					

CLOTHING (CONT'D)HIGH ALTITUDE AND ANTI-G

62	1665	2405	2647	2651	2754	2764	3414	3522	3541
3556	4046	4667	4749	6123	8348	3662	9712	9966	10,015
10,053	10,058	10,374	11,055	11,086	11,144	11,297	11,354	11,609	11,870
12,184	12,214	12,217	12,430	12,532	12,585	12,649	13,060	13,061	14,211
14,498	14,594	16,141							

NOXIOUS AGENTS, PROTECTION

3395	5357	6855	11,407	12,471	14,155	14,814			
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RADIATION PROTECTION

1964	3525	11,846	12,509	12,702	21,486	21,487	21,595		
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RESTRICTIVE EFFECTS OF

742	1348	2619	2930	3872	6376	6908	11,188	11,194	11,226
11,252	11,866	11,999	12,103	12,530	13,344	14,264	14,547	15,972	16,160

SIZING, TECHNIQUES OF MEASUREMENT

849	1345	1748	2312	4399	4551	4561	6737	11,144	11,651
12,812	14,232	14,233	14,594	15,106					

SPACE SUITS

16,160									
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THERMAL PROTECTION

948	1715	1739	1892	2081	2646	2760	2900	3229	3525
3787	4004	4375	4407	4567	6543	6506	9894	10,015	10,374
10,594	11,329	11,547	11,577	11,645	11,662	11,679	12,617	14,250	14,269
14,417	14,552	15,035	21,486	21,487	21,595				

TROPICAL ENSEMBLE

583	3328	4741	6982	9645	12,101	12,347			
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COLORCOOLING

139	335	1177	1329	2280	2361	2454	3173	3425	3929
6380	8289	8708	8741	8780	8840	8991	9654	10,004	10,638
11,670	11,805	12,397	12,574	15,039	16,337	18,731	19,644	20,447	20,628
21,366									

COMFORTCOMMAND AND CONTROL SYSTEMS

4831	12,450	12,620	14,508	14,575	14,582	14,938	16,671	19,818	
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COMMUNICATION AND INFORMATION THEORYGENERAL

232	337	838	1710	1978	2286	2706	3001	3364	3517
3677	3729	3734	3742	3913	4259	4470	4517	4583	5018
5481	5728	6526	6530	6651	6911	6913	6918	6922	6923
6924	6926	6931	7041	8167	8442	8480	10,846	11,066	11,319
11,813	11,928	12,006	12,012	12,389	12,481	12,603	12,657	12,691	14,211
14,394	14,523	14,657	14,847	14,987	15,190	16,093	16,131	16,266	16,425
16,811	16,823	16,831	16,841	16,933	16,999	18,062	18,063	21,043	

INFORMATION ASSESSMENT AND PROCESSING

67	83	1555	2732	3729	3733	4037	4287	4511	5728
6605	6736	8091	8174	8189	8483	9484	8878	8952	9541
9778	10,393	10,409	10,475	10,479	10,545	11,242	11,370	11,526	11,618
12,012	12,150	14,980	14,981	15,017	18,758				

REDUNDANCY, UNCERTAINTY

67	2494	6918	8189	8238	10,353	10,411	11,478	12,598	13,264
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COMMUNICATION SYSTEMS

GENERAL

664	2127	2957	3171	3151	3677	4386	4440	6477	6967
9055	9972	10,076	10,475	10,833	11,056	11,366	11,618	12,006	12,026
12,029	12,358	12,423	12,481	12,711	14,455	14,494	14,616	14,621	16,254
16,055	16,810	16,857	16,990	16,899	16,533	16,995	18,006	18,012	

TECHNIQUES FOR EVALUATION

3354	3542	3641	3891	4520	11,315	11,386	11,456	11,605	11,618
11,675	11,813	12,423	13,134	14,644	15,112	16,508	16,656	16,857	16,898
16,899	16,995								

COMPUTERS

DAT. PROCESSING SYSTEMS

2752	11,812	11,829	12,082	12,613	14,352	15,316	16,117	16,159	16,253
16,331	16,433	16,435	16,652	15,513	20,239				

DESIGN

950	4473	4474	11,309						
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GENERAL

2378	5227	6947	11,303	11,229	14,381	14,527	14,580	14,609	14,942
16,867									

MAN INTERACTION

11,812	12,466	16,790							
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MODELS AND PROGRAMS

179	6902	6903	6904	11,205	11,812	16,174	16,790	16,896	17,155
18,197									

SIMULATION

179	3657	4768	10,052	11,325	11,340	11,828	11,829	12,318	16,896
17,155	18,115	18,155							

SYSTEMS COMPONENT

28	6886	6887	12,005	13,336	16,305	16,508			
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CONTAINERS AND PACKAGING

1344	6581	8991	12,883	12,925	13,056	14,344	18,138		
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CONTROLS

AIRCRAFT CONTROLS

972	973	409	1186	1203	1737	1766	1767	1768	1769
1770	1771	1773	1774	1778	1784	1787	2056	2933	4651
4677	5138	5452	5749	5860	5915	6183	6184	6187	6191
6300	6608	6795	6805	6826	6862	8548	8549	9119	9226
9963	9971	9990	10,017	10,031	10,079	10,460	11,043	11,077	11,191
11,196	11,213	11,214	11,215	11,216	11,255	11,303	11,494	11,545	11,546
11,773	11,788	12,156	14,806	14,915	15,242	15,331			

AUTOMATIC

11,173	11,196	11,349	11,350	12,547	16,622				
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BACKLASH, DEADSPACE, AND RESPONSE LAG

968	999	6441	10,648	11,043	11,079	11,862	14,601		
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CODING

934	1769	1770	1771	1773	3425	3865	3988	5842	6183
8210	10,546	11,200	11,654	11,729	15,039	15,070	15,262		

COMBINED

14,406									
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COMPARISON OF TYPES

1006	1604	1605	3866	5326	5504	6862	8675	10,009	11,275
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EYE (AS CONTROL MECHANISM)

6576	6707	13,071	16,395						
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CONTROL (CONT'D)**FORCE TO ACTIVATE**

972	982	1594	2194	5431	8053	9119	11,077	11,191	11,193
13,180	13,190	14,413	15,025	16,852					

GENERAL REFERENCES

844	1140	1430	1589	2727	4451	5152	6937	6947	8819
10,002	10,079	10,546	10,736	11,191	11,193	11,862	12,334	12,594	14,505
16,242									

HANDGRIPS AND HANDLES

1604	1605	4702	6608	9119	10,017	10,546	11,332	13,180	13,190
14,778	14,816								

INDUSTRIAL

827	5227	6907	6949	6957	6959	10,009	11,381	13,704	11,769
11,772	14,026	14,406							

LINEAR MOVEMENT**LEVERS AND STICKS**

111	973	1006	1296	1520	1554	2529	3949	3984	5326
5328	5681	10,017	11,081	14,432	15,025	15,331	16,852		

PEDALS AND RUBBER BARS

973	2933	14,288	15,331	16,852					
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PUSH BUTTONS AND TOGGLE SWITCHES

1774	3410	3949	6184	12,007	14,292	14,270	14,788		
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LOCATION AND POSITIONING

389	390	1211	1213	6191	8053	8675	10,725	11,200	11,381
14,026	14,288	14,436	14,482	14,816	15,025	15,042	15,242	21,991	

MULTIPLE-AXIS

973	1737								
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REMOTE HANDLING

5629	13,003	14,575	14,891	15,039					
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RESISTANCE

475	959	1296	1766	1767	1768	1778	2109	2485	2525
4627	4732	4733	5327	6026	6079	8273	8675	8818	11,079
11,191	11,193	11,783	12,343	12,623	12,707	12,735	14,261	14,778	14,816
15,118	21,991								

ROTARY MOVEMENT**CRANKS AND WHEELS**

35	36	39	475	1211	1213	1594	1604	4025	4732
4733	6723	9732	11,057	12,623	15,155	15,331	21,991		

KNOBS

934	952	982	1006	1212	1772	2113	2485	2513	3866
5325	5565	6079	6183	10,546	11,095	11,200	11,776	12,343	12,376
12,473	12,737	13,005	13,284	15,070					

SETTING, PRECISION

952	982	999	1006	1212	2189	2528	2529	2619	3984
5326	5329	6113	6441	8294	8309	10,481	10,546	11,044	12,376
12,623	12,737	12,893	13,284	13,317	14,026	15,296	15,300		

SHIP AND SUBMARINE CONTROLS

12,010									
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VEHICLE CONTROLS

11,654	15,042	15,107							
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CONTROL-DISPLAY DYNAMICS**COMPATIBILITY AND MOTION STEREOTYPE**

150	387	578	625	952	975	968	985	1153	1193
1213	1223	1224	1224	1228	1229	1295	1296	1377	1537
1547	1775	1793	2231	2248	2249	2269	2526	2527	2325
3433	3436	3951	3998	3999	4072	4532	4537	5023	5864
6125	6363	6685	8199	8200	8276	8388	8389	8390	9346
9648	9670	9672	9678	9719	9752	9783	10,345	10,533	11,057
11,793	12,754	13,005	13,117	13,154	13,433	13,434	14,482	14,790	15,297

GENERAL

52	53	112	844	2349	2727	3651	4167	4999	6126
6177	8301	9073	10,548	10,643	10,725	11,125	11,146	11,798	12,066
12,877	13,000	13,248	13,319	13,432	14,195	14,329	14,553	14,723	14,769
14,894	14,938	15,039	15,125	15,136	15,308	16,338	18,763		

INTEGRATION

8301	9670	11,146	11,303	14,223	15,082	16,095			
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MOVEMENT RATIOS

112	303	411	1190	1256	1772	2109	3651	3746	3747
3795	5326	5327	5328	6342	8200	10,460	10,481	10,553	10,648
11,044	12,376	13,168	13,186	14,601	15,118	15,246	16,288		

QUICKENING

32	33	9742	10,480	10,572	10,187	11,125	12,010	14,899	
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CYBERNETICS

1840	3517	4060	4531	4535	6430	6911	7002	9050	10,196
11,193	11,309	11,509	11,718	11,773	14,641	14,802	14,880	16,622	18,200

DETECTION THEORY

5803	5881	6095	6116	6635	6918	6922	6928	9053	10,661
10,666	10,827	10,830	11,675	11,323	12,566	12,706	12,761	12,986	13,103
13,104	13,265	13,408	14,586	14,953	15,212	15,230	15,374	16,094	16,095
16,096	16,154	16,446	16,913	16,994	18,832				

DIET, FOOD AND NUTRITION

365	141	834	1341	1344	1363	1526	1632	1714	2786
2787	2831	3240	3726	4146	4152	4844	4967	4872	4873
4976	4895	4897	4906	5083	5145	5456	5551	5557	5940
6040	6063	6254	6255	6268	6338	6417	6436	6439	6558
6581	6854	6860	6876	6964	6973	6983	6993	8231	9750
9916	10,141	10,142	10,151	10,153	10,207	10,226	10,260	10,261	10,262
10,263	10,264	10,265	10,266	10,267	10,344	10,511	10,536	10,544	10,551
10,552	10,581	11,117	11,137	11,236	11,484	11,553	11,589	11,628	11,631
11,688	11,689	11,691	11,720	11,774	11,830	11,961	11,979	12,179	12,220
12,275	12,322	12,353	12,361	12,375	12,601	12,686	12,731	13,156	13,162
13,335	13,362	14,501	14,509	14,510	14,579	14,832	16,643	16,668	16,705
16,876	16,958	17,138							

DISPLAYSDIAL AND SCALE DESIGN

129	140	159	409	578	827	906	967	1000	1002
1003	1005	1008	1086	1098	1376	1574	1581	1583	1585
1780	1879	1911	1954	2126	2252	2668	2700	3173	3646
3653	3654	3951	3966	4040	4114	4742	4759	4853	5329
5519	5520	6176	6181	6188	6308	6333	6343	6458	6505
6567	6961	6980	6992	8104	8110	8122	8126	8209	8214
8447	8524	9322	9710	9722	9723	9729	9730	9733	9783
10,353	10,690	10,857	11,203	11,334	11,336	11,423	11,907	11,910	13,004
14,540	14,681	14,720	18,677						

GENERAL REFERENCES

159	597	600	950	1129	1137	1140	1186	1430	1576
2471	2727	3004	3234	3539	3734	3826	3861	4032	4371
4680	5330	5860	6504	6709	8219	9403	8548	9055	9222
9226	9581	9648	9710	9715	10,021	10,354	10,604	11,085	11,281
11,302	11,694	11,743	11,788	12,070	12,410	12,475	12,501	12,529	12,666
12,814	12,840	13,129	14,220	14,270	14,505	15,649	14,825	14,826	14,828
14,829	14,830	14,831	14,835	14,836	16,474	16,671	16,741	19,086	21,052

POINTER DESIGN

578	959	987	988	1549	1791	2126	2700	5519	6175
6188	8122	8126	8209	16,284					

READING AND INTERPRETATION PROBLEMS

107	129	140	409	412	882	955	961	966	967
979	987	996	1000	1002	1005	1008	1086	1098	1239
1376	1581	1583	1780	1785	1791	1792	1794	1911	2126
2252	2452	2668	2906	3450	3654	3959	3966	3996	4069
4739	5145	5519	6000	6163	6195	6567	6575	8104	8110
8122	8126	8128	8202	8209	8211	8214	8224	8279	8304
9322	9526	9527	9722	9723	9729	9730	10,352	10,477	10,690
10,857	11,037	11,223	11,657	13,004	14,540	14,720	16,503	18,677	

SIZE

578	854	955	1000	1183	10,690	14,701	15,209		
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DISPLAYS (CONT'D)**TYPE****AIRSPEED INDICATORS**

961	7439	2668	6175	10,056	11,058	11,163	11,479	12,333
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ALTIMETERS

1376	1719	1789	1790	3653	3655	4784	6627	6812	6884
10,050	11,163	11,438	11,657	11,913	11,914	11,915	13,119	14,218	

ATTITUDE INDICATORS

515	854	1183	1269	1305	1677	2734	3163	3845	3867
3987	4134	4300	4342	4359	4757	6181	6446	6627	6996
11,125	11,397	12,151	12,260	14,379	14,762	16,282	16,287	16,286	18,284

COMBINED DISPLAYS

2584	3959	5330	8370	10,050	11,303	11,424	11,479	11,713	12,641
12,640	12,980	14,220	14,263	14,691	14,776	14,964	16,196	16,486	16,451
16,600									

COMPARISON OF TYPES

224	996	1185	2525	2906	3002	3655	3845	3867	4688
4701	4757	5138	5655	5716	6513	6592	6627	6812	8108
9222	11,281	11,307	11,311	11,793	11,794	11,907	12,215	12,370	12,544
12,753	12,916	13,340	14,745	16,284					

HEADING INDICATORS

974	2523	2700	3002	4597	4688	4701	6188	6504	6886
6887	8168	11,283	11,451						

INDICATOR AND WARNING

3368	3653	4018	4680	6176	6778	11,303	11,570	11,973	12,528
12,530	12,544	12,726	12,875	12,993	14,824				

LARGE DISPLAYS

106	107	1238	1239	1947	2955	3587	3594	3915	4385
8211	8304	9589	16,170	19,818					

OTHER

404	908	2458	2525	4297	5501	8219	8301	9733	11,041
12,237	12,876	13,184	14,272	14,469	14,790	14,922	14,923	16,271	16,813

POLAR COORDINATE

106	976	977	978	1094	1573	2252	3002	11,732
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DIURNAL CYCLES

2741	2968	6130	6398	10,153
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DRIVING**ANALYSIS OF**

1661	3513	4218	4275	5102	5296	5781	5831	5832	6007
6388	8226	9182	9601	9617	9618	10,691	11,905	11,966	12,077
12,136	12,621	12,829							

PERFORMANCE AND SKILLS

853	2476	4821	5269	5271	5285	5286	5296	5668	6388
7090	7094	7099	8226	8563	9913	9915	10,730	11,026	11,452
12,032	12,077	12,656	12,851	13,165	13,334	14,740	15,024	15,044	15,277
18,042									

DRUGS

2	45	46	47	582	782	834	1300	1357	1358
1366	1490	1491	2257	2409	2417	2474	2635	2675	2743
2769	2770	2771	2803	2804	2805	2807	2835	2866	2890
2892	3246	3255	3311	3441	3715	3895	3896	4145	4147
4390	4392	4393	4605	4625	4711	5031	5082	5098	5112
5444	5557	5643	5960	5963	5964	5965	5968	5989	5990
5997	6010	6014	6022	6023	6024	6025	6026	6027	6084
6409	6450	6494	6495	6496	6614	6708	6829	6963	8305
8378	8750	8751	9249	9425	9447	9448	9473	9489	9520

DRUGS (CONT'D)

9528	9708	9763	9798	9907	10,006	10,254	10,626	10,668	10,674
10,678	11,274	11,573	11,619	11,655	11,658	11,834	11,835	11,861	11,981
12,000	12,032	12,357	12,451	12,519	12,550	12,602	12,950	13,144	13,277
13,377	13,429	13,437	14,244	14,420	14,437	14,444	14,603	14,737	14,763
14,796	14,864	14,869	14,910	16,175	16,436	16,971	19,029	18,961	20,275

DURRY AND HANNIXIN DESIGN

1761	2868	12,256
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EJECTION CAPSULE

1963	3503	4024	4609	6241	6857	8332	8360	8553	9955
9957	9960	10,016	10,031	10,045	10,047	10,056	10,057	10,078	10,590
10,711	12,584	13,275	14,230	14,475	16,382	18,201			

ENVIRONMENTAL CONDITIONS AND EFFECTSAIR VELOCITY

12,688	12,733								
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ATMOSPHERIC PRESSURE

62	329	803	869	540	1204	2435	2775	2805	2812
2820	2836	2840	2842	2878	2880	2883	2891	3273	3502
3892	4039	4373	5250	5253	5454	5953	6080	6108	6109
6110	6111	6112	6120	6121	6158	6335	6406	6418	6469
6542	6916	6970	8411	8554	8561	9506	9656	9807	9859
10,168	10,171	10,228	10,374	10,376	10,377	10,383	10,707	10,715	10,716
10,748	10,759	10,765	11,060	11,071	11,184	11,499	11,566	11,609	11,708
11,833	11,971	12,186	12,214	12,295	12,341	12,519	12,796	12,848	12,939
13,059	13,201	14,253	14,295	14,368	14,384	14,476	14,772	15,187	16,476
16,943	18,954	18,961	19,255						

COLD

31	168	184	566	571	772	1,156	1799	2314	2710
2787	2850	2910	3100	3268	4142	4296	4401	4426	4513
4516	4778	5384	5940	6059	6259	6268	6367	6453	6722
6746	6748	6999	8242	9550	9563	9569	9659	9883	9884
9886	10,139	10,145	10,148	10,149	10,150	10,151	10,152	10,169	10,172
10,204	10,207	10,250	10,501	10,502	10,543	10,597	10,622	10,623	10,758
10,760	10,763	10,764	10,765	10,772	10,773	10,775	11,030	11,076	11,120
11,179	11,342	11,343	11,484	11,512	11,523	11,531	11,553	11,577	11,586
11,601	11,631	11,679	11,680	11,765	11,804	11,844	12,001	12,113	12,198
12,216	12,271	12,280	12,303	12,323	12,335	12,485	12,494	12,600	12,671
12,961	13,372	13,381	14,354	14,357	14,742	14,832	14,865	16,828	19,229

DECOMPRESSION

329	1738	1741	3225	3415	4041	6542	6837	9656	9735
9871	9959	10,591	10,707	10,748	11,525	11,983	12,284	12,532	13,061
14,228	14,295	14,476	14,477	14,584	14,721	14,772	18,791	19,255	

EQUIPMENT AND METHODS USED IN STUDY OF

2322	2477	2878	4604	6406	9876	10,715	11,677	12,652	13,062
13,120	14,253								

EVAPORATIVE COOLING

5764	5876	9568	10,137	10,139	11,076	12,273			
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GENERAL REFERENCES

54	402	558	566	772	830	526	1021	1334	2367
2477	2672	2710	3179	3369	3537	3752	4120	4389	4489
4512	4778	5068	5531	6310	6388	6792	6910	6998	8553
9569	9657	9854	9872	9874	9878	10,175	10,231	10,232	10,388
10,389	10,500	10,542	10,719	10,723	10,728	10,753	11,004	11,261	11,495
11,608	11,634	11,798	11,947	11,963	12,057	12,127	12,300	12,309	12,322
12,541	12,674	12,779	12,881	12,971	13,052	13,053	13,054	13,063	13,068
13,212	13,221	14,301	14,751	14,890	14,929	15,188	16,563	16,697	16,837
16,844	18,018								

HEATING

3753	4489	8438	8516	9568	9569	10,138	10,179	10,503	10,507
11,120									

ENVIRONMENTAL CONDITIONS AND EFFECTS (CONT'D)

<u>HOT</u>									
49	51	183	187	189	1524	1533	1673	1805	2314
2477	2787	2962	3468	3514	3593	3753	3916	4012	4013
4167	4203	4328	4560	4741	5124	5157	5158	5275	5380
5862	5876	6239	6245	6259	6269	6372	6467	6595	6566
6854	6856	6988	9123	9563	9650	9896	9906	10,138	10,144
10,212	10,218	10,226	10,250	10,503	10,507	10,566	10,771	10,772	10,776
11,170	11,350	11,475	11,638	11,677	11,751	11,959	12,063	12,567	12,078
12,270	12,303	12,361	12,571	12,632	12,688	12,733	12,734	12,735	12,757
12,762	12,816	14,509	14,684	14,772	15,247	16,175	16,958	18,153	
<u>HUMIDITY</u>									
1497	3468	3928	9344	9890	10,620	11,959	12,341	12,549	12,688
12,757	12,760	14,302							
<u>IONIZED AIR</u>									
16,805									
<u>OXYGEN REQUIREMENTS</u>									
55	413	763	869	1351	1372	2038	2075	2784	2801
2803	2804	2874	2951	3124	3415	3531	4145	4204	4390
4604	5895	5958	5965	8768	9235	9236	9246	9447	9765
9807	9878	9888	9895	10,135	10,168	10,228	10,607	10,716	10,724
10,757	10,758	10,759	10,769	11,071	11,274	11,554	11,561	11,568	11,619
11,833	11,971	12,227	12,276	12,295	12,555	12,771	12,858	13,147	14,266
14,627	14,726	14,822	15,068	16,943	16,979	22,586			
<u>RADIATION</u>									
2776	2821	3335	4065	4311	5907	5988	6663	6664	9873
10,177	10,178	10,211	10,219	10,224	10,228	10,252	10,584	11,096	11,126
11,219	11,628	11,691	11,711	11,739	11,750	11,751	11,836	11,842	11,846
11,921	11,922	12,539	12,580	13,147	13,189	13,194	13,203	14,158	14,305
14,353	14,411	14,418	14,419	14,512	14,524	14,576	14,712	14,716	14,774
14,815	14,906	14,910	15,079	15,375	16,856	18,109	18,110	18,138	18,160
18,166	18,191	18,386	18,830	21,440					
<u>TEMPERATURE</u>									
49	51	190	290	1206	1756	3100	3336	3753	4552
4684	6439	6614	6889	9344	9850	10,138	10,153	10,179	10,204
10,212	10,218	10,301	10,507	10,620	10,622	10,623	10,624	10,758	10,760
11,133	11,184	12,549	14,245	14,302	14,684	16,502	16,979		
<u>THERMAL RADIATION</u>									
2083	2900	4921	5000	5002	6029	6689	8014	8516	8788
9876	9895	10,252	10,774	10,775	11,209	11,345	11,531	11,593	11,609
11,660	11,792	11,821	11,842	15,174					
<u>TOLERANCE, ADAPTATION, ACCLIMATIZATION</u>									
<u>ALTITUDE AND PRESSURE</u>									
54	56	329	2435	2795	2805	2812	2836	2840	2842
3541	5575	6991	9859	9504	10,168	10,171	10,560	10,586	10,592
10,707	10,759	11,568	11,719	12,347	12,972	14,276	14,476	15,421	
<u>COLD</u>									
184	2641	3137	9569	9659	10,148	10,149	10,150	10,151	10,152
10,172	10,501	10,502	10,758	10,760	10,763	10,764	10,765	10,772	11,010
11,032	11,083	11,162	11,179	12,549	12,605	12,688	12,759	12,762	14,974
<u>HEAT</u>									
187	189	290	958	993	995	1757	1805	1901	2695
2757	3916	6856	9569	9850	9876	10,503	10,507	10,772	10,776
11,133	12,057	12,270	12,271	12,457	12,549	12,632	12,667	14,417	15,035

ENVIRONMENTAL CONDITIONS AND EFFECTS (CONT'D)**TOXIC ENVIRONMENTS**

763	1204	2478	2784	3055	3276	6329	6407	6708	6231
9739	9765	9869	9870	9874	10,208	10,209	10,216	10,229	10,722
10,724	11,434	11,520	11,569	11,944	12,755	12,796	13,207	14,599	14,991
15,031	16,308	16,856	17,794	14,796					

VENTILATION

2435	4489	5264	6930	9568	9875	10,168	10,372	10,374	10,512
10,562	11,660	14,302							

WATER

3792	6120	10,597	10,672	10,709	10,754	10,760	11,897		
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WINDBLAST, AIRBLAST, WINDMILL

31	3892	4606	9213	9655	10,620	12,240	12,697	14,477	14,652
14,669	14,683								

EQUIPMENT**DESIGN AND EVALUATION**

844	1307	2996	3068	3238	3315	3707	3820	3845	4247
4534	4586	4604	4793	5292	6619	6663	6664	6746	6777
8755	8991	9870	11,266	11,277	11,294	11,320	11,453	11,545	11,975
12,147	12,342	12,349	12,514	12,651	12,653	14,389	14,431	14,638	14,647
15,165	15,166	15,250	16,357	16,734	16,918	18,018			

EQUIPMENT USED IN HUMAN FACTORS RESEARCH

292	2191	2945	8579	9727	11,490	14,239	14,898	15,065	15,244
16,165	16,700	18,835							

ERROR**EQUIPMENT**

3238	10,482	16,656	16,994						
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HUMAN

193	821	2508	2972	3056	3668	3794	8548	9200	10,386
10,388	10,482	10,494	10,578	10,583	11,045	11,273	11,710	11,896	12,789
13,199	14,668	15,175	15,305	18,128					

ESCAPE FROM**AIRCRAFT**

223	400	508	584	813	2047	2353	2756	2839	2841
3273	3503	3892	4133	4293	4377	4609	5901	6241	6548
6857	6990	9332	8335	8360	8405	8409	8970	9129	9213
9226	9955	9957	10,016	10,031	10,045	10,047	10,056	10,057	10,078
10,368	10,721	11,048	11,260	11,315	11,481	11,557	11,563	11,706	11,877
12,153	12,533	12,697	12,720	12,912	12,930	12,975	13,190	13,273	13,274
14,215	14,356	14,490	14,652	14,816	14,959	15,385	16,242	16,296	16,492
16,535	16,715	16,785	16,920	18,065					

OTHER PLACES**SUBMARINES**

226	672	673	5759	11,839					
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EXERCISE AND PERFORMANCE

1451	1455	1805	2780	2852	2854	2862	3289	4141	4516
4540	4679	4854	6138	6400	6402	6410	6420	9751	9820
9880	10,135	10,139	10,143	10,227	10,304	10,510	10,757	10,771	11,076
11,137	11,358	11,709	11,795	12,401	16,175	16,695			

EYE**DOMINANCE**

936	939	6260	10,293	10,734					
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BYE (CONT'D)

147	559	946	962	1009	1236	2896	2974	3065	3066
3208	3252	3261	3453	3890	4437	4699	4902	4926	4938
4979	5060	5257	5382	5459	5572	5699	5872	6052	6231
6294	6233	8476	8515	8541	8695	9746	9801	9991	10,112
10,121	10,163	10,165	10,238	10,239	10,779	10,997	10,473	10,651	10,745
11,175	11,926	11,962	12,636	12,728	12,824	12,935	13,321	13,327	14,403
14,570	14,677	14,734	14,754	14,883	15,274	16,113	16,121	16,804	16,168
18,169	19,298	19,301	19,564	19,885					

E

FACILITIES

1501	2031	2032	2043	3554	11,408	11,414	11,415	11,455	12,234
12,390	12,523	12,553	12,562	12,652	12,692	12,804	12,817	14,137	14,234
14,352	14,423	18,104							

FLIRS

DISPLAY USE

2399	2436	6768	6823	8585	8586	8527	8589	8590	8594
8595	8550	9014	9055	16,857					

FINE FIGHTING

EQUIPMENT

2436	11,425	11,577	11,612						
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FLASH

BUSINESS

3632	3673	5585	6619	11,791	12,615	15,073	16,644		
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RATE

2464	3184	4295	4640	5571	5574	5585	6619	6695	8270
12,639	15,052								

VISIBILITY

152	4270	4640	12,639	16,302					
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FLICKER

7	561	1131	1306	1996	1997	2674	2697	2743	3193
3316	3527	3549	3768	3816	4618	5038	5039	5040	5258
5261	5352	5357	5449	5533	5534	5535	5536	5537	5538
5545	5546	5634	5836	5873	6030	6036	6329	3117	8249
8754	8763	8764	9009	9227	9228	9471	9503	9506	9702
9770	9775	9780	9782	10,297	10,598	10,731	10,735	10,773	10,779
10,799	11,000	11,784	11,827	11,901	12,135	12,142	12,230	12,254	12,513
12,679	13,035	13,166	13,337	13,409	13,417	13,435	14,395	14,525	14,548
14,706	14,754	15,186	20,417	3781					

FLIGHT

GUIDANCE SYSTEMS

3652	3845	6391	6805	8969	8982	9956	9990	11,056	12,156
12,269									

PERFORMANCE AND SKILLS

821	825	854	867	878	943	951	957	995	997
1178	1181	1183	1185	1232	1862	2506	2933	3105	3123
3306	3330	3710	3783	3784	3926	4174	4325	4393	4558
4635	4645	4689	4691	4836	5462	5518	5819	5884	5887
5890	5893	5918	5920	5924	5926	5932	5933	5934	5935
6065	6143	6391	6745	6750	6560	8344	8356	8367	8541
8650	8925	8969	9971	11,056	11,279	11,294	11,474	11,509	11,546
11,558	11,624	11,640	11,641	11,703	11,710	11,759	11,794	12,156	12,184
12,224	12,248	12,269	12,278	12,318	12,608	12,840	12,850	12,853	12,919
13,199	13,213	14,355	14,368	14,425	14,439	14,440	14,441	14,463	14,626
16,741									

SIMULATION

1444	1800	1826	1883	2870	2887	3068	3072	3073	3074
3075	3076	3105	3299	3657	3806	4438	4473	4474	4666
4699	4768	4776	4795	4802	5547	5681	5924	6219	6406
6702	6756	6862	6948	8328	8329	8330	8331	8334	8337
8338	8339	8341	8342	8347	8361	8364	8443	8558	8559
8649	8653	8654	8656	9024	9207	9209	9744	9959	10,276
10,277	10,546	10,689	10,707	10,844	11,043	11,079	11,125	11,277	11,303
11,533	11,625	11,771	11,822	11,840	11,913	11,914	11,915	12,085	12,269
12,318	12,382	12,383	12,695	13,108	13,215	14,000	14,008	14,180	14,270
14,300	14,379	14,425	14,692	14,913	16,493	16,744	18,115	18,155	

FLIGHT (CONT'D)**TESTING**

426	957	2209	3710	3889	4661	5819	5884	5887	6248
8443	10,723	11,364	11,417	11,544	11,546	11,712	11,714	11,715	11,773
11,845	11,940	11,973	12,156	12,269	13,215	14,430	14,913	18,024	

FLUORESCENT AND LUMINOUS MATERIALS

76	557	749	4302	4794	6179	6180	6486	8117	11,492
16,792	18,823	19,922							

FOG, HAZE, SMOG AND SMOKE

2656	5388	5606	10,056	11,670	11,969	12,482	12,918	14,410	14,946
18,619									

FURNITURE DESIGN

2325	5307	11,067							
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GAME OR DECISION THEORY

349	422	427	1414	1431	1809	2,01	2311	2331	5345
5653	5898	6924	6938	10,529	10,532	10,633	10,647	10,664	11,005
11,493	12,096	12,022	12,350	12,385	12,390	12,522	12,578	12,620	12,754
13,009	13,091	13,229	13,237	14,506	14,586	14,592	14,653	14,722	14,833
14,875	14,908	15,032	15,139	16,481	16,690	18,005	18,850		

GENERAL AND COMPREHENSIVE REFERENCES IN HUMAN FACTORS ENGINEERING

ARTICLES AND REPORTS

42	43	50	345	405	536	540	541	956	1096
1424	1438	1439	1589	1752	1858	1859	1925	2040	2041
2188	2451	2503	2549	2559	2964	3151	3195	3315	3338
3545	3714	3729	3820	3827	4151	4232	4261	4327	4535
4562	4586	4610	4766	4774	4778	4959	5249	5332	5402
5439	5471	5662	6344	6710	6754	6804	6810	6910	8550
8816	8990	9073	9082	9092	9093	9328	9841	10,037	10,042
10,055	10,100	10,101	10,102	10,103	10,104	10,173	10,563	10,564	10,569
10,582	11,131	11,141	11,266	11,284	11,305	11,383	11,399	11,465	11,620
11,699	11,702	11,823	11,837	11,943	12,017	12,047	12,200	12,206	12,234
12,274	12,315	12,316	12,394	12,395	12,397	12,408	12,425	12,431	12,437
12,460	12,476	12,764	12,774	12,785	12,966	12,984	12,987	12,988	12,997
12,998	13,141	13,178	13,182	13,192	13,290	13,335	14,108	14,246	14,279
14,341	14,349	14,399	14,448	14,450	14,462	14,505	14,605	14,621	14,674
14,812	15,217	15,275	16,056	16,058	16,363	16,674	16,727	16,989	17,516
17,518	18,022	18,699	18,776	18,788	18,953	19,678	20,246	20,247	20,248
21,212	22,056								

BIBLIOGRAPHIES

212	225	258	378	423	563	564	1021	1439	1441
1473	1474	1481	1490	1491	1495	1576	1600	1619	1709
1734	2032	2043	2521	2666	3476	3507	3511	3537	3554
3639	3864	3958	4444	4577	4764	4797	5308	5759	5917
6480	6497	6652	6775	6901	11,098	11,134	11,152	11,195	11,198
11,247	11,263	11,266	11,267	11,280	11,495	11,555	11,559	11,666	11,735
11,761	11,762	11,763	11,766	11,883	11,948	11,949	11,985	12,110	12,170
12,359	12,418	12,433	12,434	12,436	12,461	12,468	12,470	12,517	12,559
12,567	12,572	12,613	12,648	12,752	12,809	12,841	12,859	12,885	12,927
12,971	12,996	13,198	13,385	14,029	14,063	14,082	14,137	14,154	14,240
14,247	14,342	14,366	14,422	14,430	14,637	14,643	14,779	14,866	14,914
14,943	15,301	15,304	15,310	15,348	16,318	16,320	16,496	16,756	16,835
18,679	18,928	19,546	21,988	22,141	22,141				

BOOKS

275	374	402	926	4590	6430	11,084	11,984	12,358	
12,366	12,386	12,387	12,389	12,390	12,393	12,480	12,547	12,744	12,745
12,899	14,271	14,999	15,228	21,017	21,018				

FILMS

HANDBOOKS

1410	1727	2721	3862	5291	6563	12,967	14,239	14,285	14,862
18,084	18,714	18,793	18,819	19,868					

SYMPOSIA AND CONFERENCES

213	315	388	533	1413	1428	1429	2672	2786	2787
3831	4034	4579	4755	6412	6414	6454	6657	6753	6821
8442	11,165	11,224	11,788	11,824	11,933	12,432	12,527	12,601	12,710
12,814	13,270	13,271	13,272	13,279	14,389	14,521	14,624	14,738	14,875
16,057	16,273	18,007	18,112	18,171	18,755	18,756	18,764	18,771	21,006
21,043	21,053								

GRAPHS AND TABLES, DESIGN OF

950	1570	1572	1582	2911	3443	3832	3833	3848	3849
6192	8444	14,027							

GROUND SUPPORT EQUIPMENT

11,730 15,129 15,129 19,868

GROUPSAIR CREWS

3	327	997	1290	1381	2198	2203	2448	2620	2671
2870	3455	3710	3801	3945	4555	4621	4635	4645	4691
4946	5442	5523	5589	5961	6160	6218	6413	6733	6801
8318	9763	9875	9971	10,348	10,371	11,156	11,232	11,256	11,316
11,802	12,040	12,497	12,561	12,582	13,195	17,517			

COMMUNICATION

88	399	1288	1681	2198	2340	2494	3113	3191	3205
3439	3677	5594	5724	5944	5945	6087	6370	6967	6971
8144	8145	11,183	11,256	11,477	12,433	13,340	14,283	16,112	16,198

EFFECTIVENESS

327	360	361	436	856	922	1285	2203	3303	3312
3385	3801	4621	5480	5524	5578	5621	6316	6341	6843
8131	8316	9074	9523	11,014	11,156	11,232	11,256	11,678	11,802
11,826	11,981	12,040	12,497	12,499	12,561	14,161	15,552	18,554	

EVALUATION

360	361	1203	2203	5944	5945	6875	8131	9074	9281
10,541	11,316	11,678	11,802	11,930	12,499				

GENERAL REFERENCES

360	361	3515	4049	4772	5944	5945	6256	6843	8521
9181	9523	9661	11,749	11,383	12,108	12,988	14,604	16,362	18,005

INFANTRY SQUADS

361	436	922	3693	4813	5436	6572			
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INTERACTION

361	1290	1297	2107	2236	4206	4557	4621	6218	6971
6976	8883	11,183	11,768	12,015	12,312	12,478	12,568	16,436	16,447

LEADERSHIP

338	1425	1999	2567	2665	3899	3919	3920	3933	4049
4434	4621	4992	5377	5523	10,541	11,151	11,993	12,108	12,454
14,161	16,307	16,447							

MISSILE CREWS

14,150

MORALE

338	361	428	1297	2107	2665	3204	3312	3515	3710
4492	5280	5281	5528	5576	11,351	12,015	12,041	12,042	12,302
12,454	13,030	4992							

PROBLEM SOLVING

88	338	361	1288	1681	2494	3113	3677	3808	4333
4555	4556	4835	5528	5724	6107	6843	8058	8062	8445
8883	10,541	11,051	11,111	11,348	11,477	11,768	11,868	11,941	12,014
12,753	13,370	13,376	14,283	14,592					

PRODUCTIVITY

2107	3312	5510	5576	5579	6720	10,701	11,092	11,351	11,678
11,868	12,302	12,454	13,370	15,015	15,349	18,014			

RESEARCH TECHNIQUES

1523	2107	2340	2665	5944	5945	8521	11,015	11,016	11,348
11,767	11,932	11,941	12,497	13,425	14,161	14,325	14,592	16,168	16,174
18,393	18,552	18,553	18,554						

SELECTION

2236	3693	10,248	10,371	11,684	11,802				
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SHIP AND SUBMARINE CREWS

262	418	449	450	451	452	676	696	714	727
758	774	1231	3052	3054	3196	3210	3367	3371	3899
4725	5694	5944	5945	11,014	11,433	12,084	12,914		

GROUPS (CONT'D)

SIZE

9974 11,981 14,283 15,054

SPACE CREWS

19,252 13,067 13,202 14,727 15,219 16,418

STRUCTURE

338 1288 2236 2434 3677 3899 4555 5589 5673 5686
5727 5944 5945 6370 6720 11,015 11,016 11,092 11,156 11,183
11,477 11,684 12,020 13,291 13,340 14,592 15,349 16,317 21,285

TANK CREWS

1838 2567 5738 6749 11,447 12,604 14,025

THEORY

2107 3205 11,111 12,020 14,161 19,358 21,281

HANDBOOKS, MANUALS, TEXTS, DESIGN OF

376	1065	1068	2368	3803	3827	8142	8545	9535	9537
9538	9591	9643	11,714	11,715	11,742	11,781	14,227		

HELICOPTERS

320	1049	1269	1567	5368	3163	4795	6665	6733	6882
8345	8969	9205	10,012	10,086	10,276	10,277	10,588	10,685	11,294
11,494	11,650	11,714	11,715	11,845	11,892	11,978	11,979	12,044	12,065
12,151	12,235	12,329	12,333	12,916	13,109	14,297	14,340	14,400	14,691
14,775	15,118	16,184	16,283	16,285	16,287	16,486	18,001	18,266	19,688

HIGHWAY RESEARCH

875	876	1945	3513	5268	5270	5651	5831	6140	8226
9914	9927	10,106	10,225	10,233	10,234	10,235	10,687	11,904	11,966
12,076	12,137	13,094	14,794	14,803	14,804	14,805	14,901	15,420	16,237
16,238	16,239	16,240	16,241	18,034	18,037	18,038	18,043	18,637	19,678

HOUSES, DWELLINGS AND SHELTERS, DESIGN OF

3179	11,235	11,403	12,783	14,305	16,878	21,889			
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HUMANCONTROLLER

33	232	1271	1764	2078	2200	2349	2512	4535	5402
6795	6826	8508	8510	8511	10,064	10,752	11,205	11,509	11,604
11,965	12,318	12,351	12,458	12,624	12,739	12,747	12,877	14,176	14,195
14,503	14,587	14,650	14,666	14,795	14,802	14,852	15,093	15,303	15,304
15,308	16,248	18,762	18,763						

INFORMATION PROCESSING CAPABILITIES

160	805	1587	1830	2112	2982	3417	3729	3837	4126
4219	4228	4235	4235	4236	4510	4785	4823	6530	6605
6633	6760	6791	6846	6849	6871	6918	6919	6922	6924
6931	8045	8102	8480	8483	8484	8908	8952	9541	9646
9682	9693	9777	9778	10,112	10,167	10,279	10,290	10,359	10,391
10,393	10,479	10,492	10,497	10,752	11,106	11,604	11,928	12,016	12,060
12,126	12,150	12,307	12,466	12,598	12,785	12,789	12,842	13,374	14,793
15,037	16,054	16,055	16,099	16,269	16,865	18,128	22,087		

TRANSFER FUNCTIONS

937	938	953	960	964	965	985	1004	1010	1764
2916	4136	5805	6068	6143	6373	6795	6826	9971	10,401
11,533	11,604	12,049	12,458	12,877	13,168	14,176	14,195	14,223	14,666
14,755	14,894	15,093	15,124	15,305	16,583	21,357			

INDIVIDUAL FACTORS AFFECTING PERFORMANCEACCEPTABILITY OF AND ATTITUDE TOWARD EQUIPMENT AND TASKS

287	519	1043	2011	3710	4171	4482	4492	4798	5468
6436	6974	6975	8142	8221	9114	10,269	10,544	10,742	11,159
11,169	11,651	11,689	11,720	11,774	12,353	12,686	12,943	13,002	13,159
13,335	13,362	13,763	14,472	14,497	14,739	14,186	16,351	16,668	16,705
16,876									

ALLEGRESS

1027	1028	1030	1939	2016	2482	3421	8311	9864	12,331
12,464	12,515	12,951	13,283	20,349	20,417				

APTITUDE AND INTELLIGENCE

932	2002	2586	2926	2977	2978	4658	5076	5710	5747
6270	8321	10,746	10,819	11,636	12,212	12,995	13,238	15,313	

ATTENTION

639	1084	1556	1539	1540	1557	3536	3811	3861	4202
4205	5031	5082	6108	6109	6110	6133	8949	8950	9492
9650	9777	10,534	10,658	10,662	14,286	15,374	20,347	20,349	

EMOTION

511	649	1055	1153	1379	1385	2117	2168	3528	3710
3861	4496	4961	5222	5385	5797	6002	6003	6214	6345
6960	8249	8318	8321	8767	10,007	10,599	10,637	11,221	11,565
10,703	10,806	12,731	13,316	13,343	18,176	1386			

GENERAL

4841	5532	6256	7030	9837	9861	10,742	10,819	12,174	12,312
12,602	12,826	12,977	12,978	12,979	12,988	13,372	13,381	14,852	14,851
16,151									

MOTIVATION AND MORALE

9	10	49	639	782	1450	1456	2508	2657	3204
3460	3515	3715	4191	4209	4454	4492	4496	4807	4838
4992	5113	5146	5147	5222	5468	5475	5888	6108	6110
6210	6359	6971	8732	10,248	10,310	10,650	10,742	11,234	12,013
12,121	12,257	12,258	12,302	12,757	13,125	13,318	14,449	14,606	14,639
15,426	15,438	16,151	16,903	20,347					

PERSONALITY

154	262	643	1385	1386	2002	2575	2601	3527	3528
3919	4482	4985	4906	5062	5211	5550	5591	6315	6368
6528	6971	6984	8387	8391	9180	10,006	10,007	10,248	11,379
11,427	11,433	11,636	11,798	12,102	12,213	12,225	12,581	13,367	14,357
14,549	15,120	15,134	15,201	16,447	22,586				

SET

521	805	938	944	1536	1539	1540	1587	2468	2913
3861	3964	3967	3968	4224	4245	4638	4987	5006	5769
5770	5813	5835	5840	6163	6164	8054	8098	9291	10,544
10,634	10,654	10,658	10,660	10,667	11,636	11,816	11,928	12,125	13,023
13,040	14,606	14,728	14,850	14,948	16,447				

THOUGHT PROCESSES

108	294	484	838	932	1214	1587	2008	2164	2469
2586	2681	2769	2784	2913	2978	3004	3013	3216	3735
4035	4222	4224	4242	4243	4244	4245	4279	4334	4704
4711	4995	5231	5339	5346	5347	5376	5797	5841	5965
6238	6293	6335	6874	6955	8124	8245	8246	8247	8313
8386	8445	9489	9520	9665	9682	9691	9861	10,483	10,631
10,633	10,647	10,667	10,819	11,051	11,129	11,341	11,458	11,633	11,636
11,792	11,816	11,818	12,054	12,199	12,298	12,305	12,410	12,421	12,439
12,445	12,478	12,560	12,581	12,630	12,719	12,761	12,790	13,009	13,028
13,029	13,260	13,299	13,338	13,353	13,357	13,367	13,387	14,134	14,569
14,582	14,639	14,703	14,728	14,771	14,835	14,949	14,958	15,052	15,189
15,438	16,098	16,213	16,447	16,467	16,481	16,488	16,628	16,809	16,931
18,703	18,768	19,010							

INDUSTRIAL**EQUIPMENT, DESIGN OF**

2314	6907	6909	6953	6957	6955	8550	10,055	10,570	11,132
11,140	12,055								

INDUSTRY AND BUSINESS, HUMAN FACTORS ORIENTED STUDIES

32	41	2688	2996	2997	3379	3578	4492	5126	6728
6914	6949	6953	6962	7025	7026	9268	10,055	10,269	10,697
10,701	11,132	11,133	11,148	11,195	11,259	11,273	11,919	11,957	12,024
12,450	12,454	12,609	12,699	13,135	13,136	13,137	13,293	13,355	13,365
13,370	14,334	14,339	14,409	14,416	14,498	14,506	14,518	14,520	14,653
14,722	14,911	15,188	16,685	17,572	17,794	17,795	17,796		

INFORMATION**STORAGE AND RETRIEVAL SYSTEMS**

12,379	12,409	13,198	18,197	21,935
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INSTRUMENT LIGHTING**COLOR AND INTENSITY OF ILLUMINATION**

5	6	409	412	992	1000	1613	1794	1826	1922
3432	5849	6181	6185	6195	6858	12,940			

DIRECT LIGHTING AND FLOODLIGHTING

878	881	5472	5905	6178	6180	6185	6187	6200	9973
10,836									

EDGE AND RING

432	1483	3030	6181	6185	11,695
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ELECTROLUMINESCENT

12,534	14,934
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GENERAL

409	432	882	1783	1922	2727	3464	3654	3773	3983
6589	9322	9615	9648	10,098	10,099	10,836	11,439	11,600	11,692
11,876	12,290	12,492							

REAR

3422	3425	3453	4742	6187	6195	6200	11,867
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J - K**JOB PERFORMANCE AIDS**

277	2209	2389	3050	3108	5148	5283	6401	8545	11,741
11,879	11,997	12,106	14,312	14,586					

KINESTHESIS**CODING**

1108	1209	1210	1212	1215	1758	1766	1767	1768	5851
9672	9788	10,309	10,539	11,770	12,216	12,623	12,696	12,893	16,283

GENERAL REFERENCES AND BASIC DATA

154	406	1209	1210	1530	4269	4826	4862	4911	5014
5036	5151	5287	5432	5851	6272	6378	6693	8065	8273
10,454	12,245	12,246	12,251	12,351	12,393	13,014	13,017	13,130	13,249
13,281	15,331	18,778							

LABELS. DESIGN OF

3425	3453	6187	6191	8206	11,654	14,350
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LANGUAGE DESIGN

67	318	666	895	897	1292	1301	1471	1578	2164
2172	2286	2384	2385	2495	2500	2752	3041	3109	3745
4017	4331	4383	4380	4892	5196	5336	5337	5756	5806
6008	6092	6331	6424	6584	6940	6968	8013	8227	8386
8393	8880	8894	8933	8934	9642	10,850	11,301	11,337	11,368
11,371	11,530	11,557	11,746	12,011	12,086	12,089	12,103	12,182	12,209
12,266	12,415	12,416	12,635	12,657	12,923	13,097	13,254	13,346	14,381
14,394	14,619	14,705	15,075	16,188	16,277	16,630	16,677	16,957	19,103
19,237	19,558	20,276							

LIFE JACKETS

2991	5938
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LIGHTCOOLING

702	1353	3173	3184	3549	3789	4088	9753	9754	9980
9984	9985	10,084	10,106	10,297	10,348	10,600	10,638	10,669	10,741
10,837	11,097	11,926	12,069	12,528					

COLORS

17	5405	5877	5972	9973	10,069	10,072	10,521	10,794	10,801
11,755	11,790	12,388	15,139						

GENERAL

114	9973	17,519
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MEASUREMENT AND SPECIFICATION

117	1241	1253	1256	2048	2921	2956	3271	3768	4641
5405	5407	5440	5472	5489	5650	6,337	6146	6154	6912
9593	10,067	10,068	10,069	10,455	10,521	10,741	10,789	10,792	10,794
10,801	10,802	10,814	10,835	10,837	10,838	10,841	11,519	11,597	11,671
11,755	11,757	12,159	12,160	12,261	12,502	12,534	11,835	12,890	12,918
14,249	14,274	14,502							

NATURAL

1786	2696	5631	6097	6146	6154	6792	10,814	10,840	11,519
11,597	11,623	11,640	11,641	11,671	12,261	12,352	14,482	12,502	12,821
12,841	12,890	13,312	13,328	14,249	14,274	14,410	14,459	14,595	14,890
14,972									

PHYSICAL CHARACTERISTICS

1352	1359	2696	5406	6146	6154	6912	10,067	10,068	10,069
10,075	10,090	10,741	10,778	11,288	11,377	11,597	11,623	11,757	

SPECIAL TYPES

5	6	205	794	870	881	945	1356	1606	1726
2537	2689	3000	3049	3230	4710	5398	5489	5877	6083
6178	6179	6180	6330	6729	8451	8454	8754	8773	10,090
10,199	10,741	12,141	12,534	12,573	14,435	14,686	14,945	15,173	16,792
18,019	18,823								

LIGHTING SYSTEMSOUTDOORSAIRFIELDS

1732	1906	2640	2988	4001	4118	4296	4298	4299	4769
6674	6872	9380	9594	9958	10,044	10,070	11,053	11,287	11,288
11,696	11,733	12,167	12,328	12,820	13,140	15,156	15,433	19,918	

FLARES

12,443	14,446
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LIGHTING SYSTEMS (CONT'D)

OUTDOORS (CONT'D)

FLOODLIGHT

4458	4459	9578	10,199	11,892
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GENERAL

3652	9578	10,669	10,756	10,767	10,836	10,837	10,838	11,282	14,890
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HIGHWAY AND STREET

9578	9601	9618	10,066	10,092	10,106	10,778	10,835	16,237	16,238
16,239	16,240	16,241	18,619						

LOW LEVEL, HIGH SPEED FLIGHT

MAINTENANCE (MAINTAINABILITY)**BEHAVIOR, STRATEGIES**

354	451	480	498	561	2209	2404	2475	2680	3022
3356	3367	3389	3627	3802	4124	4820	5506	5835	6067
6289	6290	6302	6529	6873	6875	6942	6969	8085	9799
9804	10,087	10,860	11,276	11,285	11,364	11,489	11,624	11,685	11,741
11,755	12,035	12,125	12,560	12,990	13,289	13,411	14,049	15,135	15,191
15,216	15,287	15,288	2407						

DESIGN FOR

169	186	364	480	2680	4626	6321	9804	10,081	11,344
11,873	11,896	12,058	12,727	14,742	15,208				

EQUIPMENT, USED IN

1906	4451	9799	10,019	10,300	10,862	11,276	11,285	11,741	11,765
11,896	11,997	12,653	12,815	14,132	14,742	14,756	15,191		

GENERAL REFERENCES

449	488	2276	3153	3507	3532	3627	4029	4255	4822
5694	6454	6942	8138	9804	10,019	10,300	12,474	12,488	12,489
12,567	12,783	12,784	12,795	12,845	12,914	14,088	14,169	14,517	14,939
15,066	15,175	16,825	19,234						

SYSTEMS

28	520	4451	5506	6589	6942	9804	11,276	11,285	11,323
11,396	11,765	11,847	12,694	13,286	13,289	14,284	14,907	14,942	15,080
15,133	15,135	15,320	16,435	16,595	18,099	19,810			

MAN-ASSIST**MAPS AND CHARTS, DESIGN OF**

417	945	950	979	1238	1564	1880	1921	2341	2389
2689	2992	3247	3419	3763	3915	4000	5453	5740	5741
6058	6457	6660	6671	6995	7088	9117	9121	11,085	11,281
11,283	11,444	11,515	11,516	11,517	11,518	11,521	11,652	11,974	12,223
12,267	12,325	12,422	12,751	12,773	12,880	12,976	16,304	16,417	18,008
21,952									

MARKSMANSHIP

198	215	436	2083	3162	3374	3584	3693	5304	5306
6740	6765	8218	13,169	15,038					

MASKS

413	1675	2883	3278	4005	5622	5895	6434	5501	6571
6638	6954	9123	9870	10,366	10,370	10,595	11,007	11,109	11,387
11,571	11,598	11,891	12,531	12,825	14,233	14,265	14,725	18,966	18,967

MATHEMATICAL AND STATISTICAL METHODS

285	289	646	743	769	1004	1096	1299	1310	1414
1416	1431	1562	1579	1711	1855	1857	1953	2046	2159
2164	2585	2916	3348	3364	3413	3449	3465	3678	3682
3728	3733	3943	3946	3991	4259	4704	4837	5065	5300
5601	5688	5766	5767	5786	6038	6143	6426	6527	6765
6876	6913	6920	6926	6998	6999	8297	8314	8487	8673
8951	9544	9725	10,516	10,699	10,700	10,853	10,854	11,050	11,110
11,111	11,205	11,235	11,265	11,357	11,676	11,687	11,841	11,965	12,020
12,133	12,188	12,336	12,456	12,503	12,578	12,582	12,585	12,603	12,619
12,931	12,932	12,936	12,937	12,945	12,977	12,978	12,992	12,994	13,047
13,050	13,077	13,086	13,172	13,286	13,287	13,292	13,295	13,339	13,341
13,342	13,347	13,345	13,356	13,358	13,420	13,424	13,427	14,306	14,382
14,390	14,391	14,438	14,468	14,541	14,612	14,615	14,696	14,731	14,768
14,792	14,799	14,811	14,813	14,820	14,834	14,892	14,908	14,969	15,053
15,056	15,150	15,171	15,203	15,245	15,270	15,279	15,281	15,283	15,285
15,286	15,312	15,365	15,409	16,097	16,117	16,353	16,533	16,394	16,557
16,585	16,623	16,631	16,640	16,657	16,679	16,681	16,693	16,809	16,815
16,858	16,864	16,875	16,953	17,462	18,106	18,280	18,394	18,839	19,570
19,719	20,271	21,213							

METHODS AND TECHNIQUES FOR STUDY AND ANALYSIS OF TASKS, OPERATIONS, AND SYSTEMS

CRITICAL INCIDENT TECHNIQUE

4212 5425 5833 6210 6278 6323 13,371 16,307 18,271

PRECISION ANALYSIS

1414 14,11 1857 2069 3158 3934 5231 5518 10,633 10,647
10,664 14,508 15,225 18,850

GENERAL REFERENCES

315 758 2345 3952 4515 5539 5766 5767 6320 6412
6414 6953 9093 9431 9841 10,586 11,141 11,548 12,250 12,390
12,454 13,106 14,538 15,183 15,283 15,285 15,286 21,058

JOB AND TASK DESCRIPTION AND ANALYSIS

3 58 268 271 277 315 450 451 485 519
630 1124 1232 1511 1517 2315 2334 2368 2418 2419
2566 2567 3122 3456 3463 3526 4801 4822 5932 5933
5934 5935 6620 6621 6715 6801 6824 6943 6962
9706 10,568 10,571 10,686 10,692 10,593 11,232 11,273 11,316 11,613
11,738 11,880 12,004 12,035 12,037 14,515 15,583 16,356 16,433 16,565
18,558

OPERATIONS RESEARCH

164 744 793 812 843 1073 1871 2346 3470 3858
4003 4581 10,302 11,113 11,730 12,360 12,386 12,387 12,396
12,522 12,288 13,291 13,293 13,294 14,653 15,119 15,420 16,623 16,858
17,572 21,006

OTHER METHODS

3 271 758 1231 2320 2995 3068 3132 3756 4051
5083 5167 5658 6589 6757 8131 9058 9706 9711 10,552
11,232 11,306 11,599 11,730 11,736 11,830 11,858 11,957 12,024 12,035
12,119 12,226 12,421 12,636 12,913 13,335 13,371 15,399 16,124 16,422
16,612 16,643 16,685 17,079 18,024 19,121 19,696 21,014 21,952

PHOTOGRAPHIC TECHNIQUES

1235 2965 3633 4466 5819 5832 6927 10,735 11,253 11,700
12,407 12,622 12,880 12,974 13,181 14,322 14,514 14,518 16,605 18,002

QUEUEING

2490 2957 6477 6987 11,153 11,327 11,353 11,668 11,811 11,847
12,392 12,393 13,269 14,939 14,965 15,366 15,367 15,368 16,685 16,855

TIME AND MOTION STUDY

524 1552 2375 3526 3613 3759 3761 3762 3870 6350
8673 8816 10,565 10,686 10,682 10,729 11,453 11,801 11,919 12,226
14,515 14,517 14,520

MILITARY STANDARDS AND SPECIFICATIONS

335 11,131

MINIATURIZATION, EQUIPMENT

14,513 14,960 14,963 17,076

MOTION, EFFECTS OF

ACCELERATION AND DECELERATION

GENERAL REFERENCES

1007 1322 1323 1436 1437 1438 1785 2004 3650 3888
4105 4763 4958 5045 5204 5699 6149 6241 6449 6518
8695 9662 9699 9713 9726 9741 10,013 10,228 10,365 10,377
10,383 10,386 10,560 10,561 10,589 10,671 10,673 10,675 10,676 10,712
10,749 11,278 11,286 11,855 11,937 12,201 12,238 12,424 12,467 12,479
12,597 12,837 12,952 12,967 12,989 14,266 15,157 16,802 16,884 19,772

MOTION, EFFECTS OF (CONT'D)

ACCELERATION AND DECELERATION (CONT'D)

PROTECTION FOR

1205	1967	3474	3502	3541	4746	4749	4763	6532	6538
6557	9662	9699	9713	9726	9741	10,013	10,228	10,365	10,377
10,383	10,386	10,590	10,711	11,664	12,000	13,196	16,600	16,807	

TOLERANCE FOR

1967	2106	2409	2737	2763	4122	4128	4609	4763	4909
5865	6532	6557	6827	8454	9655	10,008	10,376	10,558	10,587
10,672	10,673	10,710	10,749	11,229	11,278	11,992	12,000	12,276	12,278
12,337	12,357	12,413	12,449	12,520	12,697	12,712	12,720	12,756	12,768
13,051	13,069	13,216	13,218	14,115	14,315	14,372	14,373	14,375	14,424
14,545	14,684	14,704	14,941	14,970	15,036	15,395	16,688		

TYPES OF

1762	2763	3372	3474	5627	5628	5630	6650	6652	9655
9662	9713	9726	10,561	12,362	14,316	14,489	14,652	14,782	14,918
14,941	16,296	16,316							

AMPLITUDE AND FREQUENCY

2413

EQUIPMENT AND METHODS

1436	1437	1438	2882	3275	5311	5317	6461	6513	6540
9699	10,377	10,844	11,822	12,449	12,655	12,709	12,720	14,231	14,535
14,692	14,982	15,395							

GENERAL REFERENCES

6480	9695	10,383	10,547	12,363	14,215				
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OSCILLATORY

10,745	14,316	16,493	16,807						
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ROTATION

1182	2256	3731	3740	4313	4314	4911	5108	5288	5311
5315	5321	5659	5730	5733	5736	6149	6540	6833	9785
9791	10,397	10,496	10,547	10,676	10,745	11,229	11,808	11,822	12,892
13,026	14,443	15,019							

SICKNESS

47	791	1300	1429	2413	2474	2675	2737	2770	2771
2773	2806	2807	2850	2866	2876	2881	2882	2902	3246
3255	3275	3311	3895	3896	4393	5288	5960	5963	5964
5968	5973	5989	5990	5996	5997	6010	6012	6013	6014
6015	6022	6023	6024	6025	6026	6027	6075	6084	6085
6086	6368	6409	6495	6496	8379	8380	8381	8382	8750
8751	9215	9249	9898	10,003	10,471	10,745	11,197	11,565	11,592
11,619	11,834	12,296	12,451	13,214	14,796	14,864	15,019		

VESTIBULAR FUNCTIONING

1179	2256	3650	3731	3740	4313	4314	5730	6149	8695
9785	9791	10,671	11,229	11,286	12,189	14,741			

MOTOR PERFORMANCE AND SKILL

AIMING

198	458	2083	2750	2751	2769	2998	3656	4575	4589
5569	6062	8218	10,365	10,482	10,648	11,690	11,732	11,945	12,564
13,169	20,882								

COORDINATION OF LIMBS

652	1216	2193	2847	3490	4919	5238	6202	6275	6389
9505	9818	9820	9857	10,746	11,551	12,459	12,556		

MOTOR PERFORMANCE AND SKILLS (CONT'D)

DIMENSIONAL ANALYSIS

178	238	241	393	394	395	458	2131	2235	3633
4361	6311	8099	8115	8134	8223	8761	9712	9719	9721
9728	9818	10,296	10,453	10,523	10,642	10,692	10,729	11,207	11,801
12,622	13,113	14,404							

EQUIPMENT AND METHODS USED IN STUDY OF

84	241	247	867	998	1088	1614	1621	2013	2054
2445	3997	4824	4995	5808	5208	6249	6266	6267	6291
6456	8118	8761	9711	10,494	10,540	10,600	11,078	11,235	11,562
11,709	11,783	11,815	13,181	14,925					

GENERAL REFERENCES

52	53	238	618	908	1161	1322	1397	1075	2152
2166	2231	2578	2733	3491	3872	4265	4552	4949	5100
5396	5643	5691	5960	5965	6045	6046	6047	6048	6138
6139	6217	6360	6389	6753	8059	8102	8178	8383	9473
9670	9711	9717	9728	9818	9888	10,159	10,160	10,227	10,465
10,466	10,472	10,474	10,479	10,523	10,540	10,554	10,650	10,655	10,681
10,739	10,747	11,210	11,254	11,551	11,814	11,854	12,059	12,109	12,268
12,599	12,645	12,696	12,700	13,117	13,118	13,385	14,210	14,393	14,485
14,737	18,769								

HANDEDNESS

391	1616	1929	3270	6694	8250	9359	10,293	11,776	12,758
13,116	13,155								

INVOLUNTARY REFLEXES

406	1563	1927	3100	4165	5084	5085	8178	8188	9348
9449	11,249	11,752	11,756	11,806	11,884	11,945	12,555	12,564	12,616
12,622	12,625	12,656	12,766	14,785	15,238	19,146			

MANUAL DEXTERITY

168	1323	1616	1849	2165	3340	5807	5827	5839	6203
6217	6224	6448	6748	8063	8133	8225	8730	9523	9684
10,150	10,362	10,622	10,623	11,120	11,179	11,586	11,679	12,280	12,303
12,323	12,485	12,991	13,413	15,039	18,058				

POSITIONING MOVEMENTS

40	111	112	176	177	236	1006	1108	1109	1123
1188	1209	1210	1214	1215	1216	1217	1849	2170	2189
2485	2513	2529	2650	3619	3870	4958	5067	5569	5669
6113	6206	8273	8678	9493	9705	10,692	11,095	11,776	11,783
11,815	13,317	14,436	15,296	15,299					

REPETITIVE MOVEMENTS

35	36	39	458	475	519	567	570	1211	2068
2129	2194	2230	3679	4058	4709	4896	5044	5743	6070
6474	6713	6723	9023	9716	10,649	11,094	11,935	14,533	18,058

SERIAL MOVEMENTS

370	568	569	571	652	797	943	1007	2013	3649
4999	8103	10,540	10,693	11,664	11,994	12,079	12,700	12,924	13,024
13,116	13,144	13,280	14,177	14,323	15,225	16,121	16,612	16,613	16,895

SPEED AND PRECISION

1214	5085	5086	5259	6051	6394	8678	10,553	10,554	10,600
12,991	14,436								

STEADINESS (AND TREMOR)

2083	2750	2769	4147	4575	6139	8118	8218	9506	9528
9860	9909	10,649	15,144						

THROWING

1647	2751								
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NAVIGATIONAL AIDS AND SYSTEMS

224	630	692	1185	1573	1690	1781	2062	2523	2525
2707	2711	3002	3047	3506	3652	3915	4009	4199	4503
4597	4739	5740	5741	6457	6901	6886	6925	5743	11,154
11,281	11,283	11,448	11,516	11,517	11,518	11,521	11,588	11,612	11,705
11,732	11,809	11,849	11,976	12,045	12,221	12,223	12,239	12,267	12,330
12,505	12,651	12,751	12,753	12,773	12,835	12,804	12,916	14,744	14,945
14,946	15,164	16,304	16,305	16,486	16,474	16,874	16,922	18,008	

NEURAL THEORY

5069	5556	8464	10,577	10,624	10,625	10,726	10,737	10,813	11,267
11,901	12,448	13,072	13,083	13,152	14,207	14,680	16,763		

NUCLEAR OPERATED EQUIPMENT AND SYSTEMS, PROBLEMS OF

10,040	12,539	12,615	12,680	12,813	13,030	13,197	14,408	14,591	14,906
18,109	18,110	18,162	18,193	18,386	21,440				

NUMERALS, LETTERS, AND CHARACTERS, DESIGN OF

162	197	417	544	545	879	942	1001	1003	1090
1389	1575	1580	1603	4000	4054	4056	4376	4742	4759
4969	4978	4982	5581	5583	6032	6037	6056	6058	6164
6192	6671	6721	8201	8229	8304	9430	9537	9538	9718
9733	10,477	10,545	10,549	11,093	11,380	11,421	11,803	12,150	12,374
12,375	12,643	12,839	13,002	13,098	16,331	16,985	18,950		

OPTICAL AIDSBINOCULARS

595	775	779	1935	3051	5046	5799	8766	10,350	11,289
11,472	11,549	12,146	12,833	12,947	14,358	14,595	15,266	18,019	

GLASSES, SPECTACLES, AND GOGGLES

12	115	126	675	681	684	700	701	703	708
853	1255	1355	1359	1365	1369	1649	1877	2701	3535
4291	4631	4821	5061	5426	5622	6083	6179	6421	8107
10,107	10,241	10,508	11,290	11,536	11,540	14,224	14,376	14,730	15,073
15,145	15,167	16,644							

LENSES AND FILTERS

596	679	703	768	773	1242	1246	1247	1248	1249
1250	1251	1252	1253	1255	1257	1258	1259	1260	1261
1262	1263	1264	1265	1266	1267	1268	2793	2889	3161
3242	3464	3535	4594	5061	5243	5426	5622	6179	6445
8107	9978	9986	10,241	11,122	11,317	11,318	11,607	12,874	12,969
13,139	15,043	15,172	19,253	22,737					

PERISCOPES

288	854	1690	2547	3544	4379	4661	4860	5099	6925
11,160	11,363	12,983	16,672						

RANGE FINDERS

1454	1458	1656	1672	1806	2071	2074	2990	3091	6416
6766	9924	10,014	11,068	11,454	11,602	11,731	12,807	14,318	

SIGHTS AND RETICLES

946	1656	1670	1672	1957	2074	2504	2505	2638	2735
3504	3584	3713	3879	3947	4589	5553	6740	6767	6784
10,014	11,154	11,160	11,189	11,454	11,819	11,832	12,444	12,801	12,947
12,948	13,139	13,169	13,285	14,454	14,536				

TELESCOPES

603	1834	2071	3157	3955	3956	5099	11,190	11,290	11,292
11,512	11,549	11,623	12,831	12,832	12,947	13,187			

VISORS

9996	9997	10,002	10,038						
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ORIENTATION IN SPACE, FACTORS DETERMINING

136	154	317	1080	1735	1862	1874	1875	2135	2136
2137	2138	2150	2772	3168	3169	3275	3650	3888	4174
4313	4314	4536	4538	4689	4861	5045	5149	5151	5204
5312	5315	5376	5462	5628	5632	5730	5731	5733	5734
5736	5744	5745	5796	5950	6216	6250	6251	6657	6688
8163	8265	8282	9222	9689	9736	9745	9878	10,386	10,495
10,547	10,616	10,709	11,286	11,808	11,835	11,893	12,960	13,026	13,032
13,054	13,205	13,234	14,440	14,626	14,663	14,921	18,284		

OVERLAYS

PACKS AND CARRIERS

1337	4400	4404	4422	4465	4466	6054	6511	6703	6704
11,778	11,779	11,780	12,535	12,883	12,917	15,102	15,110	15,113	16,275
16,734									

PAIM

1336	1974	2140	2375	3253	4138	4572	4665	4890	5000
5002	5093	5675	5676	5677	5678	5735	5826	6029	6418
7014	8079	8517	8747	9771	9882	10,005	10,247	10,255	10,592
10,774	10,775	11,231	12,367	12,661	12,662	13,207	14,557	14,763	1975

PAINTS, FINISHES AND SURFACES

76	2698	2912	3046	6106	8991	9022	10,202	12,484	12,864
13,331	14,331	14,686	14,940						

PANEL AND CONSOLE DESIGN

AIRCRAFT AND SPACECRAFT

159	879	1565	1788	1791	1818	1819	1824	3986	4367
4388	6184	6185	6187	6191	8969	9648	9963	10,381	11,253
11,303	11,692	11,746	11,771	11,794	12,239	12,641	12,741	12,814	14,238
14,297	14,691	14,745	14,841	15,306	16,499	19,917	21,057		

GENERAL REFERENCES

1117	8832	11,253	12,543	14,350	14,359	14,420	16,824		
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KEYBOARD DESIGN

847	1936	1937	2254	3159	3661	3999	8205	9029	10,357
15,250	15,311	18,134	19,102						

LAYOUT

1117	2084	2113	2513	2630	2656	3661	3929	4104	4192
4286	4809	5292	6575	6672	9031	9345	10,381	10,696	11,044
11,303	11,803	13,188	14,238	14,292	14,370	14,691	14,788	14,841	14,938
15,142	15,307	16,221	17,076						

SHIPS AND SUBMARINES

5292	12,010								
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SPATIAL DYNAMICS, FREQUENCY OF USE OF COMPONENTS, AND ORDER OF USE

940	955	962	963	981	984	991	1009	1117	2974
3560									

VEHICLES

PARACHUTES

1736	3042	3273	5938	6650	11,557	11,563	11,644	11,742	12,152
14,098	14,490	16,245	16,275	16,280	16,316	16,972			

PERCEPTION

OF BODY MOVEMENT AND POSITION

136	494	811	1182	1853	2114	2135	2136	2137	2138
2150	2772	3070	3168	3169	4538	4908	4909	4911	4912
5149	5151	5204	5312	5315	5376	5796	6216	6251	6687
8265	9788	11,346	11,808	13,032	13,234	18,266	21,438		

GENERAL REFERENCES

149	212	1980	2137	2583	2652	2687	2733	2932	3069
3081	3131	3853	4223	4624	4719	4721	5131	5516	5532
5602	5687	5770	5840	5897	6019	6131	6144	6404	6883
7050	8013	8160	8162	8166	9900	10,458	10,464	10,534	10,601
10,639	10,654	11,996	12,157	12,661	12,793	13,028	13,146	13,155	13,300
13,313	13,315	13,320	13,360	13,366	13,431	14,879	18,202	18,540	19,546
407									

ILLUSIONS

22	29	131	192	798	1091	1136	1735	2090	2357
2719	3090	3135	3275	3635	4007	4310	4639	4707	5045
5130	5378	5448	5462	5496	5612	5627	5630	5730	5733
5736	5772	5850	6770	8243	10,403	10,528	10,538	10,603	10,616
10,660	10,665	10,720	10,732	10,787	11,175	12,428	12,805	12,892	13,027
13,297	13,415	13,439	14,439	14,441	14,443				

PERCEPTION (CONT'D)**THEORY**

944	3442	3734	4202	4624	4846	4656	4908	4909	4910
4911	4918	4945	4954	5062	5147	5149	5208	5209	5229
5323	5867	6033	6378	6382	8009	8033	8037	8040	8041
8042	8163	8464	9778	10,627	10,635	10,737	11,893	12,515	12,690
13,079	14,857								

PERSONNEL**ASSESSMENT**

68	214	283	343	438	622	696	714	1203	1231
1290	1381	1416	1511	1517	1518	2133	2345	2486	2694
3452	3459	3532	3595	3625	3693	3790	3801	3802	4014
4029	4051	4276	4309	4325	4337	4515	4837	5148	5214
5694	5837	5838	6278	6320	6323	6875	6975	6977	11,104
11,224	11,316	11,599	11,880	12,084	12,108	12,168	12,169	12,259	12,293
13,055	13,372	13,381	14,105	14,126	15,276	15,289	16,596	17,077	21,055

CLASSIFICATION AND ASSIGNMENT

270	502	1282	2197	2448	3158	3790	4755	5148	5818
6586	6946	11,378	11,562	12,259	12,489	12,582	12,961	13,372	13,381
14,149	14,235	18,558							

GENERAL REFERENCES

382	502	1119	2210	2521	4444	4747	4755	10,701	11,224
11,575	11,595	14,506	14,747	21,037					

MANAGEMENT

283	2115	6946	12,257	12,454	12,779	12,851	12,855	14,293	14,409
14,609	15,137	15,411	16,385						

SELECTION

85	191	326	339	418	501	502	696	721	774
877	1012	1434	1655	2811	2847	3490	3543	3693	3790
3797	4042	4164	4240	4254	4433	4559	4956	5194	5818
6314	6909	6914	6921	6936	8114	8663	11,224	11,443	11,798
12,169	12,241	12,259	12,469	12,789	14,093	14,107	14,144	14,159	14,409
14,928	14,930	14,942	15,135	16,385	16,423	16,596	16,825	19,696	

SUBSYSTEM CONCEPTS

339	2995	3158	5221	11,575	11,777	12,694	14,116	14,150	14,583
14,780	14,895	16,190	16,433	18,817					

PHOTOGRAPHS, PHOTOGRAPHY AND PHOTO INTERPRETATION

488	764	2359	2399	2424	2588	3309	3576	3849	4521
4595	4596	4598	4663	4664	4765	4793	5403	5408	5942
6735	6927	6989	8579	9926	9986	9987	9988	10,865	11,167
11,253	11,382	11,400	11,440	11,457	11,607	11,626	11,974	12,139	12,147
12,148	12,225	12,546	12,633	12,677	12,685	12,728	12,974	13,033	13,123
13,365	14,322	14,331	14,363	14,518	14,701	14,703	14,729	14,734	14,957
15,041	15,146	15,163	16,302	16,409	16,410	18,970	21,901		

PHYSICAL FITNESS AND PERFORMANCE

913	917	1124	1592	1593	1653	2117	2811	2827	2828
2829	2830	2832	2833	2851	2852	2854	2855	2859	2862
2863	3162	3301	3534	4213	5940	6064	6224	6276	6371
6420	8225	9183	9185	9750	9751	9865	9879	9887	10,304
10,504	10,765	10,766	10,776	11,627					

PHYSIOLOGICAL CAPACITIES**ACCLIMATIZATION**

2812	2842	3514	3916	5157	5158	5575	6970	9850	9876
10,148	10,149	10,171	10,172	10,501	10,502	10,507	10,759	10,763	10,764
10,765	10,772	10,776	10,866	11,010	11,236	11,523	11,719		

PHYSIOLOGICAL CAPACITIES (CONT'D)

BREATHING

221	226	671	994	1887	1962	2875	4679	5297	5368
5973	6018	6049	6060	9449	9735	9879	9885	9910	10,135
10,146	10,147	10,170	10,618	10,706	10,755	10,758	10,761	11,571	11,601
11,629	12,314	12,340	12,369	12,538	12,780	12,952	13,058	13,131	14,267
14,384	14,489	14,726	14,916	18,106	5953	10,757			

CARDIO-VASCULAR INDICES

1336	2003	6016	6049	6060	6372	9185	9879	9880	10,171
10,561	10,591	10,755	10,762	10,771	10,776	11,593	12,218	12,519	12,775
12,837	12,972	13,201	14,115	14,372	14,782	14,968	16,476		

ENERGY EXPENDITURE

2780	3726	4398	4683	4685	5104	5157	5158	6367	6505
6510	6595	6854	9469	9901	10,139	10,142	10,268	11,170	11,688
11,778	11,779	11,786	11,961	12,176	12,361	16,661	22,756		

GALVANIC SKIN RESPONSE

5429	5517	6426	8086	8184	9449	9792	11,786	12,109	12,424
12,595	12,659	13,006	13,041	13,157	13,316	13,429	13,437	14,237	14,352
14,749	16,388	16,663							

GENERAL REFERENCES

802	1498	3336	3537	5907	6130	6393	6953	8676	9552
9655	9865	10,169	10,292	10,571	10,577	10,592	11,267	12,270	12,515
12,889	3,071	13,110	13,215	13,244	14,458	14,485	14,718	14,888	14,896
14,917	7,947	16,233	16,867	20,275					

HEART RATE

2757	5110	5158	6049	9185	9879	9880	10,139	10,759	10,771
11,719	11,786	12,109	14,772						

METABOLIC RATE

2646	3441	6268	6338	9750	9820	9897	10,145	10,305	10,511
10,594	10,621	10,772	11,137	13,063					

MUSCLE POTENTIAL

238	567	568	569	570	571	1584	1927	2835	5309
6060	6137	6332	8002	9575	9688	9819	9820	10,744	10,862
11,073	11,074	11,181	11,213	11,214	11,215	11,216	11,249	11,255	11,582
11,786	11,859	11,860	12,193	12,356	12,515	13,281	13,352	20,348	

OXYGEN CONSUMPTION

2801	2803	2804	2836	2840	2854	3124	3351	3531	3602
3603	4039	4204	4540	6049	6247	6330	9236	9820	9878
9880	9892	10,135	10,139	10,145	10,510	10,594	10,618	10,621	10,724
10,748	10,750	10,755	10,757	10,758	10,759	10,761	10,769	11,108	11,630
11,719	11,861	12,105	12,227	12,401	14,968	15,121	16,698	16,979	

PHYSICAL FITNESS

2827	2828	2829	2830	2851	2854	2855	3534	4213	6049
9183	9750	9820	10,765	10,776	11,567	11,627	11,708	11,719	11,795
12,283	12,469	14,115	14,298	15,115	16,828	16,971	21,055		

TEMPERATURE, BODY

168	1498	1753	1984	1985	2646	2757	3756	4203	4549
4675	4684	4939	5000	5110	5157	5158	5626	5721	5876
6028	6029	6059	6060	6245	6566	6666	6982	8014	8747
9800	9886	9902	9906	10,137	10,138	10,169	10,172	10,250	10,503
10,506	10,620	10,621	10,622	10,624	10,653	10,760	10,772	11,209	11,583
11,586	11,587	11,593	11,601	11,609	11,646	11,660	11,680	11,842	12,105
12,124	12,273	12,283	12,327	12,335	12,494	12,669	12,816	14,357	14,568
14,772	14,822	14,877	14,974	15,111	15,114	15,153	15,162	16,359	16,502
16,979	18,153								

PHYSIOLOGICAL EQUIPMENT AND METHODS

ELECTROCARDIOGRAM

8	840	4516	8449	10,197	10,561	10,562	10,749	13,213	14,241
14,708									

PHYSIOLOGICAL EQUIPMENT AND METHODS (CONT'D)

ELECTROENCEPHALOGRAPH

1351	1385	1386	3421	5664	5665	5949	5962	6329	8311
8319	8767	9877	10,562	10,596	12,123	12,802	14,287	14,485	14,947

20,350

ELECTROMYOGRAPHY

567	980	3086	3421	3649	5465	7002	9575	9688	10,239
10,649	10,693	10,744	10,758	11,073	11,074	11,213	11,214	11,215	11,216
11,249	11,255	12,134	13,044	14,556	15,291	15,425	15,426	16,119	

ELECTRORETINOGRAM

134	147	158	200	3067	5144	9807	12,052	12,354	12,687
12,721	12,777	14,950	16,231	16,232					

GALVANOMETER

155	1872	2681	3253	5675	5678	6214	6426	10,596	10,626
11,905	12,596	16,388							

GENERAL REFERENCES

155	3179	3334	61,7	6393	9841	10,728	10,774	11,267	12,669
12,712	12,889	13,217	14,260	14,272	14,298	14,326	14,403	14,539	14,570
14,850	15,149	18,966	18,967	19,278	21,042				

METABOLIC MEASUREMENT

155	221	2875	3124	3475	4288	4547	4675	4685	9563
9568	9727	9735	10,141	10,142	10,146	10,596	10,565	10,619	10,728
10,749	10,755	10,762	11,030	11,500	11,585	11,586	11,646	12,185	12,311
12,336	12,486	12,797	13,406	14,267	14,492	15,034	15,100	15,272	15,282
16,566	19,015								

OTHER METHODS AND EQUIPMENT

8	155	1753	2379	2524	2774	2878	3737	3740	4547
4685	5465	5949	6214	6759	6963	10,114	10,165	10,170	10,158
10,596	10,618	10,728	10,744	11,002	11,567	11,580	11,990	13,041	13,059
14,241	15,121	16,663	3275						

TELEMETRY

6997	14,527	14,708	16,221	19,708					
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PORTABILITY, DESIGN FOR

5900

PRINTED MATERIAL, LEGIBILITY, AND READABILITY

GENERAL REFERENCES

942	1236	1571	1921	2389	2452	2911	3446	3861	6053
6294	6737	6786	8142	8174	8626	9117	9118	9121	9433
9720	11,145	11,526	11,756	11,757	12,644	14,607	14,654	14,694	14,767

18,950

READABILITY, ASSESSMENT OF

1674	2119	2282	2310	3104	3446	4232	4506	4507	4899
4902	4926	4927	4928	4932	4934	4938	4969	4971	4973
4977	4978	4981	4982	5073	5159	5180	5584	6058	6192
6294	7027	8101	8112	8113	8204	8444	8476	8482	9531
9532	9535	9537	9538	9591	9643	9707	9720	9733	9986
9987	9988	10,346	10,545	10,549	11,752	11,918	11,926	11,934	12,646
14,211	14,350	14,654	14,695	14,924	18,844	21,075			

PROGRAMMED INSTRUCTION

15,143	18,559	18,560							
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PROLONGED CONFINEMENT

9	10	2620	2671	9744	11,869	12,418	13,030	13,195	13,202
13,372	13,381	14,606	15,157	15,219	16,260	16,437			

PROSTHETICS

522	576	1233	1659	5562	6305	8130	11,139	11,161	12,125
12,565	12,684	12,898	12,907	12,908	12,911	14,194	14,289	14,412	14,786
14,917	15,154	17,523	17,525	19,832	19,973				

PSYCHOPHYSICS**GENERAL REFERENCES**

1463	1952	2008	2469	2508	3081	5498	5529	5706	8080
8090	8091	8141	9122	9679	9704	9847	10,410	10,464	11,127
11,461	12,281	12,305	13,347	13,349	13,431	14,212	14,689	14,880	15,212
15,283	16,045	19,570							

METHODS

769	860	1097	1118	1127	1899	1900	1953	2508	3766
3978	4828	4832	5003	5014	5401	5529	5697	6378	6382
6871	8020	8027	8220	8292	8397	8398	8399	8437	8459
8460	8487	8870	10,410	10,416	10,635	10,641	10,786	10,800	11,237
11,240	11,242	11,462	11,642	11,643	11,923	12,048	12,216	12,331	12,403
12,900	13,018	13,019	13,029	13,036	13,048	13,193	13,128	13,142	13,409
14,710	15,195	15,233	15,330	19,694					

SCALING

1097	5063	6876	8060	8079	8080	8141	8227	8302	8459
8543	10,095	10,416	10,525	10,533	10,630	10,728	10,802	10,858	11,038
11,987	12,404	13,014	13,018	13,019	13,249	13,314	13,346	13,388	14,675
14,711	14,879	16,450	19,468	19,811	21,438				

THEORY

1987	5116	5323	5498	6378	6867	6876	8397	8398	8399
8437	8870	8943	10,635	11,127	11,923	13,036	13,088	14,585	14,688
16,096	19,811								

QUALITY CONTROL

10,697

RADAR AND OTHER CRT DISPLAYSDETECTABILITY, SIGNAL

456	743	1076	1085	1087	1092	1111	1220	2975	3590
3598	3703	3932	3976	3990	4292	5145	5559	5659	6000
6371	6637	9050	9051	11,223	11,271	11,395	11,506	11,507	11,747
11,810	11,924	12,101	12,736	13,164	13,368	14,259	14,280	14,321	14,630
14,631	14,662	14,700	14,783	16,913					

GENERAL REFERENCES

743	1089	1091	1220	2404	2407	2945	3023	3247	3506
3507	3552	3565	3703	3912	4739	5570	5572	5658	6502
6503	6743	6757	6788	6823	9014	9052	9222	10,010	10,011
10,014	10,050	10,052	11,138	11,201	11,271	11,296	11,573	11,747	11,887
12,030	12,138	12,529	12,736	12,910	13,043	13,164	13,324	14,281	14,427
14,657	14,700	14,783	15,066	15,200	16,605	19,845			

NOISE AND CLUTTER

1092	1387	3897	11,223	11,506	11,556	11,573	14,783	18,000	
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OPERATOR PERFORMANCE

976	977	978	1101	1136	1139	1294	1375	1786	1946
1947	2219	2226	2335	2357	2358	2532	2906	2948	2994
3023	3247	3546	3553	3559	3570	3571	3589	3877	3897
4015	4016	4739	4765	5572	5658	6000	6062	6081	6423
6578	8351	8487	10,345	10,395	11,018	11,019	11,506	11,747	12,145
12,442	12,513	12,681	14,134	15,197	16,103	16,205	18,832		

OVERLAYS

1238	3139	3598							
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RANGE AND BEARING SCALES AND AIDS

1101	1110	1111	1138	1139	1946	2252	2357	2358	2948
3547	3548	3558	3562	3563	3567	3586	3588	3591	3592
3597	4292	5659	6328	9526	9527	10,798	12,101	12,267	12,498

SCREENBRIGHTNESS

1074	1076	1085	1087	1092	1110	1111	1116	1387	1966
2975	5559	6743	10,347	11,138	11,271	11,394	12,631	13,164	14,631

ORIENTATION AND ANGLE OF MOUNTING

503	1110	1116	1779	3561					
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SIZE AND SHAPE

456	976	977	1110	3546	3589	4016	11,018	11,019	11,122
11,810	12,145	12,631	14,321	14,631					

SIGNAL CHARACTERISTICS

456	978	1076	1077	1087	1100	1111	1116	1122	1375
1864	1865	2051	3546	3994	6374	6578	9050	9051	9052
10,345	10,395	11,019	11,507	11,573	11,810	11,887	11,924	12,101	12,145
12,513	16,503	18,000							

SIMULATION

1237	1723	1810	1903	2335	2359	3038	3057	3188	3234
3317	3551	3657	3668	3826	3972	6888	6898	8343	11,411
11,574	11,796	11,797							

SYMBOLS

11,841	11,911	12,144	14,783	15,033	15,196	15,240			
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TYPES OF

392	976	977	978	1779	2086	2726	2948	2975	3317
3568	3569	3912	4680	4752	6167	6502	6503	10,010	10,052
11,018	11,031	11,069	11,321	11,362	11,409	11,466	11,574	11,705	12,475
12,510	12,910	13,164	14,219	14,432	14,467	14,550	14,630	14,647	14,662
14,679	14,775	15,048	15,226	16,278					

REACTION TIME AND REFRACTORY PERIOD

152	195	196	860	1083	1084	1206	1377	1436	1530
1536	1541	1857	2129	2191	3883	4059	4127	4228	4269
4572	4920	5065	5085	5086	5088	5119	5287	5432	5550
5711	5823	5912	5960	6051	6275	6252	6355	6437	6524
6559	6562	6919	8321	9716	9790	10,361	10,399	10,407	10,411
10,459	10,468	10,483	10,484	10,497	10,543	10,615	10,636	10,661	11,062
11,088	11,213	11,214	11,215	11,216	11,250	11,255	12,060	12,485	12,597
13,041	13,107	13,350	13,418	13,432	14,299	14,393	15,241	15,295	15,298
16,122	16,123								

RELIABILITY**EQUIPMENT**

3238	4285	4743	8992	10,081	10,363	11,494	16,801	18,931	21,309
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HUMAN

3668	10,081	10,697	12,019						
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SYSTEMS

3497	4285	4743	11,009	11,045	13,286	13,295	14,598	14,851	15,151
16,508	16,533	16,684	16,994						

REPETITIVE STIMULATION, EFFECTS OF**OTHER****VISUAL**

3816	12,802	15,059	20,347	20,417					
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RESCUE EQUIPMENT

76	2991	3149	5938	6083	12,329				
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RESEARCH TECHNIQUES IN HUMAN FACTORS ENGINEERING

366	1944	2965	3511	3575	4371	5056	5332	6408	10,701
10,728	11,050	11,935	12,073	12,464	12,906	13,090	13,347	13,349	14,390
14,522	14,541	14,892	15,190	15,203	16,613	18,003			

RETENTION**LONG-TERM**

935	4962	5126	6931	7104	8028	9641	9646	10,279	13,298
13,389									

SHORT-TERM

1531	2058	3004	4205	4211	4233	4235	5126	5552	5561
5685	5721	5760	6144	6931	7104	8058	8221	9492	9641
9646	9653	9658	9693	10,279	10,492	12,126	13,389		

SAFETY (AND ACCIDENTS)ACCIDENTS, ANALYSIS OF

601	731	2809	2901	2908	3547	3754	3755	3788	3871
3923	4028	4212	4220	4237	4257	4324	4573	5102	5950
6007	6018	6038	6039	6050	6384	6415	6820	6870	6896
6958	8123	8849	8953	9182	9935	9945	9946	9947	9948
9949	9951	9952	9954	9994	10,031	10,113	10,225	10,246	10,256
10,270	10,273	10,288	10,359	10,388	10,389	10,555	10,558	10,559	10,583
10,585	10,593	10,708	11,048	11,059	11,061	11,062	11,315	11,710	11,717
11,725	11,726	11,727	11,807	11,890	11,894	11,906	11,952	12,036	12,112
12,304	12,551	12,645	12,668	12,729	12,750	12,790	12,826	12,857	12,975
12,978	12,979	13,055	13,199	13,207	13,209	13,373	14,179	14,387	14,456
14,471	14,483	14,484	14,549	14,750	14,797	14,858	14,953	14,983	14,962
15,053	15,120	15,175	15,255	15,256	15,258	15,277	16,238	16,294	18,040
18,041	20,415	14,457							

AIR

188	192	193	507	633	678	813	1751	1941	2182
2190	2234	2251	2803	2839	2841	2901	2908	2972	3579
3547	3871	3888	3923	4098	4157	4220	4237	4257	4310
4324	5295	5375	5950	6018	6167	6337	6484	6638	6717
6774	6820	6870	6896	6958	8121	8349	9548	8963	9129
9200	9213	9737	9951	9962	9964	10,022	10,024	10,030	10,091
10,245	10,249	10,278	10,289	10,359	10,388	10,389	10,500	10,557	10,558
10,559	10,578	10,580	10,581	10,582	10,583	10,585	10,593	10,616	10,708
10,722	11,013	11,047	11,048	11,104	11,158	11,313	11,315	11,538	11,561
11,563	11,706	11,710	11,717	11,725	11,726	11,727	11,807	11,890	11,900
12,036	12,112	12,202	12,304	12,551	12,704	12,857	12,975	13,199	13,209
13,270	13,271	13,272	13,279	14,236	14,356	14,477	14,562	14,590	14,750
14,858	14,903	14,959	15,057	15,063	15,175	16,629	16,920	17,340	17,517
18,833	20,415								

CRASH IMPACT

188	1751	3547	6818	6819	9858	9927	9928	9929	9945
9946	9947	9948	10,556	10,558	10,559	10,708	10,851	11,027	11,725
12,044	12,407	13,143	14,179	14,251	14,262	14,433	14,713	14,903	16,629

GENERAL REFERENCES

1904	3583	4050	6385	6415	6910	8572	9932	9949	9951
9953	9961	9962	9994	9996	9997	10,002	10,061	10,084	10,091
10,107	10,229	10,246	10,556	10,570	11,104	11,872	12,018	12,541	12,811
12,977	15,046	15,309	16,563	17,341					

INDUSTRIAL

601	3578	6384	9031	9037	9193	10,040	10,084	10,173	10,208
10,239	10,229	10,246	10,570	10,576	11,148	11,894	12,668	12,729	12,750
12,854	12,881	14,348	14,409	14,457	14,471	14,472	14,483	14,484	18,824

MOTOR VEHICLE AND HIGHWAY

675	731	853	875	876	3150	3513	4136	4218	5102
5285	5051	5781	6050	6140	6388	6507	8123	8136	8366
9182	9912	9930	9931	9933	9934	9936	9937	9938	9940
9941	9942	9943	9944	9945	9946	9947	9948	9949	9953
10,983	10,113	10,174	10,225	10,230	10,233	10,234	10,235	10,246	10,256
10,257	10,258	10,259	10,270	10,271	10,272	10,273	10,274	10,288	10,294
10,299	10,687	10,730	10,778	10,851	11,026	11,027	11,059	11,062	11,064
11,339	11,404	11,886	11,906	11,946	11,956	12,032	12,136	12,487	12,826
12,857	13,094	14,387	14,549	14,794	14,797	14,803	14,805	14,901	14,944
15,045	15,120	15,255	15,256	15,258	15,277	16,238	16,294	16,971	17,339
18,040	18,041	18,042	18,043	18,580	18,637				

SEA

3871	4673	4745	10,231	10,232	14,872				
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SHIELDING

9995	10,851	12,680	12,813	13,203	14,305	14,591	14,756	16,856	18,191
21,440									

SEACRAFT DESIGN OFRESCUE

76	115	116	557	749	858	8780
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SEATS AND SEATINGBODY SUPPORTS

2325	3149	8349	8366	10,624	10,250	10,579	12,417	12,579	13,143
14,231	14,262	15,108	15,105	15,160	16,184				

COMFORT

250	1998	6972	8350	8542	8677	10,020	10,024	10,080	11,672
11,085	12,535	12,901	14,330	14,984	15,109	15,160	15,218	16,422	16,437
15,604									

EJECTION

400	508	1016	1590	3503	4293	6548	8774	8970	10,020
10,358	10,589	11,705	11,877	12,201	12,313	12,467	12,535	12,718	12,864
12,912	12,926	13,276	14,778	14,959	16,242	16,535	16,785	18,055	

GENERAL REFERENCES

559	833	3108	5875	5894	6380	6818	6949	8549	8717
8963	9944	9945	9946	9947	9948	10,024	10,030	11,166	11,360
11,401	11,488	11,854	14,486						

SENSORYCOMPARISON

110	144	146	443	970	1940	3135	4055	5001	5374
5498	6513	8080	8746	8762	9696	9701	9724	9788	10,550
10,638	10,813	10,824	10,858	11,392	12,016	12,402	12,530	12,536	12,544
13,072	13,087	13,148	13,232	13,251	13,252	13,351	13,409	14,286	14,511
14,660	14,953	14,980	15,403	16,706					

DEPRIVATION

2919	3110	11,356	11,739	11,869	11,930	12,661	12,920	13,118	13,202
13,299	13,300	13,400	14,660	14,687	14,897	14,933	15,134	15,176	16,064
20,416									

FACILITATION AND INHIBITION OF RECEPTION

2687	4877	8043	10,632	10,637	10,644	15,018
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FEEDBACK

40	406	12,002	15,403	16,804
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GENERAL REFERENCES

407	970	1478	1940	4785	5273	5532	9752	10,493	10,717
10,726	11,231	12,157	12,557	12,650	13,146	14,491	14,801	16,429	18,767

INTERACTION

144	145	146	724	1650	1917	1940	2139	2431	2749
2838	2867	3070	3187	3890	4007	4846	4856	4908	4909
4910	4911	4918	4949	4950	5036	5108	5149	5536	5537
5538	5731	5734	5744	5745	5986	6163	6165	6213	6231
6251	6526	6601	6714	8009	8031	8269	8404	9428	9770
9777	9788	9789	10,454	10,495	10,531	10,632	10,637	10,644	10,717
10,732	10,773	11,017	11,039	11,893	12,155	12,536	12,679	13,018	13,130
14,511	14,553	15,023	15,374	20,347					

SEX, COMPARISON OF

294	2137	2138	2716	6077	8395	9503	12,034	13,101	13,110
13,145	13,334	13,428							

SHIPLIGHTING SYSTEMSEXTERIORSIGNALING SYSTEMS, VISUAL

433	749	868	2127	6486	6700	6730	8780	10,184	12,676
14,595	14,954								

SIGNSDESIGN OF

286	2981	5278	11,964	12,137	12,820	19,546
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SIMULATION AND SIMULATORS

179	403	182	1903	2074	2420	2490	2721	2752	3657
3806	3826	4438	4765	5215	6118	6219	6732	8508	9014
9207	8809	9799	10,011	10,023	10,052	10,053	10,063	10,196	10,276
10,277	10,287	10,305	10,548	10,709	11,031	11,153	11,176	11,193	11,201
11,277	11,309	12,438	12,510	12,621	12,652	13,120	13,324	14,038	14,535
14,912	15,126	15,127	16,285	16,384	16,493	16,544	16,700	16,714	16,857
19,074									

SLEEP AND PERFORMANCE

3882	4574	4854	5685	6106	6129	6131	6134	6361	6369
6494	6551	8028	8319	8438	9552	9877	9897	10,292	10,358
10,626	10,653	10,769	11,496	11,484	11,658	12,066	12,067	12,105	12,428
12,439	12,941	14,485	14,947	15,130	16,151	16,979			

SLEEPING BAGS

4574	5889	11,174
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SHELL AND TASTE

2009	2010	2375	3198	3782	4409	4573	4585	4587	4832
4848	4852	5234	5235	5254	5272	5551	5624	5914	6040
6130	5135	6150	6151	6864	8060	8173	3191	8374	8385
8748	3956	9789	9893	9900	9905	10,405	10,457	10,525	10,533
10,606	10,716	11,080	11,100	11,123	11,691	11,971	12,901	13,231	13,240
14,196	14,397	14,487	14,493	14,534	14,546	14,623	14,765	14,876	16,380
16,429									

SOCIAL INTERACTION

3205	3303	4460	6976	8521	11,035	12,428	12,568	13,290	15,130
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SPACE FLIGHT SYSTEMSCAPSULE DESIGN

10,711	10,721	13,197	13,203	14,251
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COMMUNICATION

16,460

CONTROL SYSTEM

11,265	12,749	14,650	14,806	18,772
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GENERAL REFERENCES

10,060	10,364	10,753	11,025	11,881	12,310	12,542	12,588	14,702	14,862
14,961	15,097	15,254	16,092	16,694	16,764	21,002			

GROUND SUPPORTNAVIGATION

11,265	12,884	16,874	19,917
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SEALED CABIN

9740	10,584	10,713	10,721	10,739	12,279	12,284	12,285	12,286	13,064
13,066	13,067	14,174	14,189	14,465	15,071	15,096	15,187	15,248	16,764
16,943	16,954	16,998	18,030	19,254					

TELEMETRY

16,221	16,499	18,006
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SPACE TRAVELBEHAVIORAL EFFECTS

10,584	11,025	11,739	12,763	13,196	13,208	14,685	14,727	14,810	14,996
16,160	16,260								

BIOMEDICAL PROBLEMS

2821	5531	10,723	11,739	12,373	13,056	13,278	14,251	14,353	14,810
14,842									

EQUIPMENT AND TOOLS

10,711	14,261
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SPACE TRAVEL (CONT'D)GENERAL REFERENCES

3783	3784	5531	9557	10,060	10,228	10,252	10,387	10,719	10,753
11,025	11,063	11,265	11,739	11,881	12,310	12,441	12,542	12,810	13,078
14,501	14,844	14,862	14,863	14,943	15,021	15,055	15,161	15,162	16,460
16,802	16,908	18,766	21,002	21,017	21,018				

MANEUVERS

11,265	12,520	13,078	13,196	13,216					
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PHYSIOLOGICAL EFFECTS

10,709	11,025	13,193	13,200	14,810	16,260	16,807	16,943	18,143	
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VISUAL PROBLEMS

16,672									
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SPEAKING, INDIVIDUAL DIFFERENCESGENERAL

889	1157	1166	1168	1169	1172	1173	1174	1175	1176
1820	2015	2302	2303	2304	2423	2433	2436	2437	2511
2531	2555	2556	2569	2570	2575	2576	2577	3087	3566
3607	3610	4194	4332	4394	5135	6066	6440	8869	8888
8922	10,485	11,037	12,715	13,111	13,174	13,254	14,532	16,468	17,463

NATIONALITY

2386	2394	3175	4331	5379	5806	6424	6683	12,675	
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SEX

1168	2533	6424							
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SPEECHARTICULATION AND INTELLIGIBILITY TESTS

318	719	889	902	904	1155	1156	1157	1158	1160
1161	1163	1164	1165	1166	1167	1168	1170	1172	1281
2436	2511	2556	2574	2577	2578	2738	2946	3099	3102
3142	3265	3542	3812	3813	3814	3817	3979	4319	4544
4545	4670	5363	5705	5806	5869	5956	6008	6074	6120
6121	6427	6444	6523	6571	6680	6798	8069	8146	8836
8923	8936	8946	8998	9681	9772	10,089	10,423	10,424	10,425
10,435	10,437	10,439	10,442	10,809	10,817	10,825	10,832	11,135	11,192
11,212	11,222	11,239	11,243	11,246	11,248	11,293	11,787	11,908	11,988
12,115	12,119	12,192	12,272	12,294	12,301	12,923	13,057	13,115	13,254
14,254	14,753								

AUDIOMETRIC TESTING

719	725	726	727	732	734	776	902	1061	1160
1161	1163	1164	1165	1166	1167	1168	1170	1172	1281
1909	1988	2481	2554	3059	4010	5364	5866	5956	5957
6390	6568	6986	8858	8864	8897	8935	9502	9681	9731
9756	9759	9761	9762	9772	9784	9792	9816	10,089	10,116
10,118	10,119	10,121	10,122	10,123	10,124	10,126	10,127	10,128	10,181
10,244	10,321	10,423	10,424	10,425	10,437	10,439	10,442	10,443	10,445
10,447	10,448	10,449	10,450	10,517	10,807	11,001	11,135	11,977	12,301
12,575	12,732	12,746	12,923	13,097	13,115	13,126	13,133	13,171	13,173
13,254	14,254	14,277	14,336	14,405					

BASIC CHARACTERISTICSINFORMATION ANALYSIS

67	83	2495	5361	6090	6846	8013	8853	8878	8881
8933	8982	8987	9793	11,603	13,089	15,017	15,074	16,131	

PHONETIC AND PHONEMIC ANALYSIS

1164	1166	1168	1702	2385	2495	4480	5361	5365	5725
6090	6093	8881	8890	8922	8923	8933	8936	8978	8979
8980	8981	9798	9846	10,415	10,435	10,436	10,818	10,829	11,192
11,244	11,528	11,529	11,530	11,603	11,991	12,194	12,922	13,029	13,094
13,112	14,705	15,074							

SPEECH (CONT'D)

BASIC CHARACTERISTICS (CONT'D)

SPECTRAL ANALYSIS

420	889	1159	1164	1166	1168	1170	1173	1174	1869
2064	2569	4021	4022	4090	4545	5362	5364	5368	6066
6570	6681	8853	8858	8869	9884	8886	8887	8888	8891
8910	8930	8932	8951	8981	8987	9498	9502	9794	9795
9856	10,829	11,037	11,244	11,977	12,272	12,294	12,716	13,094	13,114

13,122

COMMUNICATION SYSTEMS

AIRCRAFT

255	900	1676	1897	2946	3087	11,301	11,319	12,272	16,826
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18,021

FACE-TO-FACE

6667	9855	10,475	12,398
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GENERAL

324	550	904	1161	1173	1174	1175	1428	1679	1689
2403	2553	2663	2705	3542	3566	3641	3921	4219	5800
5843	5859	6089	6091	6092	6101	8877	8998	9833	9835
9855	9972	10,076	10,423	10,833	11,212	11,222	11,230	11,675	11,697
11,908	11,972	12,029	12,116	12,187	12,211	12,228	12,259	12,415	12,435
12,610	12,706	12,921	12,949	13,176					

INTERCOM, RADIO, AND TELEPHONE

435	614	2403	2656	2663	2946	4443	4905	5196	5436
6473	6550	6571	6845	8865	8931	10,298	11,001	11,239	11,293
11,320	11,322	11,496	11,622	11,654	11,683	12,029	12,062	12,619	12,635
12,678	12,699	13,294	14,324	14,334	14,497	14,589	14,616	18,021	

MULTI-CHANNEL

242	243	1676	1704	2922	3811	4578	4823	5359	8092
11,222	11,293	11,550	11,909	11,989	14,308	14,313	14,314	14,315	

OTHER

399	1680	1694	3263	4440	6159	6525	11,251	11,445	11,446
11,584	11,614	12,272	16,384	16,973					

SHIP

1694	3041	3087	4591	4857
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VEHICLE

255	2663	3087	12,787	16,826
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DISTORTION EFFECTS

AMPLITUDE MODULATION

5869	6433	9793	9816	15,384	16,842
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CHOPPING, CLIPPING

560	969	2431	3305	3390	5879	8876	8976	9832	9833
10,438	13,084	13,346	14,733						

COMPRESSION AND EXPANSION

1687	1706	2066	3343	3375	4479	5800	5869	9796	9833
9836	9846	9853	10,430	10,431	10,432	11,248	11,416	11,529	11,722
14,973	16,277	19,103							

DELAYED FEEDBACK

3026	4542	5359	5366	8905	9838	9842	10,485	11,035	11,786
11,865	13,093	13,126	13,153	13,171	13,174	14,388	15,390	16,126	16,842

ENVIRONMENTAL EFFECTS

1694	2572	2652	4331	5367	5600	5649	5859	6120	6121
6322	6584	8900	9855	10,375	10,562				

SPEECH (CONT'D)

DISTORTION EFFECTS (CONT'D)

EQUIPMENT EFFECTS ON

713	1170	1713	2436	2437	2705	2883	4528	4791	5648
6165	6473	6571	8857	8900	11,007	13,175	14,580		

FREQUENCY DISTORTION

1695	1886	2431	2517	2738	2946	4319	5196	5705	6433
8905	8976	9796	12,117	12,713	14,733				

SIDETONES

420	892	893	894	898	899	1170	2373	2555	2575
2576	2702	3256	3265	3815	3893	4090	4319	5135	5360
5365	5366	6366	6447	6519	10,117	10,121	10,420	10,421	10,440
12,715	13,174	13,177	14,388						

SIGNAL-TO-NOISE

554	1158	1281	1639	2300	2302	2303	2305	2386	2705
2924	2925	3227	3542	3641	4219	5704	5705	5806	5859
6582	6900	8876	8905	9835	9842	9972	10,402	10,417	10,433
10,830	11,011	11,212	11,246	11,785	12,116	12,119	12,301	12,923	13,084
14,346									

EQUIPMENT AND METHODS FOR STUDY OF

560	894	1143	1144	1148	1159	2705	3375	4021	4022
4231	4395	4396	4478	4479	4480	6074	6089	6519	6531
8864	8885	8886	8887	8890	8995	8910	8911	8936	8951
8577	8987	9794	9795	9831	9835	9836	9840	9846	10,809
10,832	11,036	11,105	11,230	11,722	12,415	1149			

GENERAL REFERENCES

895	897	1158	2302	2304	2649	3146	4432	4480	5365
5725	5859	6008	6091	6440	6475	6493	6506	6582	6583
6711	8069	8882	8884	8891	8896	9498	9701	9831	10,130
10,441	11,128	11,171	11,550	11,837	12,204	12,570	13,131	14,533	16,354
16,677									

MASKING BY

NOISE

255	318	554	893	1145	1146	1147	1152	1156	1157
1158	1161	1439	1698	1699	1703	2097	2104	2386	2403
2423	2431	2489	2517	2531	2533	2554	2571	2573	2574
2577	2578	2686	2705	2778	2922	2946	3128	3141	3142
3170	3387	3723	3811	3813	3817	4010	4382	4823	5603
5704	5705	5800	5956	5992	6322	6428	6433	6506	6523
6550	6679	6680	6845	6900	8146	8473	8485	8486	8854
8948	8976	9829	9835	9842	9972	10,094	10,121	10,127	10,375
10,417	10,817	10,823	10,825	11,028	11,065	11,135	11,243	11,245	11,246
11,293	11,366	11,697	11,785	11,982	11,988	12,115	12,116	12,117	12,118
12,398	12,399	12,714	13,084	13,259	13,262	13,264	13,265	14,452	14,589
14,616									

PURE TONE

888	891	5603	8867	10,823					
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SIMULTANEOUS SPEECH

4	1145	1146	1698	2337	2433	2922	2925	3811	4578
4823	5395	5603	6432	6523	8043	8949	8950	9690	10,429
10,492	11,373	11,503	11,504	11,989					

SPEECH (CONT'D)PERCEPTION

94	242	725	895	897	1165	1168	1172	1173	1174
1175	1452	1553	1557	1704	1712	2302	2337	2433	2500
2511	2517	2531	2553	2570	2571	2573	2574	2649	2652
2733	2778	2922	2924	2925	3099	3102	3142	3146	3170
3227	3343	3608	4186	4205	4219	4231	4382	4542	4545
4578	5705	5806	5869	5870	6008	6074	6091	6092	6109
6111	6165	6366	6427	6582	6583	6682	6711	6759	6846
6922	8043	8064	8146	8480	8965	8896	8946	8949	8950
8953	8959	8973	8979	8980	9498	9681	9832	10,402	10,415
10,424	10,428	10,435	10,829	10,850	11,011	11,037	11,106	11,245	11,460
11,503	11,504	11,528	11,529	11,530	11,785	11,787	12,088	12,089	12,111
12,115	12,117	12,118	12,119	12,194	12,204	12,211	12,294	12,299	12,326
12,714	12,746	12,922	13,093	13,097	13,115	13,264	13,265	18,568	

RECOGNIZERS

4470	4478	4479	4480	6089	6092	6531	8910	8981	8983
9831	9836	9840	11,105	11,550	14,381	14,580			

STRESSGENERAL

9	1152	1153	1379	1529	1542	2117	2168	2253	2620
3577	3662	4326	4328	4427	4754	4851	5761	5797	6252
7108	8387	8410	8438	9858	10,007	10,179	10,373	11,036	11,633
11,634	11,703	11,789	11,806	11,857	11,889	11,963	12,057	12,267	12,365
12,479	12,924	12,967	12,981	13,000	13,008	13,195	13,245	13,357	14,843
14,881	18,200								

PHYSIOLOGICAL INDICES

57	511	791	2597	2899	2919	3179	3210	3514	3710
3744	4501	4834	5110	5113	5158	5349	5380	5517	5778
6269	6280	6572	8351	9644	9727	9802	9918	10,006	10,008
10,243	10,310	10,596	10,744	11,221	11,538	11,682	11,806	11,947	11,951
12,287	12,550	12,658	12,705	13,125	13,213	13,250	13,377	14,463	14,889
14,966	15,237	15,259	16,249	16,795	16,502	19,771	20,272	20,349	

PSYCHOLOGICAL INDICES

190	194	511	643	791	2657	3353	3483	3624	3644
3744	4178	4492	4496	4498	4501	4961	5222	5346	5347
5349	5380	5517	5660	5759	5913	6002	6003	6021	6203
6572	8140	9644	9676	9802	9868	9918	10,006	10,243	10,599
11,126	11,210	11,275	11,789	11,857	11,889	12,308	12,477	12,628	12,705
13,377	15,204	15,219	15,259						

SUBJECTIVE PROBABILITY

165	166	167	1134	2172	2469	2507	4242	4244	5345
5786	6624	10,529	10,667	11,831	12,074	12,122	12,204		

SUBMARINECONTROLS

11,398	12,237	14,697	16,813						
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DISPLAYS

217	3485	12,237	12,251	12,875	12,876	14,697	14,922	16,813	
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ESCAPE SYSTEMS

1902	3950	14,840	19,255	22,168					
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GENERAL REFERENCES

9	10	262	739	785	1694	1931	3048	3864	3957
10,231	10,753	11,839	12,342	12,754	14,504	14,510	18,928		

HABITABILITY

9	10	763	8413	13,068	14,492	15,345	18,268		
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SUPPLY SYSTEMS

1298	1721	1934	3416	11,114	11,150	11,435	11,436	11,487	11,648
11,653	11,847	11,848	12,420	12,438	12,593	14,508	14,641	14,659	14,988
14,989	16,661	19,074	19,720	20,239					

SURVEILLANCE SYSTEMS

399	2995	3706	3738	11,626	11,656	12,183	12,521	12,953	14,095
14,096	14,097	14,116	14,119	14,121	14,124	14,181	14,182	14,183	14,184
14,201	14,202	14,203	14,204	14,290	14,707	14,743	14,775	14,783	15,220

SURVIVALEQUIPMENT

1567	1568	3288	3787	5174	5938	6640	6641	6860	9960
10,760	11,202	11,315	11,352	11,677	12,130	12,416	12,649	12,769	16,958

IN UNUSUAL ENVIRONMENTS

3767	4617	6640	6641	6642	10,597	10,760	11,236	12,040	
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SYSTEMS DESIGNGENERAL REFERENCES

817	850	1473	1600	2964	4210	5423	10,287	10,354	11,850
12,026	12,366	12,460	12,518	12,896	14,807	14,808	14,955	16,109	16,159
16,356	16,482	16,496	16,824	18,023	18,490	18,720	18,757	18,759	18,760
18,761	18,762	18,768	18,769	18,770					

TECHNIQUES OF ANALYSISEVALUATION

2740	2995	3526	4287	11,009	11,612	11,858	12,512	14,125	14,638
16,112	16,181	16,455	16,810	21,796					

GENERAL

58	1707	3657	5011	11,114	11,306	12,380	12,381	12,577	13,092
14,214	14,323	14,781	14,791	14,806	15,312				

MANAGEMENT AND COST

164	823	837	3760	5801	10,551	11,009	11,113	11,150	11,493
12,385	12,593	13,292	14,508	15,119	15,349	16,658	19,720		

THEORY

1840	11,112	12,744	12,745						
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TACTILE CODING

934	1126	1132	1212	3866	3868	5069	5160	5353	5742
5842	6721	8210	8315	8988	9519	9696	9788	10,418	10,454
10,539	10,813	11,142	11,419	11,729	12,319	12,634	13,019	14,491	14,557
14,632	14,793	14,878	15,070	16,333	17,078	19,639			

TELEVISION DISPLAYS

2410	2496	3349	4593	4664	5403	5815	5816	8168	8581
8594	8598	8599	9009	9010	3973	9985	13,003	14,117	14,249
14,551	14,575	16,613	16,633	21,701	3518				

TESTS AND TESTING

APTITUDE AND INTELLIGENCE

13	68	312	326	487	619	1072	1283	3666	3682
3889	4240	4658	4659	4704	4946	4947	4956	5058	5076
5177	9768	9808	11,800	12,173	12,177	12,178	12,212	12,224	12,241
12,560	12,734	14,543	15,201						

CONSTRUCTION

1032	2149	2226	3054	5148	5177	5433	5646	5932	5933
5934	5935	6936	8216	10,355	11,233	11,310	12,177	12,178	12,611
14,163	15,412								

GENERAL REFERENCES

63	258	315	2874	3021	4259	4747	4775	5766	5943
9737	9867	9972	10,286	11,310	12,084	12,104	12,488	14,306	14,426
16,247									

MOTIVATION AND OPINION

296	2961	3204	3624	4807	4813	6210	6978	10,286	
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PERSONALITY AND SOCIOMETRIC

649	1379	2168	2657	3054	3624	4309	4813	5177	5385
6528	6921	6977	9763	9765	11,993	12,225	12,258	12,268	12,581
13,345	17,077	21,285							

PREFERENCE

441	857	4482	4872	4873	4874	4876	4897	5083	6505
10,551	10,552	11,548	11,774	14,497	16,876	19,811	4867		

PROFICIENCY

59	714	751	313	367	376	487	488	614	622
665	714	913	917	1231	1283	1806	2404	2407	2448
2486	2565	2859	2862	2863	2983	2984	3023	3036	3196
3452	3532	3625	3790	4212	4255	4521	4774	4820	5058
5148	5214	5837	5838	5853	5884	5906	5932	5933	5934
5935	6065	6073	6289	6296	6302	6353	6358	6413	6414
6589	6757	6823	8356	9529	9768	9805	11,310	11,338	11,430
11,809	11,817	11,952	12,107	12,244	12,259	12,499	12,611	12,845	13,371
14,025	14,021	14,073	14,074	14,095	14,096	14,097	14,119	14,121	14,124
14,125	14,142	14,181	14,182	14,183	14,184	14,201	14,202	14,203	14,204
14,290	14,291	14,355	14,425	14,618	15,028	15,412	16,106	16,124	18,013
18,017	19,911								

PSYCHOMOTOR ABILITIES

84	370	393	501	567	621	647	652	655	1235
1606	2054	2165	2166	2180	2193	2226	2235	2445	2847
2874	2878	2880	2926	3034	3340	3490	3531	4074	4213
4559	4625	4870	4871	4947	5214	6001	6055	6073	6080
6201	6217	6376	6389	9505	9529	9536	9712	10,766	11,178
11,233	11,562	11,568	11,619	11,815	11,817	11,866	12,084	13,369	14,210
14,367	15,223								

TESTS AND TESTING (CONT'D)

SELECTION

13	85	191	270	313	326	567	696	721	723
727	756	774	2197	2729	3666	3790	3797	4254	4276
4946	4947	4956	5191	5962	6073	6921	9706	9759	10,364
11,178	11,995	12,177	12,178	12,429	14,163	14,402	14,928	15,273	16,423

TIME

PERCEPTION (PERSPECTIVE)

237	2468	5514	5754	8027	8241	9456	10,463	10,668	11,882
13,142	13,148	13,232	13,247	13,251	14,639	14,880	14,958	21,438	

SHARING

384	443	10,638	13,023	14,210	15,292				
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TOOLS, DESIGN OF

8129	8755	10,478	12,113						
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TOUCH

GENERAL REFERENCES AND BASIC SENSORY DATA

31	38	184	1126	1132	2375	3183	3265	3868	4148
4149	4862	4939	5000	5036	5069	5093	5287	5354	5390
5391	5392	8517	9886	10,255	10,418	10,454	10,539	10,813	10,858
11,209	12,043	12,759	12,762	13,087	13,130	13,351	14,207	14,642	14,949
15,241	16,301	16,322	16,563						

TRACKING

AIDED CONTROLS

33	391	3878	8208	8235	9734	9800	10,054	10,400	11,176
13,186	14,223	15,246							

AUDITORY

110	9803	12,123	15,195						
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COMPENSATORY

384	936	937	1845	2269	3325	3509	3640	3746	3747
3794	3795	3951	4071	4100	4198	4532	5899	6124	6127
6221	6363	6422	8235	8389	8390	9347	9709	9800	9803
10,398	10,400	10,412	10,784	11,057	11,094	11,200	11,793	12,083	12,235
13,433	15,124	938							

CONTROLS

411	968	983	988	1211	1223	1224	1226	1594	1763
2109	2116	2148	2167	2526	2527	2932	3325	3376	4025
4198	5504	6124	8388	9344	10,054	10,398	10,412	11,482	11,543
11,698	11,804	13,433	15,125	15,155	1213				

DISPLAY FACTORS

173	414	983	1388	2148	2167	2526	2527	2994	3376
3400	4100	4424	5899	6354	6897	8519	8522	8524	9493
9702	9709	9783	10,400	10,740	11,125	11,543	12,009	12,083	12,235
12,365	12,370	12,905	13,248	14,790	15,125	15,223	15,267	15,292	

EFFECTS OF ENVIRONMENTAL FACTORS ON

5472	10,555	10,675	10,676	11,274	11,275	11,345	11,804	12,078	12,324
12,362	12,504	12,733	12,735	14,846					

EQUIPMENT AND METHODS

645	998	1107	1189	1194	1607	1609	2153	2162	2514
2566	2726	2896	3061	3063	3481	3794	3878	3880	3881
5515	5547	5814	6266	6267	6547	6604	10,054	11,235	11,562
11,573	14,503	14,522	15,081						

TRACKING (CONT'D)

FEEDBACK

2529	3376	3640	3795	5811	8305	8309	10,785	14,275	14,790
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15,302

GENERAL REFERENCES

33	44	549	1394	1539	1540	1543	1610	1611	2769
4280	5814	6968	6069	6136	6706	6725	6928	8296	9674
10,456	11,312	11,744	12,008	12,184	14,894				

OPERATOR PERFORMANCE

391	411	414	419	639	640	937	953	968	985
1284	1321	1447	1608	1616	1765	1845	2116	2200	2896
2994	3088	3376	3633	3669	4280	4732	4733	4917	4921
5215	5504	5805	6043	6068	6069	6221	6341	6353	6354
6561	6725	6841	6844	8239	8258	8296	8519	8522	8524
9348	9702	10,393	10,398	10,401	10,404	10,494	10,548	10,553	10,572
10,611	10,675	10,676	10,736	11,125	11,210	11,235	11,275	11,312	11,483
11,621	11,687	11,690	11,744	11,816	11,816	12,082	12,184	12,370	13,000
13,023	13,107	13,248	14,899	15,162	15,292	15,302	15,308	16,288	

PURSUIT

39	150	247	389	390	415	419	636	643	649
959	973	983	989	1189	1194	1218	1226	1300	1765
2148	2152	2167	2269	2514	2526	2527	2597	3509	3688
4919	4921	4963	5009	5244	5350	6043	6077	6129	6136
8011	8208	8236	9343	9344	9346	9347	9505	9709	9732
10,394	10,398	10,400	10,404	10,682	10,740	10,746	10,782	10,783	11,057
11,081	11,210	11,274	11,482	11,551	11,816	12,061	12,707	12,733	12,735
13,125	16,865								

QUICKENED DISPLAY

32	33	6076	10,572	11,307
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SIGNAL CHARACTERISTICS

411	414	415	419	953	2148	2153	2167	4917	5435
5504	5899	5926	6071	6221	6354	6362	6422	6561	6897
6928	8250	8256	8257	8258	9709	9800	9803	10,394	11,632
12,235	15,078								

VISUAL VS. AUDITORY

110	1105	1106
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TRAFFIC

MOTOR VEHICLE

5831	5832	10,034	10,066	10,256	10,687	11,021	11,022	11,023	11,024
11,340	11,460	11,904	11,905	15,366	15,367	15,368	15,369		

SIGNS AND SIGNALS

4275	5278	5301	8226	11,023
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TRAINING

BASIC LEARNING DATA

CHARACTERISTICS OF THE LEARNER

1065	1230	2586	2590	2600	2601	2926	2941	2977	3666
4800	4816	5016	5211	5303	6232	6233	6874	9064	9183
9300	10,746	11,121	13,037	15,313					

CHARACTERISTICS OF MATERIAL OR TASK

144	156	281	499	505	654	662	663	1189	1193
1194	1197	1198	1199	1218	1219	1221	1223	2111	2168
2170	2178	2753	2583	2584	2590	2592	2593	2594	2596
2600	2602	2608	2628	2748	3214	3216	3426	3643	3663
3672	3721	4225	4323	4522	4583	4942	4943	4994	5015
5017	5018	5022	5059	5072	5074	5123	5303	5334	5336
5337	5480	5743	6207	6209	6220	6235	6242	6271	6283

TRAINING (CONT'D)**BASIC LEARNING DATA (CONT'D)****CHARACTERISTICS OF MATERIAL OR TASK (CONT'D)**

6348	6874	8192	8834	9127	9665	9671	9672	9691	9707
9724	11,034	11,686	11,770	12,125	12,126	12,159	13,011	13,015	13,016
13,037	12,230	13,319	13,396	13,421	14,200	15,313	16,226	18,952	

DISTRIBUTION OF PRACTICE

84	247	636	637	941	1036	1042	1045	1198	1201
1222	1225	1329	2021	2022	2023	2024	2110	2174	2233
2608	2632	2920	3421	3637	3638	3679	3800	4226	4227
4963	4965	4990	4991	4996	4997	5009	5019	5057	5107
5111	5171	5525	5540	5541	5613	6044	6789	8017	8025
8034	8035	8036	8049	8234	8254	8555	9660	10,662	10,783
12,132	12,242	13,022	13,353	15,361					

GENERAL

1191	1273	2932	3213	3663	3664	4236	4770	4993	5057
5072	5074	5115	5230	5591	5710	5747	6244	6841	6844
6955	6956	7104	8005	8011	8018	8269	8276	9127	9184
9193	9194	9196	9197	9300	9493	9642	10,110	10,407	10,631
10,657	12,031	12,075	12,174	12,196	12,208	12,218	12,612	12,705	13,150
13,358	13,390	14,617	14,935	14,948	16,425	16,535	17,080	21,213	

KNOWLEDGE OF RESULTS

36	175	176	177	281	654	1329	1510	2175	
2420	2445	2632	2748	3035	3213	3619	3632	3664	3686
4209	4233	4243	4799	4942	4943	5015	5016	5017	5224
5434	5553	5827	6223	6346	6347	6365	6396	6574	6725
6844	8149	8263	8266	8295	9705	9708	9710	9993	10,310
10,479	10,657	10,661	10,784	10,785	11,511	11,541	11,632	11,640	12,002
12,218	13,242	13,246	13,370	15,361					

LENGTH OF TRAINING

3985	4800	4965	5023	5244	5691	6232	6233	6318	8047
8049	8205	8293	11,254	12,193	12,356	13,016	13,113	13,145	13,160
13,418	14,299								

MOTIVATION

37	263	2019	5215	5389	5823	5827	6275	6359	6396
8017	9682	9687	9708	12,781	13,008				

RETENTION

245	463	476	935	1147	1151	1155	1228	1229	1535
2111	2186	2564	2748	4225	4226	4227	4236	4632	4962
4965	5018	5111	5126	5166	5178	5201	5211	5335	5721
5760	5807	5810	6273	6283	6311	7104	8028	8393	9641
11,254	11,686	12,062	12,081	12,085	12,659	13,015	13,016	13,230	13,319
13,332	13,354	13,404	13,421	14,112	15,251	15,361	16,095		

SET AND RETENTION

37	145	621	643	1055	1535	2590	2604	3215	3536
3812	4460	4987	5006	5021	5211	5246	5324	5797	6161
6360	7048	9769	10,658	10,661	10,662	10,666	12,401		

THEORIES OF LEARNING

654	1039	2590	2681	3217	4227	4583	4588	4942	4943
5015	5016	5017	5100	5111	5230	5428	5601	6044	6317
7104	8005	8192	8266	11,218	12,132	13,427	14,122	14,985	15,099
15,234	16,093	16,839							

TRAINING (CONT'D)

BASIC LEARNING DATA (CONT'D)

TRANSFER

44	174	243	303	394	414	650	651	654	662
663	935	941	990	1189	1193	1194	1195	1196	1197
1199	1200	1201	1202	1218	1219	1221	1222	1223	1226
1227	1228	1229	1377	1542	1543	2028	2036	2037	2099
2160	2178	2201	2220	2232	2248	2249	2269	2361	2581
2632	3033	3342	3373	3376	3404	3482	3486	3631	3637
3638	3643	3669	3688	3793	3798	4106	4222	4225	4881
4994	4998	5057	5015	5016	5017	5022	5023	5059	5178
5233	5237	5239	5242	5241	5242	5334	5335	5350	5371
5716	5729	5743	5810	5841	5924	6044	6075	6207	6235
6301	6317	6841	7104	8036	8059	8217	8254	8255	8259
8290	8377	9069	9255	9300	9671	9672	9678	9692	10,738
10,762	11,057	11,059	11,594	11,532	11,686	11,770	11,840	12,008	12,056
12,075	12,356	12,495	13,008	13,011	13,160	13,167	13,352	14,016	14,030
14,047	14,048	14,049	14,131	14,141	14,200	15,294	16,212	18,674	18,630

WHOLE VS. PART

2944	3810	14,041
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COMPARISON OF METHODS

462	546	547	552	555	651	826	1046	1053	1056
1057	2225	2252	2581	2584	2589	2592	2593	2594	2596
2600	2602	2604	2605	2608	2632	2654	2747	3445	4214
4248	4323	4914	5542	5808	5946	6295	6298	6299	8629
8834	9641	9768	11,840	13,080	13,082				

EVALUATION OF PROGRAMS

251	265	266	350	1044	1054	1068	1069	1072	2562
2564	2587	2588	2589	2601	2609	2610	2611	2614	2621
2622	2623	2624	2626	2633	2634	2711	2877	2983	2984
3036	326	4335	4343	4588	5761	5931	9035	9194	9196
9197	9254	9258	9278	9289	9298	9768	9769	10,040	11,014
11,510	12,025	15,115							

GENERAL REFERENCES

437	477	1069	1270	1273	1510	1867	2210	2370	2418
2420	2521	2633	2961	3112	3960	4129	4140	4444	4720
4753	4760	4775	4988	4993	5305	5424	5447	6136	6238
6299	6392	6399	6675	6824	6955	6956	7025	7026	8213
9714	10,063	11,224	11,284	11,310	12,002	12,306	12,496	12,789	14,044
14,747	15,152	16,835	18,202						

INSTRUCTOR BEHAVIOR

343	556	1062	1063	1070	2420	2479	4553	4812	4825
5194	5299	5599	5931	6316	6395	6979	7070	8215	9193
9283	9284	9285	9302	9303	9768	13,367	14,024	14,130	14,141
14,617									

SPECIFIC TYPES

BASIC (MILITARY)

247	510	2157	2757	2851	2959	3625	3871	4164	4798
5058	5389	5768	6232	6233	6242	6274	6275	6286	6626
11,020	12,176	12,632	15,115						

CODE

514	2253	3021	3056	3078	4173	4914	5004	5225	5540
5541	5542	5543	5544	6314	6352	8135	8205	14,071	14,163
14,971	14,975	15,094	15,371	15,372	14,164				

TRAINING (CONT'D)

SPECIFIC TYPES (CONT'D)

FLIGHT

251	269	327	381	501	656	826	877	886	974
975	979	1012	1013	1062	1065	1068	1072	1142	1184
1156	1232	1762	1800	2014	2047	2220	2222	2262	2417
2561	2562	2568	2506	2509	2621	2622	2625	2626	2627
2628	2629	2630	2634	2654	2711	2721	2811	2870	2877
2887	2978	3121	3122	3219	3438	3452	3668	3775	3796
3797	3888	3889	4276	4309	4433	4558	4559	4666	4802
4807	4947	5138	5191	5295	5468	5837	5838	5853	5863
5885	5887	5888	5890	5891	5906	5918	5920	5932	5996
6012	6013	6015	6064	6072	6160	6219	6243	6280	6284
6298	6318	6319	6414	6756	6882	6948	6952	6958	6950
8217	8328	8329	8330	8331	8332	8333	8334	8337	8338
8339	8340	8341	8342	8345	8346	8347	8353	8355	8357
8361	8363	8364	8365	8369	8418	8558	8654	8656	8835
9024	9197	9205	9207	10,369	11,565	11,594	11,624	11,771	11,840
12,112	12,121	12,224	12,248	12,263	12,293	12,501	12,674	14,007	14,024
14,047	14,048	14,126	14,142	14,226	14,823	14,843	14,867	14,930	15,028
15,076	15,082	16,106	16,122	16,123	16,124	18,115			

GUNNERY AND MARKSMANSHIP

198	246	254	401	460	624	640	1014	1015	1017
1019	1020	1022	1025	1284	2211	2424	2560	2565	2579
2607	2613	2614	2615	2616	2625	2626	2632	2753	2807
3035	3063	3088	3374	3497	3499	3543	3656	3667	3668
3686	3797	3800	3810	3879	3880	3881	4362	4723	4811
5424	5553	5738	5768	5969	5970	5975	6052	6073	6100
6223	6279	6285	6291	6348	6349	6353	6357	6358	6767
6822	8218	8419	8835	11,541	11,649	12,444	12,465	12,564	12,616
12,628	12,642	14,009	14,010	14,041	14,042	14,143	14,172	14,177	14,178
14,187	14,291	14,358	14,898	16,814					

INFANTRY

463	3407	4206	5768	12,465	14,618				
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MAINTENANCE

58	59	61	253	266	452	555	620	1400	1418
1434	1443	1445	1511	1517	2006	2053	2225	2562	2779
2983	2984	3279	3356	3532	3802	4150	4626	4753	6289
6302	6313	6413	6529	6727	6825	6905	6933	8085	8336
8564	8658	10,087	10,088	11,624	11,625	11,635	11,637	11,665	11,685
11,765	11,879	11,895	11,998	12,035	12,107	12,495	12,795	12,914	14,031
14,049	14,099	14,144	14,191	14,339	14,907	14,932	14,942	15,087	15,088
15,116	16,315	16,825							

OTHER

80	108	250	406	551	627	638	677	818	1050
1062	1068	1112	1187	1196	1230	1366	1440	1477	1518
1592	2158	2370	2378	2479	2486	2512	2540	2562	2566
2624	2694	2729	2851	3036	3042	3169	3308	3426	3664
3785	3871	4129	4248	4333	4335	4337	4522	5021	5303
5424	5476	5507	5589	5722	5723	5759	5794	5922	5944
5945	6064	6161	6215	6220	6278	6287	6293	6297	6315
6351	6395	6396	6400	6641	6735	6747	6758	6762	6766
6946	7068	7075	7090	7094	7099	8116	8562	8563	8564
8572	8573	8632	8633	8634	8663	8689	8721	8834	8837
8849	9035	9037	9040	9193	9194	9196	9710	10,040	10,109
10,110	10,304	10,357	10,765	11,014	11,029	11,090	11,157	11,385	11,444

TRAINING (CONT'D)

SPECIFIC TYPES (CONT'D)

OTHER (CONT'D)

11,539	11,634	11,775	11,809	11,994	12,046	12,112	12,222	12,223	12,377
12,809	12,964	13,145	13,242	13,367	14,116	14,150	14,191	14,341	14,409
14,429	14,519	14,655	14,895	15,152	16,181	16,528	19,810	19,837	22,321

RADAR

2226	3038	3058	3063	3064	3071	3877	4343	4522	4777
4956	6009	6062	6234	6888	8343	8351	8429	11,510	11,511
11,796	11,797	11,929	12,244						

SONAR

313	418	714	774	2320	4214	4240	5695	9513	10,087
10,088	11,497								

SPACE

10,364	10,864	12,321							
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TRACKING AND MOTOR SKILLS

44	178	241	394	395	415	499	505	636	637
640	647	650	651	662	663	847	935	941	1025
1037	1038	1056	1190	1191	1193	1197	1198	1199	1201
1202	1218	1219	1221	1222	1223	1224	1225	1226	1227
1228	1229	1230	1284	1549	1608	1612	1658	2019	2021
2022	2023	2024	2028	2036	2037	2152	2161	2162	2166
2167	2170	2174	2175	2178	2180	2186	2189	2228	2231
2232	2233	2248	2249	2269	2445	2566	2584	2597	2602
2608	2747	2926	2944	2977	3040	3061	3088	3373	3482
3496	3499	3669	3688	3985	4140	5009	5019	5023	5100
5166	5171	5201	5215	5238	5350	5434	5525	5691	5827
6044	6076	6126	6127	6202	6272	6301	6311	6342	6345
6394	6574	6755	6789	6841	6844	8017	8018	8025	8034
8035	8036	8109	8234	9347	9660	9671	9717	9719	9721
9800	10,412	10,738	10,749	10,782	11,034	11,057	11,275	11,312	11,770
11,817	12,008	12,009	12,031	12,086	12,612	12,970	13,008	13,011	13,022
13,081	13,167	14,003	14,072	14,141	14,190	14,755	15,313	16,653	16,812

VOICE COMMUNICATION AND LANGUAGE

1144	1145	1146	1147	1150	1151	1152	1153	1154	1155
1156	1157	1160	1161	1173	1174	1175	1176	2077	2303
2304	2305	2533	2556	2563	2591	3041	3062	3087	3146
3812	5358	5367	5369	6799	8355	9642	10,089	12,211	13,265
15,090	19,437								

TRAINING AIDS AND DEVICES

AUDIO-VISUAL AIDS

1148	1150	1861	2591	2596	3605	3630	3838	4589	5213
6287	7001	7004	7005	7008	7016	7018	7022	7023	7033
7034	7043	7050	7057	7061	7068	7081	7087	7089	7092
7093	7099	7105	7107	8577	8612	8634	8635	9714	9769
11,206	11,635	12,525							

AUDITORY AIDS

1142	1143	1144	1148	1149	1150	1154	1171	7074	8614
8629	11,206	12,211							

COMPUTERS

4768	8836								
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DISPLAY BOARDS AND OTHER GRAPHIC MATERIALS

2616	3443	3739	3761	3762	3785	3789	3836	3848	3849
4744	5794	6209	6933	7037	7039	7055	7064	7066	7082
7083	7095	7096	14,027	14,940					

TRAINING AIDS AND DEVICES (CONT'D)

FILMS

156	546	547	552	556	667	668	669	832	1034
1035	1036	1037	1038	1039	1040	1041	1042	1043	1044
1045	1046	1048	1050	1051	1052	1053	1054	1055	1056
1057	1058	1059	1060	1910	2398	2560	2585	2586	2587
2588	2590	2591	2592	2593	2594	2600	2601	2602	2603
2604	2605	2607	2746	2747	2748	2907	3426	3445	3838
3839	3842	3852	3854	3855	3860	4205	4323	4762	4777
4811	5213	5397	5663	5794	5910	6234	6270	7002	7007
7009	7016	7011	7012	7013	7014	7020	7042	7044	7047
7048	7051	7052	7053	7058	7060	7062	7063	7077	7090
7098	7102	8120	8562	8580	8582	8590	8596	8597	8628
8529	8632	8634	8837	9191	9269	9298	9714	9769	11,510
11,511	11,541	14,051	15,221	16,857					

GENERAL REFERENCE

248	252	257	269	439	440	477	1270	1272	1273
1674	2418	2420	2584	2610	2611	2623	2633	2999	3027
3195	3338	3508	3605	3739	3844	3851	3856	4289	4588
4723	4744	4859	5305	5593	5794	6313	6623	6675	6727
7006	7017	7029	7058	7065	7075	8333	8469	9040	9302
9303	12,107	12,199	14,429	15,089	15,126	15,127	21,078		

MANUALS

2157	3803	4248	8562	9269	12,525	16,181			
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MOCK UPS AND MODELS

250	2616	3856	5794	6052	6761	6763	8564	11,635	11,840
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15,038

OTHER

552	866	1033	1047	2445	2565	2567	2581	2616	2626
3785	3868	5139	5283	6001	6062	7088	8362	9301	11,206
11,665	11,796	11,797	11,803	20,238					

SLIDES AND TRANSPARENCIES

2616	3856	4762	6727	7028	7076	7103	8628	8633	9269
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13,333 15,022

TEACHING MACHINES

4740	5070	5139	14,588	14,784	14,867	15,143	16,339	18,559	18,560
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22,321

TELEVISION

105	462	463	2564	3393	3462	3518	3834	3835	3839
3850	3853	6286	6295	6296	7031	7035	7038	7040	7045
7046	7049	7054	7101	8215	8469	8580	8634	8689	14,596

14,736

TRAINERS AND SIMULATORS

61	248	250	252	253	320	401	555	620	627
826	1013	1014	1015	1016	1017	1019	1020	1022	1023
1024	1026	1142	1143	1184	1186	1382	1550	2105	2211
2220	2222	2225	2417	2425	2560	2561	2568	2621	2622
2627	2628	2629	2630	2632	2634	2654	2711	2721	2779
3064	3071	3121	3122	3279	3299	3495	3496	3497	3506
3655	3775	3796	3806	4150	4473	4474	4666	4699	4723
4740	4768	4802	4811	5215	5841	5885	5888	5995	6219
6243	6284	6291	6358	6732	6755	6756	6811	6822	6840
6888	6905	6933	6948	7090	7094	8328	8329	8330	8331
8332	8337	8338	8339	8341	8346	8353	8355	8357	8365
8369	8409	8558	8559	8632	8633	8656	8743	8835	8836

TRAINING AIDS AND DEVICES (CONT'D)TRAINERS AND SIMULATORS (CONT'D)

9207	9209	11,637	11,840	11,929	12,382	12,383	12,501	12,695	14,000
14,008	14,020	14,023	14,099	14,130	14,169	14,180	14,187	14,300	14,365
14,823	14,898	14,912	15,294	16,386	16,562	16,651	16,653	16,689	16,691
16,857	16,928	17,929	19,810	19,837					

TRANSLATING DEVICES

8:94	9831	9840	11,753	12,182					
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TRANSPORTATION SYSTEMS

4512	4513	4581	11,359	11,418	11,676	11,811	11,648	12,349	12,853
14,499									

UNDERWATERBREATHING APPARATUS

765	2683	3028	6758	10,136	10,140	10,754	11,839	12,340	12,538
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CLOTHING AND EQUIPMENT

6758	10,136	11,596	12,969						
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ENVIRONMENTAL EFFECTSOXYGEN REQUIREMENTS

765	3055	3350	3792	5878	9881	9885	9891	9903	10,232
10,755	12,604	13,222	14,870	16,259	18,792				

PRESSURE REQUIREMENTS

739	3350	5120	9885	9891	10,232	11,983	12,172	14,584	16,259
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OPERATIONAL EFFICIENCY

739	3055	3350	3792	6758	10,136	10,140	10,232	10,754	10,828
11,596	11,897	11,983	16,259	18,792	21,489				

VEHICLE

DESIGN

199	204	239	1558	1561	1834	2478	3150	3707	3827
4275	4489	5227	5267	5271	6078	6449	6731	8136	9930
9931	9939	9944	9945	9946	9947	9948	10,230	10,258	10,271
10,273	10,294	10,591	10,695	11,064	11,360	11,591	11,660	11,886	12,801
14,576	14,860	14,327	15,042	15,107	15,108	15,109	15,131	15,193	18,038
18,580									

GENERAL REFERENCES

517	1679	3150	4386	6239	8614	12,708	12,795	14,387	14,890
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HANDLING QUALITIES

11,647	11,886
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LIGHTING SYSTEMS

870	2464	8997	10,688	10,695	18,037	18,038
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VESTIBULAR FUNCTION

GENERAL REFERENCES AND BASIC DATA

47	317	1179	2375	3650	3731	3740	3777	4538	5008
5151	5204	5321	5730	5796	5872	6149	9465	9736	9745
9785	9791	9801	11,229	15,274	18,136				

VIBRATION

GENERAL REFERENCES

1575	1580	1603	2962	3314	3599	4148	4149	6480	9854
10,105	10,326	10,717	10,813	11,376	11,639	13,252	16,411		

WHOLE BODY

797	829	1566	1595	2750	3180	4982	5092	5390	5391
5392	5782	6016	6882	9854	10,555	10,567	10,573	11,591	12,320
12,324	12,504	12,664	14,319	14,320	14,578	14,640	14,670	14,819	14,827
14,982	14,991	15,328							

VIGILANCE AND MONITORING

GENERAL

1001	1293	3421	3555	6000	6133	6898	10,542	11,217	11,222
11,744	11,963	12,569	12,618	12,681	13,272	13,280	14,967		

PERFORMANCE

599	1544	1556	2618	2962	3555	3642	3877	4013	4188
4495	6128	6163	6356	6494	6762	8310	8457	8518	9342
9345	9357	9685	10,542	10,661	10,666	11,270	11,491	11,744	11,874
12,027	12,100	12,101	12,102	12,332	12,761	12,951	13,005	13,100	14,264
14,352	14,470	14,559	14,564	14,611	14,938	15,197	15,235	15,239	16,098
16,133									

THEORY

4189	4202	5566	13,099	13,179	14,122	14,563	14,564	14,611
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VISION

COLOR VISION

17	26		113	115	116	118	121	122	123
124	125	126	127	138	139	201	206	408	574
674	680	704	706	707	709	710	711	768	778
1112	1113	1133	1177	1353	1360	1361	1383	1432	1717
1856	1912	1913	1914	1915	1965	1982	1994	1995	2000
2073	2108	2134	2322	2410	2454	2467	2543	2703	2743
2813	2815	2817	2819	2822	2864	2879	2884	2912	3084
3218	3256	3266	3859	4079	4094	4095	4096	4097	4101
4390	4697	4783	4878	4893	4951	4970	5047	5112	5114
5127	5133	5141	5344	5399	5400	5403	5406	5407	5409
5412	5413	5415	5416	5417	5418	5419	5522	5623	5645
5650	5700	5775	5952	5972	5974	5975	5976	5977	5978
5979	5980	5981	5982	5983	5984	5985	5999	6017	6067
6104	6105	6379	6383	6445	6482	6483	6489	6871	8012
8203	8375	8396	8454	8455	8456	8467	8526	8584	8626
8723	8741	8749	8770	8775	8780	8814	8840	8937	8991

VISION (CONT'D)

COLOR VISION (CONT'D)

8993	9022	9121	9230	9429	9487	9488	9518	9543	9586
9596	9608	9616	9753	9754	9979	9981	9983	10,162	10,183
10,185	10,186	10,197	10,200	10,201	10,214	10,242	10,462	10,521	10,530
10,602	10,741	10,779	10,780	10,787	10,788	10,790	10,792	10,794	10,801
10,803	10,806	10,843	10,849	11,204	11,317	11,603	11,827	11,903	12,180
12,252	12,253	12,344	12,574	12,717	12,787	12,822	12,823	12,847	12,848
12,862	12,863	12,865	12,866	12,867	12,869	12,873	12,891	12,903	12,954
12,955	12,956	12,957	12,974	13,298	13,302	13,303	13,304	13,307	13,311
13,323	13,325	13,328	13,329	13,330	13,331	13,332	13,363	14,303	14,331
14,345	14,371	14,502	14,525	14,571	14,600	14,629	14,635	14,651	14,686
14,714	15,058	16,185	16,231	16,974	18,551	19,253			

EFFECTS OF UNUSUAL ENVIRONMENTS

ACCELERATION

1785	3272	3650	5627	5628	5630	5730	5733	5736	6149
6847	8554	9501	9801	10,587	10,712	11,278	11,286	11,992	12,238
12,940	12,944	13,026	13,152	13,204	14,256	14,373	19,772		

HIGH ALTITUDE

130	425	1207	2812	2891	3751	5082	5951	6110	6112
6425	8554	11,516	11,521	11,819	11,832	13,204	13,312	18,954	

OTHER

1524	2038	2696	2825	2887	3043	3244	3527	3749	4552
5082	5951	5986	6554	6670	6833	6912	8012	9447	9984
10,154	10,155	10,604	10,745	10,750	10,751	10,773	11,119	11,821	12,236
12,247	12,371	12,933	12,958	13,118	13,187	13,400	14,273	14,411	14,443
14,660	15,173	15,174	18,823						

VIBRATION

4982	10,189	12,320	12,323						
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ZERO "G"

5573	10,712								
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EQUIPMENT AND METHODS USED IN STUDY OF

11	27	117	147	202	559	682	778	800	1074
1078	1135	1240	1241	1254	1256	1258	1320	1506	1651
2048	2049	2108	2155	2456	3065	3271	3498	3533	3535
3890	3995	4006	4008	4078	4674	4708	4716	4781	4979
5075	5106	5137	5284	5351	5668	5715	6030	6099	6142
6339	6416	6576	6619	6655	6691	6709	6929	8400	8762
9472	9593	9608	9747	9849	9851	9952	10,157	10,165	10,185
10,198	10,200	10,205	10,239	10,240	10,609	10,628	10,741	10,751	10,789
11,268	11,617	11,673	11,791	11,899	12,506	12,636	12,685	12,717	12,738
12,821	12,847	12,863	12,865	12,868	12,872	12,928	12,934	12,935	12,957
13,043	13,305	13,311	13,405	14,212	14,403	14,445	14,593	14,608	14,735
14,821	14,828	14,829	14,831	14,884	15,233	15,240	16,650	18,548	19,298
19,301	19,564	19,885	21,651						

GENERAL REFERENCES

96	114	405	410	527	531	561	565	607	608
609	785	954	1114	1234	1413	1506	1734	1916	1959
1981	2158	2421	4073	4641	4714	4721	5036	5054	5084
5351	5399	5602	5523	5654	6019	6383	6734	6747	8289
8532	8767	9610	9852	10,111	10,189	10,238	10,241	10,513	10,612
11,008	11,134	11,180	11,280	11,656	11,962	12,158	12,159	12,165	12,289
12,354	12,382	12,383	12,516	12,521	12,540	12,647	12,777	12,874	12,894
12,962	12,987	13,020	13,139	13,204	13,239	14,216	14,217	14,221	14,274
14,281	14,479	14,542	14,676	14,677	18,824				

VISION (CONT'D)

ILLUMINATION LEVEL

114	152	861	942	1242	1244	1245	1253	1262	1263
1364	1918	2119	2399	3090	3767	3770	3818	3983	4927
4971	4973	4983	5124	5132	5260	5472	5496	5584	6020
6036	6187	6730	6881	8121	8182	8244	8532	8582	8583
9399	9495	9573	9574	9575 9577	9586	9590	9603	9613	9627
9632	9635	9775	9984	10,187	10,205	10,217	10,727	10,740	10,788
10,791	10,796	10,800	10,805	10,841	10,842	11,012	11,752	11,755	11,756
11,757	11,956	12,160	12,928	13,253	13,285	13,297	14,278	14,373	14,447
14,454	14,572	14,573	15,224	15,236	18,542	18,543	18,544	18,545	18,822

LOW LEVEL ILLUMINATION

11	134	157	158	172	203	205	207	217	288
582	675	676	677	712	746	759	777	779	782
783	784	804	853	881	928	954	986	992	1242
1244	1245	1246	1247	1248	1249	1251	1252	1253	1262
1263	1264	1265	1266	1267	1268	1358	1363	1364	1367
1372	1382	1490	1759	1917	2482	2504	2505	2689	2785
2925	2893	2949	2951	3032	3177	3432	3584	3629	3974
3975	4275	4629	4630	4692	4693	4725	4821	4849	5136
5247	5267	5268	5269	5270	5277	5286	5558	5668	5987
6052	6082	6097	6098	6099	6100	6103	6106	6170	6185
6285	6740	6759	6762	6858	6917	8094	8127	8270	8488
9377	9383	9488	9560	10,083	11,564	11,728	11,790	11,888	11,918
11,960	12,249	12,377	12,462	12,642	12,643	12,738	12,860	12,899	12,910
13,285	14,318	14,373	14,376	14,421	14,443	14,451	14,459	14,565	14,821
14,855	14,861	14,950	15,044	15,145	15,168	16,246	16,986		

PHYSIOLOGICAL MECHANISMS

7	8	200	1125	1320	2889	2893	2949	3020	3066
3157	3441	3585	3635	3816	3948	3970	4717	5043	5048
5054	5132	5133	5187	5309	5459	5460	5556	5670	5775
6034	6041	8312	8769	9227	9468	9487	9515	9516	9722
9849	9982	10,120	10,182	10,187	10,191	10,205	10,241	10,461	10,519
10,524	10,735	10,795	10,805	11,012	12,345	12,687	12,843	13,321	13,327
13,392	14,453	14,478	14,496	14,548	14,561	14,571	14,600	14,732	14,754
14,883	16,199	18,076	18,077	18,196	18,555	18,613	22,017		

PSYCHOPHYSICAL SCALES

138	3181	6734	10,191	12,574	13,302	14,629	15,058		
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SIGNAL CHARACTERISTICS

152	157	1329	1538	2762	2931	3184	3821	3883	3969
4674	4782	5034	5038	5039	5041	5043	5558	5635	5908
6212	6537	6739	8770	9487	10,184	10,612	10,656	10,797	10,799
10,803	10,804	10,848	12,345	12,448	12,886	12,887	12,982	12,986	13,306
13,308	13,331	13,384	14,333	14,597	15,214	15,224	15,240	16,232	16,390
16,850									

TESTS OF

1	11	121	122	123	124	125	127	201	408
438	608	609	610	611	674	676	677	680	693
694	695	698	704	706	707	709	782	783	784
800	1306	1354	1360	1361	1362	1373	1366	1367	1383
1391	1392	1393	1432	1433	1717	1843	1856	1870	1895
1912	1914	2017	2095	2108	2121	2467	2543	2785	2789
2790	2793	2813	2815	2819	2822	2864	2879	2884	2885
2951	3084	3236	3256	3266	3420	3533	3535	4537	4716
4717	4781	4796	4850	4869	5075	5250	5253	5344	5555
5645	5712	5781	5921	5952	5972	5974	5975	5976	5977
5978	5979	5980	5981	5982	5983	5984	5985	5987	6017

VISION (CONT'D)

TESTS OF (CONT'D)

6067	6082	6096	6098	6099	6225	6482	6552	8203	9533
9334	9574	9979	10,213	10,214	11,578	11,602	11,728	11,916	11,953
12,051	12,154	12,155	12,180	12,262	12,288	12,493	12,787	12,834	12,861
14,337	14,345	14,451	14,479	14,724	15,023	15,168	15,169	15,269	

THEORIES

129	410	604	2258	2931	3082	3091	5168	5229	5654
5700	6635	8023	8373	8456	8467	8468	9518	9611	10,186
10,505	10,795	10,805	11,655	11,799	12,558	12,848	12,869	13,322	13,325
13,386	14,407	14,528	14,635	14,714	14,861				

VISUAL

ACCOMMODATION AND CONVERGENCE

2	425	577	1888	2087	2120	2635	3236	3306	3498
3749	3823	3824	4080	5035	5054	6096	6555	6654	6783
6917	8488	9478	9976	10,163	10,188	10,192	10,193	10,217	10,237
10,513	10,645	10,791	11,805	12,500	12,958	14,337	15,159	18,676	

ACUITY

ADAPTATION LEVEL AND

288	2951	3695	3822	3825	3843	3974	3980	3981	9975
11,203									

BRIGHTNESS CONTRAST AND RATIO

288	779	3193	3826	9399	9559	9574	9603	9992	10,524
10,800	10,805	11,291	11,318						

COLORED ILLUMINATION

205	4715	5284	9586	10,187					
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GENERAL REFERENCES

161	438	559	610	611	693	694	695	698	930
1391	1870	1884	1889	1891	1915	2017	2026	2091	2095
2130	2635	2743	2749	2750	3051	3420	3535	3948	3970
3992	4042	4717	5035	5507	5557	5645	5781	5799	5857
9474	9534	9621	9746	9848	9851	10,157	10,163	10,184	10,187
10,213	10,350	10,513	10,645	10,750	10,793	11,268	11,317	11,318	11,832
11,916	12,247	12,325	12,834	14,504	14,979	15,269	18,555		

ILLUMINATION AND

205	288	759	784	931	1243	1356	1364	1366	1890
2026	2080	2509	2762	2951	3177	3252	3308	3629	3823
3824	4715	4855	4971	4973	4989	5075	5277	5652	6034
6103	6917	8132	8532	8583	9235	9533	9559	9586	10,073
10,727	10,740	10,799	10,842	11,291	11,755	11,756	14,565	15,167	15,172
16,183									

TYPES OF

DYNAMIC

2241	2540	3231	3244	3255	3261	3711	4027	4437	4537
4692	4693	4696	10,751	11,029	11,203	12,136	12,348	12,374	12,701
13,161	13,210	14,574	14,620	14,770	16,370	16,391	18,132		

STATIC

1	3228	5430	5555	6626	6670	8220	10,751	10,781	11,041
11,119	12,146	12,372	12,422	12,440	12,462	12,546	12,895	13,139	14,278
14,651	15,169	18,613							

ADAPTATION, PRE-ADAPTATION AND PRE-EXPOSURE

11	34	134	137	151	205	206	207	217	288
577	679	681	701	703	746	750	777	779	804
887	1085	1125	1244	1248	1355	1356	1357	1358	1372
1726	1786	1914	1917	1923	1994	1995	2757	2258	2421
2669	2703	2785	2893	2949	2951	3020	3049	3067	3080
3157	3178	3230	3825	3974	3975	3976	3977	3983	3993
4101	4312	4629	4631	4710	4983	5091	5118	5125	5398

VISUAL (CONT'D)

ADAPTATION, PRE-ADAPTATION AND PRE-EXPOSURE (CONT'D)

5400	5403	5492	5493	5494	5557	5631	5670	5788	6052
6083	6097	6106	6170	6178	6483	6489	6597	6708	8012
8212	8252	8253	8287	8754	8769	8773	9229	9230	9231
9232	9236	9377	9432	9543	9560	9588	9849	9920	9921
9975	9980	9981	10,154	10,155	10,182	10,197	10,703	10,238	10,240
10,467	10,508	10,508	11,070	11,269	11,367	11,514	11,440	11,564	11,565
11,455	11,707	11,799	11,799	12,372	12,455	12,515	12,537	12,552	12,879
12,946	13,020	13,304	13,307	13,308	13,322	14,295	14,380	14,459	14,687
14,732	14,855	14,884	14,924	15,401					

AFTER-EFFECTS, AFTER-IMAGE

208	864	2986	3977	4843	4879	4985	5117	5154	5208
5209	5229	5378	5530	5672	5684	5755	8023	8176	8182
8183	8212	8281	9364	9722	10,612	10,737	12,146	13,070	13,039
13,149	13,241	13,282	13,395	14,453	14,455	15,317	16,130		

ANOMALIES AND INDIVIDUAL DIFFERENCES

124	125	127	148	408	574	596	704	707	716	711
759	828	1113	1133	1353	1360	1383	1393	1432		1433
1588	1912	1913	1914	2093	2108	2659	2660	2789		2790
2813	2815	2817	2819	2822	2826	2888	3218	3377		3533
4088	4720	4850	5091	5247	5254	5256	5872	5972		5974
5975	5976	5977	5978	5979	5980	5981	5982	5983		5984
5985	6017	6067	6104	6105	6779	8344	8749	8937		9848
9851	9979	9983	10,108	10,109	10,111	10,113	10,162	10,164		10,165
10,214	10,215	10,242	10,245	10,462	10,513	10,557	10,718	10,779		10,780
10,796	10,845	10,849	11,204	11,330	11,331	11,385	11,578	11,751		11,960
12,051	12,252	12,253	12,254	12,493	12,787	12,867	13,396	13,435		13,436
14,371	14,614	14,634	14,714	16,847						

BRIGHTNESS DISCRIMINATION

712	806	1097	1121	1177	1650	1898	2643	2684		2931
3181	3182	3818	4006	4070	4380	4647	4718	4985		5034
5038	5039	5042	5408	5655	5771	5908	5930	6378		8244
8253	8274	8288	8292	8397	8399	8393	8394	8395		8396
9231	9246	9488	9495	9517	9519	9514				
10,189	10,406	10,605	10,659	10,780	10,781	10,790	10,796	10,800		10,805
11,087	11,606	11,920	12,254	12,388	12,586	12,787	12,819	12,821		12,891
13,020	13,239	13,331	13,410	13,416	14,700	14,821	15,186	16,616		18,541

CODING

160	335	1329	2122	2127	2280	3173	3549	3816		3837
3929	4032	4056	4785	6379	6684	6730	6939	8261		8838
8840	8937	8991	9654	9757	9792	10,111				
10,795	11,670	11,803	11,854	11,857	11,858	11,859				
16,287										

COMFORT AND FATIGUE

675	794	841	881	2450	2482	2889	3086	3236		3765
3767	3768	3769	3770	4983	5309	6053	8117	8204		8586
8587	9588	9591	9593	9603	9609	9611	9616	9617		9618
9620	9621	9708	9952	9984	9996	9997	10,002	10,075		10,083
10,778	11,288	11,752	11,756	11,757	12,465	13,396	14,140	14,530		14,994
15,167	15,197	15,215	15,238	15,239						

FIELD

BINOCULAR

2545	2890	2909	3082	3636	5271	5415	5508	5857		5921
8001	8063	8264	9474	9925	10,113	10,157	10,158	10,659		10,734
10,750	10,786	11,268	12,261	12,325	12,485	12,500	12,693	12,897		12,929
13,123	14,229	14,296	14,572	14,573	14,837	15,224				

VISUAL (CONT'D)

FIELD (CONT'D)

DISTORTED

2772	4678	4945	5755	5811	6182	6194	11,740	12,245	12,246
13,024	13,027	13,160	13,413						

MONOCULAR

2059	2545	2909	3636	4378	5382	5508	5857	8001	8053
8264	9474	10,659	10,750	10,786	11,264	11,292	12,897	12,929	13,034
13,337									

PERIPHERAL VISION

143	151	288	712	746	777	779	852	1369	1424
2092	2134	2697	3308	3816	3821	4640	5040	5043	5051
5087	5277	5507	5771	6112	6212	6452	6701	6747	8202
8253	8768	9506	9708	9775	9852	10,659	10,790	11,088	11,429
12,053	12,154	12,490	12,528	12,866	12,878	12,886	12,887	12,895	12,897
12,965	13,323	14,385	14,435	14,460	14,868	14,924	15,184	15,214	15,231
16,122	16,123	18,550	18,555						

INFORMATION PROCESSING

160	2343	2982	3969	6635	6871	8260	8483	8484	8762
10,112	10,409	10,656	12,016	12,463	13,250	15,058			

MASKING AND INTERFERENCE

545	1001	2452	2669	2994	3989	4436	5040	5042	5762
6161	6164	8581	9790	9989	10,022	10,644	10,805	11,506	12,009
12,644	12,767	13,007	14,607	14,654	14,694	14,695	14,767	14,826	14,828
14,829	14,830	14,835	14,836	14,957	15,206				

PERCEPTION OF

ANGLE

1101	1109	1123	1138	1139	2135	2136	2138	2350	2838
3187	3736	3764	4908	4909	4910	4918	4954	5149	5204
5460	5731	5734	5744	5745	6033	6838	6839	8041	8286
9679	9689	9766	9767	9779	9788	10,408	10,535	10,601	10,732
11,808	11,835	12,251	12,861	13,151	13,395	14,528	14,923	18,929	18,934

DEPTH AND DISTANCE

109	153	163	551	604	852	986	1240	1242	1243
1245	1246	1247	1354	1362	1373	1392	1596	1597	1599
1648	1649	1651	1652	1654	1683	1825	1843	1889	1890
1891	1960	2072	2078	2093	2121	2122	2145	2255	2414
2456	2482	2505	2544	2545	2743	2753	2888	2890	2930
3029	3082	3090	3091	3186	3313	3645	3664	3736	3764
3799	3819	3922	4639	4695	4707	4842	4869	4951	4953
4957	5046	5048	5051	5052	5053	5061	5106	5116	5129
5131	5140	5154	5186	5243	5251	5255	5266	5269	5430
5460	5463	5476	5731	5734	5735	5744	5745	5769	5799
5830	5929	5930	6004	6019	6020	6031	6033	6411	6555
6661	6662	6770	6838	6839	3883	8030	8037	8040	8041
8042	8100	8121	8127	8264	8275	8282	8303	8308	8447
8513	8514	8523	8526	8565	8566	8823	9472	9478	9484
9510	9534	9684	9767	9773	9919	9922	9923	9976	9978
10,157	10,158	10,192	10,193	10,350	10,363	10,518	10,537	10,608	10,613
10,628	10,640	10,680	10,718	10,734	10,743	10,793	11,041	11,049	11,091
11,228	11,257	11,502	11,607	11,652	11,805	11,825	11,917	12,099	12,128
12,163	12,262	12,500	12,558	12,693	12,861	12,871	12,919	12,928	13,033
13,040	13,123	13,152	13,253	13,359	13,386	13,394	13,413	13,438	14,467
14,469	14,478	14,494	14,572	14,633	14,837	14,923	15,224	15,332	15,528
16,121	16,128	16,183	16,648	19,546					

VISUAL (CONT'D)

PERCEPTION OF (CONT'D)

FORM AND CONTOUR

200	218	550	553	1099	1120	1121	1122	1128	1177
1591	2146	2160	2201	2242	2243	2255	2343	2520	2583
2643	3069	3313	3492	3857	3859	3889	3897	3964	3967
3968	4032	4073	4624	4849	5046	5109	5115	5168	5186
5187	5205	5580	5656	5666	5750	6042	6189	6215	6612
6648	8286	8452	8453	9541	9653	9666	9667	9669	9686
9696	9698	9766	9767	9779	9782	9989	10,392	10,396	10,408
10,452	10,498	10,538	10,601	10,610	10,634	10,787	11,124	11,127	11,606
11,740	12,139	12,150	12,163	12,265	12,375	12,508	12,576	12,644	12,690
12,824	13,300	13,404	14,445	14,607	14,654	14,694	14,695	14,767	14,825
14,826	14,828	14,829	14,830	14,831	14,835	14,836	14,956	14,990	15,236

MOVEMENT

22	29	142	143	549	798	986	1182	1586	1740
2145	2545	2719	2761	2930	3029	3090	3650	3670	4123
4384	4460	4639	4707	4781	4782	4949	4950	4953	5041
5045	5137	5186	5204	5205	5246	5269	5286	5473	5612
5679	5736	5850	6033	6041	6068	6069	6071	6375	6580
6838	6839	6881	6883	8042	8127	8251	8264	8461	8515
9364	9501	9515	9516	9694	9695	9778	9791	10,408	10,456
10,498	10,522	10,528	10,603	10,609	10,627	11,017	11,203	11,325	11,578
11,820	11,875	12,143	12,638	13,012	13,013	13,025	14,229	14,256	14,573
14,633	14,660	14,885	15,249	16,370	16,503	16,649	16,650	18,042	20,885

NUMBER

1102	1103	1104	1187	2644	3184	3837	4286	4622	5144
5266	5635	6734	8001	11,864	11,918	13,252			

PATTERN

503	1437	1577	1587	1601	2176	2838	3187	3492	3777
3859	3960	4951	5476	5760	5762	6144	6161	6164	6205
6351	6527	6838	6839	8402	8483	8484	9697	9698	9701
9766	9767	9782	10,396	10,458	10,534	11,740	12,175	12,767	12,824
12,887	12,897	13,007	13,079	13,391	13,408	15,206			

SIZE

551	777	862	1136	1177	1823	1825	2045	2079	2544
2716	3313	3636	3736	3799	4127	4378	4638	4719	4842
5099	5114	5121	5129	5131	5154	5386	5530	5929	5930
6044	6379	6648	6714	6734	8040	8100	8160	8261	8264
8291	8448	9474	9663	9667	9683	10,413	10,414	10,452	10,537
10,608	10,640	10,737	11,049	11,606	11,987	12,919	13,038	13,045	13,123
13,159	13,300	13,351	13,360	13,394	16,351				

VELOCITY

549	2350	2753	4008	4078	4780	6190	6375	6537	6739
6883	8251	9791	10,419	10,609	10,730	11,268			

REACTION TIME

34	152	195	860	1084	1788	3155	3306	3883	5086
5087	5947	6051	9467	9790	10,184	11,278			

REQUIREMENTS

3052	3123	3150	3306	4725	6081	8344	8663	11,758	12,155
14,504									

SEARCH AND DETECTION

AIR TO AIR

883	1207	1352	1359	1671	5950	6153	6167	6186	10,022
10,614	12,502	12,643	12,832						

TABLE (CONT'D)

SEARCH AND DETECTION (CONT'D)

AIR TO GROUND

2241	3247	4247	5258	6157	6185	6348	11,515	11,517	12,502
12,876	12,854	14,450	16,451	16,489					

AIR TO SEA

115	115	557	757	1025	5485	12,502	12,948		
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GENERAL

504	577	1195	2367	3312	3544	3342	9574	9554	9585
9552	10,154	10,348	10,395	10,444	10,465	11,093	11,217	11,450	11,871
11,895	11,908	12,191	12,249	12,255	12,535	12,728	12,770	12,817	12,933
13,297	13,411	14,410	14,528	14,592	14,701	14,703	14,729	14,734	14,457
14,972	15,085	15,145	15,209	15,230	15,233	15,170	15,562	15,804	16,832
18,370									

GROUND TO AIR

883	1352	2310	2566	3499	5722	5723	6004	6186	6784
8840	10,365	10,647	10,848	11,091	11,124	11,190	11,223	11,674	12,352

TARGET DETECTION

806	878	1122	1725	1137	2307	2310	2482	2574	2736
2959	3544	3642	3877	3974	3976	4048	4431	4574	5771
6154	6348	6522	6626	6734	6784	8219	8307	9651	9989
9993	10,477	10,751	11,068	11,091	11,119	11,124	11,190	11,223	11,516
11,517	11,554	11,606	11,619	11,826	11,832	12,071	12,082	12,277	12,442
12,448	12,430	12,818	12,821	12,832	12,878	12,885	12,959	12,993	12,948
12,965	12,982	12,986	13,139	13,312	13,348	13,374	13,402	13,443	14,229
14,255	14,294	14,446	14,510	14,520	14,734	14,975	15,153	15,211	15,214
15,239	15,103	15,104	15,390	15,446	15,980	18,011	18,541	15,541	18,549
18,550	18,581								

UNDERWATER TARGETS

1410	5261	21,489							
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STANDARDS AND SPECIFICATIONS

17	113	139	335	757	842	2049	2308	2813	2815
2817	2819	2822	3052	5418	8753	8814	10,186	10,741	10,792
10,794	10,801	10,802	10,842	11,291	12,848	12,853	12,954	12,955	12,956
13,303	13,331	14,447	14,504	14,902	16,246	16,974	18,542	18,543	18,544
18,545									

THRESHOLDS

134	151	157	206	207	410	500	553	565	604
81E	1899	1935	2480	3020	3080	3184	3544	3635	3821
3853	3854	4047	4101	4223	4302	4312	4624	4833	4986
5001	5084	5117	5118	5132	5133	5134	5147	5228	5388
5490	5722	5723	5908	6212	6213	6271	6357	6381	6404
6520	6527	6635	6730	6881	8001	8013	8033	8045	8270
8397	8398	8399	8437	8769	8770	8840	9122	9230	9236
9399	9487	9488	9574	9588	9669	9982	9986	9993	10,112
10,187	10,352	10,469	10,470	10,531	10,614	10,634	10,637	10,639	10,641
10,644	10,651	10,659	10,751	10,781	10,790	10,797	10,800	10,803	10,804
10,845	10,847	10,848	11,008	11,091	11,203	11,291	11,606	11,640	11,641
11,918	11,920	12,249	12,252	12,253	12,254	12,265	12,352	12,482	12,490
12,506	12,508	12,576	12,638	12,644	12,679	12,821	12,832	12,862	12,864
12,873	12,878	12,879	12,886	12,887	12,894	12,897	12,965	13,007	13,012
13,166	13,250	13,304	13,307	13,326	13,329	13,384	13,400	13,428	13,435
13,436	14,249	14,252	14,255	14,333	14,386	14,435	14,461	14,548	14,597
14,600	14,608	14,732	14,825	14,830	14,835	14,836	14,902	14,971	14,994
15,184	15,202	15,211	15,231	16,232	16,446	16,744	18,548	18,549	18,550
18,551									

VTOL, STOL AIRCRAFT

11,494	12,666	14,776	16,449	16,987					
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WARNING DEVICES

549	1561	5468	5484	5778	5932	8137	10,085	10,833	11,302
11,525	14,286	14,709							

WARNING AND SIGNAL LIGHTS

596	702	1374	1558	1782	2127	2464	3155	3358	3552
4618	4088	4132	4295	4391	5383	5571	5574	5950	5197
6196	6195	5695	5872	5932	8226	8358	9384	9514	10,380
10,555	10,588	11,088	11,097	11,282	11,287	11,288	11,326	11,426	11,422
11,570	11,521	12,166	12,157	12,215	12,290	12,292	12,388	12,439	12,870
12,942	14,359	14,309	14,946	15,024	15,139	15,237	15,522		

WEAPONS SYSTEMS, DESIGN OF

GENERAL REFERENCES

431	1344	1492	1537	3578	4755	5326	5721	6730	5748
8407	9120	10,027	10,051	10,714	11,285	11,302	11,481	11,750	12,327
12,031	12,257	13,191	14,745	14,780	15,155	15,165			

HANDHELD

1598	1547	1878	1924	2478	2504	2505	2751	3488	3556
4585	4702	5304	5306	5539	5740	10,251	11,046	11,189	11,670
12,444	12,629	12,663	13,169	13,285	14,145	14,304	14,454	14,536	15,038

INTERMEDIATE SIZED SYSTEMS

211	401	517	1670	2638	3315	3479	3480	3499	3504
3880	3881	3957	4429	4515	5345	6100	6741	6988	11,058
11,160	11,365	11,402	11,412	11,413	11,442	11,542	11,543	11,661	12,349
14,322	16,814	16,928							

LARGE SCALE SYSTEMS

28	403	427	908	4792	5292	5321	6665	6732	9695
11,045	11,285	11,289	11,512	11,775	11,777	12,025	12,028	12,073	12,583
12,194	14,150	14,284	14,432	14,429	14,538	14,895	15,320	15,354	16,091
16,326	21,796								

WEIGHTLESSNESS

5577	10,228	10,355	10,671	10,709	10,720	10,844	11,255	11,473	12,321
12,587	12,877	13,138	13,200	14,251	14,375	14,585	14,748	14,749	14,921
14,993	14,995	15,157	16,802	16,902					

WINDSHIELDS

EVALUATION OF

1991	3313	4431	4578	5252	5265	11,054			
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WORK PLACE DESIGN

ACOUSTICS

8578	8851	8852	8872	8874	8896	8912	8915	8954	8959
8968	9639	14,428							

AREA REQUIREMENTS

2969	3931	5839	6364	8635	8710	8989	10,012	10,381	10,704
11,830	11,854	11,938	15,408						

ARRANGEMENT OF EQUIPMENT AND MEN

244	844	1396	2630	5227	6842	6909	6949	6959	8545
8710	10,381	10,691	10,704	11,259	11,830	12,055	13,070	14,510	

ATMOSPHERIC CONTROL

1756	8213	8516	8553	11,534	11,846	17,795			
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GENERAL REFERENCES

4626	4934	5307	6377	6842	6907	6914	5949	9952	10,084
10,756	10,841	11,846	12,130	12,274	14,510	14,581	18,184		

WORK PLACE DESIGN (CONT'D)

ILLUMINATION

AIRCRAFT LIGHTING

352	432	850	943	1356	1483	1664	1783	1785	1991
3368	3546	4132	4677	5903	5905	6058	6170	6180	6181
6194	6135	6192	6200	6858	8545	9515	10,836	11,087	11,088
11,097	11,313	11,621	11,693	12,492	14,529	17,520			

COMMAND CENTERS

9531 9589

FACTORY AND OFFICE

3765	3773	9398	9573	9575	10,071	10,097	10,096	10,099	10,757
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GENERAL REFERENCES

1351	1354	1951	2048	2489	3765	3767	3768	3769	3770
4712	4713	4927	5250	5563	5532	9180	9531	9532	9573
9575	9577	9581	9584	9590	9593	9595	9513	9521	9522
9531	9535	10,059	10,097	10,058	10,099	10,727	10,755	10,757	10,814
10,837	10,838	10,840	11,555						

HOME

3765	9398	10,055	10,838	10,839					
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LIGHTING FIXTURE

9433	9573	9577	9589	9590	9596	9753	10,098	10,757	10,838
10,839	9754								

OTHER FACILITIES REQUIRING SPECIAL LIGHTING CONDITIONS

2012	2530	2921	3854	5440	8536	8537	8539	8635	9754
10,073	10,052	10,757	11,737	11,872	12,573				

RADAR ROOM

1100	1666	2537	3989	4263	5729	10,740	11,582	12,151	14,552
15,261	15,268								

SHIP AND SUBMARINE

5	5	682	3000	5439	14,504	14,510	699		
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VEHICLE

10,688	10,783								
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PASSAGEWAYS

1355	1749	5343	8583	8710	10,065	10,092			
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SEATING ARRANGEMENTS

559	972	973	1750	1756	1777	1778	5894	6949	6957
6959	8658	15,042	15,106	15,109					

VISIBILITY, FIELD OF VIEW

824	825	1759	1777	2489	3776	6949	6957	6959	8549
9956	12,550	14,537							

WORK PLACE EVALUATION

1747	3931	9091	10,296	12,373	12,492	15,107			
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WORK AND TASK PERFORMANCE

ACCURACY AND SPEED REQUIREMENTS

30	1538	1559	2112	2228	2253	2450	2618	3559	3870
4107	6962	10,546	10,554	10,582	10,725	15,037	15,299		

CAPACITY FOR PRODUCTION

1337	4026	4209	4683	6509	6511	6558	6595	6614	6852
9023	10,476	10,566	10,685	11,778	11,779	11,780	11,856	11,919	12,477
13,057	13,318	13,343	13,430	16,661	22,756				

COMPLEXITY

30	41	1546	1712	2112	2230	2431	2449	2458	2618
2733	3013	3436	3644	3663	5113	4057	4381	4400	4691
4709	4839	5044	5576	5926	6362	6387	6614	6697	6843
6859	8011	8241	8240	10,359	10,391	10,565	10,611	10,682	10,862
11,121	11,621	11,636	11,814	12,054	12,079	12,080	14,258	14,334	14,843
15,298									

WORK AND TASK PERFORMANCE (CONT'D)

FATIGUE AND BEHAVIOR DECREMENT

247	570	957	1321	1448	1449	1453	1455	1459	1532
1930	2450	2457	2458	2518	2520	2571	3162	3409	3528
3562	3579	3715	3831	4144	4392	4495	4498	4535	4545
4591	4851	4854	5011	5044	5155	5171	5222	5250	5421
5471	5550	5850	5897	5911	5912	5913	6003	6021	6128
6129	6131	6132	6133	6134	6135	6137	6138	6139	6340
6459	6494	6733	6859	8035	8047	8235	8257	8305	8730
9058	9819	10,295	10,295	10,355	10,373	10,385	10,500	10,510	10,555
10,571	10,649	10,741	10,819	10,853	11,121	11,191	11,182	11,233	11,234
11,274	11,405	11,531	12,508	12,757	12,838	12,961	13,124	13,238	14,740
14,911	15,112	15,144	15,204	15,210	15,425	15,426	15,119	16,971	18,176

GENERAL REFERENCES

548	1943	2997	3153	3517	3962	4526	5475	5371	5377
8309	8842	9073	9082	9093	9711	9717	10,210	10,295	10,453
10,555	10,597	10,701	11,084	11,177	11,217	11,255	11,300	11,405	11,450
12,274									

LENGTH AND DISTRIBUTION OF WORK AND REST PERIODS

1321	1858	2154	2230	2458	2545	2571	3512	3579	4103
4135	4709	4953	4965	5011	5044	5045	6245	6356	6361
6494	8268	8730	10,510	10,522	10,727	10,842	11,425	11,531	11,950
11,557	12,508	12,938	13,124	13,157	13,165	13,238	13,402	14,354	16,133
16,398	16,399								

METHODS OF STUDY AND MEASUREMENT

1833	1992	4465	4466	5988	6118	9459	9771	10,692	11,152
11,217	11,218	11,233	11,273	11,864	11,935	12,673	14,258	14,515	14,520
15,399									

PACING

1556	1833	2191	2443	3531	3743	4210	4709	4839	4896
5911	6202	6352	6849	8518	9723	9184	10,391	12,079	13,163
16,398	16,399								

PHYSIOLOGICAL MEASURES OF

1302	2457	2458	2831	3084	3210	3649	4146	4152	4583
5104	5380	5465	5512	5511	5550	5874	6130	6135	6137
6459	6509	10,449	10,481	10,493	10,759	10,752	11,030	11,215	11,216
11,255	11,801	11,859	11,860	12,268	12,278	12,829	12,981	13,057	

1
Gordon, D.A., Zagorski, M.J., Woods, I.A. & Reuder, Mary. A STUDY OF SLOAN ORTHO-RATER PLATES AS MEASURES OF VISUAL ACUITY AT VARIOUS LEVELS OF ILLUMINATION. Proj. 25530100, PHS Rep. 975, Aug. 1952, 8pp. USA Personnel Research Branch, Office of the Adjutant General, Washington, D.C.

1 To make a preliminary assessment of the usefulness of Sloan Ortho-Rater targets (specific combinations of ten letters of the alphabet) as a test of far visual acuity, data obtained from 446 Korean infantrymen by presenting targets in the Baesch and Low Ortho-Rater under three levels of brightness - 10.2, 7.35, and 6.96 log microns-candela were analyzed. Distributions of acuities at different brightness levels, relative difficulties of letters in terms of error scores, and qualitative differences in perception of letters in terms of misidentification are discussed.
T. 2 4

2 Clonents, R., Archer, J.M., Nays, Ruth, Schoening, Joyce K., et al. THE EFFECTS OF CHLOROQUINE ON THE SPEED OF VISUAL ACCOMMODATION IN MAN. Contract AF 41(607) 44, Proj. 21 1601 0005, Nov. 1953, 7pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Medical School, University of Texas, Austin, Tex.).

2 To determine the functionally significant effect of chloroquine on speed of visual accommodation, approximately 70 subjects of a prison population received two tablets of chloroquine (therapeutic doses) or the equivalent in placebo, weekly for 52 weeks. Visual accommodation was tested tachistoscopically and the results are discussed with respect to far-to-near and near-to-far accommodation. Discussion is also presented on the cardiovascular effects observed in animals and side effects of the drug in man.
T. 1. & 12

3 Morris, R.C. DEVELOPMENT OF AN EFFICIENT SET OF DIMENSIONS FOR DESCRIPTION OF AIR-FORCE GROUND-CREW JOBS: PART I. RATING DIMENSIONS. Contract AF 33(218) 13474, AFPRC TM 55 63, June 1956, 57pp. USAF Personnel Research Lab., Lackland AFB, Tex. (Teachers College, Columbia University, New York, N.Y.).

3 The purpose of this study was to determine the appropriate dimensions by which to measure the demands made upon the abilities of the individual in various Air Force ground-crew jobs. Four professional psychologists rated 150 jobs with respect to 170 attributes, on the basis of a written set of job descriptions and attribute definitions. A factor analysis of 130 of these attributes, selected on the basis of their reliability and judged importance, was carried out by Thurstone's diagonal method. The results are interpreted in terms of the number of useful job-ability dimensions that can be identified.

4 Broadbent, D.E. LISTENING TO ONE OF TWO SYNCHRONOUS MESSAGES. AFU 157/51, Oct. 1951, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

4 In an investigation of what determines which of two synchronous messages will be listened to, five groups of 8 to 12 subjects were required to attend to a message presented simultaneously with an irrelevant message. Cues to the correct message included the usual auditory call signs, added visual call signs, previous instructions as to which voice to listen to, and the usual auditory call sign repeated twice or inserted late rather than early in the message. The relative effectiveness of each treatment is discussed. The presence of a practice effect is noted.
G. R. 11

5 USC Medical Research Lab. A PHOTOMETRIC SURVEY OF THE RED LIGHTING INSTALLATION ON THE USS TRIGGER (SS-564). Proj. NM 002 014-01, Memo. Rep. 52 4, March 1952, 6pp. USC Medical Research Lab., New London Submarine Base, Conn.

5 A photometric survey was made of the low level red illumination in the submarine U.S.S. Trigger, limited to general compartment illumination in the Officers Quarters, the Attack Center and the Crew's Mess Section. Specific recommendations relating to use of plastic covers on fixtures, illumination of instrument dial faces, green radiation emitted by background panels of various instruments, and use of filters at strategic points, are made. Illumination data are included.
T.

6 USC Medical Research Lab. SECOND PHOTOMETRIC SURVEY OF THE RED LIGHTING INSTALLATION ON THE USS TRIGGER (SS-564). Proj. NM 002 014-01, Memo. Rep. 52 5, March 1952, 6pp. USC Medical Research Lab., New London Submarine Base, Conn.

6 A second photometric survey was made one month after the first survey of the low level red illumination in the submarine U.S.S. Trigger (see accession number 5). Approximately 90% of the internally illuminated equipment was tested. Additional discussion and recommendations are made regarding the use of improved filters, design of dials for improved readability, use of red glass lamps, etc. Illumination data are included.
T.

Pachman, R.H. & Hart, W.M. SUBTHRESHOLD RETINAL INTEGRATION SHOWN IN LOW CONTRAST FLICKER MEASUREMENTS. Science, Nov. 1955, 120(304), 1256-1257. (Eye Research Foundation, Bethesda, Md.).
Evidence of facilitation of response has been found in psychometrically determined critical fusion frequencies to flicker at low contrast. Spatial summation is denied by the distribution form of the data. Temporal summation within a determined time limit is supported. This may be mediated through association cells at the bipolar-ganglion synapse.
R. 6

8

Rosley, D.A., Glagov, S. & Storer, P. MEASUREMENT OF HUMAN HEART RATE DURING USUAL ACTIVITY. *Science*, Oct. 1953, 130(3381), 976-977. (Pathology Dept., University of Chicago, Chicago, Ill.).

A small, rugged, self-contained cumulative heart-beat counter has a transistorized amplifier, a watch movement made into a counter, and a battery. The counter is activated by each R-wave of the electrocardiographic complex obtained from newly designed precordial electrodes. Heart beats can be counted for as long as 24 hrs. The pulse counter may also be used for measurement of heart rate during work, exercise, disease, or therapy.

9

Willson, T.L. & Ritch, T.G. REPORT ON THE GENERAL HEALTH AND MORALE OF THE OFFICERS AND CREW DURING A 30 DAY SIMULATED WAR PATROL ABOARD A SNORKEL SUBMARINE. Proj. NM 002 009, Rep. 3, Nov. 1948, 7pp. *USN Medical Research Lab.*, New London Submarine Base, Groton, Conn.

USS IREX (SS 482), an experimental snorkel submarine with conventional superstructure and battery, conducted a submerged patrol during the period 1-30 March 1948, during which time she was submerged 615 hrs., 390 by snorkel and 225 on battery propulsion. During this patrol, morale and health were good. The increased monotony and emotional stress incident to a largely or totally submerged patrol is considered to make mandatory an even more stringent personnel selection program and efforts directed toward augmented physical and emotional comfort, proper illumination, pleasing interior color and design, and all practical diversifications. The effect on personnel of atmospheric pressure fluctuation due to opening and closing of snorkel head valve presented no problem during this patrol. However, conditions of operations did not afford an evaluation of the problem, in that negligible pressure fluctuations were experienced. A concise appraisal is required of the effect on personnel of prolonged snorkelling during periods of sleep; this most easily accomplished by a proposed dock-side study.

R 2

10

Weybrew, S.B. PSYCHOLOGICAL AND PSYCHOPHYSIOLOGICAL EFFECTS OF LONG PERIODS OF SUBMERGENCE. I. ANALYSIS OF DATA COLLECTED DURING A 265-HOUR, COMPLETELY SUBMERGED, HABITABILITY CRUISE MADE BY THE USS NAUTILUS (SSN571). Proj. NM 23 00 00, Task NM 23 02 20, Subtask 4, MRL Rep. 231, Feb. 1957, 43pp. *USN Medical Research Lab.*, New London Submarine Base, Groton, Conn.

30 enlisted men from the crew of the NAUTILUS were measured daily during an 11-day, completely submerged period to determine when, or if, any debilitating effects resulted from this period of submergence. Critical Flicker Frequency thresholds, Hand Tremor scores, heart and respiratory periods, and daily self-ratings on 28 fatigue-like variables were included in the measurement battery. The data from each test, plotted by day submerged, suggest that optimal adaptation to the submerged conditions occurred during the first 6 days. From the 6th to 8th days, muscular tension increased and the proportion of individuals reporting insomnia, headaches, and lowered motivation also increased, thus suggesting less effective adaptation during this period. The data for the last 2 days indicated more effective adaptation; however, these results were considered spurious due to the "end spurt" previously observed in men living in confined environments for prolonged periods.

R 11

11

Rose, H.W. A BRIGHT-ADAPTATION DEVICE FOR USE WITH DIFFERENT NIGHT-VISION TESTERS. Proj. 21 31 003, Rep. 1, April 1952, 5pp. *USAF School of Aviation Medicine*, Brooks 'B, Tex.

11

To develop and test a bright-adaptation device for use with different night vision testers, a diffusing sphere (painted aluminum) was constructed. Tests employing pre-adaptation by means of the device show the effects of pre-bright-adaptation to five levels of luminance on subsequent dark adaptation. The average threshold measurements for 19 subjects are given for 2 minutes, 5 minutes and then every 5 minutes until the 45th minute. The results are discussed and recommendations made for the use of this device.

T. G. R 7

12

Hillman, Beverly. REPORT ON TESTING AND EVALUATION OF BAUSCH AND LOMB NEUTRAL N-15 SUNGLASSES. Proj. NM 003 041.51, Memo. Rep. 53 3, March 1953, 6pp. *USN Medical Research Lab.*, New London Submarine Base, Conn.

12

To evaluate Bausch and Lomb N-15 sunglasses for use by the Navy, they were tested for standard naval optical requirements, spectral transmittance was measured, and Judd average percent deviation for daylight transmittance was computed. Results are discussed in terms of naval standards and usage and recommendations made.

C. T. R 7

11
Uhlman, J.E. & Bolanovich, D.J. DEVELOPMENT OF ARMY FORCES QUALIFICATION TEST AND PRE-DECESSION ARMY SCREENING TESTS, 1946-1950. Proj. 2651100, PRS Rep. 976, Nov. 1952, 58pp. *USA Personnel Research Branch*, Office of the Adjutant General, Washington, D.C.

The purpose of this program was to develop screening tests for selection of personnel procured by recruitment and induction to fit existing operational requirements and to provide for continuous improvement of these instruments and related procedures. Recruitment tests: R-2, R-3, and R-4 were constructed and used as initial screening tests at local recruiting stations. The Armed Forces Qualification Tests (AFQT), Forms 1 and 2 were developed to meet the need for greater uniformity among the services in mental screening procedures. Each of the 2 forms contains 90 items divided equally among vocabulary, arithmetic reasoning, and spatial relations. Items were matched not only for validity and difficulty but for similarity in content and psychological processes as well. Standardization of the 2 forms was based on samples of the entire military population on duty in all the services as of Dec. 31, 1946. A single conversation table was adopted since the differences in the distribution of the scores on the 2 forms were so slight. AFQT scores were found to be highly correlated with scores on Army aptitude tests such as AGCT. The distribution of scores obtained from operational administration was found to differ significantly from the distribution of scores expected on the basis of the standardization studies. Follow-up studies substantiated the original standardization. To reduce this "operational slippage" steps were taken to control test administration at Armed Forces Examining Stations. (HEIAS)

R 5

17 Chapanis, A. & Malsey, Rita M. LUMINANCE OF EQUALLY BRIGHT COLORS. *J. opt. Soc. Amer.*, Jan. 1955, 45, 1-6. (Psychological Lab., Johns Hopkins University, Baltimore, Md.).

17 To test recent observations which show systematic variations in the luminance of equally-bright colors, the CIE Y values (luminances) of 342 colored filters, previously matched in brightness by direct visual comparison, were calculated. The CIE diagram was partitioned into 20 zones and the average luminance calculated for the colors in each zone. Supplementary experiments were run to check the validity of the data. Results are discussed in terms of the implications for evaluating relative brightnesses of two filtered light sources.
T. G. R 8

22 Edwards, W. TWO-AND THREE-DIMENSIONAL AUTOKINETIC MOVEMENT AS A FUNCTION OF SIZE AND BRIGHTNESS OF STIMULI. *J. exp. Psychol.*, Nov. 1954, 48(5), 391-398. (USAF Personnel and Training Research Center, Lackland AFB, Tex.).

22 To investigate the effects of size and brightness of the stimulus on autokinetic movement, special apparatus was built to prevent the stimulus from illuminating surroundings thereby providing a "frame of reference". Fifty-one naive subjects, presented with five stimuli varying in size from .25 to 12 inches and of three brightness levels, .0927, 3.85, and 173.9 foot-lamberts, reported latency, direction and amount of movement. The data for subjects reporting movement are analyzed in terms of movement as a function of size and brightness. The concept of "frame of reference" is examined critically.
T. G. I. R 11

26 Talbot, S.A. GREEN VISION AND BINOCULAR FUSION OF YELLOW. *Science*, Feb. 1952, 115(2982), 220-221. (Department of Medicine and Ophthalmology, Johns Hopkins University, Baltimore, Md.).

26 A critical discussion of recent evidence apparently disproving the binocular fusion of yellow is given here. Ways in which the data falls short of proof are pointed out and the need for more data in specific phenomena are mentioned.
R 11

27 Jameson, Dorothea & Hurvich, L.M. USE OF SPECTRAL HUE-INVARIANT LOCI FOR THE SPECIFICATION OF WHITE STIMULI. *J. exp. Psychol.*, June 1951, 41(6), 455-463. (Eastman Kodak Company, Rochester, N.Y.).

27 The experiment was designed to develop a method for specifying the effects of continued action of various perceptual white or neutral stimuli on the balance of visual sensitivities. Psychologically pure or unique hues in the spectrum were determined by three observers under two conditions: 1) in a neutral state (ten minutes dark adapted) and 2) light adapted (five minutes at 25 milli-lamberts) to a series of color temperatures. Results are given in terms of total shifts in spectral hue-invariant loci and implications for specification of white standards in visual experimentation are discussed.
T. G. R 17

28 Allen, W.R. DYNAMIC SYSTEMS STUDIES: OPERATION AND MAINTENANCE PROCEDURES FOR ANALOG COMPUTERS. Contract AF 33(038) 15068, Proj. 7060, WADC TR 54 250, Part 6, Sept. 1956, 116pp. USAF Aeronautical Research Lab., Wright-Patterson AFB, Ohio. (University of Chicago, Chicago, Ill.).

28 This report is concerned with maintenance and operating procedures for analog computers in the field of air weapon systems dynamics. A preliminary discussion is presented of the philosophy and methods of instrumentation of analog computation and restricting the following sections to differential analyzers. The following chapters are devoted to 1) setup procedures and problems with specific examples connected with unitary aerial weapons systems, 2) checking procedures for problem setups and/or solutions, 3) examination of type of staff to operate the computer, and 4) maintenance procedures. In addition, appendices are included covering special computer techniques, a mathematical model for setting up spare parts inventories, and a discussion of fast time computers. T. I. R 76

29 Edwards, W. AUTOKINETIC MOVEMENT OF VERY LARGE STIMULI. *J. exp. Psychol.*, Dec. 1954, 48(6), 453-495. (USAF Personnel and Training Research Center, Lackland AFB, Tex.).

29 To investigate the possibility of very large stimuli producing autokinetic movement (apparent movement of a stationary light in a dark surround), six subjects observed large patterns of dots subtending up to 60° of visual angle under conditions which precluded illumination of surrounding objects by the stimuli. Latency and kind of movement observed are reported and discussed with reference to the question of the stability of the ordinary visual world.
T. R 1

30 Conrad, R. PRELIMINARY FACTORY STUDIES OF THE EFFECT OF SPEED AND LOAD ON COTTON WINDING. APU 147/51, April 1951, 11pp. Applied Psychology Research Unit, HRC, Cambridge, England.

Attention is drawn to the fact that the internal factors of industrial skills (the man-machine relationships) have been much less studied by industrial psychologists than have the external factors (working conditions). Drawing on the results of laboratory experiments, it is suggested that what in the textile industry is called "work-load" may confuse two quite separate factors--speed and load--each of which affects performance, but in different ways. Experiments were carried out in the winding rooms of two cotton textile mills in an attempt to examine these factors under the more realistic conditions of normal industrial life. It was found that: a) Increasing the number of spindles far beyond what could possibly be considered to be a reasonable work-load, resulted in a continued increase in operative output per hour. The logarithm of the rate of creeling--i.e., replacing empty supply packages--was found to be directly proportional to the rate at which supply packages emptied; b) creeling time--considered to represent the vast majority of a winder's work--was also proportional to the rate at which supply packages emptied. Thus, under increased work-load conditions, operatives not only pieced-up more ends per unit time, but the relation between an actual operation and the interval between operations, changed. The implications of these results both for current and for future methods of work-load assessment are discussed.

R 10

31 MacInerth, R.M. FINGER NUMBNESS IN VERY COLD WINDS. APC 15:51, Nov. 1951, Sup. Applied Psychology Research Unit, MRC, Cambridge, England.

31 To determine the effects of cold winds on tactile sensitivity, the right index finger tips of 35 men were exposed for 3 minutes to various combinations of air temperature and wind velocity ranging from -25 to -35° C. and from 0 - 10 miles per hour. Loss of sensitivity, as defined by an increase in the minimum gap between two edges which could be detected when they were applied to the index fingertip, is related to air temperature, air velocity, duration of exposure and the skin temperature.
T. G. R 14

32 Birmingham, H.P., Kahn, A. & Taylor, F.V. A DEMONSTRATION OF THE EFFECTS OF QUICKENING IN MULTIPLE-COORDINATE CONTROL TASKS. Final Report. Proj. NR 554 G20, NRL Prob. Y04 02, NRL Rep. 4380, June 1954, 7pp. USN Engineering Psychology Branch, NRL, Washington, D.C.

32 To determine whether quickening (process of providing operator with instantaneous information of the effects of his own motions) of the control loops will enable the human operator to perform more controller tasks concurrently, a four-coordinate task was performed by six subjects. The task was to manipulate two joystick sticks to keep within view two target dots on a two-gun cathode-ray tube. Each dot was free to move in both x and y coordinates. Performance on this task with quickening was compared with that of tracking on only one or two coordinates without quickening. Implications for training and selection problems are noted.
G. I. R 2

33 Birmingham, H.P. & Taylor, F.V. A HUMAN ENGINEERING APPROACH TO THE DESIGN OF MAN-OPERATED CONTINUOUS CONTROL SYSTEMS. NRL Prob. Y04 01, Proj. NR 513 G50, NRL Rep. 4333, April 1954, 28pp. USN Engineering Psychology Branch, NRL, Washington, D.C.

Empirical evidence suggests that, at least for short periods of activity, the simpler the tasks imposed upon the human operator of a control system the more precise and less variable become his responses. This leads to the view that optimal man-machine control system performance can be obtained only when the mechanical components of the system are designed so that the human need act only as a simple amplifier. Ways and means are described for achieving such design through "unburdening" (relieving the operator of the task or acting as an integrator) and "quickenning" (providing the operator with immediate knowledge of the effects of his own responses). Aided tracking and other efforts to improve the stability of man-machine systems by modifying the display circuitry are shown to be examples of these two processes. In Part II, a "stimulus-response" analysis is made of the concepts of unburdening and quickening. It is argued that in those man-machine system arrangements which require that the operator behave as nothing more complicated than a simple amplifier, a condition of "stimulus response integrity" may be said to exist. Only under this condition do the responses which the man is called upon to make bear an invariant and proportional relationship to the instantaneous amplitude values of the visual error (stimuli). It is suggested that the choice of a pursuit or compensatory type display is contingent upon the extent to which stimulus-response integrity has been achieved in the system under consideration.
R 27

34 MacLeod, S. & Bartlett, N.R. HUMAN REACTION TIME DURING DARK ADAPTATION. J. opt. Soc. Amer., May 1954, 44(5), 374-379. (Hobart College, Geneva, N.Y.).

34 To study human reaction time during the course of dark adaptation, two trained observers responded to flashes of constant luminance during a 40-minute period in the dark. Experimental conditions included: 1) two levels (735 and 14 millilamberts) of light-adapting luminance 2) five test-flash luminances (from barely visible at periphery but not at fovea to clearly visible at fovea), 3) one luminance restricted to short-wavelength end of spectrum, and 4) two retinal loci (fovea and below fovea). Reaction times in milliseconds are presented for all conditions and discussed for bearing on traditional psychophysical measures of threshold changes.
T. G. R 3

35 Lincoln, R.S. RATE ACCURACY IN HANDWHEEL CRANKING. J. exp. Psychol., June 1954, 47(6), 465-470. (Johns Hopkins University, Baltimore, Md.).

36 Learning a rate of turning a handwheel (radius 7.5 cm) with verbal average error information only, and with a visual error indicator also, was studied with six different types of knowledge of results. Graphs present the accuracy and error data in terms of time during which the proper rate was maintained, in rpm, and in respect to number of oscillations from a standard rate per minute. Results are presented separately for the learning phase, the interim (test) phase, and for relearning.
G. R 3

Examined was the accuracy with which different linear and angular rates of cranking movement can be maintained for clockwise and counter-clockwise directions of turning. The Ss cranked a handwheel at each of 5 different speeds combined with each of 3 different handwheel radii. 15 Ss cranked in a clockwise direction while 15 other Ss cranked in the counter-clockwise direction. The Ss were provided with an instantaneous visual indication of their rate of cranking. In appearance the task resembled a conventional tracking problem but the task was reduced to the maintenance of the required rates. In addition, no changes in handwheel load were introduced by changes in the required speed of turning. With constant angular speed of movement, rate-accuracy increases with increased linear rate in the lower range of handwheel speeds. At the higher handwheel speeds this relationship is reversed, and accuracy decreases as linear rate increases. The differences between handwheel speeds, radii and the interaction of these 2 variables was tested. It was found that for both directions of turning the 2 variables and the interaction were significant at p<0.1. Ss tended to crank at rates slower than the required rate although they were capable of maintaining the required rate. This tendency increased as both linear and angular rate increased. No significant differences in accuracy appeared between the 2 directions of movement, but those Ss who cranked in the counter-clockwise direction showed a significantly greater tendency to lag in rate. (MCAS)
R 6

37 Luchins, A.S. & Luchins, Edith, H. THE EINSTELLUNG PHENOMENON AND EFFORTFULNESS OF TASK. *J. gen. Psychol.*, 1954, 50, 15-27. (McGill University, Montreal, Ontario, Canada).

37 This experiment investigates the relationship between Einstellung (mental set) and effort, and their role in learning. Two groups of college students traced paths on paper-and-pencil mazes wherein direct and/or indirect (circuitous) paths were available in a given order. Group I received the series of mazes with a mirror-tracing (effort-increasing) apparatus first, and then took the series without the mirror. Group II took them in the reverse order. Results are discussed and reference to previous findings and accepted theories is made.
T. R 15

38 Burton, Nancy G., & Dallenbach, K.M. THE DURATION OF THE AFTER-SENSATIONS OF WARMTH AROUSED BY PUNCTIFORM STIMULATION. *Amer. J. Psychol.*, July 1953, 66(3), 386-396. (University of Texas, Austin, Tex.).

38 The duration of the after-sensation of warmth aroused by punctiform stimulation of 1-sec. duration and of constant temperature was measured for 5 subjects. A Cornell esthesiometer was used to stimulate the dorsal surface of the forearm at $40.6 \pm 0.1^\circ\text{C}$. One hundred measurements were made for each subject at each of three intensive levels of the original sensation. Results are given concerning the duration, quality, and individual differences in the obtained after-sensations.
T. G. R 9

39 Swartz, P., Norris, Eugene B., & Spragg, S.D.S. PERFORMANCE ON A FOLLOWING TRACKING TASK (MODIFIED SAM TWO-HAND COORDINATION TEST) AS A FUNCTION OF RADIUS OF CONTROL CRANKS. *J. Psychol.*, 1954, 37, 163-171. (University of Rochester, Rochester, N.Y.).
Investigated was the adequacy of performance of a 2-hand tracking task as a function of the radius of the control cranks. Each of the 40 Ss was given 2 trials on each of the following control crank radii: 1.0, 2.0, 3.0, 4.0 and 5.5 ins. A latin square design was used to balance the sequence of presentation of the experimental conditions. 2 combinations of control crank positions were employed. In Position I both control cranks rotated in the vertical plane parallel to the frontal body plane. In Position IV the right-hand control crank rotated in the vertical plane perpendicular to the frontal body plane and the left-hand crank rotated in the vertical plane parallel to the frontal body plane, i.e., as in Position I. (The designation of these positions as I and IV is explained.) For both positions clockwise rotation of the right control crank moved the target follower in a direction directly away from the operator; clockwise rotation of the left control crank moved the target follower to the operator's right. 20 of the Ss performed in Position I, the remaining 20 in Position IV. The results were analyzed in terms of mean time on target for each of the control radii within each position and for Position I vs. Position IV. Performance was found superior for the middle values (2.0, 3.0 & 4.0 in. radii) than for the smallest and largest radii used (1.0 & 5.5 in.). A more detailed analysis showed that both for Positions I & IV the 2.0, 3.0, 4.0 & 5.5 in. control cranks all yielded significantly better performances than the 1.0 in. crank. Also, for both positions, the 2.0 & 3.0 in. cranks were significantly superior to the 5.5 in. crank. For Position I performance on the 3.0 in. crank was significantly superior to that on the 4.0 in. crank. For every control radii used performance was somewhat better when the tracking task was performed in Position IV than in Position I.
R 6

40 Weiss, B. THE ROLE OF PROPRIOCEPTIVE FEEDBACK IN POSITIONING RESPONSES. *J. exp. Psychol.*, March 1954, 47(3), 215-224. (University of Rochester, Rochester, N.Y.).
The purpose of the present experiment was to determine the accuracy of positioning responses as pressure and distance information was varied using a task where visual feedback was delayed. Eleven different force-displacement conditions were used to provide the variation in information. The S's task was to compensate for the displacement of a spot of light from the center of an oscilloscope screen by moving a stick control the proper distance and in the proper direction. 11 Ss were used, each serving under all 11 conditions. The results showed that relative error and variability decrease with distance moved but that pressure variation has no apparent effect on the measures. Further, the effect of variation in distance was found to be greatest at the smallest displacements within a condition. It was concluded that, in positioning responses made in the absence of visual feedback, displacement is the more crucial dimension of the force-displacement relationship of a control.
R 10

41 Conrad, R. & Siddall, G.J. AN EXPERIMENTAL STUDY OF PIRM-WINDING. THE EFFECT OF MIXED SETS ON OPERATIVE EFFICIENCY. *APU 202/53*, June 1953, 11pp. *Applied Psychology Research Unit*, MRC, Cambridge, England.
An experiment was set up in the firm-winding room of a cotton textile mill to examine the effect on operative efficiency of mixed yarn sets. With both work-load and the number of spindles in the sets kept constant a difference of as much as 10 minutes per operative/hour was found between certain sets. Differences in efficiency were associated with differences in the proportion of the total work-load contributed by each group of like spindles on the set. The highest operative efficiencies were obtained when the two different yarns on the same set each provided 50 per cent of the total work-load. The reason for these differences is not known although one possible explanation has been mentioned. The differences between the performance of operatives on any one set were statistically insignificant.
R 3

42
Chapman, A. SOME CONTRIBUTIONS OF EXPERIMENTAL PSYCHOLOGY TO MACHINE DESIGN. Contract NSORI 126, Proj. NR 145 089, Task 1, 1953, 16pp. U.S. OFFICE OF NAVAL RESEARCH, Department of the Navy, Washington, D.C. (Joint Hopkins University, Baltimore, Md.).

A relatively new application of experimental psychology is the engineering of machines for human use and the engineering of human tasks for operating machines. 2 general contributions of experimental psychology to machine design have been: a) a stress on the importance of individual differences, and b) the substitution of experimental data for experience and opinion. 4 specific applications of experimental psychology are discussed: a) critical incident techniques; b) design of dials; c) preferred directions; and d) design of cranks. (MC145)

46
Harvey, Vivian T., Lanzetta, J.T., Nowlis, Helen H., Nowlis, V., et al. CHEMICAL INFLUENCES ON BEHAVIOR. II. DEVELOPMENT OF METHODS AND PRELIMINARY RESULTS ON THE EFFECTS OF SOME DRUGS ON EMOTIONAL AND SOCIAL BEHAVIOR. Contract NSORI, 126, Proj. NR143 060; 54000, Task 1, March 1953, 31pp. Psychology Dept., University of Rochester, Rochester, N.Y.

46 This an exploratory study designed to develop experimental methods for determining the motivational and emotional effects of amytal, seconal, benzedrine, and a placebo on ten individuals working in three small groups. Group task, subjective and objective individual measures, verbatim typescripts and rating scales are employed to discover how well these tests reflect the effect of the drugs on such variables as elation, social drive, relaxation, anxiety, group productivity, etc. Comparisons are made among the drugs on some of these variables.
T.

47
Wendt, C.R. STUDIES OF MOTION SICKNESS, VESTIBULAR FUNCTION AND OF PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF DRUGS. FINAL REPORT, 1946-1954. Contract NSORI 126, Proj. NR143 060, Task 1, June 1954, 36pp. Psychology Dept. University of Rochester, Rochester, N.Y.

47 This report consists primarily of an annotated list of unpublished experiments and surveys on motion sickness, vestibular functions and the effects of certain drugs on emotional and social behavior, which were carried out during the period 1946 - 1954. It includes a short history of earlier investigations of motion sickness. A factor analysis of behavior changes (as measured by rating scales) induced by seconal, benzedrine, sodium amytal, dramamine, scopolamine and pyrexly compound is discussed in greater detail.
T. R 22

44
Andreas, B.G., Green, R.F. & Spragg, S.D.S. TRANSFER EFFECTS BETWEEN PERFORMANCE ON A FOLLOWING TRACKING TASK (MODIFIED SAM TWO-HAND COORDINATION TEST) AND A COMPENSATORY TRACKING TEST (MODIFIED SAM TWO-HAND PURSUIT TEST). J. Psychol., 1954, 27, 173-183. (Department of Psychology, University of Rochester, Rochester, N.Y.).

44 To investigate the possibilities of transfer between training in pursuit and in compensatory tracking tasks, 92 military basic trainees were divided into four groups who were trained successively on one type of tracking and then the other. Tests were modifications of the SAM Two-Hand Coordination Test (compensatory) and the SAM Two-Hand Pursuit Test (pursuit). Both "natural" and "unnatural" display-control relationships were included in the experiment. Results in terms of mean time on target are discussed in terms of conditions where transfer occurred.
T. G. R 15

45
Nowlis, Helen H., Nowlis, V., Riesen, A.H. & Wendt, C.R. CHEMICAL INFLUENCES ON BEHAVIOR. III. THE EFFECTS OF DRAMAMINE AND SCOPOLAMINE ON EMOTIONAL AND SOCIAL BEHAVIOR WITH COMPARISON DATA ON THE EFFECTS OF OTHER DRUGS. Contract NSORI-126, Proj. NR144-060;54000, Task 1, March 1953, 19pp. Psychology Dept., University of Rochester, Rochester, N.Y.

45 This is a study of the effects of dramamine and scopolamine on emotional and social behavior. Twelve subjects divided into three groups were tested on the Gehl-Kutash grapho-motor test, a code-substitution test, and an adjective check list. Performance of the subjects, under the various medications, in a series of social and motor tasks was also observed and the results are presented in terms of the behavior of the group as a whole and behavior of individual subjects. Comparative data is offered for the effects of placebo, amytal, seconal, and seconal plus benzedrine.
T.

48
Grether, W.F. (Chm.). THE ROLE OF HUMAN ENGINEERING IN NATIONAL DEFENSE: RECOMMENDATIONS FOR INCREASED EFFECTIVENESS. HPS 107/1, May 1951, 12pp. US Research & Development Board, Department of Defense, Washington, D.C.

This report on the human engineering program of the Department of Defense is based on a discussion by the Panel on Human Engineering and Psychophysiology, Committee on Human Resources, Research and Development Board, at a meeting held at Wright-Patterson Air Force Base in 1951. The meeting evaluated the role of human engineering in the development of military equipment. Recommendations are made for achieving immediate and long-range improvement of the human engineering program of the Department of Defense. (HE145)

48
Pepler, R.D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. 7. A COMPLEX MENTAL TASK WITH VARYING SPEED STRESS AT TWO LEVELS OF INCENTIVE. APU 198/53, Dec. 1953, 25pp. Applied Psychology Research Unit, MRC, Cambridge, England. (Royal Naval Tropical Research Unit, University of Malaya, Singapore, Malaya).

49
This experiment was designed to test the effects of level of motivation upon the loss of efficiency at a high-speed mental task performed in a hot environment. Sixteen young men were tested on a paced mental task while seated in a room at each of four air temperatures: (dry/wet bulb) 85/95, 90/80, 95/75, 100/50 F. In one session at each temperature the subjects were given encouragement and knowledge of results and in a comparison session were given neither. Performance is analyzed with respect to the incentive conditions, room temperature, practice and subjective reports of comfort.
T. G. R 9

50
Fitts, P.M., Stevens, S.S., Brogden, W.J. & Inus, H. HUMAN ENGINEERING IN THE NATIONAL DEFENSE. HPS 205/1, June 1953, 12pp. US Research and Development Board, Department of Defense, Washington, D.C.

50
This paper discusses the role of human engineering in the national defense and provides a philosophy for weapon systems development that attempts to maximize the use of human and machine components by recognizing the unique potential contributions and limitations of each. The major topics are: 1) definition of human engineering, 2) military goals of human engineering, 3) military fields of application of human engineering, 4) optimum employment of men as components of future weapons systems, and 5) basic and supporting research.
R 11

51
Pepler, R.D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. 5. A COMPLEX MENTAL TASK WITH VARYING SPEED STRESS. APU 196/53, Nov. 1953, 24pp. Applied Psychology Research Unit, MRC, Cambridge, England.

51
This experiment was designed to determine the effects of air temperature upon the performance of a high speed mental task. Twenty-four physically fit young men accustomed to living in the tropics, reported discrepancies between a constant set of figures, visually displayed, and another set which changed every 4, 6, or 8 seconds. They performed this task once at each speed at each of four room temperatures: (dry/wet bulb) 85/95, 90/80, 95/85, and 100/90° F. Performance, measured in terms of errors and omissions, is analyzed with respect to air temperature, working speed, practice and subjective reports of comfort.
T. G. R 7

52
Andreas, B.G. BIBLIOGRAPHY OF PERCEPTUAL-MOTOR PERFORMANCE UNDER VARIED DISPLAY-CONTROL RELATIONSHIPS. Contract AF30(602) 200, Rep. 1, June 1953, 17pp. University of Rochester, Rochester, N.Y.

An unannotated bibliography of human engineering studies dealing with perceptual-motor performance under conditions of different display-control relationships is presented. Part of the bibliography cites general articles (32). Part of the bibliography cites experimental studies in which display-control relationships were varied: a) relationships between discrete display elements and discrete control movements (R = 10), b) relationships between the direction and plane of movement of the display and the direction and plane of movement of the controls (R = 61), c) ratio between extent of movement of controls and resulting movement of display (R = 24); d) velocity, rate-aided and acceleration control (R = 9). In general, the bibliography covers material available for examination at the end of 1952. (HEIAS)
R 136

53
Andreas, B.G. & Weiss, B. REVIEW OF RESEARCH ON PERCEPTUAL-MOTOR PERFORMANCE UNDER VARIED DISPLAY-CONTROL RELATIONSHIPS. Contract AF 30(602) 200, Rep. 2, May 1954, 17pp. University of Rochester, Rochester, N.Y.
Experiments dealing with perceptual-motor performance under different display-control relationships are reviewed. The review is divided into 4 parts: a) relationships between discrete display elements and discrete control movements; b) relationships between the direction and plane of movement of the display and the direction and plane of movement of the controls; c) ratio between extent of movement of controls and resulting movement of display; d) velocity, rate-aided, and acceleration control. Each part is introduced by an overview which indicates the problems covered by the studies and some of the more important conclusions which may be drawn from different investigations. Individual abstracts of the reports are presented next, together with comment on each. The abstracts are centered about display-control relationship problem with which the experiments deal; other aspects of the studies are omitted. An attempt is made to indicate the problem investigated, the apparatus employed, the procedure followed and the major results obtained. (HEIAS)
R 104

54
Strickland, B.A., Jr. & Downey, V.M. THE EFFECT OF AERO-MEDICAL EVACUATION ON VARIOUS CLINICAL CONDITIONS. IN-FLIGHT SYMPTOMS OF CARDIOPULMONARY PATIENTS. Proj. 21 40 002, Rep. 3, May 1954, 10pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

54
A survey of 1,777 air-evacuation patient-flights of individuals suffering from cardiorespiratory disorders is reported. The flights were made at altitudes of less than 10,000 ft. in non-pressurized aircraft. The incidence of symptomatic reactions is analyzed with respect to the diagnostic category.
T. R 10

55
Lundgren, W.P.V., Dearback, Elizabeth, Lindholm, Astrid, Kudson, B., et al. HUMAN TOLERANCE TO ACUTE EXPOSURE TO CARBON DIOXIDE. RESPIRATORY RESPONSE TO OXYGEN AND 4.1 AND 6.2 PERCENT CARBON DIOXIDE IN AIR AND OXYGEN AT A CROSSLAND LEVEL OF 5,000 FEET. Contract AF 33(608) 13214, Proj. 21 1402 GOM, Rep. 3, July 1954, 14pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Department of Respiratory Physiology, Lovelace Foundation for Medical Education and Research, Albuquerque, N.M.).

55
This investigation concerns the differences between the effects of breathing carbon dioxide (CO_2) in air and in oxygen (O_2). Four subjects, acclimated to a ground level of 5000 ft. breathed air for 10 minutes, the experimental mixture for 10 minutes, and the air for 10 minutes. The experimental mixtures were air + 4.1% CO_2 , air + 6.2% CO_2 , O_2 + 4.1% CO_2 , and O_2 + 6.2% CO_2 . The data analyzed are the content of the expired gas, the expiratory minute volume, the tidal volume, and the respiratory rate.
T. G. R 21

56
Hacheger, J.P., Wechsberg, F. M., Pestel, C.V., Yawer, G.F., et al. ALTITUDE STRESS IN SUBJECTS WITH IMPAIRED CARDIORESPIRATORY FUNCTION. Proj. 21 27 009, Rep. 4, May 1954, 35pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Aeronautical & Physic Environment Lab., University of Illinois, Chicago, Ill.).

56
To investigate the effects of high altitudes on individuals with impaired cardiorespiratory function, 8 patients with angina pectoris, 14 with chronic anemia and 8 normals breathed ambient air at simulated altitudes of 10,000 and 14,000 feet. The three groups are compared on a variety of measures including pulse rate, cardiac output, systolic and diastolic blood pressure, respiratory rate, oxygen and carbon dioxide of the expired air, etc. Implications for selection and transportation by air of cases involving cardiac respiratory pathology are discussed.
T. G. R 38

57
Doranski, T.J. PHYSIOLOGICAL RECOGNITION OF STRAIN IN FLYING PERSONNEL. COSINOPIA IN B-29 COMBAT OPERATIONS. Proj. 21 1208 GOM, Rep. 3, Nov. 1953, 20pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

The occurrence of cosinopia in B-29 aircrew personnel flying combat missions over Korea was investigated. The aircraft commander, navigator, radar observer, bombardier, and engineer of each of five crews were studied with respect to a total of 55 man-missions. Post-flight data were obtained for 45 of the man-missions concerned. One of the missions was a Leaflet and the remainder were bombing missions. The data include findings relative to an aircrew flying its first combat mission. The incidence of cosinopia during the flight phase was circa 20 percent. This value appears to be consistent with the relatively mild stress associated with the air operations described.
R 5

58
Miller, R.B. A STUDY OF THE DEVELOPMENTAL HISTORY OF SELECTED COMPLEX ELECTRONIC SYSTEMS. Contract AF 16 (600) 1339, Proj. 7709, Task 37304, AFTRC TR 56 1, Dec. 1956, 5pp. USAF Maintenance Lab., Lowry AFB, Colo.

58
This is a summary report of a research program designed to determine what kinds of maintenance-related information become available during stages of development of complex electronic systems and to consider the usefulness of this information for the early planning of personnel and training programs for electronic mechanics. Information concerning the developmental history of two systems was obtained and analyzed for developmental products (specifications, diagrams, test equipment, etc.) which would permit anticipation of maintenance requirements. Further analysis of these products led to the preparation of guides for future analyses: position-task description, position structure, characteristics of training and training equipment, and handbook of job instructions. R 3

59
Buckner, D.M. CONSTRUCTION OF A PROFICIENCY EXAMINATION FOR MAINTENANCE PERSONNEL ON A NEW WEAPON SYSTEM. Contract AF 16(600) 1352, Proj. 7950, Task 17075, AFTRC TR 56 105, Aug. 1955, 17pp. USAF Personnel Lab., Lackland AFB, Tex.

59
The purpose of this study was to determine the feasibility of developing maintenance proficiency tests for Air Force ground crews in the early stages of procurement of a new weapon system. Two tests were developed for the B-52 aircraft, one for general mechanics and the other for engine mechanics. The test items were written by the test construction staff and experienced mechanics after attending the manufacturer's training school. Trial forms of the tests were administered to Air Force and civilian mechanics; the general mechanic's test to 39 subjects and the engine mechanic's test to 58 subjects. The results are analyzed in terms of the level of difficulty of the items, the independence of the subtests, and internal consistency.
T. R 2

61
French, R.S. THE K-SYSTEM MAC-1 TROUBLE-SHOOTING TRAINER: 1. DEVELOPMENT, DESIGN, AND USE. Proj. 7709, Tasks 77152 & 37301, AFTRC TR 56 119, Oct. 1956, 21pp. USAF Maintenance Lab., Lowry AFB, Colo.

61
This report describes a simplified simulator for training personnel in trouble-shooting on the K-1A Bombing and Navigation System. It consists of a console of controls and check points organized to correspond to the actual system, but only binary "normal" or "not normal" conditions are represented. Any one of over 200 malfunctions can be simulated from a separate panel of switches. Only malfunctions consisting of interruptions of data flow can be simulated. The trainer is considered suitable for the development of a knowledge of the course of data flow, system functioning and trouble-shooting procedures. Data on its actual use are reserved for a subsequent report.
T. G. R 7

55
Lundgren, W.P.V., Reerbach, Elizabeth, Lindholm, Astrid, Ruden, D., et al. HUMAN TOLERANCE TO ACUTE EXPOSURE TO CARBON DIOXIDE. RESPIRATORY RESPONSE TO OXYGEN AND 4.1 AND 6.2 PERCENT CARBON DIOXIDE IN AIR AND OXYGEN AT A CONSTANT LEVEL OF 5,000 FEET. Contract AF 33(616) 13244, Proj. 21 1442 G001, Rep. 3, July 1954, 14pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Department of Respiratory Physiology, Lavelle Foundation for Medical Education and Research, Albuquerque, N.M.).

55
This investigation concerns the differences between the effects of breathing carbon dioxide (CO₂) in air and in oxygen (O₂). Four subjects, acclimated to a ground level of 5000 ft. breathe air for 10 minutes, the experimental mixture for 10 minutes, and the air for 10 minutes. The experimental mixtures were air + 4.1% CO₂, air + 6.2% CO₂, O₂ + 4.1% CO₂, and O₂ + 6.2% CO₂. The data analyzed are the content of the expired gas, the expiratory minute volume, the tidal volume, and the respiratory rate.
T. G. R 21

56
Marbarger, J.P., Wechsberg, C. M., Pestel, C.V., Vander, G.F., et al. ALTITUDE STRESS IN SUBJECTS WITH IMPAIRED CARDIORESPIRATORY FUNCTION. Proj. 21 22 004, Rep. 4, May 1954, 35pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Aeronautical & Physiological Environment Lab., University of Illinois, Chicago, Ill.).

56
To investigate the effects of high altitudes on individuals with impaired cardiorespiratory function, 8 patients with angina pectoris, 14 with chronic anemia and 8 normals breathed ambient air at simulated altitudes of 10,000 and 14,000 feet. The three groups are compared on a variety of measures including pulse rate, cardiac output, systolic and diastolic blood pressure, respiratory rate, oxygen and carbon dioxide of the expired air, etc. Implications for selection and transportation by air of cases involving cardiac respiratory pathology are discussed.
T. G. R 38

57
Doranski, T.J. PHYSIOLOGICAL RECOGNITION OF STRAIN IN FLYING PERSONNEL. COSINOPENIA IN 8-29 COMBAT OPERATIONS. Proj. 21 1208 0005, Rep. 3, Nov. 1953, 20pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

The occurrence of cosinopenia in 8-29 aircrew personnel flying combat missions over Korea was investigated. The aircraft commander, navigator, radar observer, bombardier, and engineer of each of five crews were studied with respect to a total of 55 non-missions. Post-flight data were obtained for 45 of the non-missions concerned. One of the missions was a leaflet and the remainder were bombing missions. The data include findings relative to an aircrew flying its first combat mission. The incidence of cosinopenia during the flight phase was circa 20 percent. This value appears to be consistent with the relatively mild stress associated with the air operations described.
R 5

58
Miller, R.B. A STUDY OF THE DEVELOPMENTAL HISTORY OF SELECTED COMPLEX ELECTRONIC SYSTEMS. Contract AF 16 (600) 1129, Proj. 7709, Task 37304, AFFTC TR 56 1, Dec. 1956, 5pp. USAF Maintenance Lab., Lowry AFB, Colo.

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59
Buckner, D.W. CONSTRUCTION OF A PROFICIENCY EXAMINATION FOR MAINTENANCE PERSONNEL ON A NEW WEAPON SYSTEM. Contract AF 16(600) 1352, Proj. 7950, Task 17075, AFFTC TR 56 105, Aug. 1956, 17pp. USAF Personnel Lab., Lackland AFB, Tex.

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T. R 2

61
French, R.S. THE K-SYSTEM MAC-1 TROUBLE-SHOOTING TRAINER: 1. DEVELOPMENT, DESIGN, AND USE. Proj. 7709, Tasks 77152 & 37301, AFFTC TR 56 119, Oct. 1956, 21pp. USAF Maintenance Lab., Lowry AFB, Colo.

61
This report describes a simplified simulator for training personnel in trouble-shooting on the K-3A Bombing and Navigation System. It consists of a console of controls and check points organized to correspond to the actual system, but only binary "normal" or "not normal" conditions are represented. Any one of over 200 malfunctions can be simulated from a separate panel of switches. Only malfunctions consisting of interruptions of data flow can be simulated. The trainer is considered suitable for the development of a knowledge of the course of data flow, system functioning and trouble-shooting procedures. Data on its actual use are reserved for a subsequent report.
T. G. R 7

63 Hersh, I.W. & Hunt, W.A. ABBREVIATED PSYCHOLOGICAL MEASURES. Contract N70NR 45011, Proj. NR 154 091, 10pp. Northwestern University, Evanston, Ill.

The history of abbreviated psychological measurement extends back over the past 40 years, beginning with the efforts of medical officers of the U.S. Navy to adapt the Binet scale for measuring intelligence to selection of recruits. Criteria for such brief techniques were formulated at that time which still hold for present-day testing, covering the requirements of "cutting" scores, adequate range, objectivity, economy of time, and simplicity of administration and scoring. These pioneers in brief psychological measurement also were aware of the limitations of the methods. Continuing concern arising from experimental evidence has indicated caution in their use. World War II gave the major impetus to abbreviated tests and the present emergency and manpower mobilization problems again have stimulated interest in the development and validation of rapid, objective methods for neuropsychiatric screening. There now are available in the psychological and psychiatric literature about 300 reports on abbreviated or brief psychological tests. These cover the range of intelligence and other diagnostic measures, personality inventories, and projective techniques and sample populations of normal, neurotic, psychotic, and brain-damaged individuals. These many studies have attempted to meet the demands for brief psychological methods by the military and naval services, hospitals, clinics, schools, and business and industry. Advantages of abbreviated measures lie in their economy of time both in subject and examiner time, in elimination of "deadwood" and "filler" items, in equipment, and in trained personnel. These have been demonstrated in studies of verbal and nonverbal test materials where their diagnostic usefulness has been proven. The limitations of brief measures must be examined in terms of their specific goals, and the significance of set, motivational, and contextual factors which may change as a function of test abbreviation.

R 115

76 Farnsworth, D. EXPOSURE TEST OF FLUORESCENT PAINTS TO SUN AND SALT WATER. NM 002 014.09.05, Memo. Rep. 56 1, Jan. 1956, 5pp. USN Medical Research Lab., New London Submarine Base, Conn.

76 To test the permanence of several daylight fluorescent paints for use in air-sea rescue gear, four spherical copper floats, six inches in diameter, and four aluminum plates were coated with different formulations according to the manufacturer's instructions. They were exposed to tide water, sun, and weather for a period of three months and color loss measured (percent fading) by disc colorimetry. Recommendations regarding use of such paints for air-sea rescue gear are included.

T. G.

62 Roxburgh, M.L. & Ernstling, J. THE PHYSIOLOGY OF PRESSURE SUITS. FPM 293, Nov. 1956, 16pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

Equipment which will maintain an absolute pressure in the lungs of 141 mm Hg. In the event of exposure of aircrew to altitudes above 40,000 ft. will afford short term protection against these altitudes and an emergency descent to be made. A compromise is dictated between the physiological ideal of full body pressurization and the operational ideal of the fully efficient man. The degree of regional counterpressure required is dependent upon the magnitude of the pressure necessary to maintain an intrapulmonary pressure of 141 mm Hg. and the length of time for which it is operative. Thus a trunk counterpressure is required at pressures below 30 mm Hg. At pressures greater than this full trunk counterpressure is essential if the respiratory disturbances induced by high pressure breathing are to be minimized. b) The limit of an aircrew mask is set by the physiological disturbance produced in the unpressurized eyes and head by high breathing pressures. c) Extracorporeal pressurized limbs reduce the effective blood volume in pressure breathing. When this reduction has amounted to a certain value a vasovagal type of collapse will occur, and this sets the limit to the breathing pressure and length of time for which it can be withstood when trunk counterpressure is employed.

P 13

67 Chapman, A. THE RECONSTRUCTION OF ABBREVIATED PRINTED MESSAGES. J. exp. Psychol., Sec. 1954, 40(6), 496-510. (Johns Hopkins University, Baltimore, Md.).

67 To explore systematically some of the practical consequences of redundancy in English text, 94 subjects, varying widely in general intelligence and familiarity with grammar, were required to reconstruct English text with various amounts of it deleted. Thirteen prose passages were selected and deletions made in both regular and random patterns in 5% amounts varying from ten to 67 per cent. All subjects also took an intelligence test and an English test. Performance was scored for total amount of material inserted and amount correctly restored. These data were analyzed for effect of percentage of items deleted, regular versus random deletion, type of passage and individual differences.

T. G. R 2

68 Fuchs, E.F., Harper, Bertha, Brown, Emma & Zeldner, J. THE STABILITY OF APTITUDE AREA STANDARD SCORES AS A BASIS FOR CLASSIFICATION OF ARMY ENLISTED PERSONNEL. Proj. 2933100, PJ 3502 08, Pts A+B, 561, June 1952, 10pp. USA Personnel Research Branch, Office of the Adjutant General, Washington, D.C.

Tests in the AGCT, in different combinations, yield 10 aptitude area scores. Scores in AGCT tests were obtained for 4000 recruits processed during December 1946. 4 methods of summing the aptitude area standard scores from scores on the component tests were tried out. Relationships among the tests were investigated and an analysis made of various distributions of aptitude area scores. The average of the standard scores on the tests comprising an aptitude area gave results similar to more complicated scoring procedures, including equipercentile scales based on AGCT distributions for a 1947 group (N = 1145) and the present group. Numbers of recruits having either highest or second highest score in a given aptitude area were fairly even for the 10 areas. Percentages were consistent for 2 1948 subgroups. Of a group of 200 men, half had 20 or more standard score points difference between their highest and lowest area scores. With the 1948 subgroups the test showed a clear relationship to each other than with the 1947 subgroups. ($r_{15} = .26$ to $.72$ vs. $.03$ to $.04$).

R 2

80
Fetter, L.A., Rich, E. & Standlee, L.S. A SERIES OF LITERACY TRAINING PROGRAMS IN THE ARMED SERVICES DURING WORLD WAR II. Contract NOME 55400, Tech. Bull. 534, Dec. 1953, 134pp. USA Personnel Research Lab., Bureau of Naval Personnel, Washington, D.C. (Institute of Educational Research, Indiana University, Bloomington, Ind.).

81
This is a review of the literature based on a more extensive unpublished one related to remedial reading and improvement of functional military literacy. The historical antecedents of the World War II literacy training program dating from 1953 are reviewed, and the Army Literacy Training Program of World War II is described. Subjects treated are development of instructional material, methods of instruction, training of instructors, and results of the program.
T. R. 23

83
Newman, E.R. & Gerstman, L.J. A NEW METHOD FOR ANALYZING PRINTED ENGLISH. J. exp. Psychol., Aug. 1952, 44(2), 114-125. (Harvard University, Cambridge, Mass. & Watkins Laboratories, New York, N.Y.).

A new measure, the coefficient of constraint, is proposed which provides a limited but extremely useful estimate of the sequential dependencies in sequences of events, such as letters, which cannot be ordered into a metric scale. When the coefficient of constraint was calculated for a passage of printed English, a quite regular behavior of the coefficient was discovered which could be described by the expression $D(n) = 1/n^2$. A possible use of the coefficient of constraint is proposed by which an upper bound is set on the average information per letter in the text examined. This upper bound has both considerable resemblance to, and freedom from, greater constraint. Shannon's estimate of the 'new function'. Neither greater length greater than that of one word.
R. 9

84
Reynolds, B. & Bilodeau, Ina McD. ACQUISITION AND RETENTION OF THREE PSYCHOMOTOR TESTS AS A FUNCTION OF DISTRIBUTION OF PRACTICE DURING ACQUISITION. Res. Bull. 52 27, Aug. 1952, 8pp. USAF Personnel & Motor Skills Research Lab., Lackland AFB, Tex. (Reprinted from: J. exp. Psychol., July 1952, 44(1), 19-26).

84
To test the effect of distribution of practice during acquisition of 3 psychomotor skills, 3 experiments were run, using the Rudder Control Test, the Complex Coordination Test, and the Rotary Pursuit Test. Subjects were basic trainee airmen. Intervals between trials were varied from 0 to 120 seconds. Retention was tested ten weeks after completion of initial training periods. Mean time-on-target or mean time-per-trial are discussed with regard to the effects of practice distribution, both on immediate acquisition and on subsequent retention.
T. G. R. 10

85
Dwyer, P.G. THE RELATIVE EFFICACY AND ECONOMY OF VARIOUS TEST SELECTION METHODS. Proj. 2552100, RJ 9207 GI, PAS Rep. 937, June 1952, 57pp. USA Personnel Research Branch, Office of the Adjutant General, Washington, D.C.

The present study is an evaluation, in terms of personnel measurement for the Army, of various methods of reducing the number of tests in a battery when the battery is used for predictive purposes, without a significant loss in efficiency. Some 13 different methods were considered for selecting tests out of a larger battery for predictive purposes. Theory was developed for several new procedures and illustrative problems were employed to clarify all the methods. The conditions under which each method might be most efficient were studied. General rules were suggested for the termination of the test selection process at that a) trivial results can be avoided and b) assurance may be had that the tests selected make a significant contribution. (MC14)
R. 14

86
Shaw, M.E. SOME EFFECTS OF PROBLEM COMPLEXITY UPON PROBLEM SOLUTION EFFICIENCY IN DIFFERENT COMMUNICATION NETS. J. exp. Psychol., Sept. 1954, 48(3), 211-217. (Johns Hopkins University, Baltimore, Md.).

86
To investigate the effects of problem complexity on problem solving efficiency in different communication nets, six groups of three subjects each were assigned to four conditions. Two types of problem (simple identification of common symbols and complex problems requiring arithmetical computation) and two networks (wheel and circle) were combined to form the four conditions. Time to solve the problems, and errors were studied by analysis of variance techniques for effect of the experimental variables. A rating scale was also administered to gather some information as to effects of the variables on morale.
T. I. R. 6

94 Harris, J.D., Helms, H.L. & Myers, G.K. LOUDNESS PERCEPTION FOR PURE TONES AND FOR SPEECH. *Ann. Arch. Otolaryng.*, Feb. 1952, 55, 107-133. (USN Medical Research Lab., Naval Submarine Base, Conn.).

The technique of alternate binaural loudness was used to explore the growth of loudness in the worse ear of patients with defective and normal ears. Data for pure tones and speech were collected on a variety of types of deafness. It was found that patients can readily induced to make loudness matches for speech in 2 ears of unequal ability and that these matches can be as precise as those for steady pure tones. It was further found that irrespective of the type of deafness recruitment for speech followed a course parallel to that for pure tones and roughly intermediate among the curves of recruitment for pure tones in the speech range. 4 types of recruitment curves were distinguished: asymptotic, straight-line, delayed, and delayed plus asymptotic. No perfect correspondence exists between any type of curve and any type of hearing defect. The data did not unequivocally support the view that recruitment arises from a constant loss of loudness. Rather, it seems that the course of recruitment curves often indicates a constant decrease in the db difference between the normal and the experimental ear. Reasons for the delay feature of some recruitment curves are discussed. Analogues of recruitment in the normal ear and explanations of recruitment curves are discussed. An indication is given that increasing the loudness of speech does not, for some patients with perceptive deafness, cause a proportionate increase in speech intelligibility. (HEIAS)

R 30

95 Harris, J.D. & Myers, G.K. THE EMERGENCE OF A TONE'S SENSATION. *J. Gen. Psychol.*, April 1949 35(2), 228-237. (USN Medical Research Lab., Naval Submarine Base, Conn.).

When the absolute threshold of auditory acuity for pure tones is carefully explored with fine intensity steps, a region called the 'zone of detectability' can be noticed by experienced ss. In this zone, pure tones can be detected but cannot be said to have a true pure-tone quality. This zone of detectability is defined as the intensity area between a 5% percent detection threshold and a 50 percent pure-tone threshold. In Exp. I, these two thresholds were simultaneous; determined by a modification of the method of limits at each of six frequencies, 500, 1000, 2000, 4000, 8000, and 16,000. 2 experienced ss were used. The zone of detectability varied from 2.7 to 2.1 db for one ss and from 1.7 to 3.2 for another ss. A slight tendency was found for the zone to be larger at the highest frequencies. In Exp. II, it was shown that particularly for the higher frequencies, an experienced ss can select a certain criterion of tonality and maintain it with considerable precision. In Exp. III, 8 matched a variable frequency of very low sensation level to a standard frequency of 10 db sensation level. The frequency-match was progressively better as the intensity of the variable frequency increased from zero to 10 db sensation level, and the course of this improvement was taken to symbolize the gradual nature of the emergence of a true sensation from an indefinite 'something' to the sharp sensation of a clear pure tone. It was reasoned that the subjective criterion of 'tonality' which ss can select and maintain is indeed one of pitch rather than of loudness; but it was concluded that the phenomenon depends upon the intensity of the stimulus rather than upon a change in its frequency-composition.

R 13

96 Remmsley, Anita I. & Harris, J.D. STUDIES IN SHORT-DURATION AUDITORY FATIGUE: II. RECOVERY TIME. *J. Gen. Psychol.*, Feb. 1952, 51(2), 138-142. (USN Medical Research Lab., Naval Submarine Base, Conn.).

The technique of studying auditory fatigue using brief, weak tones has proved very fruitful, since the ear's return to normal is so quick that a great deal of information can be gathered in a short time. This paper studies the course of the recovery from such fatigue as a function of stimulation frequency and intensity, and of recovery interval. To a pure tone of 500, 1000, or 8000 cps up to 70-db sensation level, acting for 14 sec., recovery is complete within little more than a third of a second. For weaker stimuli recovery is proportionately quicker. At about 50-db sensation level, the disappearance of fatigue follows roughly an exponential course; at weaker levels a negative acceleration appears. Experiments with ear-conduction and on a patient with isolated missing rule out the central nervous system and the middle ear respectively as the locus of fatigue. An experiment on the effect of duration of stimulation shows that the ear within at least 100 msec. or less exhibits a residual threshold shift due to stimulation, but that at moderate intensities no greater threshold shifts may be occasioned with fatiguing stimulus durations of at least 10 sec. and probably indefinitely. Whether this continuously adapting mechanism is within the peripheral organ, at the transmission between the sense cells and the first nerve fibers, or is purely neural, is not yet known.

R 11

96 Chaparral, A. VISION. *Ann. Rev. Psychol.*, 1951, 11, 45-64. (Johns Hopkins University, Baltimore, Md.).

This report is an annual review of publications in the field of vision. The period covered is primarily 1949-1950. The review is divided into the following areas: 1) basic visual functions--dark adaptation, visual acuity, color adaptation, color-vision defects; 2) visual perception--figural aftereffects, perception of vertical and horizontal; 3) physiological bases of the visual process--electrical studies, single fiber studies, photochemistry of the retina; and 4) applied visual research--dials, radar scopes, reviews of human engineering data, visual requirements in industry, and visual fatigue.

R 96

97

Harris, J.B. PITCH DISCRIMINATION. *J. acoust. Soc. Amer.*, Nov. 1952, 25(6), 750-755. (USN Medical Research Lab., New London Submarine Base, Conn.).

In view of the contradictory nature of the data on the DL for pitch, especially at frequencies below 1000 cps, a new determination was made of the DL at 125, 250, 500, 1000, 2000 and 4000 cps, from 5 to 30 db above threshold, and at 60 cps from 5 to 15 db above threshold. Three well-trained subjects were used, in a forced-judgment variant of the method of constant stimulus differences. Especial care was taken to shape the onset and termination of tones and to choose tone durations so that transient content was minimized. Curves were drawn representing the decrease in sensitivity with loudness. The general relationship between sensitivity and loudness was found to be approximately constant over the frequency range used. It was also found that the absolute DL continues to decrease as frequency decreases, the relationship being more marked at the lower loudness levels. These data differ sharply from the data obtained by approximately sinusoidal frequency modulation (Shower and Biddulph), or it is concluded that at least for frequencies below 1000 cps the two methods explore quite different psychological functions. These results indicate that the traditional method of constant stimulus differences used here is more readily definable as a test of pitch discrimination. The question is raised whether the frequency modulation technique is not rather an experiment in some form of beats or masking.

R 22

98

Zwislocki, J. ACOUSTIC ATTENUATION BETWEEN THE EARS. *J. acoust. Soc. Amer.*, July 1953, 25(4), 752-759. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

In an investigation of the acoustical insulation between the ears, various earphones and obliterating devices were used. Bone conduction was shown to be chiefly responsible for the acoustical leakage between the ears. Conditions were determined under which interaural insulation could be increased considerably. Most of the measurements were performed with a compensation method which appears to give more precise results than methods previously used, and which permits phase measurements.

R 10

99

Harris, J.B. & Ramsley, Anita I. PATTERNS OF COCHLEAR ADAPTATION AT THREE FREQUENCY REGIONS. *J. acoust. Soc. Amer.*, July 1953, 25(4), 760-766. (USN Medical Research Lab., New London Submarine Base, Conn.).

Auditory adaptation was determined in 40s to 100-, 1000-, and 4000-cps tones at 30-, 50-, 70-, and 90-db loudness level. The spread of effect to closely adjacent frequencies was particularly examined. The method of adaptation was used to avoid the intrusion of sea in the simultaneous masking experiment. Loudness patterns were drawn according to the method of Munson and Gardner, confirming and extending the earlier study. Within the range represented by the differential threshold, no especial peaking of the loudness pattern was found. For example, at 1000 cps, there was a broad peak of ± 10 cps. From earlier experiments, adaptation is thought to be confined to the peripheral sense organ. According to this view, the present data would represent a stage in the process of handling frequency information, intermediate between the much broader amplitude patterns and the more precise operations at the command of the nervous system.

R 17

100

Harris, J.B. RECOVERY CURVES AND EQUINOXIOUS EXPOSURES IN REVERSIBLE AUDITORY FATIGUE FOLLOWING STIMULATION UP TO 140 DB PLUS. *The Laryngoscope*, July 1953, 63(7), 660-673. (USN Medical Research Lab., New London Submarine Base, Conn.).

Three fatigue-resistant subjects were given stimulation of 750 cps at 120-140 db sound pressure level, for up to ten minutes. Recovery to normal threshold at 1000 cps was studied with especial care. The shape of the recovery curve depends upon both intensity and duration of stimulation, the best prediction being a combination of both factors. Hearing loss is a linear function of stimulus duration, the function having a different slope for each stimulus intensity. To a less reliable extent, hearing loss is also a linear function of stimulus intensity, when stimulus duration is the parameter. A family of equi-noxious curves appears from these data, showing the combinations of intensity and duration which produce equally deleterious effects on the auditory threshold. These results will predict the hearing losses (at frequencies important in speech communication) which are occasioned by being immersed in a noise band of 600-1200 cps for up to 10 min. at sound pressure levels up to 140 db.

R 4

101

Harris, J.B. DISCRIMINATION OF PITCH: SUGGESTIONS TOWARD METHOD AND PROCEDURE. *Amer. J. Psychol.*, July 1948, 61(3), 309-322. (USN Medical Research Lab., New London Submarine Base, Conn.).

This paper presents a study of certain intra-serial effects tending to vitiate the DL in one variation of the Method of Constant Stimulus Differences. DLs were determined for groups totaling 515 men. Over 12 experimental variants were investigated. The aim was to discover the stimulus-pattern which gives the truest DL, by which is meant the distance between the actual physical magnitude of the standard stimulus and the magnitude of the variable stimulus at the 75% correct point. The final variant evolved was one with the standard stimulus gradually ascending and descending in frequency, and with variables placed quite at random around these values. This variant seemed to provide a true DL. (HEIAS)

R 16

102

Reese, W.A. & Stevens, K.N. ON THE BL FOR FREQUENCY. *J. Acoust. Soc. Amer.*, Sept. 1953, 25(5), 900-905. (Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.).

Difference limens for three frequencies (250, 1000, & 4000 cps) were determined for 2 trained observers by 2 psychophysical methods: the ABX procedure and the method of constant stimulus differences or AX procedure. Though the 2 observers differ considerably in sensitivity, their BL's for the AX procedure are less than $\frac{1}{2}$ of their BL's for the ABX procedure. Comparison of these data with data in the literature on BL's for frequency indicates a wide range of values for different psychophysical procedures and for different subjects. Some observations are reported that illustrate the effect of such factors as practice and ensemble of stimulus conditions upon the size of the BL. The influence of the stimulus ensemble upon judgment time is discussed briefly. In view of all the experimental data, it would be rather imprudent to postulate a "true" BL, or to infer the behavior of the peripheral organ from the size of a BL measured under a given set of conditions. While there is undoubtedly some relation between the size of the BL and the so-called channel capacity, there is little reason to assume that the relation is a particularly simple one, given the different operations by means of which these two quantities are determined.

R 31

104

Morris, J.D. A BRIEF CRITICAL REVIEW OF LOUDNESS RECRUITMENT. *Psychol. Bull.*, May 1953, 50(3), 190-203. (USN Medical Research Lab., New London Submarine Base, Conn.).

The phenomenon of loudness recruitment is critically reviewed. A brief history of the phenomenon is given and previous reviews are indicated. Next, the following psycho-acoustic situations affected by recruitment are reviewed: a) the loudness function; b) isophonic contours; c) restriction of useful intensity range; d) intensity discrimination; e) precision of absolute intensity limits; f) auditory fatigue; g) masking; and h) speech reception. The characteristics of recruitment, viz. inducing conditions, shapes of recruitment curve temporal pattern, and overrecruitment, are surveyed. In the absence of knowledge of just what derangements within the cochlea induce recruitment, and of just how these derangements affect loudness, a number of theories have been offered to account for the facts--a) fiber-loss theory; b) occlusion theory; c) constant loudness-loss theory; d) duplicity theory; e) geometric theory; f) impedance theory; and g) microphonic theory. Finally, analogies of recruitment in the normal ear are reviewed. (MEIAS)

R 123

105

Tyler, I.K. (Ed.). SYMPOSIUM ON TELEVISION TRAINING AND TRAINING RESEARCH, 10-11 DECEMBER 1952. HTD 210/1, 166pp. Joint Panel on Training & Training Devices, Committee on Human Resources, US Research & Development Board, Washington, D.C.

105

This publication reviews a program presented for the purpose of aiding representatives of the three military departments in "... planning their research and development programs related to television utilization in military training". Subjects covered by individual papers include descriptions of television utilization at various military and educational institutions, television research, and implications for training and research. T. G. I. R 43

107

Green, B.F., McGill, W.J. & Jenkins, N.M. THE TIME REQUIRED TO SEARCH FOR NUMBERS ON LARGE VISUAL DISPLAYS. Contract AF 19(122) 458, Tech. Rep. 36, Aug. 1953, 15pp. Lincoln Lab., Massachusetts Institute of Technology, Lexington, Mass.

107

To determine the amount of time spent in searching for numbers on large visual displays, seven experiments (from seven to twenty subjects each) were performed in which subjects located given numbers on experimental displays. Experimental conditions included: 1) varying number density (25 to 100), 2) varying number size ($1/2$ to $3/4$ inch), 3) varying orientation of number and observer, 4) varying degrees of background clutter, and 5) varying color (yellow and blue). Mean search times in seconds are interpreted with regard to time-delay in obtaining information from such displays. T. G. I. R 2

106

Green, B.F. & Anderson, Lois K. SPEED AND ACCURACY OF READING POLAR COORDINATES ON A HORIZONTAL PLOTTING TABLE. Contract AF 19(122) 458, Tech. Rep. 49, Dec. 1953, 14pp. Lincoln Lab., Massachusetts Institute of Technology, Lexington, Mass.

108

Calvert, J.F., Hartenberg, R.S., Kliphardt, R.A., Shelley, H.P., et al. DEVELOPING PROBLEM-SOLVING SKILLS IN ENGINEERING. Contract N7 ONR 45012, Proj. NR 151 144, 1953, 250pp. Northwestern University, Evanston, Ill.

106

To investigate the effect of degree of patterning (range rings and azimuth markers) on a polar-coordinate grid, five observers made azimuth and range readings of targets on six different grids (a control and five experimental patterns with varying degrees of detail). The display was presented on a horizontal plotting table with five viewing positions. Speed and accuracy scores for the various conditions are used as a functional index for making recommendations concerning the most desirable design and viewing position. T. G. I. R 8

108

A cooperative study was undertaken between engineers and psychologists: 1) to determine how problem-solving ability might be enhanced through undergraduate training, and 2) to assemble suitable educational methods, proposals for their use, and methods for testing their effectiveness. A study of specific abilities and work-methods was augmented by a literature review of problem-solving. Upon this basis, methods were devised for enhancing problem-solving abilities in a course in engineering drawing and descriptive geometry. Four sections of freshmen drawing classes were used in an experiment designed to study the effectiveness of the methods. A manipulative symbolic notation for the description and synthesis of kinematic mechanisms was also developed. T. G. I. R 34

109 Hardy, L.H., Rend, Gertrude, Rittler, M. Catherine, Blenk, A.A., et al. THE GEOMETRY OF BINOCULAR SPACE PERCEPTION. Contract N6ON7115, Proj. NR 14-538, 1953, 68pp. Knapp Memorial Labs., Columbia University, New York, N.Y.

This is a report of progress, theoretical and experimental, in the study of binocular space perception based on the theory of R.K. Luneburg. The experimental evidence definitely supports Luneburg's major conclusion that the dark room visual space has a determinate non-Euclidean metric or psychometric distance function which is a personal characteristic of the observer. In this report the metric has been expressed in terms of coordinates closely related to, but different from those of Luneburg. Now the same methods are used for determining the form of the metric as were suggested by Luneburg. The theory gives an explanation of several well-known perceptual space phenomena such as the frontal geodesics, Blumenfeld arrays, and size constancy. R 18

110 Humphrey, C.E. & Thompson, J.E. AUDITORY DISPLAYS, II. COMPARISON OF AUDITORY TRACKING WITH VISUAL TRACKING IN ONE DIMENSION. C. CONTINUOUS SIGNALS, SIMPLE, INTERMEDIATE AND COMPLEX COURSES. Rep. APL/JHU TG 194, April 1953, 5pp. Johns Hopkins University, Baltimore, Md.

110 With a continuous presentation of auditory or visual error signals in one dimension: 1) Visual tracking performance was far superior to auditory tracking performance; 2) The variability of level of performance of operators indicates a decided need for careful selection of operators who are to perform a tracking task; 3) There was a homogeneous factor operating in auditory tracking trials which did not exist in visual tracking trials; 4) The use of cyclical or repetitive courses of sufficient simplicity to approximate radar displays of aircraft movement permit the operator to learn the rate of motion. When this difficulty is overcome by complex courses, a lack of realism results; hence, random, non-cyclical courses appear to be more desirable. R 5

111 Brown, J.S., Knauff, E.B. & Rosa Baum, G. THE ACCURACY OF POSITIONING REACTIONS AS A FUNCTION OF DIRECTION AND EXTENT. Contract NSORI 57, Proj. 20 M 1, Rep. 1, 1947, 21pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., State University of Iowa, Iowa City, Iowa).

The purpose of this study was to measure the accuracy with which individuals can perform positioning reaction in the absence of visual corrective cues. The precision and variability of positioning reactions as affected by: a) plane of movement; b) direction of movement with respect to the body; and c) distance moved were studied. 6 experimental conditions consisting of 2 directions of movement (toward and away from the body) studied in each of 3 planes or axes were used. Tested were 24 Ss under each of the 6 conditions. The results indicate a tendency to overshoot the intended mark at the shorter distance and to fall short of the intended mark in the longer distances. Movements away from the body exhibit smaller percent errors in positioning than do movements toward the body at comparable distances from their respective starting points. The variability of positioning movements directed away from the body is greater than that of movements toward the body at distances of 10 and 40 cm. The relationship is reversed for distances of 0.6 and 2.5 cm. This effect is attributed to the position of the terminal points with respect to the body, since the larger variabilities were associated with the more remotely located points. (HEIAS) R 8

112 Jenkins, W.L. DESIGN FACTORS IN KNOBS AND LEVERS FOR MAKING SETTINGS ON SCALES AND SCOPES. Contract AF 18(600) 24, RDO 694 17, WADC TR 53-2, Feb. 1953, 5pp. USAL Wright Air Development Center, Wright-Patterson AFB, Ohio. (Lehigh University, Bethlehem, Penn.).

This is a brief summary of five detailed research reports prepared by Lehigh University on the design of knobs and levers. It is intended to provide the design engineer with a convenient integration of the major findings of the research. This research indicates that the time required to make a setting is affected more by the ratio of control movement to indicator movement than by inertia, friction, backlash, setting tolerance, or control size. When a control knob is used to make settings on a linear scale, the optimal ratio is found to be: a) for fine tolerances (.007 to .015"), one or two in. of pointer movement for one complete turn of the knob; b) for coarse tolerances (.016 to .100"), about six in. of pointer movement for one turn of the knob. When a lever is used to make settings on a linear scale to coarse tolerances (.016 to .100"), the optimal ratio is one unit of pointer movement to three units of lever movement. When a joy stick is used to make settings, in two dimensions, on a simulated scope face to coarse tolerances (.10"), the optimal ratio is one unit of indicator movement to two-and-a-half units of stick movement. R 5

113 von Schelling, H. THREE CHARTS FOR MEASURING CHROMATICITY SHIFTS RESULTING FROM CHANGES IN ILLUMINATION, MACULAR PIGMENTATION, AND INTRAOCULAR ABSORPTION. Proj. NM-003-042, 19-03, Rep. 210, Oct. 1952, 12pp. Medical Research Lab., U.S. Naval Submarine Base, New London, Conn.

113 This report deals with the determination of shifts in chromaticity of pigments due to changes in illumination or to variation between observers in macular pigmentation and intraocular absorption. To facilitate determination of the average shift from the values of the 1931 Standard Observer and Coordinate System of the International Commission of Illumination, three charts, based on mathematical calculations, are given. Directions for use and a variety of sample problems are included. G, R 7

114

Farnsworth, D. ILLUMINATION. Rep. 5 on Bu. Med. Proj. NM 003 041.12 (formerly NM 000 000), Rep. 160. Nov. 1950. pp. 60-68. Medical Research Lab., U.S. Submarine Base, New London, Conn.

114

This report is an offprint of a chapter on illumination from 'Handbook of Applied Psychology', a chart and Co., 1950. The text first describes measures of light and variables of vision, then elaborates these in four major topics (author's classification): illumination levels, spectral quality, pleasantness of lighting, and optimum conditions. Sub-topics deal with variables of the task, the physiological apparatus, and conditions of illumination.

T. R 5

115

Malone, Florence L., Sexton, Mary S., & Farnsworth, D. THE DETECTABILITY OF YELLOWS, YELLOW-REDS, AND REDS IN AIR-SEA RESCUE. Proj. No. NM 003 041.35.01, Rep. No. 182. Sept. 1951. pp. 177-185. Medical Research Lab., Submarine Base, New London, Conn.

115

This preliminary study was designed to investigate the effectiveness of the yellow currently in use for life-saving equipment and the usefulness of detection goggles as a means of increasing visibility of colors. Seven subjects made outdoor judgment, with and without goggles, of the distance at which 1/4-inch color circles (a graduated series of yellows, yellow-reds, and reds) mounted on blue-grey boards could be seen. Upon the basis of the resulting data some recommendations are made and further experimentation is indicated.

T. G. 1.

116

Sexton, M.S., Malone, F.L., & Farnsworth, D. THE RELATIVE DETECTABILITY OF RED-PURPLES, REDS, AND YELLOW-REDS, IN AIR-SEA RESCUE. BuMed. Proj. NM 003 041.35.02, Rep. No. 12. Mar. 1952. 9pp. Medical Research Lab., U.S. Naval Submarine Base, New London.

116

A continuation of a previous study (accession 115), this experiment investigated the relative threshold visibility of a graduated series of light and medium-light red-purples, reds, and yellow-reds, under conditions containing the essential visual elements normally present in an operational search for personnel adrift at sea. Six subjects made outdoor determinations of the distances at which test colors (1/4-inch circles) mounted on blue-grey boards (representing ocean under two weather conditions), were visible. Effect of hue and brightness contrast are discussed; other factors which should be included in the selection of colors for this problem are also pointed out.

G 1

117

von Schelling, H. CORRECTION FACTOR TO THE PHOTOMETRIC SQUARE LAW FOR AREA OF SOURCE AND RECEIVER. Proj. NM-003-041.40.03. Rep. 231. July 1953. 8pp. Medical Research Lab., Bureau of Medicine & Surgery, U.S. Naval Submarine Base, New London, Conn.

117

Since the assumptions of only point sources of illumination and point receivers which underlie the photometric square law are not met rigorously under laboratory conditions, this report presents a refinement useful for research workers on problems of vision and illumination. Given with the underlying formulae are a correction factor and detailed directions for use.

T. G.

118

Farnsworth, D., & Reed, J.D. RETENTION OF DISCRIMINABLE HUE OF TEN COLORS AT SMALL SUSTENSE. Color Vision Rep. No. 7. Apr. 1944. 14pp. Medical Research Lab., U.S. Naval Submarine Base, New London, Conn.

118

This is an exploratory approach to the practical problem of naming ten colors which will retain their identity at 4,000 yards distance, under daylight illumination, against a dark blue-green background. Six to ten subjects identified colors presented singly, in pairs, or in groups of 14 (in laboratory and on river); the scale in relation to 4,000 yards, 1:360 and 1:64; angles subtended, 2 1/2 and 1 1/2 minutes. The per cent number of times a color was miscalled is presented on a series of perspective projections of a standard ICI diagram; a tentative list of colors is recommended pending further tests.

T. G. 1, R 4

121

Farnsworth D., & Reed, J.D. A SURVEY OF METHODS USED IN ADMINISTERING PSEUDO-ISOCROMATIC TEST PLATES FOR COLOR VISION. NRL Color Vision Rep. No. 3, Rep. 30. Nov. 1943. 13pp. Medical Research Lab., U.S. Submarine Base, New London, Conn.

121

To find errors in the administration of American Optical Company's Pseudo-Isochromatic Plates (color vision test) which had contributed to the unreliability of previous testing, 27 men were selected at random from a group of 105 color defectives. All had passed their physical examinations for Submarine School but had failed the screening test for color vision at the Submarine Base. Informal interviews yielded information concerning test conditions which lead to identification of a variety of administrative faults. Further investigation of the plate is suggested.

T.

122

Farnsworth, D., Reed, J.D., & Shilling, G.W. THE EFFECT OF CERTAIN ILLUMINANTS ON SCORES MADE ON PSEUDO-ISOCROMATIC TESTS. Color vision rep. 4. Nov. 1943, reissued Dec. 1948. 9pp. Medical Research Lab., New London, Conn.

122

To study the effects of certain illuminants on the validity of scores made on American Optical Company's Pseudo-Isochromatic Plates (color vision test), 27 applicants (see Accession 121) for submarine school were tested under two illuminants: 1) standard daylight lamp, and 2) 100-watt lamp with a filter chosen under artificial light. Shifts in error scores are analyzed and recommendations made concerning type of illuminant to be used.

T. 1, R 6

123

Shilling, G.W. REPORT ON TRIAL OF ROYAL CANADIAN NAVY COLOUR VISION LANTERN IN COMPARISON WITH OTHER TESTS OF COLOR VISION. NRL Color Vision Rep. No. 2, Rep. 15. Jan. 1943. 14pp. Medical Research Lab., U.S. Submarine Base, New London.

123

This report is an evaluation of the Royal Canadian Colour Vision Lantern. Five hundred men were tested on the Lantern in addition to other color tests: a pseudo-isochromatic test (American Optical Company's plates), and the Eldridge-Green Lantern. Test scores are analyzed and discussed in terms of relative merits of the tests. Modified procedures for testing with the Royal Canadian Lantern are suggested.

T. G. R 2

124

Farnsworth, D., & Reed, J.D. SUMMARY AND CONCLUSIONS, EXTRACT FROM EXAMINATION OF THE WILLIAMS LANTERN AS A TEST FOR COLOR VISION. Color Vision Rep. 6, Nov. 1943, 2 pp. US Naval Medical Research Laboratory, New London, Conn.

124

To examine the Williams Lantern as a suitable test for color vision, 75 normals and 25 color deficient were tested using a variety of combinations of size of apertures, numbers of light filters, and brightnesses. Both dark and light surroundings were used. Recommendations as to the value of the Lantern are made by comparing the test results to scores on four standard tests for color vision: Pseudo-isochromatic tests, D'Amico Anemioscope, Royal Canadian Navy Lantern, and Farnsworth Dichotomous Test B-20. Operating characteristics are also discussed.

125

Farnsworth, D., & Reed, J.D. THE EFFECT OF CHANGING THE ILLUMINATION ON THE COLORS IN PSEUDO-ISOCROMATIC PLATES. Color Vision Rep. No. 5, Jan. 1944. 10pp. Medical Research Lab., U.S. Naval Submarine Base, New London, Conn.

125

This is a study of the effect of illumination in changing the relations between colors, with particular reference to consequent differential changes in color blind (deuteranopes and protanopes) responses to pseudo-isochromatic tests (see Accusations 121, 122). Conclusions drawn are applied to a particular plate in the Navy test in use at the time of this report. T. G. 1. R 3

126

Farnsworth, D. THE EFFECT OF COLORED LENSES UPON COLOR DISCRIMINATION. NRL Color Vision Rep. No. 9, Sept. 1945. 15pp. Medical Research Lab., U.S. Naval Submarine Base, New London, Conn.

126

To determine their effects on color perception, six commercial types of sunglass lenses were subjected to six laboratory tests with results from only two reported: 1) Farnsworth-Munsell 100-Hue test with and without goggles, and 2) a liquid wedge method of matching film colors in a bi-part field. Subjects were 20 young Navy men with normal color vision. Mean scores on the F-M 100-Hue test are graphically presented and methods of specification of color for sunglasses are discussed. T. G. 1. R 4

127

Farnsworth, D., & Reed, J.D. COMPARISON AND EVALUATION OF AMERICAN OPTICAL CO. PSEUDOISOCROMATIC PLATES, FIRST AND SECOND EDITIONS. BuMed. X-480, Rep. 55, March 1954, 12 pp., US Naval Medical Research Laboratory, New London, Conn.

127

To investigate the comparative reliabilities of the first and second editions of the American Optical Company's Pseudo-Isoschromatic Plates, a group of 410 men (298 of normal color vision, 112 defective color vision) was examined and their resultant error scores compared. Factors in the analysis were: differentiation of normal from defective color vision, ease of memorization of test plates, and ease of administration. Recommendations for certain corrections in the second edition are made. T. G.

129

Chapman, A., & Leysorek, M. ACCURACY OF VISUAL INTERPOLATION BETWEEN SCALE MARKERS AS A FUNCTION OF THE NUMBER ASSIGNED TO THE SCALE INTERVAL. J. exp. Psychol., 1950, 40, 655-667. (Johns Hopkins Univ., Dept. of Psychol.)

125

To obtain information on the relation between accuracy of visual interpolation and the number system assigned to scale markers, eleven naval radar operators estimated the position of a number of short arcs scattered in and concentric with a pattern of four equally spaced concentric circles (scale markers). Eleven numerical scale units were tested--100 to 10,000 yards and 2.5 miles. Relative errors of estimation are analyzed into two components, constant, and variable errors. Differences among scales are discussed in terms of number preferences. T. G. 1. R 8

130

Whiteside, T.C.D. THE PROBLEMS OF VISION IN FLIGHT AT HIGH ALTITUDE. London: Butterworths Scientific Publications, 1957, 168pp. AGARDOGRAPH 13.

130

This book deals specifically with visual problems of flight in the stratosphere or upper limits of the troposphere. Following an introduction a series of investigations are reported on: 1) effects of changes in intensity and spectral distribution of sunlight at high altitudes; 2) physiological changes affecting visibility of objects inside the cockpit; and 3) physiological factors affecting air-to-air visibility. A discussion of the problems of glare (contrast measurements, discomfort and anoxia) and search (empty field myopia, accommodation, fixation pattern, other problems of empty visual field) presents a comprehensive view of the problem as a whole. T. G. 1. R 98

131

Dallenbach, K.M. THE ELASTIC EFFECT: AN OPTICAL ILLUSION OF EXPANSION. Amer. J. Psychol., 1955, 66, 634-636. (Univ. of Texas).

131

This note describes an optical illusion observed from a moving car wherein the broken painted lines (as well as other objects) dividing traffic lanes on a highway are observed to grow in length, at first slowly and then rapidly, as the observer approaches them. The illusion of expansion occurs under many conditions of speed, illumination, color and length. An explanation of the phenomenon is offered, although no experimental data are cited. R 1

134

Boynton, R.M., & Friedman, M.H. A PSYCHOPHYSICAL AND ELECTROPHYSIOLOGICAL STUDY OF LIGHT ADAPTATION. J. exp. Psychol., 1953, 46, 125-134. Contract N7onr-358, Task Order 2, Proj. NR-140-359. ONR, Brown U.

134

To study the course of light adaptation at scotopic levels, two experiments (two subjects each) were performed using two types of response: 1) Intensity-discrimination threshold, 2) b-wave component of the electroretinogram (ERG). Experimental conditions included: 1) luminance of adapting stimulus about one log unit above absolute threshold, 2) various adapting intervals, including negative (test flash preceding adaptation onset) intervals, 3) 30-minute dark adaptation, 4) from two to six experimental sessions. Sensitivity data are given and discussed in terms of current theory. T. G. 1. R 11

136
Bitterman, M.E., & Trochel, P. THE PHENOMENAL VERTICAL AND HORIZONTAL IN BLIND AND SIGHTED SUBJECTS. *Amer. J. Psychol.*, 1953, 66, 593-602. (University of Tex.)

136
To investigate the relative importance of visual and postural cues in spatial perception of normal individuals, orientation to the vertical and horizontal in 22-blind and 22 sighted subjects deprived of vision were studied. Subjects adjusted a rod to both orientations in an upright position and with body tilted to left and right; half of the adjustments were made with left and half with right hand. Average deviations and lateral discrepancies of the settings are analyzed with reference to the problems.
T. & R 14

137
Boynton, R.H., Bush, W.R., & Enoch, J.M. RAPID CHANGES IN FOVEAL SENSITIVITY RESULTING FROM DIRECT AND INDIRECT ADAPTING STIMULI. *J. opt. Soc. Amer.*, 1954, 44, 56-60. Contract Nonr-568(05). ONR, University of Rochester.

137
To measure (central) sensitivity changes associated with adapting stimuli, intensity discrimination thresholds of a test-flash were determined by two trained subjects before, during, and immediately after the onset of two different adapting stimuli: 1) concentric with and larger than the foveal test-flash, 2) presented at a glare angle of 18°. Luminances of adapting stimuli used were those yielding the same test-flash threshold at "zero" adapting interval. Log luminance of threshold test-flash is shown as a function of the adapting interval. These results are discussed in terms of the stray-light hypothesis.
T. G. I. R 13

138
Halsey, Rita M. A COMPARISON OF THREE METHODS FOR COLOR SCALING. *J. opt. Soc. Amer.*, 1954, 44, 199-206. Contract N5-ori-166, Proj. Designation No. NR 507-470, Rep. No. 166-I-176. ONR, Naval Research Lab., Systems Division, Johns Hopkins Univ., Psychol. Lab.

138
To construct perceptual color scales and to investigate the amount of agreement among them, each of five observers completed three experiments using three different methods for yielding scales: successive bisection (equal-interval scale), color matching (integrated just noticeable difference scale), and absolute judgment (equal-discriminability scale). Constant viewing conditions were maintained, mixtures of yellow and blue primaries were produced by filtered light, at constant luminance. Scales are constructed from the data and correspondences among them discussed.
T. G. R 15

139
Halsey, Rita M., & Chapanis, A. CHROMATICITY-CONFUSION CONTOURS IN A COMPLEX VIEWING SITUATION. *J. opt. Soc. Amer.*, 1954, 44, 442-454. Contract N5ori-166, Proj. Designation No. NR 145-089, Rep. No. 166-I-179. ONR, Johns Hopkins Univ., Psychol. Lab.

139
To determine color confusion contours when many heterogeneous stimuli, spatially separated, are in the field of view at the same time, twenty subjects matched a standard color (58 distributed throughout the CIE constant-luminance diagram) to an assortment of colors (342--171 in each display) arranged in a display. Viewing conditions approximated those found in certain complex display situations. Contours drawn on the CIE diagram show the percentage of times various chromaticities were confused. Practical implications for color coding are drawn from these data
T. G. I. R 9

140
Hake, H.W., & Garner, W.R. THE EFFECT OF PRESENTING VARIOUS NUMBERS OF DISCRETE STEPS ON SCALE READING ACCURACY. *J. exp. Psychol.*, 1951, 42, 358-366. Contract N5-ori-166, Proj. No. NR-784-001, Rep. No. 166-I-128. Special Devices Center, ONR, Johns Hopkins U.

140
To study scale reading accuracy as affected by the number of discrete steps presented, 16 subjects made readings on an instrument dial for 5, 10, 20, and 50 different positions of a pointer within a single interpolation interval. Two sets of instructions were given: 1) to restrict responses to given values, and 2) to report positions as accurately as possible (numbers from 0-100). An analysis of accuracy in terms of mean square errors and of the amount of information transmitted (information theory) was made and implications for scale design were discussed.
T. G. R 4

141
Kehler, I. AUDITORY GUIDANCE STUDIES. Contract AF 61 (514) 889, AFOSR TR 55 43, 1956, 58pp. USAF Air Research & Development Command, Paris, France. (Institut für experimentelle Psychologie der Universität Innsbruck, Innsbruck, Austria).

141
To investigate factors involved in auditory guidance ("obstacle sense," "facial vision") a series of studies were conducted. A method was developed by which obstacle sense could be measured and 267 persons (four to 85 years of age) were tested with and without a guidance device. Physical and physiological optimum conditions for the "ideal" guidance sound and guiding device were established. A further group of 13 blind and 27 blindfolded persons wearing a guidance device were given intensive training and the results evaluated in terms of the values and limitations of training. And finally the relations between auditory stimuli and facial sensations which occur in connection with detection of obstacles were investigated. A theoretical explanation of the findings is offered.
G. I. R 47

142
Luchins, A.S. THE AUTOKINETIC EFFECT AND GRADATIONS OF ILLUMINATION OF THE VISUAL FIELD. *J. gen. Psychol.*, 1954, 50, 29-37. McGill Univ., Dept. of Psychol.

142
To study the autokinetic effect (apparent movement of a stationary light in a dark surround) as a factor of surrounding illumination, 220 subjects observed a continuous stimulus (dot of light) in a field of variable illumination (darkness to 70 foot-candles). Oral reports by the subjects of latency, kind and amount of movement, changes in the surround, and the "cease setting" point (that illumination level at which the stimulus became stable) are given and discussed.
R 10

143
Luchins, A.S. THE AUTOKINETIC EFFECT IN CENTRAL AND PERIPHERAL VISION. *J. gen. Psychol.*, 1954, 50, 39-44. McGill Univ., Dept. of Psychol.

143
To compare autokinetic movement in central and peripheral vision, 25 subjects (dark adapted for 15 minutes) observed a stationary light stimulus imbedded in a box with dark surround, in positions such that the stimulus was 1) directly in front, 2) to the right and just barely visible, and 3) to the left, also barely visible. Extent, rate, and kind of movement are described for all three positions. Differences are reported and discussed, with need for further investigation indicated.
R 1

144

Hendray, C.M. SIMULTANEOUS VISION AND ADDITION: THE COMPREHENSION OF PROSE PASSAGES WITH VARYING LEVELS OF DIFFICULTY. *J. exp. Psychol.*, Nov. 1953, 44(5), 365-372. (Johns Hopkins University, Baltimore, Md.).

Prose passages selected from fiction sources and having three levels of difficulty as determined by a Flesch count were presented to Ss visually and aurally at the same time. Two groups of Ss were used - one a group of novel enlisted men and the other a group from a university population. The auditory material was recorded on a magnetic tape recorder, whereas visual presentation was accomplished by means of a visual pager that prevented forward and backward glancing. The speed of visual and auditory presentations was identical. Responses were measured by a ten-item questionnaire designed to test for comprehension of the paragraph and for the retention of discrete facts. Scores obtained from simultaneous trials were compared with scores obtained from control groups that performed the same tasks non-simultaneously. The following conclusions can be drawn: a) For simultaneous presentation significantly greater deterioration (from a nonsimultaneous level) occurred with the easy material, thus substantiating earlier findings. b) The scores from all paired presentations were separated on the basis of the lowest score and the highest score regardless of channel involved or level of difficulty of material, it was found that the lowest scores, with only one exception, did not differ significantly from a chance level.

R 13

145

Hendray, C.M. THE PERCEPTION OF SHORT PHRASES PRESENTED SIMULTANEOUSLY FOR VISUAL AND AUDITORY RECEPTION. *Psych. J. exp. Psychol.*, May 1954, 47(2), 86-92. (Psychological Lab., Johns Hopkins University, Baltimore, Md.).

Subjects were provided with outline maps that were incomplete in several details. Brief, simultaneous, visual and auditory instructions were given for completing some of the missing details. Certain items could be completed on the basis of direct information contained in one or other of the sensory modalities. Other, however, could be completed only because of their relation to details capable of location by direct instruction. Information important for the completion of map details was distributed randomly among short passages of unconnected material. All relevant visual and aural clues were presented simultaneously in every case. Opportunities for alterations of attention were curtailed. Thirty-six subjects were randomly assigned to three experimental conditions, and to two groups that were given different instructions. One group was told that relevant information would always appear simultaneously, while the other group was not allowed this information. The number of successfully located simultaneous pairs of items presented for direct location was found to be no greater than could be expected by chance. The total number of correctly located items was less than 50 per cent of the possible items. There was no difference in the number of correctly located simultaneous pairs of items between the "instructed" and the "uninstructed" groups. The "uninstructed" group did not learn in the course of the experiment that all relevant material was presented simultaneously. Significantly more correct completions were made with the visual material than with the auditory. It was concluded that successful division of attention did not occur.

R 2

146

Hendray, C.M. SIMULTANEOUS VISION AND ADDITION: THE DETECTION OF ELEMENTS MISSING FROM OVERLEARNED SEQUENCES. *J. exp. Psychol.*, Oct. 1952, 44(4), 292-300. (Psychological Lab., University of Cambridge, Cambridge, England).

The relative performance of vision and audition under conditions of simultaneous stimulation was investigated for rapid scanning tasks considered to exhibit two levels of difficulty. The Ss were required to detect elements missing from alphabets and numeral sequences when such sequences were presented simultaneously to the two senses in one of four combinations - visual alphabet with auditory alphabet, visual numeral with auditory numeral, visual alphabet with auditory numeral, or visual numeral with auditory alphabet. Performance on the simultaneous trials was compared with nonsimultaneous performance of the same conditions. Analysis of performance was made on the basis of two types of errors. These were errors of omission, or deleted elements which were not reported as missing, and errors of commission which were elements reported as missing which were not in fact missing. The following results were obtained: a) For nonsimultaneous operation more errors of omission were made with the alphabet sequences than with the numeral sequences. More auditory than visual errors of omission were committed with the numeral sequences; b) For nonsimultaneous operation 4 to 5 times as many errors of commission were made with the auditory sequences as with the visual sequences; c) Increase in the number of errors of omission from nonsimultaneous to simultaneous trials because of the conflicting nature of the material was not significantly greater for one modality or the other; d) Increase in the number of errors of commission from nonsimultaneous to simultaneous trials was significantly greater for the visual trials than for the auditory. (HEIAS)

R 8

147

Riggs, L.A., Armington, J.C., & Ratliff, P. MOTIONS OF THE RETINAL IMAGE DURING FIXATION. *J. Gen. Soc. Amer.*, 1954, 44, 315-321. Proj. NR-140-359, Contract N70nr-358. ONR, Brown Univ.

147

To explore the extent to which steadiness of retinal image is achieved during fixation, various methods for measuring eye movements were examined critically. Using a method involving plane mirror attachment to contact lenses in conjunction with a multiplier phototube, eye-movements for monocular fixation on a black-dot fixation point at center of a bright field were recorded. Data are given for typical excursions of the retinal image during various exposure intervals from 0.01 to 1 second duration, and are interpreted in terms of effect on visual experimentation.

G. I. R 19

148

Sloan, Louise L. CONGENITAL ACHROMATOPSIA: A REPORT OF 19 CASES. *J. Opt. Soc. Amer.*, 1954, 44, 117-128. Contract N6onr-24307. ONR, Johns Hopkins Univ.

148

Studies were made of the visual functions of 19 subjects having complete and partial achromatopsia (congenital total color blindness). Data and discussion cover: 1) findings of the routine ophthalmological examination, 2) color discrimination data with description of the simple color tests used, 3) course of dark adaptation after preadaptation to high luminance, and 4) the significance of these data for diagnostic procedures and for visual theory.

T. G. I. R 20

148

Ames, C. E., Marshel, P. & Dallenbach, K.M. "FACIAL VISION: THE PERCEPTION OF OBSTACLES OUT OF DOORS BY BLINDFOLDED AND HINDFOLDED-DEAFENED SUBJECTS." *Amer. J. Psychol.*, Oct. 1953, 61(4), 319-323. (University of Louisville, Louisville, Ky.).

149

To determine the role of hearing and learning in the perception of obstacle/out of doors by the blindfolded and/or deafened, a series of experiments was made with two groups of ten subjects, matched for ability to hear and serving under both conditions. Other variables were: day versus night, occlusion of sense of smell, trials with and without knowledge of results. Data are presented as distances of object-perception, in feet, number of collisions and false reports. Discussion is in terms of the factors involved in "facial vision." T. R 8

150

Andreas, E.G., Green, R.F. & Spragg, S.D.S. TRANSFER EFFECTS IN FOLLOWING TRACKING (MODIFIED SAN TWO-HAND COORDINATION TEST) AS A FUNCTION OF REVERSAL OF THE DISPLAY-CONTROL RELATIONSHIPS ON ALTERNATE BLOCKS OF TRIALS. *J. Psychol.*, 1954, 37, 185-197. (Department of Psychology, University of Rochester, Rochester, N.Y.).

150

This experiment in following-tracking deals with changing from "natural" to "unnatural" display-control relationships, with blocks of trials alternating between one and the other. Eight groups of inexperienced men in basic training at a military installation were subjects, 30 in each group. Each man received 20 or 6 minute trials but the length of the blocks of trials was different for each group (1, 2, 4, or 8). Controls moved a display in the same direction they were turned, or the opposite. Time-on-target scores are reported. T. G. R. 12

151

Baker, H.D. THE INSTANTANEOUS THRESHOLD AND EARLY DARK ADAPTATION. *J. opt. Soc. Amer.*, 1953, 43, 798-803. Contract NSR-166, Proj. No. NR 507-470, Rep. No. 166-I-114. ONR, Johns Hopkins Univ.

151

To determine sensitivity changes of the light-adapted eye just preceding, coincident with, and immediately after the extinction of the adapting light, luminance threshold measurements were made to a white stimulus 1° in diameter for six subjects, foveal and parafoveal positions, with several adapting luminance levels. Threshold data are discussed with regard to their theoretical implications. T. G. I. R 14

152

Bartlett, N.R., & Macleod, S. EFFECT OF FLASH AND FIELD LUMINANCE UPON HUMAN REACTION TIME. *J. opt. Soc. Amer.*, 1954, 44, 306-311. Contract Nonr-572(00), Proj. No. 142-032. ONR, Hobart College.

152

To determine the effect of flash and field luminance upon human reaction time, two trained subjects reacted to a flash signal over wide ranges of stimulus intensity and under varying conditions of signal flash and background field luminance. Two retinal positions, foveal and peripheral, were used. Reaction time was measured in milliseconds from onset of signal to manual release of switch. The data are summarized graphically and an equation describing the function is discussed. T. G. I. R 8

153

Wells, G.L. THE COMMON-SENSE HORIZONTER. *Amer. J. Optom. & Physiol. Opt.*, Sept. 1954, Nov. 133, 1-18. (School of Optometry, University of California, Berkeley, Calif.).

153

This paper discusses the possibility of improving perception of depth by means of increasing the "topologic range" (region of binocular fusion) by moving the upper threshold to higher values through training. A discussion of the various monocular and binocular cues of depth perception is given with particular emphasis on the definition of the solid or common-sense horizonter. I. R 5

154

Witkin, H.A. INTERRELATIONSHIPS BETWEEN PERCEPTION AND PERSONALITY: A SYMPOSIUM. PART II. THE NATURE AND IMPORTANCE OF INDIVIDUAL DIFFERENCES IN PERCEPTION. *J. Pers.*, 1949, 18, 145-170.

154

To investigate the nature of individual differences in perception of orientation of objects, including one's own body, in relation to upright space, three standardized test situations involving a conflict between visual and postural determinants of the perceived upright were administered to subjects of both sexes and of varying ages. Results, expressed in degree of deviation of settings from the upright, are analyzed and discussed in terms of consistency, stability, and generality of the individual's mode of perception, sex differences, and developmental patterns. T. G. I. R 3

155 Davis, R.C., Siddons, G.F. & Stout, G.L. APPARATUS FOR RECORDING AUTONOMIC STATES AND CHANGES. *Amer. J. Psychol.*, 1954, 67, 343-352. Contract N6onr 18011, USN Office of Naval Research. (Indiana University, Bloomington, Ind.).

Three pieces of apparatus, devised to record autonomic states and changes are described. The first apparatus is an amplifier with an automatic reset for recording galvanic skin responses and similar changes that are slow. An automatic feedback device, which will shift the zero point of the scale by a known amount whenever the need arises, allows the device to operate over a wide and useful range. The second apparatus is an electrical impedance plethysmograph which is a modification of Nyboer's apparatus. The third apparatus is a recorder for pulse and arterial pressure. R 2

156
Kopstein, F.P. FACTORS INFLUENCING THE EFFECTIVENESS OF AUDIO-VISUAL TRAINING MATERIALS. NO. 2. THE VALUE OF USING MULTIPLE EXAMPLES IN TRAINING FILM INSTRUCTION. NRC Rep. 23, Aug. 1951, 23pp. USAF Human Factors Research Lab., Bolling AFB, Washington, D.C.

156
This article is a prepublication draft and is supposed to be cited or referenced only with written permission of the chief, audiovisual research division, NRC. To discover the value of using multiple examples in training films, learning to read micrometer settings was taught with various experimental films. Three examples, six examples, or either of these conditions along with supplementary instruction and four additional examples, were presented. Thirty-two classes totalling 1300 basic Air Force trainees were tested on amount learned from the films. Per cent of material retained under the various conditions, influence of difficulty of material, and of intelligence of trainees are reported. There are discussion and recommendations.
T. G.

157
deGroot, S.G., Dodge, J.N., & Smith, J.A. FACTORS IN NIGHT VISION SENSITIVITY: III. THE INTERRELATION OF SIZE, BRIGHTNESS, AND LOCATION. Proj. NMD03 041.00.06, Rep. No. 234. Sept. 1953. 13pp. Medical Research Lab., Bureau of Medicine and Surgery, U.S. Naval Submarine Base, New London.

157
To investigate the relations between size, brightness, and location of stimulus for scotopic (night) sensitivity in the dark adapted eye, three trained observers made judgments for stimuli ranging in size from 8 to 25 minutes diameter presented for three seconds at four distances from fixation, on four radii (up, down, nasal and temporal), with brightnesses between 25 and 125 millimicrolamberts. Sensitivity data are expressed as size-brightness limens and are discussed in terms of generalized relationships.
T. G. R 9

158
Riggs, L.A. ELECTRORETINOGRAPHY IN CASES OF NIGHT BLINDNESS. Am. J. Ophthalm., 1954, 38:part 2, 70-78. Contract W70nr-358, Proj. NR-140-359. ONR, Brown Univ.

158
Since the electroretinogram as a clinical test for night blindness has not been fully established, this paper reports six cases (three of congenital night blindness and three of retinitis pigmentosa) studied by this method. Electrical response data of each is compared with adaptometer data, and the usefulness of the electroretinogram as a diagnostic test is discussed.
G. I. R 10

159
Williams, A.G. SUGGESTIONS CONCERNING DESIRABLE DISPLAY CHARACTERISTICS FOR AIRCRAFT INSTRUMENTS. Contract N60r1-71, Proj. 20-L-1, Proj. Designation NR-784-003, Tech. Rep. SDC 71-16-4, July 1949, 17pp. SDC, ONR, Fort Washington, N.Y.

159
This report discusses display characteristics for aircraft instruments which determine speed and accuracy of interpretation and use by the pilot and other operators. Topics considered are: the role of the psychologist in this problem, the pilot's task as both computer and servo, and discrimination and manipulation behavior. Suggestions for optimal characteristics for displays cover legibility, predigestion, the moving part, and index-control relations.
I.

160
Klemmer, E.T., & Prick, F.C. ASSIMILATION OF INFORMATION FROM DOT AND MATRIX PATTERNS. J. exp. Psychol., 1953, 45, 15-19. Human Factors Operating Research Labs., Air Research and Development Command, Bolling Air Force Base, Washington 25, D.C.

160
To demonstrate the application of the information measure to a simple visual perception and to discover the maximum amount of information that can be assimilated using a particular visual code, stimuli, consisting of one or more dots on a plane, were exposed briefly (0.03 second) to subjects required to reproduce the location of dots on answer sheets. Data are scored in terms of the amount of information (bits) transmitted from screen to answer sheet.
T. R 8

161
Ogle, K.W. REPORT ON INTERNATIONAL NOMENCLATURE FOR DESIGNATING VISUAL ACUITY. Jan. 1953. National Research Council Vision Committee, Ann Arbor, Mich.

161
To explore the feasibility of decimal notation of visual acuity and a standard geometrical graduation of test letters for international usage, a special committee from the American Committee on Optics and Visual Physiology studied both problems, and their interrelations, in the light of present experimental and theoretical bases. Conclusions and recommendations are made.
T. G. R 23

162
Lansdell, H. EFFECT OF FORM ON THE LEGIBILITY OF NUMBERS. Canad. J. Psychol., 1954, 8, 77-79. D.R.B. Proj. D 77-94-20-21. Defense Research Medical Laboratory.

162
To investigate the effect of form on legibility of digits, a new series was designed using triangular and rectangular components so that the forms were as nearly as possible like "normal" digits. With a little practice, subjects recorded each digit as it was presented, singly and under low illumination (ten foot-lamberts), for a series of the new design, the Mackworth, and the Hound series. The percent correct recognition scores are analyzed for each series and compared for legibility.
I. R 7

163
Dusek, R.D., Teichner, W.H. & Kobrick, J.L. EFFECTS OF THE ANGULAR RELATIONSHIPS BETWEEN THE OBSERVER AND THE BASE-SURROUND OF THE STIMULI ON RELATIVE DEPTH DISCRIMINATION. Rep. 232, June 1954, 11pp. USA Quartermaster Research & Development Center, Natick, Mass.

163
To investigate the effect of the angular relations between the observer and the base-surround of the stimulus on depth discrimination, four subjects made judgments of equality of settings on a modified Howard-Dolman apparatus. Analysis of the three variables (viewing distance, eye-level height, and frontal-parallel slope of base-surround of targets) is made and discussed in terms of their effect on depth discrimination. Practice effects are noted.
T. G. I. R 10

164
Herrmann, C.C. & Magee, J.F. OPERATIONS RESEARCH FOR MANAGEMENT. Harv. bus. Rev., July-Aug. 1953, 31(4), 100-112. (Massachusetts Institute of Technology, Cambridge, Mass.).

164
The use of Operations Research as a tool for management is discussed in this paper. The essential features of this tool are defined and the basic concepts (the model, the measure of effectiveness, the necessity for decision, and the role of experimentation) are discussed in detail. Operations Research is then distinguished from such other services as statistics, accounting, marketing research, engineering and industrial engineering. Finally, administrative problems and the use of Operations Research in solving them are discussed.
G.

165
Edwards, W. THE RELIABILITY OF PROBABILITY-PREFERENCES. Am. J. Psychol., March 1954, 62(1)
68-95. (Johns Hopkins University, Baltimore, Md.)

A previous experiment has shown that choices between bets of equal expected value stated in terms of rolls on a pinball machine are influenced by preferences among the probabilities involved. This and subsequent research raised several methodological questions, which the four experiments here reported were designed to examine. Experiment I showed that a replication of the previous experiment with different Ss and slightly different experimental conditions gave essentially the same results. The pattern of preferences among probabilities reported in the previous experiment was found. The choices involved could not be fitted to a unidimensional subjective scale. The Ss agreed with one another to a very highly significant extent. Experiment II showed that choices between pairs of bets were not substantially influenced by the wording of the bets, the outcome of previous rolls of the pinball machine, or the number of bets being compared. Experiment III showed that the essentials of the pattern of preferences among probabilities could be found in a non-gambling game involving risk, designed to be as different as possible from the pinball situation. Experiment IV showed that the same pattern of preferences among probabilities could be recovered at several different levels of expected value. It was not possible to find any reasonable scale of the subjective value of money which would be consistent with the results of the experiment. This finding was interpreted to mean that the results of experiments like these should be attributed primarily to preferences among probabilities rather than to differences between the subjective and the objective value of money.

167
Edwards, W. PROBABILITY-PREFERENCES IN GAMBLING. Am. J. Psychol., July 1953, 66(3),
349-364. (Johns Hopkins University, Baltimore, Md.)

Ss in gambling experiments do not make choices in such a way as to maximize their expected winnings or minimize their expected losses, although there is reason to assume that these are their goals. An experiment was designed to find out why they do not. Bets of equal expected value, stated in terms of rolls on a pinball machine, were compared with each other by the method of paired comparisons. 12 Ss were run under 3 conditions: Just imagining they were gambling, gambling for worthless chips and gambling for real money. The results showed that there are 2 factors determining choices among bets of equal expected value. The first is a tendency to prefer or avoid "long shots." The second is a set of specific preferences among specific probabilities. Ss made choices in such a fashion that inconsistent triads of choices appeared less than 1/4 the number of times they could. Have appeared, and the number of inconsistent triads decreased as the experiment progressed. Different Ss tended to make the same choices in the same situation to a highly significant extent.

R 9

166
Edwards, W. PROBABILITY-PREFERENCES AMONG BETS WITH DIFFERING EXPECTED VALUES. Am. J. Psychol., March 1954, 62(1), 56-67. (Johns Hopkins University, Baltimore, Md.)

Preferences were found for some probabilities over others in gambling situations in a previous experiment. In that experiment, all choices had to be made between bets of the same expected value. The present experiment was designed to find out what Ss would do when required to choose between bets of different expected values. After preliminary sessions in which the results of the previous experiment were confirmed, Ss were required to make choices between pairs of bets of different expected value according to the method of paired comparisons. The results showed that both preferences for bets with higher expected values, or lower negative expected values, and preferences among probabilities influenced Ss' choices. The former factor was dominant in those bets on which Ss could only win or break even; both were important in those bets on which Ss could either win or lose. These variations in effectiveness of the two major determinants of choices were related to specific properties of the bets involved. It is concluded that probability-preferences are important in determining decisions among bets even when there are objective reasons for preferring one bet to another, although as the difference in expected value increases it seems likely that the importance of probability-preferences will decrease.

168
Dusek, E.R. MANUAL PERFORMANCE AND FINGER TEMPERATURE AS A FUNCTION OF AMBIENT TEMPERATURE. Proj. 7-83-01-005B, Tech. Rep. EP-68 Oct. 1957, 8pp. USA Quartermaster Research and Engineering Center, Watlck, Mass.

168
To investigate manual performance and finger skin temperatures as related to environmental temperatures, 18 subjects performed on three standardized tests (Minnesota Rate of Manipulation, O'Connor Finger Dexterity, and Purdue Pegboard) under each of four ambient temperature conditions (35, 45, 55, and 75 degrees Fahrenheit). Under each condition, except the control at 75 degrees, the subjects sat for 30 minutes until their hands cooled before completing the tests. Continuous skin temperature recordings were made during the 90-minute exposure period. The performance data (mean for two trials at each temperature) and finger temperatures were analyzed as functions of temperature and for relations among these three. Recommendations are included. T. G. R 4

169
Fitts, P.M. (Chm.). DESIGN FOR EASE OF MAINTENANCE. Second Symposium on Electronics Maintenance, PPT 202/3, 9-11 May 1956, 201pp. US Research & Development Board, Department of Defense, Washington, D.C.

169
This report presents the papers read and subsequent discussion at a symposium on electronics maintenance. The major theme was that of improved maintenance through initial design so that functions of trouble-shooting, maintenance records, calibration, replacement, and repair are simplified and geared to the military personnel and training subsystem. The general discussion topic was "How can engineers and human engineers together improve the design for equipment maintenance?" Topics included uniform data-collecting systems for criterion failures, maintenance handbooks, a criterion for maintainability, and trade-off curves in the various design areas.

T. I, R 23

170

von Békésy, G. NOTE ON THE DEFINITION OF THE TERM: HEARING BY BONE CONDUCTION. J. Acoust. Soc. Amer., Jan. 1954, 26(1), 106-107. (Harvard University, Cambridge, Mass.).

This paper clarifies the meaning of bone conduction in hearing and defines the types of bone conduction. The 3 types are labyrinth bone conduction, skull bone conduction, and clinical bone conduction. Labyrinth bone conduction is independent of both the state of the middle ear and the vibrations of the lower jaw. It would be an ideal tool for the diagnosis of nerve deafness were it not for the fact that it is hard to measure, even in normal ears. Skull bone conduction is concerned with the condition of the middle ear (e.g. presence or absence of ossicles) but is independent of the vibrations of the lower jaw. Clinical bone conduction includes both these types, and in addition it includes hearing produced by the relative movements of the lower jaw.

R 1

172

Mattwick, R.G. DARK ADAPTATION TO INTERMEDIATE LEVELS AND TO COMPLETE DARKNESS. J. Opt. Soc. Amer., March 1954, 44, 223-228. Contract A-0mr-558(CO), Proj. LR 140-036, CEE, (Florida State Univ.)

172

To investigate intermediate dark adaptation (changes in sensitivity of the eye as a result of moving from high luminance to levels between that and complete darkness), threshold measurements (foveal and parafoveal) were made on three subjects during the course of adaptation to four intermediate luminance levels and to darkness. The theoretical and practical implications of the data are discussed.

T. G. I. R 6

173

Bilodeau, E.A. & Morin, R.E. PROFICIENCY ON THE PEDESTAL SIGHT MANIPULATION TEST WITH AND WITHOUT THE TRACKING PIPPER. Proj. 509 020 0007, Res. Bull. 51, 27, Dec. 1951, 7pp. USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.

173

Ninety-six airmen were subjects in an experiment testing ranging and tracking performance with and without the tracking pipper. They practiced for 12 trials per day on five successive days. Time on target scores for ranging, tracking in azimuth, in elevation, and in both, and for triggering are reported. There is a discussion of the results and possible explanations.

T. G. R 6

174

Bilodeau, E.A. DECREMENTS AND RECOVERY FROM DECREMENTS IN A SIMPLE WORK TASK WITH VARIATION IN FORCE REQUIREMENTS AT DIFFERENT STAGES OF PRACTICE. Proj. 509 020 0001, Res. Bull. 51 34, Dec. 1951, 6pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

174

As a part of a larger project investigating transfer of training in motor skills, the factor of physical force in the performance of a simple manual skill was investigated. Four groups of basic airmen (total, 160) turned a crank for five minutes of initial practice, and after a 40 sec. rest, three minutes of final practice. Each group had to exert a different amount of force to turn the crank. Data consist of number of crank revolutions per 20 second period. Analysis in terms of horsepower and study of certain extremes of performance are also reported. The results are of interest in connection with the control component of equipment and manual skills.

T. G. R 4

175

Bilodeau, E.A. SOME EFFECTS OF MODIFICATION OF INFORMATION ABOUT A PREVIOUS RESPONSE UPON THE ACQUISITION OF TWO LEVER POSITIONING HABITS. Proj. 509 020 0001, Res. Bull. 52 1, Jan. 1952, 7pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

175

These experiments investigated the effects of alternating practice on a visual positioning task with correct knowledge of results, and on the "same" task for which the "knowledge" of results included a constant error. If the subjects compensated for this constant error, their response was reported to them as correct. Two hundred basic airmen were divided into a control group and 4 experimental groups. Each of the 4 experimental groups had reported to them a different constant error. Within-period and between-period trends in scores are reported and there is a discussion of the function in the learning process of the modified and unmodified information presented.

T. G. R 2

176

Bilodeau, E.A. A PRELIMINARY STUDY OF THE EFFECTS OF REPORTING GOALS AS A FUNCTION OF DIFFERENT DEGREES OF RESPONSE ACCURACY. Proj. 509 020 0007, Res. Bull. 52 4, Jan. 1952, 5pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

176

This report investigates the belief that in early stages of training it is desirable to provide greater accuracy tolerances than will be required in actual performance. Two hundred eighty-eight basic training airmen moved a green light in one column with a "job stick" to match a red light in another column. The three experimental groups differed in the amount of tolerance allowed in making a "batch". Test trials following immediately after training were the same for all groups, with the true placement being reported. Results are analyzed by groups and by scoring (tolerance) areas of one, two or three lamps.

T. G. R 5

177

Bilodeau, E.A. A FURTHER STUDY OF THE EFFECTS OF TARGET SIZE AND GOAL ATTAINMENT UPON THE DEVELOPMENT OF RESPONSE ACCURACY. Proj. 509 020 0007, Res. Bull. 52 7, Feb. 1952, 5pp. USAF Perceptual & Motor Skills Lab., Lackland AFB, Tex.

177

This study is concerned with the factor of target size in acquiring accuracy in a motor positioning habit with visual stimuli--using a lever to position a green light to a corresponding fixed red light. One hundred forty-seven basic training airmen were divided into 3 groups; one group had a one-lamp target, with accurate knowledge of results. The other two groups had a three-lamp target, but through restriction of reports of "correct", one of these received fewer reported lights than the other. Implications for the importance of target size in training are discussed.

T. G. R 6

178

Lincoln, R.S., Simon, J.R. & Decrow, T.W. THE EFFECTS OF PRACTICE UPON DIFFERENT COMPONENT MOVEMENTS IN VISUAL TRACKING. Percept. Mot. Skills Res. Exch., 1952, 4(3-4), 123-131. (University of Wisconsin, Madison, Wisc.).

178

This study discusses the analysis of direct tracking into its components, and analyzes data reported from previous experiments. Rate errors and positioning errors are considered separately. Time-on-target scores are analyzed, with target speed and amount of practice as variables. Conclusions are drawn about the effect of practice on the component movements of the direct visual-pursuit tracking task.

T. G. R 4

179

Gregory, R.L. A SPECULATIVE ACCOUNT OF BRAIN FUNCTION IN TERMS OF PROBABILITY AND INDUCTION. APU 183/52, 1952, 11pp. Applied Psychology Research Unit, MRC, Cambridge, England.

This paper presents a model of brain function in terms of a probabilistic induction machine. Objections to computer (deduction) models of brain function are given. Next the model is developed and applied to perception, learning, and personality. Some experiments designed to test this model are suggested.

R 4

183

Pepler, R.D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. I. A TASK OF CONTINUOUS POINTER ALIGNMENT - EXPERIMENT 1. APU 153/53, Jan. 1953, 20pp. Medical Research Council, Applied Psychol. Res. Unit, Psychol. Lab., Cambridge, England.

183

To determine the effects of air temperature upon performance on a tracking task involving moderately strenuous work, sixteen physically fit young men, accustomed to living in the tropics, performed the task at air temperatures (dry/wet bulb) of 75/65, 85/75, 93/83 and 100/90° F. The performance score was the time integral of instantaneous pointer misalignment. The relation of this measure to air temperature, rectal temperature, loading of the control handle and previous practice is discussed.

T. G. R 8

184

Mackworth, N.H. COLD ACCLIMATISATION AND FINGER NUMBNESS- FIELD AND LABORATORY STUDIES. APU 173/53, June 1953, 25 pp. Medical Research Council, Applied Psychol. Res. Unit, Cambridge, England.

184

This investigation was undertaken to determine whether the effects of cold winds upon tactile sensitivity are ameliorated by habitual exposure to cold. The two-point threshold and the vibration threshold of the index fingertip were measured during exposure to air temperature of -16 to -25° C. and wind velocities of 0 and 4 mph. The loss of tactile sensitivity in men who worked outdoors in a very cold climate is compared to that of indoor workers. A similar comparison is made between the results obtained in the course of daily 2-hour exposures to -15° C. of men living in a moderate climate during the winter and during the summer months.

T. G. R 13

186

Miller, R.B., & Folley, J.D., Jr. RECOMMENDATIONS ON DESIGNING ELECTRONICS EQUIPMENT FOR THE JOB OF MAINTENANCE. Contract AF33(038)-12921, Proj. 507 008 0001, Res. Bull. 51 33, Dec. 1951, 18pp. USAF, Air Training Command, Human Resources Research Center, Technical Training Research Lab., Chanute AFB, Ill.

186

This report presents a detailed discussion of the problems involved in job maintenance and maintenance training. Such aspects as the following are treated: the prediction of maintenance requirements, the essential aspects of maintenance training, the psychological components of maintenance, the design of equipment for maintenance, and so forth. Suggestions and techniques to be utilized in the solution of maintenance problems are presented along with a discussion of the relevance of these methods and techniques in the formulation of an efficient maintenance training program.

187

Pepler, R.D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. 3. A TASK OF MORSE CODE RECEPTION. APU 155/53, Feb. 1953, 19pp. Medical Research Council, Applied Psychology Research Unit, Psychol. Lab., Cambridge, England, (University of Malaya, Singapore).

187

To investigate the effects of air temperature upon performance in reading Morse code, 12 physically fit young men, accustomed to live in the tropics, read and recorded standardized Morse code messages for 12 three-hour periods in air temperatures of (dry/wet bulb) 80/70, 85/75, 90/80, 95/85, 100/90, and 105/95° F. The number of errors per message is analyzed with respect to air temperature, rectal temperature, sweat loss, time of day, recent practice and reports of subjective comfort.

T. G. R 4

188

De Haven, H. THE SITE, FREQUENCY AND DANGEROUSNESS OF INJURY SUSTAINED BY 900 SURVIVORS OF LIGHTPLANE ACCIDENTS Contract W6 onr 264 12, July 1952, 55pp. ORC, (Medical College of Cornell University).

188

This report investigates causes of injury among survivors of light plane accidents; and its relationship to crash force, cockpit construction, and safety belt design and restraint. Results are analyzed in terms of "pattern" of injury, the relationship of severity of accident to injury sustained, and the relationship of safety restraints and cockpit design to amount of injury. Suggestions and recommendations for further investigations are made.

I. T. G.

189

Pepler, R.D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. 2. A TASK OF CONTINUOUS POINTER ALIGNMENT EXPERIMENT 2. APU 154/53, Feb. 1953, 26pp. Medical Research Council, Applied Psychol. Research Unit, Cambridge England.

189

This experiment was designed to investigate the effects of air temperature and humidity upon performance on a tracking task involving vigorous muscular activity, and to assess the adequacy of the Effective Temperature (E.T.) Scale as a predictive index of such effects. Thirty-two young men performed the tracking task at temperatures of (dry/wet bulb) 79/74, 89/64° F. (E.T. 72.5°F); 85/80, 100/70° F. (E.T. 79.5°F); 90/85, 110/75° F. (E.T. 84.5°F); 97/92, 120/85° F. (E.T. 92.5°F). Performance criteria are analyzed with respect to air temperature, humidity, Effective Temperature, physical work load, physiological reactions and subjective comfort.

T. G. R 8

190

Bartlett, D.J., & Gronow, D.G.C. THE EFFECTS OF HEAT STRESS ON MENTAL PERFORMANCE. FPRC846, Aug. '953, 16pp. Flying Personnel Research Committee, Great Britain.

190

To investigate the effects of heat stress upon anticipatory perception and judgment, 16 subjects performed a test requiring them to predict hypothetical collisions between aircraft diagrammed on a card. They performed under 4 environmental air temperatures (dry/wet bulb): 70/60, 80/90, 90/80, 100/90° F. The results are analyzed in terms of the test card parameters and the environmental temperature.

T. F 5

191
Stunkel, Eva R., Tye, V.H., & Yankey, D.W.
VALIDATION OF EXPERIMENTAL SELECTION INSTRUMENTS FOR ARCTIC SERVICE. Proj. 29535100, PJ 3301-05, FRS Rep. 945, April 1952, 13pp.
DA, TAGO, Personnel Research Section, Washington, D.C.

191
The usefulness of several experimental selection instruments in predicting which men will be successful in Arctic military duty is assessed on the basis of correlations found between the predictors--three self-description questionnaires, an inventory of hobby interests, a physical fitness test, a job satisfaction scale and performance ratings by associates--and the criterion measure of success--squad leader ratings on performance during an Arctic military exercise.
T. R 6

192
Cocquyt, F. SENSORY ILLUSIONS. *Shell Aviat. Med.*, ca. 1952, (178), 3-8. (SABENA, Brussels, Belgium).

192
This paper discusses and illustrates sensory illusions as a possible reason for certain puzzling aircraft accidents broadly classified as "pilot's error". Primary concern is with the optical illusions of the pilot who does not accurately follow the movement of his aircraft and therefore the "imagined" position differs from the "true" position with resultant error in control. Recommendations concerning proper precautions to take in training pilots are made.
1.

193
Thorndike, R.L. THE HUMAN FACTOR IN ACCIDENTS WITH SPECIAL REFERENCE TO AIRCRAFT ACCIDENTS. Proj. 21 30 001, Rep. 1, Feb. 1951, 175pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Teacher's College, Columbia University, New York, N.Y.).

A comprehensive survey of the literature relating to accidents, particularly aircraft accidents, is presented. This appears to justify the following conclusions: a) systematic safety programs have led to reduction in accident rates; b) an accurate and complete system of reporting aircraft accidents and a functional procedure for coding and analyzing the reports is fundamental to research on the causes and prevention of the accidents; c) much of the literature on accident-proneness must be discounted because of inadequacies in the data on procedures of analysis. However, it appears that there are genuine individual differences in tendency to have accidents; d) no test has been found which is clearly outstanding as a predictor of tendency to have accidents; e) evidence from common experience indicates that at the extremes such temporary factors as drinking, fatigue, emotional disturbance make the individual more susceptible to accidents. However, experimental evidence to indicate the critical level of these agents is meager or lacking; f) accident rates have typically been found to be high for the young and for the inexperienced; g) there is little satisfactory evidence as to the effect upon aircraft accident rate of any specific programs of training, retraining, or safety education; h) aircraft accident rates depend upon the task which the pilot faces as well as upon the pilot. In view of these general findings, recommendations are made with respect to future research on aircraft accidents.
R 209

195
Conrad, R. THE TEMPORAL ACCURACY OF RESPONSE IN A SENSORI-MOTOR SKILL. APU 186/53, May 1953, 14pp. *Applied Psychology Research Unit, MRC, Cambridge, England.*

An attempt was made to explain the accuracy with which a series of responses could be matched to a series of signals by reference to the continuously changing temporal relationships between these events. Although approximately half of the responses were made too soon and half too late, this distribution was not fortuitous. The temporal position of a response in relation to the signal which started it was influenced both by the position of the previous response, and by the position of the signal for the next response. Not only did these events determine whether a response would be made early or late, but to a large extent they influenced the size of this error. Thus whilst the character of the temporal structure of events around a signal determined the relative accuracy of the response, the mean signal speed in relation to the mean response rate, determined the frequency with which particular temporal structures occurred. The underlying factors that actually determined the character of the response were shown to be masked when the effects of certain experimental variables on response were presented as mean accuracy values.
R 4

194
Lazarus, R.S., Dease, J., & Osler, Sonia F. REVIEW OF RESEARCH ON EFFECTS OF PSYCHOLOGICAL STRESS UPON PERFORMANCE. Contract AF 33(038) 13253, Proj. 509 020 0001, Res. Bull. 51 28, Dec. 1951, 13pp. *USAF Human Resources Research Center, Lackland AFB Tex. (Johns Hopkins University, Baltimore, Md.).*

An understanding of the effect of psychological stress upon skilled performance is of great theoretical and practical importance. People are often faced with the necessity of performing skilled work under conditions which are highly stressful. Such is obviously the case in military combat. The effectiveness of a pilot, gunner, or radar observer must be maintained even when he is threatened by physical injury or harassed by the need to hurry the performance of a complicated task. The obvious fact that human beings are often required to work under stress does not call for further elaboration. The present report represents a systematic review of the literature dealing with the effects of stress on performance. First of all, various experimental procedures which have been used to produce stress are analyzed and evaluated. Various techniques for measuring the effects of stress are next considered. This is followed by a review of experimental studies of performance under stress. Based upon this review, the authors undertake an evaluation of the problem of the effects of stress including a consideration of theoretical constructs which contribute to an understanding of this problem. A bibliography of forty-five references dealing with stress completes the report.
R 45

- 196 Day, R.H. REACTION TIMES DURING A DIFFICULT TRACKING TASK. *EPSC 845*, Aug. 1953, 4pp. Flying Personnel Research Committee, London, England. (Psychology Dept., University of Bristol, Bristol, England).
- Studied were variations in performance of the subsidiary task resulting from the various display-conditions of the main task. The task was for the S to extinguish 1 of 2 lights as quickly as possible employing the proper response. The subsidiary task was essentially a complex reaction time situation with which the S dealt during the performance of a difficult tracking task. The time taken by the S to put out the light was recorded by a pen chronograph. 3 experiments were conducted with square displays with areas of the display being 3, 9, 16, 25, and 36 sq. in. in area for Exp. I; square displays with areas of 12, 20, 30, 36, and 38 in Exp. II; and a circular display with areas of 3, 9, 16, 25, and 36 sq. in. in Exp. III. It was found that the response times to the 2 lights varied little with changes in the area of the inner part of the display. None of the differences between the means were statistically significant. No significant changes occurred in the response times of the subsidiary task. No practice effects were observed in the left hand response task during any one trial, and the variation in the time interval separating the signals has not effected the response times.
- R 3
- 197 Long, E.R., Reid, L.S., & Queal, R.W. FACTORS DETERMINING THE LEGIBILITY OF LETTERS AND WORDS DERIVED FROM ELEMENTAL PRINTERS. Contract No. W 33(038)-ac-21269, AF Tech. Rep. No. 5924, Aug. 1951. Wright Air Development Center, Air Research and Development Command, Aero-Medical Lab., Wright-Patterson AFB, Ohio.
- 197 To explore some of the factors determining legibility of word patterns formed by elements or dots (see accession numbers 144 and 545), stimulus materials of four-letter words and four-letter "jumbles", printed in black and white and a "gray scale" were viewed by 144 subjects. Other variables were number of elements in letter, type and degree of degradation. Analysis of variance is used to evaluate the recognition data in terms of the experimental variables. Implications for engineering design of the presentation device are enumerated.
- T. G. I. R 3
- 198 Saul, E.V., & Hirsch, R.S. PSYCHOLOGICAL PROBLEMS IN MARKSMANSHIP OF INFANTRY TYPE WEAPONS. *J. Psychol.* 1954, 37, 257-270. Contract Nona 494(01), ONR, Special Devices Center, (Tufts College).
- 198 This is a review of literature on psychological problems in marksmanship of direct-fire and line-of-sight weapons. Topics covered are: visual factors of acuity, ocular dominance, and others, motor factors of steadiness, tremor, and muscular adaptation, and marksmanship training including sighting and aiming, firing position, trigger squeeze and breath control, correct application of sustained and rapid fire, and sight adjustments.
- R 30
- 199 McFarland, R.A., Dunlap, J.W., Hall, W.A., & Huseley, A.L. HUMAN FACTORS IN THE DESIGN OF HIGHWAY TRANSPORT EQUIPMENT. June 1953, 41pp. Harvard School of Public Health, Boston, Mass.
- This report has attempted to evaluate the tasks of twelve current models with respect to the size and capabilities of the operator population. Its purpose is to determine the optimum arrangement of controls, displays, seating, and window areas for the most comfortable, efficient, and safe operation of the vehicle. This human engineering approach can be utilized only when the data on human sitting and capabilities are given equal consideration with the structural and mechanical demands of the automotive engineer. Since the operator is the one element in the integration of the man and the machine that can not be redesigned, it becomes necessary to start with the man and design the machine around him. Only with this method can the most satisfactory arrangement be achieved. It is hoped that this study can contribute to these ends: greater integration of the man with the machine, and for the driver, greater comfort, less susceptibility to fatigue, fewer errors, fewer occupational diseases, collisions and injuries, better morale on the job, and a longer productive working life.
- R 25
- 200 Fiorentini, Adriana, & Ronchi, Lucia. ON THE RESPONSE OF THE HUMAN EYE TO LIGHT STIMULI PRESENTING A SPATIAL OR TEMPORAL GRADIENT OF LUMINANCE. Contract AF 61(514)-634 G, EDARDC-TN-8, AFOSR-TN-56-444, 9pp. Istituto Nazionale di Ottica, Arcetri, Firenze.
- 200 To investigate the role of retinal mechanisms in vision of spatial and temporal gradients of luminance, findings from psychophysical and electrophysiological studies are reported. With a stimulus field having different gradients of luminance (constant along a line but varying perpendicularly) the apparent brightness distribution at different points of the field is measured by obtaining differential threshold data for control and peripheral viewing (fovea, three and six degrees from fovea). Electro-retinographic measurements were made using stimuli with various time gradients. The characteristic features of the resulting records were analyzed. The results from both types of measurement are discussed in terms of the visual mechanisms involved.
- G. I. R 5
- 201 Schmidt, I. EVALUATION OF THE GREYER SELF-ADMINISTERING COLOR VISION TEST. Mar. 1953. 10pp. USAF School of Aviation Medicine, Randolph Field, Texas.
- 201 To evaluate the Greyer Self-Administering Color Vision Test, 141 subjects were tested and the results compared with those from three other color vision tests (American Optical Company, Abridged, School of Aviation Threshold Tester, Nagel Anemaloscope). Evaluation is in terms of the correct identification of color normals and color defectives, and the qualitative and quantitative classification of color defectives. Suggestions are made for improvement of the test and for usage in its present form.
- T. I.

202
Wilson, M.R. & Fleck, H.G. A DUAL RETINOSCOPE FOR IN-
STRUCTIONAL PURPOSES. SPECIAL REPORT. May 1953, 3pp.
USAF School of Aviation Medicine, Brooks AFB, Tex.

202
This one page article describes a demonstration in-
strument for instructors in retinoscopy, by which they
can present the reflexes connected with various types of
refractive errors of the eye. The instructor and stu-
dent can use the instrument together. Two photographs
of the instrument with notation of parts are provided.
1.

203
Bridgman, C.S. THE CORRECTION OF LOW
INTENSITY LUMINANCE FUNCTIONS FOR THE PUR-
KINJE EFFECT. J. opt. Soc. Amer., 1952,
42, 832-836.

203
To correct low intensity luminance functions for
the Purkinje effect, a correction curve, based on
standard photopic and scotopic luminosity data, has
been calculated for translating from cone to rod lum-
inance specification. Application of the "rod lumin-
ance" scale is made to existing threshold data for
various wavelengths; limitations of the scale and prac-
tical considerations in its use are discussed.
T. G. R 31

204
McFarland, R.A., Damon, A., Stoudt, H.W., Moseley, A.L.,
et al. HUMAN BODY SIZE AND CAPABILITIES IN THE DESIGN
AND OPERATION OF VEHICULAR EQUIPMENT. 1953, 137p.
Harvard School of Public Health, Boston, Mass.

204
This manual applies the knowledge of body size and
capabilities to the design and operation of land vehi-
cles. Chapter I discusses the problem of integrating the
man and his machine in terms of medical and operational
aspects; Chapter II considers solutions to this problem
by use of anthropometry and human capability data. Chap-
ter III presents the general principles for designing
controls and instruments in terms of the operator's job;
factors in the working environment and examples of design
analyses methods are described. Chapter IV reports de-
tailed design characteristics of numerous machines.
Chapter V summarizes the aims and principles of the human
engineering approach to vehicle design.

205
Sex'on, M., Malone, F., & Farnsworth, D.
THE EFFECT OF ULTRAVIOLET RADIATION FROM
FLUORESCENT LIGHTS ON DARK ADAPTATION AND
VISUAL ACUITY. BuMed Proj. NM 003 041.38.
OL, MRL Rep. 169. Dec. 1950, 9, 301-317.
Medical Research Lab., U.S. Naval Sub-
marine Base, New London, Conn.

205
To investigate the effect of ultraviolet radiation
from illuminants of twenty footlamberts (highest bright-
ness level commonly found in submarines) on dark adap-
tation and visual acuity, two experiments were run with
two subjects: 1) threshold measurements were taken over
a four-hour period after pre-adapting one hour to each
illuminant: fluorescent, ultra-violet shielded fluores-
cent, and incandescent; and 2) visual performance task
(Weston Cancellation Test) of rings, gaps of .84, 1.26,
and 1.68 minutes of arc were performed under same con-
ditions as above. Dark adaptation curve, and mean acu-
ity scores are presented and discussed
T G R 5

206
Jameson, Dorothea & Hurvich, L.M. SPECTRAL SENSITIVITY OF THE FOVEA. II. DEPENDENCE ON
CHROMATIC ADAPTATION. J. opt. Soc. Amer., July 1953, 43(7), 552-559. (Tufts University,
Medford, Mass.).

Reported are studies undertaken to determine what changes, if any, the spectral sensi-
tivity of the fovea undergoes with change in chromatic adaptation. Five states of adaptation
were compared. The eye was adapted to pure white, blue, green, yellow and red, at the same
time brightness level (10ml). Measurements were obtained for the right eye of each of 2
practical observers, and 10 threshold functions were determined for each condition of adapta-
tion. Measurements for the bright and dark-adapted neutral states were intended as controls
against which to evaluate the effects of chromatic adaptation. The results indicate that a
slight Purkinje shift occurs even for a 1° foveal area with a transition from light to dark-
adaptation. The former was consequently selected as the proper control condition. Alterna-
tive interpretations of the Purkinje shift in the fovea were examined. The spectral sensi-
tivity for the fovea is shown to be dependent on the chromatic state of adaptation. The
changes are small for the single adapting luminance used here, but the dependence is regular
and consistent. The main effect of adaptation to a stimulus of given hue is a relative de-
crement in foveal sensitivity to the range of spectral stimuli which evoke that hue. Spec-
ific shifts in maxima and various inflections in the sensitivity functions are also discussed.
R 21

207
Hurvich, L.M. & Jameson, D. SPECTRAL SENSITIVITY OF THE FOVEA. I. NEUTRAL ADAPTATION. J.
opt. Soc. Amer., 1953, 43, 485-494.
The spectral sensitivity of the 1° fovea of the right eye of two practiced observers was
measured at 10ml intervals from 400 mμ to 700 mμ for the dark-adapted state and for the
bright-adapted (10ml), chromatically neutral state. Ten complete luminosity functions were
obtained for each observer for each of the specified adaptations. The data of these experi-
ments are intended to provide controls against which to evaluate luminosity data for differ-
ent chromatic states. A number of inflections and shoulders are found in the functions for
both states of adaptation. Moreover, the functions for both observers are shown to undergo
a change in form and a displacement from the bright to the dark-adapted state. These changes
in the foveal functions, although small in magnitude, are in the same sense as the familiar
"Purkinje shift". Alternative theoretical explanations of the data are discussed and ana-
lyzed.
R 62

208

Edwards, W. APPARENT SIZE OF AFTERIMAGES UNDER CONDITIONS OF REDUCTION. *Am. J. Psychol.*, July 1953, 66 (3), 449-455. (Johns Hopkins University, Baltimore, Md.).

208

This experiment tested the prediction that the apparent size of the afterimage should remain constant at every distance of the projection-surface under reduction conditions. Ten naive Ss each made 30 judgments of afterimage size; this involved: after-image production by observation through a reduction tube of a 803 ft.-L field for 45 sec., 30 sec. of darkness, and after-image measurement by viewing the original field and the comparison field dimly luminous and adjusting the position of the latter until the two were of equal size. Ss alternated eyes; five afterimage projection distances were used from 42.25 to 90.25 in. (Ss's ability to interpret distance-change as size-change was tested separately). The data were examined by analysis of variance technique and discussed relative to Emmert's law. T. R. 9

211

Corvey Engineering Company. AIRCRAFT ROCKET GROUND HANDLING METHODS STUDY. Contract AF 33(616) 3117, AFAC TR 56 92, May 1956, 46pp. Corvey Engineering Company, Alexandria, Va.

211

To evaluate present ground handling methods and equipment for folding fin aircraft rockets loaded into aircraft, a program of research was conducted including 1) analyses of reference material; 2) observations of existing facilities, aircraft, rockets and their handling procedures, equipment and tools; and 3) interviews with individuals involved in the ground handling operations. Evaluation and recommendations for improvements are given for rocket packaging and shipment, rocket storage and processing (bulk storage, ready service storage, transport equipment), and aircraft (fighter-bomber and interceptor). I. R. 21

212

Kilpatrick, F.P. (Ed.). BIBLIOGRAPHY OF BOOKS AND ARTICLES REFERRING TO RESEARCH IN HUMAN BEHAVIOR FROM THE TRANSACTIONAL POINT OF VIEW. ADDENDUM. March 1954, 4pp. Psychology Research Center, Princeton University, Princeton, N.J.

212

This is an addition to a bibliography of books and articles concerning human behavior from the transactional point of view (based on Ames' visual demonstrations and perceptual theory). Items included refer to varied aspects of behavior. R. 36

213

Flood, M.M. (Chm.). SECOND ANNUAL CONFERENCE OF HUMAN ENGINEERS, COLUMBIA UNIVERSITY, 9-10 SEPTEMBER 1954. ABSTRACT OF PROGRAM. 17pp. USN Office of Naval Research, Washington, D.C. (Institute for Research in the Management of Industrial Production, Columbia University, New York, N.Y.).

213

This is a collection of abstracts of the second annual "Conference of Human Engineers" sponsored by the Office of Naval Research, (Sept. '54). Papers are summarized which deal with the development of training devices, and applications of human engineering to specific problems, such as open-pit mining drag-line operations, design of airplane indicators, simulators, and systems analysis.

214 Wilson, C.L., Mackie, R.R., & Buckner, D.N. RESEARCH ON THE DEVELOPMENT OF SHIPBOARD PERFORMANCE MEASURES. PART II. THE USE OF A PERFORMANCE RATING SCALE IN THE MEASUREMENT OF SHIPBOARD PERFORMANCE OF ENLISTED NAVAL PERSONNEL. FINAL REPORT. Contract N70NR 70001, Feb. 1954, 81pp. Management and Marketing Research Corporation, Los Angeles, Calif.

A performance rating scale that included 10 traits reflecting various technical and non-technical aspects of Navy shipboard performance was developed and used to evaluate the performance of Electrician's Mates (EM's) and Engineers (EN's) serving aboard submarines in the Atlantic and Pacific Fleets. Analysis of results indicated that officers and petty officers using the scale tended: a) to agree with one another when they evaluated the same man; b) to be consistent in their own evaluations from one time to the next; c) to discriminate reliably among men of the same pay grade; d) to differentiate, to an appreciable degree, the technical from the adjustment aspects of shipboard performance. In addition, a factorial analysis indicated that: e) at least two broad "factors" of shipboard performance--one representing technical skill, and the other, adjustments representing the technical side of performance correlations among traits; f) the traits representing the technical side of performance correlated moderately high with independent measures of technical skill, but the traits representing the adjustment side of performance were not related appreciably to any other measures obtained. As a part of this overall research project practical performance tests and performance check lists for EM's and EN's were also developed (see Parts I & III of this Final Report for details). Relationships between these two measures and the rating scale and reported and discussed in this report. R. 62

215

Johns Hopkins University. PRESENTED AREAS OF AN AVERAGE PRONE CHINESE INFANTRYMAN. Contract DA 36 034 ORD 375RD, Proj. TB 3 0238A, Proj. THOR TR 6, March 1952, 50pp. Institute for Cooperative Research, Johns Hopkins University, Baltimore, Md.

215

Studies of the effectiveness of weapons for attack of ground troops require knowledge of the target presented area. The average presented area of a typical Chinese infantryman prone on the ground is given as a function of the angle of arrival of fragment or bullet. World War I dimensions of the average United States infantryman were scaled by a relative stature factor to represent those of the average Chinese infantryman. Some applications of the results are suggested. T. U. I. R. 3

217

Verplanck, W.S. A BRIEF EXPERIMENT ON THE LEGIBILITY OF THE TDC UNDER SEVERAL CONDITIONS OF ILLUMINATION AND ADAPTATION. BuMed & Surgery Proc. X-519 (Av-273-p), Final Rep., March 1946, 8pp. Medical Research Department, U.S. Submarine Base, New London, Conn.

217

To investigate the legibility of the Torpedo Data Computer (TDC) under various conditions of adaptation and illumination of the submarine conning tower, two measures of efficiency (time and errors) were obtained on six subjects. Conditions of pre-adaptation and conning tower illumination were 1) 15 minutes in red illumination and same illumination for trial reading; 2) 15 minutes outdoors and red illumination for trial reading; 3) 15 minutes outdoors and white illumination for reading. The data were analyzed to find the effect of the adaptation and illumination conditions on performance. Recommendations are included. T. R. 1

219

Mard, W.D. SUBJECTIVE MUSICAL PITCH. J. Acoust. Soc. Amer., May 1954, 26(3), 369-380. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

The subjective relation "octave of" is demonstrated to be a valid interval for determining scales of musical pitch for pure tones presented successively. Octave judgments of trained musicians have a standard deviation averaging about 0.6 percent. Inter-observer variability is 2 to 5 times as great, increasing with frequency. Judgments vary significantly from day to day, but as the direction of shift at different frequencies for a single observer is random, the shifts cannot be attributed to changes in the octave criterion. Instead, this variability, and also: a) differences between right- and left-ear judgments of a given observer; b) the change in difference between subjective and physical octaves as a function of frequency; and c) the high inter-observer variability, all confirm the basic instability of pitch-frequency relations implied by the facts of binaural diplacusis. Individual and group scales of musical pitch are deduced. In these scales, the average rate of change of musical pitch with respect to frequency level is less than unity by a small but significant amount. Although this discrepancy is not explained, tests show that it is not an obvious artifact of method. Simultaneous presentation raises variability, but effects means only slightly. The relation between the peculiarities of individual scales and binaural diplacusis is discussed.

R 23

218

Nichotte, A. & de Clerck, J. STRUCTURES PERCEPTIVES CIRCULAIRES CORRESPONDANT A DES FORMES GEOMETRIQUES ANGULAIRES. (CIRCULAR PERCEPTIVE STRUCTURES CORRESPONDING TO ANGULAR GEOMETRIC PATTERNS. L'Année Psychologique, 1951, 50, 305-326. UDC 612.84:535.7, Library Translation 511, Feb. 1953, 14pp. Ministry of Supply, Royal Aircraft Establishment, Farnborough, Hants.

When geometric patterns defined by low intensity points are observed on a screen in total darkness, the constituent points being projected in succession, one at a time, the patterns perceived in a large number of cases are circular or curvilinear. The effects of size and shape of image and of time between the appearance of each individual point are investigated, and the results interpreted by the theory that a circular form is the most easily appreciated shape of a pattern whose size is just small enough to be appreciated as a whole.

R 0

221

Dittmer, Dorothy S. & Grebe R.M. (Eds.) HANDBOOK OF RESPIRATION. Contract AF 33(616) 3972, Proj. 7158, Task 71801, WADC TR 58 352, Aug. 1958, 403pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Division of Biology and Agriculture, The National Academy of Sciences, The National Research Council, Washington, D.C.).

221

This report presents data on respiration for man, other animals, and plants, arranged in tables, graphs, charts, and diagrams. The material is organized into 14 categories: basic physical and chemical data, basic respiratory anatomy, lung volumes and pulmonary function, blood respiratory characteristics, erythrocytes and respiratory pigments, mechanics of breathing, artificial respiration, effects of exercise, effects of various concentrations of inhaled gases, effects of drugs, other factors affecting respiration, oxygen consumption (animal organisms), respiration (animal tissues), and respiration (plants). Six appendixes and a detailed index are included. Bibliographic sources are appended to each table.

T. G. I. R some

223

Davies, J. THE PROBLEM OF BACK FRACTURES DURING EJECTION FROM USAF AIRCRAFT. PERIOD: 1 Aug. 1949 THRU 31 MARCH 1956. Publication 2 57, AFR 190 16, Jan. 1957, 37pp. USAF Directorate Flight Safety Research, Office of the Inspector General, Norton AFB, Calif.

223

To determine the frequency and causes of back fractures experienced during ejection escape, a review of ejection escape experiences over a seven year period was made. Reports from the personnel involved plus other relevant data were used as bases for recommendations toward reducing these fractures and for proposed research and development here.

T. I.

224

Roscoe, S.N., Smith, J.F., Johnson, B.E., Dittman, P.E., et al. COMPARATIVE EVALUATION OF PICTORIAL AND SYMBOLIC VOR NAVIGATION DISPLAYS IN THE 1-CA-1 LINK TRAINER. Contract N70NR 291, Rep. 92, Oct. 1950, 80p. CAA Division of Research, Washington, D.C.

224

To evaluate a pictorial as contrasted with a symbolic VOR (omni-directional radio range) instrument display for facilitating the solution of navigation problems, both private and instrument pilots participated in a series of three experiments in a 1-CA-1 Link Trainer. Results are given in terms of the speed and accuracy of solutions yielded by the two types of displays, with attention given to practice effects. A technical description of the displays is appended.

T. G. I. R 4

225

USN Special Devices Center. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS REVISED 1 JANUARY 1953. 1953, 23pp. USN Special Devices Center, Port Washington, N.Y.

225

This bibliography lists the human engineering reports issued by the Special Devices Center. The period covered is from 1946 through 1952. For each report the following information is given: author, title, rate of issue, classification, and report number. Titles are organized under broad subject matter titles: learning, motor skills, perception, voice communications, extreme environmental factors, systems analysis, controls and displays, training devices, and general.

R 362

226 Carney, C.R., Scheffer, K.E. & Alvis, H.J. STUDIES OF LUNG VOLUMES IN INSTRUCTORS AT THE ESCAPE TRAINING TANK. Proj. NM 002 015.12.01, Rep. 260, Nov. 1954, 13pp. USN Medical Res. Lab., USN Submarine Base, New London, Conn.

Based on a common experience of instructors at the Escape Training Tank, namely, that during their tour of duty, they learn to hold their breath longer and breathe differently, a study of their pulmonary capacities was undertaken. Vital capacity, inspiratory reserve, and total lung capacity of the Tank instructors were found significantly larger than those of laboratory personnel representing average individuals. When measured vital capacities of the two groups were compared with vital capacities predicted on the basis of body surface area, the measured values of the Tank instructors were 14.6% higher than predicted, while those of the laboratory personnel were 0.56% lower. A longitudinal study of the lung volumes of instructors performed over a period of one year following their assignment to the Escape Training Tank demonstrated a significant increase in inspiratory reserve, tidal volume, vital capacity, and total lung capacity while expiratory reserve and residual volume did not change significantly. These findings indicate an adaptation of the lung volume to the stress of skin diving.

R 9

227 Draper, J. AN INTRODUCTION TO INFORMATION THEORY, WITH REFERENCE TO THE HUMAN OPERATOR. Repo. from: "The Human Operator in Control Systems, the Royal Military College of Science", Sept. 1954, 19pp. Clothing & Equipment Physiological Research Establishment, Directorate of Physiological & Biological Research, Ministry of Supply.

This paper outlines some of the fundamentals of the theory of selective information. It also describes some of the work that has been done on information transmission by the human S_i, and discusses the estimation of information transmission rates from samples of limited size. Some of the examples of the application of information theory involving human S_i include choice reaction time studies, and a study of the problem of how much information is gained, or how much is learned about spatial location in a single glance. These, as well as several other studies, are described. The correspondence between the measure of the rate of transmission of information and other conventional measures of agreement were indicated. The difficulties and inconvenience of handling the rate of transmission of information algebraically is recognized but the application of this new method to attacking problems and interpreting data appears to be to its credit.

R 22

235

Loeb, M. THE INFLUENCE OF INTENSE NOISE ON PERFORMANCE OF A PRECISE PATTING TASK. Proj. 6-95-20-001, Rep. 268, April 1957, 10pp. AMRL, Port Knox, Ky.

235

To investigate the influence of intense noise on performance of a precise fatiguing task, ten subjects were required to row to certain standards before, during and after three experimental conditions. The conditions were: 1) 115 decibels continuous broad band noise; 2) 115 decibels randomly interrupted noise; and 3) 50 decibels ambient noise (control exposure). A trial consisted of "rowing till exhaustion" at 50 strokes per minute. Performance was recorded by precision potentiometers activated by the rowing movements. The data were studied by analysis of variances for changes attributable to noise. The possible significance of the findings is discussed.

T. R 10

236

Herbert, M.J. THE SPEED AND ACCURACY WITH WHICH SIX LINEAR ARM MOVEMENTS CAN BE VISUALLY POSITIONED FROM TWO DIFFERENT CONTROL LOCATIONS. Proj. 6-95-20-001, Rep. 260, March 1957, 14pp. AMRL, Port Knox, Ky.

236

To investigate the speed and accuracy of linear arm movements, 18 subjects moved a short rod into and through a metal cylinder until contact was made with a switch at rear of tube, using a right-hand control. Variables studied were: 1) direction of movement (up, down, push, pull, left, right), and 2) location of control (in front of right shoulder, on center line of body). Performance, recorded after four practice days, was measured by time-in error scores (times when rod touched side of cylinder), and total movement times. These data were studied by analysis of variance techniques for differences due to experimental variables. Recommendations for operational equipment design are included.

T. G. I. R 8

237

Loeb, M. THE EFFECTS OF INTENSE STIMULATION ON THE PERCEPTION OF TIME. Proj. 6-95-20-001, Rep. 269, June 1957, 9pp. AMRL, Port Knox, Ky.

237

To determine the influence of intense sound and light upon judgments of time intervals, an exploratory experiment was conducted requiring 27 subjects to make successive estimations (with feedback) of ten- and three-minute periods by throwing a toggle switch. Successive judgments without feedback were then made by 15 subjects in one hour sessions in the presence of 110 decibels noise with normal illumination, 80 decibels noise with intense illumination, and 80 decibels noise with normal illumination. Subjects were engaged in working a jigsaw puzzle. The data (mean estimations) were studied by analysis of variance technique for differential effects due to the experimental conditions.

T. G. R 8

238

Davis, R.C. ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL: THE RELATION OF MUSCULAR TENSION TO PERFORMANCE. Rep. 55-123, Dec. 1956, 8pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

238

This paper presents the background for and reviews the results of a series of studies dealing with the ways by which muscular tension affects the performance of a task. The studies were organized around the problem of learning how concurrent responses affect each other. Their design was based on the hypothesis that an exact electromyographic description of each of the responses taken singly makes it possible to predict what happens when they are combined. From the experimental data, a further hypothesis was then derived--that there are patterns of response, detectable by electromyographic recording, which will facilitate or inhibit other responses according to their similarity.

R 22

239
Wolf, W.S. OPERATIONAL ANALYSIS OF THE ROUGH-
TERRAIN FORK LIFT TRUCK. Proj. 7-83-01-0045,
Tech. Rep. 27-42, Jan. 1957, 27pp. Environ-
mental Protection Research Division, Quarter-
master Research & Development Center, Watick,
Mass.

239
To determine problems in the use of the rough-terrain
fork lift truck encountered in actual operating condi-
tions, an operational analysis was conducted. The pro-
cedures used include: conferences with development en-
gineers, planning personnel and operating personnel;
field visits to commercial users of equipment; and to Army
exercises; and library research. Factors considered and
analyzed were: job to be performed, personnel and perfor-
mance problems in use of existing equipment, and special
characteristics of operating personnel. Specific problem
areas have been defined and recommendations for further
human engineering and mechanical studies presented for
both immediate improvements and for broader future
changes. T. 1.

240
Tolhurst, G.C., & Morrill, S.W. FLIGHT
DECK NOISE-EXCLUSION PERSONNEL HELMET
(PDFH) EVALUATION. Contract N60000-22525,
Proj. Nr 145-993. (CNR) Joint Proj. Rep. 16.
May 1953, 7pp. U.S. Naval School of Aviation
Medicine, Naval Air Station, Pensacola, Fla.

240
Eight different Flight Deck Noise-Exclusion Per-
sonnel (PDFH) Helmets were tested under 3 general
sound conditions to see which structure and composi-
tion has the best noise attenuation qualities. The
eight helmets are ranked as to effectiveness.
I. T. G.

241
Sneider, R. & Smith, K.U. DIMENSIONAL ANALYSIS OF MOTION: VI. THE COMPONENT MOVEMENTS OF AS-
SEMBLY MOTIONS. J. Appl. Psychol., Aug. 1953, 32(4), 300-314. (University of Wisconsin,
Madison, Wisc.).

This study describes electronic techniques which make possible detailed experimental
study of the component movements in assembly motions. By means of the electronic techniques
described, the component movements of travel, grasp, loaded travel, and positioning in a
unimanual assembly task may be isolated and their durations measured in hundredths of sec.
Distributions of the component movement times for 46 Ss were approximately normal. Practice
did not affect uniformly the different types of movement. The efficiency of the 2 manipula-
tive movements, positioning and grasping, changed the most; whereas, the travel movements
in the task, especially the unloaded travel component, showed very little change with prac-
tice. Similar results were found for measures of variability of response during practice.
Practice did not alter significantly the correlations between component movements. Early in
learning the correlations between different component movements of manipulation and practice
are near zero. As practice continues, the values of these correlations do not change sig-
nificantly. At the start of learning, a correlation of about +.007 is found between the 2
travel components in the task. With practice, this correlation increased slightly but not
significantly. These findings, along with similar results found for other motion patterns,
point toward the lack of significance of learning concepts in understanding the details of
movement coordination in skill. However, these results point up the great significance of
component and dimensional analysis in dealing with this problem.
R 6

243
Broadbent, D.E. THE ROLE OF AUDITORY LOCALIZATION IN ATTENTION AND MEMORY SPAN. APU 171/53,
March 1953, 16pp. Applied Psychology Research Unit, MRC, Cambridge, England.

3 experiments are reported which were designed to: a) Exp. I--examine the relative effi-
ciency of a number of different types of localization; b) Exp. II--confirm the possibility
that 2 simultaneous auditory stimuli can both be dealt with provided their sources are sepa-
rated in space; c) Exp. III--as a consequence of the results in Exp. II, to examine the li-
mits of immediate memory on 2 channels. The results of these 3 experiments suggest that spa-
tial separation will normally be useful unless alternation between 2 channels is required at
a rate faster than about 1 or 2 secs. This time interval has been found to be important in
other connections, such as this study of "fatigue".
R 12

242
Poulton, E.C. LISTENING TO TWO OR MORE CHANNELS. FPRC 843, Aug. 1953, 2pp. Applied Psychol-
ogy Research Unit, MRC, Cambridge, England.

This report gives a brief summary of APU 163: "Multiple Channel Listening" and APU 164:
"Two Channel Listening" and makes the following practical recommendations: a) when messages
over a busy channel have to be logged, a separate monitor should be allocated to it; b) two
busy channels should not be allocated to a single monitor; c) whether one busy channel and
one or more quiet channels, or simply a number of quiet channels, can be allocated to a
single monitor depends upon the frequency of message overlap to be expected, and upon the im-
portance of the messages. Messages will be more likely to be missed or misheard under these
conditions only when they overlap each other; d) if a monitor is allocated a single channel,
but has to sit in a cabin with other monitors, he should use headphones (both in order to
prevent him from hearing messages from other sources, and to prevent other monitors from
hearing his messages); e) if a monitor is allocated two or more channels, he should be in a
separate cabin, with loudspeakers spaced in a horizontal semi-circle in front of him, and
what is known of binaural localization. If he has only two channels to monitor, one earphone
and a speaker opposite the other ear is equally effective--Broadbent, D.E. "The role of audi-
tory localization in attention and memory span." APU 171, 1953.
R 2

245

Beckhouse, R.G., Campbell, J.T., Birnbaum, A.H., Dunn, T.F., et al. PILOT STUDY ON THE AMOUNT OF FORGETTING OF BASIC MILITARY SUBJECT MATTER AFTER BASIC TRAINING. Proj. 29544100, PES Rep. 932, April 1952, 9pp. USA Personnel Research Section, Adjutant General's Office, Washington, D.C.

245

Retention for subject matter taught in basic training was studied in 186 enlisted men who had completed such training between one month and eighteen months preceding the study. Scores are given for Basic Military Subjects Tests, and retests. Results are analyzed with respect to the variables of performance on original tests, interval before retest, and type of postbasic training of subjects. There is a discussion of implications for basic military training.

T.

249

Hasty, G.T. PSYCHOLOGICAL ADAPTABILITY: INVESTIGATION OF MIRROR VISION PERFORMANCE. Proj. 21 0202 0005, Rep. 4, Sept. 1953, 7pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

249

This experiment is related to the problem of the effects of aging on adaptability to changes in motor performance requirements. The AFSAM Pursuit Confusion Test, Model A was used to study differences in a mirror-vision task between preferred and non-preferred hands; subjects were about 20 years old, basic trainee airmen. Initial learning times, and transfer (mirror) learning, both unilateral and bilateral, are reported. Clockwise and counter-clockwise motion are studied. The results bear upon the precision of this technique for the measurement of age-related adaptability.

T. G. R 8

246

Horrocks, J.E., Krug, R. & Bowlus, D. TRAINING FOR ANTI-AIRCRAFT ARTILLERY GUNNERY. FINAL REPORT. Contract 495 (01), Human Engng. Rep. SDC 495 G1 1, Aug. 1952, 117pp. USN Special Devices Center, Port Washington, N.Y.

250

Denerberg, V.H. THE TRAINING EFFECTIVENESS OF A TANK HULL TRAINER. HUMPRO TR 3, Feb. 1954, 28pp. Human Resources Research Office, George Washington University, Washington, D.C.

246

The purpose of this survey on Army anti-aircraft marksmanship and gunnery training is to recommend change in training and use of training aids to improve marksmanship and make the program more economical. A detailed survey was made at various training establishments which included activity analyses for the various gunnery systems, description of phases of training, and lists of training aids. Discussion of results includes advanced individual phase, unit phase, and post-cycle training, and training in civilian components, ROTC, and National Guard. There is a detailed exposition of future research plans.

I.

247

Barch, A.M. PERMANENT WORK DECREMENTS IN THE PERFORMANCE OF A PURSUIT TASK ARISING FROM SHORT PERIODS OF MASSED PRACTICE. Contract AF 33(038) 13214, Proj. 509 020 0001, Jan. 1952, 5pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

250

To determine the effectiveness of the Tank Hull Trainer 3-T-3 as a training aid in teaching 1) starting and stopping procedures, 2) driver's instruments and controls, and 3) track and suspension system, four companies of basic trainees receiving tank training were used as Ss. A performance test and two paper-and-pencil tests were used to measure the effectiveness of training received by three methods: Army Training Program (utilized M47 tanks for practical work), the trainer, and an inexpensive mock-up of the instrument panel and driver's controls of the M47 tank. Evaluation of training effectiveness was made on the basis of test scores and in terms of man hours, tank hours, and expense of method used.

T. G. I.

247

This experiment was designed to study the role of reactive inhibition and conditioned inhibition in learning an Epicyclic Pursuit Rotor task (keeping a stylus on a moving target). The distributed practice group of subjects (who were college students) had thirty 15 second trials separated by 45 second rests. The massed practice group had no rests between trials, but both groups had five minutes of rest after every six trials. Time-on-target scores are the measures used for the analysis of conditioned inhibition effects, and reminiscence; influence of practice schedule, and of level of initial performance are examined.

T. G. R 7

248

Mead, L.C. SYNTHETIC TRAINING DEVICES. HEM 200/1 Appendix, June 1951, 34pp. US Research & Development Board, Washington, D.C. (Department of Psychology, Tufts University, Medford, Mass.).

248

This paper reviews principles concerning the design and use of synthetic training devices, from a military and psychological point of view, appraises these principles, and recommends research and administrative action with regard to gaining the greatest value from these devices. The difficulties involved in predicting how much training on devices will transfer to the operational situation are discussed, with respect to realism, knowledge of results, etc. Trainer efficiency and practicality from both a training and an over-all military point of view are treated.

R 47

251
Smith, J.F., Flexman, R.E. & Houston, R.C. DEVELOPMENT OF AN OBJECTIVE METHOD OF RECORDING FLIGHT PERFORMANCE. Proj. 508 016 0002, Tech Rep. 52 15, Dec. 1952, 49pp. USAF Human Relations Research Center, Air Training Command, Lackland Air Force Base, San Antonio, Texas.

This project was part of a general research program proposed during an Air Force Planning Conference on Pilot Training Research. The purpose of this project was to develop a method of objectively recording pilot performance in the Primary Flying Training Program. To construct forms for recording student pilot performance satisfactorily, it first was necessary to determine the requirements for completion of the flying phase of Primary Pilot Training. The approach to this task was to examine all maneuvers in the Primary Flying Syllabus in terms of their component items. Each maneuver and its component items was described and listed in an item-by-item format. Following in-flight checks, the maneuver analyses were revised to increase their accuracy and completeness. Upon completion of the maneuver analysis, Performance Record Sheets were designed to record student performance in flight. Items for these record sheets were selected from the maneuver analysis. Experienced flight instructors reviewed, used, and revised the Performance Record Sheets. In addition, observer reliability studies were conducted to determine the agreement between the records of two instructors observing the same pilot performance. Results from these studies were employed to revise the Performance Record Sheets for maximum observer reliability. There are two direct products of this research: first, the maneuver analysis covering all maneuvers in the Primary Pilot Training Program, and second, a method of objectively recording pilot performance. These two products will be of use in pilot training for standardization, for the comparison of group performance, and for the development of objective proficiency measures.

R 19

252
Wolfe, D. THE USE AND DESIGN OF SYNTHETIC TRAINERS FOR MILITARY TRAINING. OSD Rep. 5246, July 1945, 36pp. USAF Office of Scientific Research & Development, Washington, D.C.

252
This report summarizes "... the psychological principles which should be observed in the design and use of trainers". Attention is given to the characteristics of good trainers, the use of trainers, advantages of trainers over real equipment, the evaluation of a trainer, and planning and designing a trainer. Frequent reference is made to experimental data. Two appendices list various specific trainers studied or designed by the projects of the Applied Psychology Panel, NDRC.
T. G. R 37

253
Miller, R.B., Folley, J.D., Jr. & Smith, P.R. JOB AN-
LICATION PROCEDURES APPLIED TO THE K-1 SYSTEM. Con-
tract AF 33(038) 12921, Proj. 507 008 0001, Tech. Rep.
53 20, July 1953, 13pp. USAF Technical Training Research
Lab., Chanute AFB, Ill. (American Institute for Research,
Pittsburgh, Penn.).

253
This report pertains to the problem of providing the required specially trained maintenance personnel as soon as new production models are put into the field. The training of these technicians is based on maintenance procedures established for prototype models of the equipment in question. In the present study, the methods for determining maintenance procedures are analyzed and described for both prototype and operational models of the "K-1" radar system. This includes both equipment and activity analysis. A comparison is made between the procedures for the prototype and the operational model, and practical application of the job forecasting techniques are discussed.
T. R 8

254
Hirsch, R.S. EXPERIMENTAL EVIDENCE FOR IMPROVEMENTS NEEDED IN RIFLE MARKSMANSHIP TRAINING. Contract NONR 494(01), Human Engng. Rep. SDC 494 01 3, June 1953, 36pp. USN Special Devices Center, Port Washington, N.Y.

254
The experiments summarized here are part of research aimed at improving and economizing rifle marksmanship training in the Army. The results have implications for standards of marksmanship measurement, the content of the Army Training Program, and conditions of training. Results with trainee subjects are presented for an experiment in reducing Preliminary Rifle Instructions, a spaced-practice firing experiment, experiments on transfer from sub-caliber training, the use of training films, and a study on the effect of extended training. Recommendations based on the obtained results are given, which pertain to training materials and procedures, and further research.
T, G

255
Meeker, W.F., Carroll, R.M., & Sixhausser, E.D. STUDY OF COMMUNICATION IN HIGH-LEVEL AMBIENT NOISE FIELDS. Contract DA-36-039-sc-64469, Proj. 132B, Rep. 8, Aug. 1956. RCA, Camden, N.J.

255
This report is one of a series providing research information leading to improved design of Signal Corps voice communication systems used in high-level noise environments of armored vehicles and helicopters. The data reported here concern the construction and testing of ear muffs to provide noise exclusion and the testing of three headset arrangements for suitable transfer characteristics. Attenuation amplitude and phase measurements were made with the subject facing the sound source. The noise reduction achieved by the test of the muffs was compared to that of an electronic noise reducer alone.
G. I.

256
Pollack, I. THE IDENTIFICATION AND DISCRIMINATION OF COMPONENTS OF ELEMENTARY AUDITORY DISPLAYS. Proj. 7682, 1956, 10pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C.

Six Ss participated in a series of sound-level discrimination and identification tests which were carried out over a wide range of conditions. In the discrimination tests, Ss attempted to detect differences in sound levels between two members of a pair of tones when the reference signal for discrimination was varied over the range of sound levels examined. In the identification tests, they attempted to assign numerals to the tones. The major findings were: 1) the discrimination threshold increases as the range of sound levels available to the reference signal for discrimination increases; 2) the information transmitted in the identification situation increases as the range of sound levels available for identification increases; 3) the net effect of these two findings is that the information transmission associated with both the discrimination and identification experiments is roughly equivalent over a moderate range of sound levels, at least for medium discrimination criteria.
R 0

257
Edgerton, H.A., Heinemann, R.F.D. & Gray, E.J. CONSTRUCTION OF THE 1953 FORM OF THE EVALUATION PROCEDURE FOR TRAINING AIDS AND DEVICES. Contract N70NR 38302, Human Engng. Rep. SDC 383 2 2, Jan. 1953, 105pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Company, Inc., New York, N.Y.).

257
This report describes the method used in developing a form for evaluating the effectiveness of training aids and devices. This instrument can be used by any military personnel familiar with the device, and meets other criteria of usefulness. The experimental form (1953), its field testing, and analysis of data and scoring procedure are presented in detail.
T. G.

258 Wherry, R.J. (Principal Technician). CONTROL OF BIAS IN RATING. SUB. PROJ. L. SURVEY OF THE LITERATURE. FINAL REPORT. Contract DA 49 083 OSA 69, AF Proj. 417, PAS Rep. 890, Sept. 1950, 71pp. USA Adjutant General's Office, Personnel Research & Procedures Branch, Washington, D.C. (Ohio State University, Columbus, Ohio).

This annotated bibliography was prepared primarily from references obtained from the Psychological Abstracts covering a period from 1930-1950. Included is the literature in the fields of rating, judgment and decision, psychophysics, attitude, opinion, interest measurement, and testing. The material is organized into 5 categories: Rating Procedures; Judgment and Decision; Psychophysics; Attitude, Opinion and Preference; Tests. An appendix attempts to summarize the difficulties found or claimed to apply to ratings and means of improvements suggested in the rating literature, and to bring together points concerning related problems from other psychometric fields. A total of 264 references are given. (NEIAS)
R 264

263 Hoehn, A.J. A FORMULATION OF THE PROBLEM OF STUDENT MOTIVATION IN AIR FORCE TECHNICAL SCHOOLS. Res. Bull. 51 17, Aug. 1951, 25pp. USAF Technical Training Research Lab., Chanute AFB, Ill.

263 A theoretical formulation of the problem of student motivation in formal learning situations is presented in terms of Lewin's interpretation of field theory. Within this framework motivation principles are reviewed and an analysis is made of motivational problems in Air Force technical schools, utilizing responses of 157 students at 2 AF schools in "non-directive" interviews. Several research studies are proposed.
1. R 20

264 Croeger, J.A. & Detter H.M. THE RELATION BETWEEN SEAT LOCATION AND PERFORMANCE ON TWO RADIO CODE TESTS USING LOUDSPEAKER ADMINISTRATION. Proj. 7700, Task 77G14, AFTRC TR 54 64, Nov. 1954, 6pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

264 This study tested the effect of seat location on the performance of two radio code tests: Signal Corps Code Aptitude Test (SCCAT) and Army Radio Code Test (ARC-1). The SCCAT was administered to 2,507 airmen and the ARC-1 to 2,314, using two loudspeakers in a 107-seat room. The scores from these tests were analyzed in two ways: variance of the mean scores for each seat and variance of the mean scores for seats grouped in terms of horizontal and longitudinal displacement; also the interaction variance from these two methods was tested. Seat-location differences were examined in terms of test validity.
T. 1. R 3

260 Siegel, A.I., & Stirner, F.W. AN EXPERIMENTAL FLIGHT EVALUATION OF PROTOTYPE SEAT CUSHION ASSEMBLIES. Contract W156a-33411, Oct. 1956, 26pp. Air Crew Equipment Laboratory, Naval Air Experimental Station, NAMC, Philadelphia, Penn.

260 To determine the in-flight usefulness of eight prototype seat cushion assemblies for reducing specific discomforts and debilitations on prolonged flights, comparison data were collected under actual operational, long-range flight conditions. The designs included 1) variations of the present "standard" seat, 2) seat pulsation of mechanical vibration characteristics, 3) use of new porous plastic (Trilok) and 4) inflatable rubber ring. Each pilot (56) completed a structured questionnaire after his evaluative flight and was interviewed to obtain further preference data. Comfort characteristics (fatigue, numbness, pressure, perspiration, efficiency) were analyzed for each seat and comparisons made. Design recommendations are included.
T. G.

262 Kinsey, J.L. & Weybrew, B.B. ETIOLOGICAL FACTORS IN THE DISQUALIFICATION OF SUBMARINE PERSONNEL. BuMed Proj. NM 003 041.13.03, Rep. 226, June 1953, 40pp. USN Medical Research Lab., New London Submarine Base, Conn.

This report is the first of a series concerned with answering the question, "Why--because of what personality factors, or adjustment processes--does a person become disqualified from the submarine force?" The data consist of a heterogeneous grouping of background factors, test battery scores, evidence of neurotic symptoms, and onboard ratings and observations. Much of the data are used to describe the disqualified sample as completely as possible. On the variables for which an adequate control group of qualified submariners are available, several hypotheses are studied investigating the usefulness of the variable in question for predicting the qualify-disqualify criterion. The results indicate that over half of the disqualifications are the result of inappropriate motivation for the submarine service. There are several predictors of this inadequate motivation suggested by the data; for example, attitude toward authority, ability to verbalize, and the possession of definite goals. There is some evidence that some neurotic-like process may be involved in about 25% of the disqualified group; another 10% may have had such sociological variables as instability of home life associated with their disqualification; while the data from the remaining portion of the group suggest social withdrawal as a major contributing variable.
R 22

265 Berkshire, J.R., Burgess, G.G., Harrell, T.W. & Swanson, R.A. A STUDY OF THE TRAINING AND ASSIGNMENT PROBLEMS OF SPECIALISTS IN THE FAR EAST AIR FORCES. Res. Bull. 51 26, Nov. 1951, 13pp. USAF Technical Training Research Lab., Chanute AFB, Ill.

265 To evaluate training in the States under the Air Training Command, and assignment to the combat area in the Far East, this survey studied a population of 3105 officers and airmen at Far East Air Force bases. A Job and Training Questionnaire was administered, and interviews in addition were held with 160 of the men. Specific reactions as to adequacy of stateside training, or inapplicable training, and as to the relationship of specialist training to assignment are detailed. A discussion treats the current general approach to on-the-job training, and related problems.
T.

266

Dickens, D.D., Stone, G.R. & Highland, R.W. A STUDY OF THE RETENTION OF ELECTRONICS FUNDAMENTALS DURING BASIC RADAR MECHANIC TRAINING. Contract AF 33(038) 13611, Proj. 507 008 0002, Res. Bull. 52 36, Dec. 1952, 31pp. USAF Technical Training Research Lab., Chanute AFB, Ill. (Ohio State University, Columbus, Ohio).

266

The overall purpose of this research is to assess the usefulness of generalized technical training courses which teach principles, later applied in specialized training courses. Airmen in training took a 22 weeks' course in electronic fundamentals for radar mechanics. During two months following this course, while the airmen were still in academic, specialized training, retention of the fundamentals was measured by written examination. Retention scores, in relation to interval elapsed since learning, are given; appendices include details of the examination, with statistical treatment of results.

269

Ericksen, S.C. DEVELOPMENT OF A LIGHT PLANE PROFICIENCY CHECK TO PREDICT MILITARY FLYING SUCCESS. Proj. 508 016 0003, Tech. Rep. 52 6, Nov. 1952, 45pp. USAF Human Resources Research Center, Air Training Command, Goodfellow AFB, Tex.

This Technical Report describes background research directed toward the development of a light plane flight-check. A flight-check of this type was required in research directed toward assessing the utility of a "pre-primary" light plane training course. This research, currently in progress, will be reported in other Technical Reports. On the basis of the research described in this report a light plane flight-check for field research use has been developed by in-service personnel. In the development described in this report, advantage has been taken of past experience in developing flight-checks and consideration has been given to operational realities and requirements in the administration and use of flight-checks. Since such flight-checks tend to determine the nature of training maneuvers, the maneuvers used in the flight-check for the light plane have been tailored in terms of requirements for performance in flying the T-6 aircraft. This has been done in order to maximize the possibility of transfer of skills learned in flying light planes to the job of flying the T-6 aircraft and in order to maximize the possibility of predicting proficiency in flying the T-6 from flight-check measures of proficiency in light plane flying.

R 13

270

Howard, J.K. & Pickrel, E.W. VALIDATION OF THE AIRMAN CLASSIFICATION BATTERY FOR WOMEN IN THE AIR FORCE. Tech. Rep. 52 5, Nov. 1952, 31pp. USAF Human Resources Research Center, Air Training Command, Personnel Research Lab., Lackland AFB, Tex.

The Airman Classification Battery has been shown to have marked utility in the classification of male personnel. Although the battery was developed specifically for use in classifying male personnel, it also has been used in the classification of the increasing number of WAF's who have been inducted recently. This use of the ACB has been necessary since no other adequate procedure for the classification of female personnel was available. This study, carried out as soon as sufficient data on WAF's became available, was directed toward assessing the effectiveness of the Airman Classification Battery in classifying female personnel. The results of the study indicate that, in general, adequate classification of Women in the Air Force can be made on the basis of tests, weights, and conversion tables designed for the classification of males. On the other hand, the analyses indicate specific areas in which the Airman Classification Battery tests and scoring procedures should be improved to render the battery more effective in the classification of females. For example the Biographical Inventory, as presently constituted, is generally not effective in the classification of female recruits. Moreover, in classifying with respect to jobs involving a mechanical factor the present battery is considerably more effective for males than for females.

R 25

271

Rupe, J.C. RESEARCH INTO BASIC METHODS AND TECHNIQUES OF AIR FORCE JOB ANALYSIS-I. Proj. 507 015 0002, Tech. Rep. 52 16, Dec. 1952, 68pp. USAF Human Resources Research Center, Lackland AFB, Tex.

The relative value of 5 methods of job analysis: questionnaire-survey, group interview, individual interview, observation interview, and technical conference, was investigated. 12 jobs were selected and noncommissioned officers were selected and trained as analysts. Teams of job analysts carried out analyses of jobs at 16 Air Force bases utilizing the five methods. The relative adequacy of the five methods was evaluated through determination of the coverage of job elements which each provided. Determination of the elements associated with any given job was based on the judgments of a large group of experts who reviewed the elements yielded by each of the five methods with respect to whether they actually were or were not associated with the job in question. Evaluation of the five methods of job analysis against this criterion indicated that the questionnaire-survey methods and the group interview method, in general, provided less information on job elements than did the other three procedures. In terms of amount of pertinent job information provided, there was little to choose between the individual interview, the observation interview, and the technical conference methods. However, the data from these four jobs suggest that of the three most effective procedures, the individual interview has important advantages with respect to man hours (particularly of high level personnel) required to obtain the job analysis information.

R 24

275

Floyd, W.F. & Welford, A.T. SYMPOSIUM ON HUMAN FACTORS IN EQUIPMENT DESIGN. London: H.K. Lewis & Company, Ltd., 1954, 132pp. (The Ergonomics Research Society Proceedings, Vol. II.).

The following papers are included: the anatomy of work, body size and work spaces, body measurements of the working population, chairs and sitting, the range and strength of joint movement, the physiological effects of climate on man, heat loss by radiation and convection from a clothed thermostat and from a clothed man, circulatory insufficiency in the standing position, experimental studies of physical working capacity in relation to sex and age, perceptual problems involved in observing displays, the human response to variations in the design of a visual indicator, speed stress, movement and force in sensori-motor skill, and equipment layout. (HEIAS)

277

Besnard, G.G. DEVELOPMENT OF A CHECK LIST TO STUDY JOB TASKS PERFORMED BY B-29 AIRPLANE AND ENGINE MECHANICS. Proj. 507 012 0003, Res. Bull. 52 31, Nov. 1952, 12pp. USAF Human Resources Research Center, Air Training Command, Chanute AFB, Ill.

A check list of job tasks performed by Airplane and Engine Mechanics, AFSC 43131-B, working on B-29 aircraft has been developed. The check list is to be administered to job incumbents and checked by their immediate supervisors. In case of disagreement on level of performance for any task, the supervisor's response will be used. Using results to be obtained from having the check lists completed by mechanics and their supervisors at several Strategic Air Command bases, a factor analysis will be accomplished to identify various clusterings of tasks. The results to be obtained will test the hypothesis that those tasks in the various clusters which will result from factor analysis will resemble closely those tasks which compose the groupings obtained by using expert judges to rate them according to their apparent level of technical complexity employing the method described in this Research Bulletin.

281

Hirsch, R.S. THE EFFECTS OF KNOWLEDGE OF TEST RESULTS ON LEARNING OF MEANINGFUL MATERIAL. Contract N60MR 269, Human Engng. Rep. SDC 269 7 30, Sept. 1952, 27pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

285

Edwards, W. METHODS FOR COMPUTING UNCERTAINTIES. Amer. J. Psychol., March 1954, 67(1), 164-170. (Johns Hopkins University).

285

This note proposes a simplification in tabulation techniques for computing uncertainties in binary data. In addition, methods for computing uncertainties in certain kinds of non-binary data are discussed. T. R 4

281

To determine whether knowledge of results (KR), provided by means of the Classroom Communicator, would affect the learning of material from tests based on the contents of selected sound films, an experiment was conducted. Learning was defined as retention of specific material. It was measured as a difference between two tests, the first accompanied by KR and the second three weeks later without specific awareness of results. Following the showing of a film, a pencil-and-paper test was given and KR was presented in one of four ways to separate groups of subjects; two control groups had no KR. Differences between the groups on a final post-test and also between immediate and delayed post-test were analyzed. Effectiveness of the various methods for presenting KR are discussed. T. G. 1.

286.

Forbes, T.W., Nowcowitz, K., & Morgan G. A COMPARISON OF LOWER CASE AND CAPITAL LETTERS FOR HIGHWAY SIGNS. Proc. Highway Res. Bd., (30th Annual Meeting), 1950, Dec., 355-373.

286

To compare legibility of lower case and capital letters for highway signs, 75 observers made 1939 individual observations of the distance at which letter targets could be read under daylight and artificial illumination. Other stimulus factors varied were: letter size (5 - 18 inches height), and familiarity of word patterns (from scrambled to a second viewing of familiar place names). The results (recognition distances) are discussed in terms of legibility of the two letter forms as it varies with height, width, sign area, and degree of familiarity. T. G. 1. R 6

287

Gibbons, C.C. EMPLOYEE ATTITUDES AND PRODUCTIVITY. Mich. Bus. Rev., Nov. 1953, 3(6), 4pp. (W.E. Upjohn Institute for Community Research, Kalamazoo, Mich.).

287

This article discusses the relationship between productivity and employee attitudes. Suggestions are offered through which management should be able to improve relationships with employees, such as keeping the worker informed about the goals of the organization, encouraging wider participation by giving the workers opportunity to express their ideas about operations, and providing the right kind of leadership.

283
Iredell, K.H., Older, H.J., Scipino, J.A. & Hilton, A.C. PERSONNEL STUDIES IN MINE WARFARE. Tech. Rep. & Appendices to Tech. Rep. - Part I, Contract Nonr 902(00), Rep. 53 6, Aug. 1953, 729pp. Psychological Research Associates, Washington, D.C.

This report describes the initial phases of a series of studies of mine warfare personnel administration. This report presents the research methodology used to collect the basic data for further steps of the project. In addition 2 by-products of this research are reported here. One is the development of requirements for personnel to be "qualified in mine warfare". The other is a research memorandum concerning several areas of administrative concern within the mine forces. (NEIAS)

288 Sperling, H.G. & Farnsworth, D. PERISCOPE ACUITY AT NIGHT. CENTRAL AND PARACENTRAL ACUITY AS A FUNCTION OF CONTRAST AND ADAPTATION. Proj. W4 003 041-39.01, NRL Rep. 157, Nov. 1950, 22pp. USN Medical Research Lab., New London Submarine Base, Conn.

Discrimination of a target approximating the visual subtense of a ship at 5,000 yards on low power was measured with the right eye at 9 retinal positions, from central fixation to 15° off central vision. Target to background contrast was varied to sample a range of visibility conditions at sea. It was found that for all target contrasts at light levels at or below twilight (.27 millilamberts) off-center acuity was greater than central acuity. Acuity at 6° from central fixation was found best but little decline was discovered out to 15°. The subsequent effect upon discrimination of the target of viewing 3 common visual indicators was measured. After viewing the S.S. radar P.P.I., a long recovery time was required to detect targets illuminated even as high as full moonlight. The "Christmas Tree" and red illuminated dials produced smaller but appreciable decrement. These laboratory tests indicate that viewing radar indicator lights and dials at normal operating brightness is detrimental to periscope vision at night.

R 4

289 Chapanis, A. NOTES ON AN APPROXIMATION METHOD FOR FITTING PARABOLIC EQUATIONS TO EXPERIMENTAL DATA. Psychometrika, Dec. 1953, 18(4), 327-336. (Johns Hopkins University, Baltimore, Md.).

289 When a numerical transformation of raw data is used only to simplify the arithmetic of curve fitting, the transformation may lead to undesirable and even highly distorted results. This principle is illustrated with an approximation method of fitting parabolic equations to experimental data. The usefulness of this method is discussed and its limitations pointed out.

T. G. R 4

290 Taylor, C.J. HUMAN TOLERANCE FOR TEMPERATURE EXTREMES. Physics and Medicine of the Upper Atmosphere, pp. 548-561. (University of California)

290 is review of human tolerance for thermal extremes summarizes briefly the present state of knowledge with respect to the practical conditions under which extreme environments are encountered, the relevant physical parameters of heat load, the biological parameters of thermal effect, the duration of exposure and the activity being performed.

T. G. R 27

292 Roush, R.G., & Urbanski, E.T. UNIVERSAL MEDICAL TIMER AND PULSE STIMULATOR. Electronics. New York: McGraw-Hill Pub. Co., Inc. Nov. 1953. Contract N5-ori-166, T.O. 1, Proj. No. NR-145-089, Rep. No. 166-I-177. ONR, Johns Hopkins Univ.

292 A pulse-type electronic stimulator and a timer are described, so designed that they can be adapted to many stimulation problems in the field of psychological and medical research. Standardized units for timing and for stimulus generation are designed so that equipment can be changed by assembling different units to provide the required display problem.

I.

294 Sweeney, E.J. SEX DIFFERENCES IN PROBLEM SOLVING. Contract N6ONR 25125, Proj. NR 153 149, Tech. Rep. 1, Dec. 1953, 79pp. Psychology Dept., Stanford University, Stanford, Calif.

4 studies are reported which were designed to provide data relevant to 1 or more of the following 5 questions concerning differences between men and women in achievement in problem solving: a) can the kinds of sex differences in problem solving previously reported be verified; b) can differences in problem solving be demonstrated for groups of men and women matched with respect to general intelligence; c) can sex differences in problem solving be demonstrated for groups equal in intelligence be accounted for in terms of differences in various special abilities; d) to what extent can sex differences in problem solving not otherwise explained be accounted for in terms of differences in specific knowledge or training; e) what characteristic or characteristics are common to problems on which sex differences are obtained which are not accounted for by differences in intelligence, special abilities, or specific knowledge? The data obtained support the conclusion that there are sex differences in achievement in problem solving which are not accounted for by differences in intelligence in the groups compared or by known sex differences in special abilities or specific knowledge. A loading on the general reasoning factor is characteristic of 1 group of problems on which such differences were obtained. Results obtained with 3 other general kinds of problems confirm the hypothesis that sex differences will occur in problems which involve difficulties in restructuring, but not in problems which lack such difficulties.

R 17

296 Smith, R.G. & Westen, R.J. STUDIES OF MORALE METHODOLOGY AND CRITERIA. Proj. 507 009 0063, Res. Bull. 51 29, Dec. 1951, 15pp. USAF Human Resources Research Center, Chantute AFB, Ill.

The research presented in this bulletin represents work directed toward development of methods for use in assessing airman attitudes in the morale area. Data from 13 short scales directed toward measurement of different aspects of Air Force life were factor analyzed. 3 factors were tentatively established. 1 was a general factor designated morale. Another factor reflecting attitudes toward such aspects as standard of living, personal problems, and the Air Force as a way of life and was labeled tentatively a personal-subjective factor. A third factor reflected attitudes toward such issues as barracks and housing, food, and recreation and was tentatively designated the objective-physical need factor. The development of a scale which may yield a general measure of attitudes associated with morale is of methodological interest as is the finding that sentence-completion techniques apparently do not yield as satisfactory measures as do multiple-choice questionnaire techniques. Marked utility of the sentence-completion procedure has been indicated, however, in providing guides for the development of questionnaire items. The implications of this study are primarily methodological and are of principal interest to other workers carrying out research on this important problem. The results may be of some interest, however, to training and operational personnel as background material with respect to research and research problems in this area.

R 32

300

Spence, K.W. (Dir.). SURVEY OF THE EDUCATIONAL PROGRAM OF THE ARTILLERY SCHOOL, ANTIAIRCRAFT AND GUIDED MISSILES BRANCH, FORT BLISS, TEXAS. HUMPRO Spec. Rep. 1, Dec. 1952, 98pp. Human Resources Research Office, George Washington University, Washington, D.C.

300

A Special Survey Commission of educational and psychological consultants were requested to survey the Artillery School, Antiaircraft and Guided Missiles Branch at Fort Bliss, Texas. This report details their findings, which deal with curriculum organization, course content, methods of instruction, training devices used, and methods of evaluation of student progress. As background, there is a description of the organization and administration of the School. There follows a description of the various curricula. Various problems and suggested steps for improvement are discussed as they arise in these descriptions. An appendix contains a student questionnaire (utilized in the study) on attitudes toward the school and courses.

303

Rockway, M.R., Eckstrand, G.A., & Morgan, R.L. THE EFFECT OF VARIATIONS IN CONTROL-DISPLAY RATIO DURING TRAINING ON TRANSFER TO A LOW RATIO. Proj. 7197-71635, WADC Tech. Rep. 56-10, Oct. 1956, 12pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

303

In order to determine the relationship between amount of transfer of a two dimensional tracking skill and degree of physical similarity between the training and test control-display ratios, three groups of subjects (total of 45) were trained on one of three different control-display ratios. Following this they were tested with the lowest of the three ratios. The results are presented and discussed in terms of the relative effect of training with a particular ratio upon subsequent performance with a ratio which for two groups is lower and for the third equal to the training ratio. The degree of positive transfer exhibited by all groups and group differences are also treated.

T. G. R 5

313

Anderson, A.V. RELATIONSHIPS AMONG APTITUDE, SCHOOL AND SHIPBOARD MEASURES FOR SONARMEN. FINAL REPORT. Proj. P6 52, HP 001056, Nov. 1952, 17pp. USN Electronics Lab., San Diego, Calif.

313

This is the final report of a study assessing the relationships of selection and school measures to follow-up shipboard ratings of graduates of sonar school (San Diego). The selection tests used included the basic test battery and audiometer test scores, and the school grades were concerned with both operator and maintenance sonar skills. Rating scales routinely sent to Commanding Officers, dealing with many aspects of shipboard sonarman performance, were analyzed for 63 different ships, with graduates of 13 different classes being rated. There are a detailed correlational treatment and a factor analysis of the data.

T. R 6

315

McCormick, E.J. (Chm.) SYMPOSIUM ON RESEARCH IN OCCUPATIONAL CLASSIFICATION. (PROCEEDINGS OF THE 18TH MEETING OF THE PANEL ON MANPOWER.) 5-6 May, 1952. HMP 201/1, 75pp. Panel on Manpower, Committee on Human Resources, US Research & Development Board, Washington, D.C.

The general subject of the symposium, the problems of research in occupational classification, was presented in 2 main subdivisions--job analysis and job classification. The main emphasis which emerged in the discussion was that, in order to establish and implement an occupational classification system, basic job facts are essential. Within the Armed Services, the job-analysis techniques, methodology and research approaches utilized have taken different forms, but the end results have been accepted by the individual service; and presumably are serving operational needs. In connection with the determination of the best techniques for analyzing the physical demand of jobs, it was reported by Wayne University that their study to develop a usable physical-demands, physical-capacity form for use by both medical personnel and job analysts showed promise. The U.S. Employment Service discussed work on the development of a functional system of occupational classification.

R 18

317

Worchel, P. THE ROLE OF THE VESTIBULAR ORGANS IN SPACE ORIENTATION. J. exp. Psychol., July 1952, 44, 4-10. (Univ. of Texas.)

317

The role of the vestibular organs in space orientation was investigated employing 32 subjects from a school for the deaf in a 2 X 2 X 2 factorial design: total vs. partial deafness, congenital vs. adventitious deafness, and vestibular sensitivity vs. vestibular insensitivity. In the space orientation tests, S was guided along a portion of a triangular path and then asked to return to the starting position. The results are in terms of accuracy of return to the starting positions, i.e., distance from final goal.

T. R 13

318 Sapon, S.M. & Saul, E.V. FINDINGS ON THE DIFFERENTIAL RESISTANCE TO NOISE OF FRENCH, SPANISH, AND ENGLISH. Georgetown University Monograph Series on Languages and Linguistics, Monograph 6, July 1954, 61-70. (Harvard University, Cambridge, Mass. & Tufts University, Medford, Mass.)

The present study attempted to assess the differential effects of noise on the intelligibility of spoken French, Spanish, and English materials. It was found that: a) for all languages studied, intelligibility is increased in context situations as opposed to isolated words, and in low-noise as opposed to high-noise conditions. This is in accord with previous well verified findings. b) Spanish displays a higher degree of intelligibility than either of the 2 other languages under most conditions. This superiority is generally apparent, and, in the noted instances, statistically significant, but the data do not permit an unqualified statement of the superiority of French to English with regard to noise resistance. c) Several hypotheses relating specific linguistic features as determinants of intelligibility have been assessed, with the finding that no single variable satisfactorily explains all of the obtained data. There is a further implication of practical value pertinent to the notion that some language other than English might be more efficient in communication systems and situations in which resistance to noise is critical.

R 10

Garner, W.R. CONTEXT EFFECTS AND THE VALIDITY OF LOUDNESS SCALES. *J. exp. Psychol.*, Sept. 1954, 48(3), 218-224. (Johns Hopkins University, Baltimore, Md.).

30 Ss were required to make half-loudness judgments with a method of constant stimuli. Each of 3 groups of Ss were given a different nonoverlapping range of variable stimuli to be judged with respect to a standard stimulus. The major results and conclusions are: a) For each group the mean intensity required for half loudness was not significantly different from the mid-point of the range of variable stimuli. Thus, the judgments were made almost completely with respect to the context of presented stimuli; b) Within each group there were large individual differences which were established early in the judgment series and were maintained over the entire series of judgments; c) It is concluded that such judgments are reliable but not valid for purposes of loudness scale construction; d) It is further pointed out that Os in general do not seem able to describe sensory magnitudes with a scale of numbers. Thus, sensory scale construction must depend on the use of converging operations which do not require the assumption of the valid use of number scales by Os.

R 9

Attneave, F. PRINCIPLES FOR THE ABSTRACT SIMULATION OF MOVEMENT OVER GROUND. A PRELIMINARY REPORT. Lab. Note SCRL 55-10, Nov. 1955, 6pp. Skill Components Research Lab., APPTRC, ARDC, Lackland AFB, Tex.

This "unpublished draft" of a preliminary investigation discusses principles involved in visual simulation of movement over ground (as in a helicopter). Six dimensions of movement are identified and displays that account for four of them are described briefly. Problems as yet unsolved are indicated.

I.

Garner, W.R. AN INFORMATIONAL ANALYSIS OF ABSOLUTE JUDGMENTS OF LOUDNESS. *J. exp. Psychol.*, Nov. 1953, 46(5), 373-380. (Johns Hopkins University).

To determine the effect of number of stimulus categories on accuracy of judgments of loudness and to examine some of the factors affecting judgmental accuracy, six subjects were required to make absolute judgments of the loudness of tones, using numbers corresponding to the number of stimulus categories. Six stimulus categories varying from three to twenty were used in separate experiments. The data were analyzed in terms of information transmission for judgmental accuracy as affected by number of categories, observer, preceding stimulus, distribution of stimuli and experimental session.

Davis, M., Eldredge, D.H., Glorig, A., Newman, E.B., et al. HIGH-INTENSITY NOISE AND MILITARY OPERATIONS: AN EVALUATION, Contract NMR 1151(01), Proj. NR 140 069, CHABA Rep. 1, Jan. 1954, 9pp. Armed Forces-NRC Committee on Hearing and Bio-Acoustics, Central Institute for the Deaf, St. Louis, Mo.

This report is an operational commentary and evaluation of the BENOX report (An Exploratory Study of the Biological Effects of Noise). A brief background sketch of the formation of the BENOX group is first given. Noise as an operational hazard is considered under the following topics: immediate and cumulative injury, operational importance of injury, specific effects of noise on man, and difficulties of assessing noise hazards. The remainder of the report describes various methods for avoiding and protecting against such noise; some of these deal with noise source, work location, personal protective devices, operational procedures, medical supervision.

322 Garner, W.R. A TECHNIQUE AND A SCALE FOR LOUDNESS MEASUREMENT. *J. acoust. Soc. Amer.*, Jan. 1954, 26(1), 73-88. (Psychological Lab., Johns Hopkins University, Baltimore, Md.).

A method of loudness scaling is presented for obtaining a true ratio scale of loudness. 2 separate loudness functions are required, 1 based on equisection judgments and the other based on fractionation judgments. Interrelation of these 2 scales allows determination of all constants necessary for a ratio scale. The method provides validation of the assumptions underlying its use. Experimental data are also presented which show that a) the method is valid for individual observers; b) differences between loudness scales of different observers are considerably reduced with the method; and c) the loudness function obtained with this method is much flatter than the standard scale now used. It is then shown that this new loudness scale is in better agreement with other data on equal loudness intervals than the standard scale. It is also shown that this scale is in agreement with monaural-binaural loudness data and data on loudness of multicomponent tones.

R 12

324 Davis, M., & Eldredge, D.H. FIRST ANNUAL REPORT OF THE ARMED FORCES-NATIONAL RESEARCH COUNCIL COMMITTEE ON HEARING AND BIO-ACOUSTICS. Contract NMR 1151(01), Proj. NR 140 069, CHABA Rep. 2, Feb. 1953-June 1954, 21pp. Armed Forces-National Research Council, Committee on Hearing and Bio-Acoustics, St. Louis, Mo.

The Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics (CHABA) was organized early in 1953 along the lines of the Armed Forces-National Research Council Vision Committee to provide consultation and advice to the Armed Forces in the general areas of a) the effects and control of noise, b) auditory discrimination, c) speech communication, d) the fundamental mechanism of hearing and e) auditory standards. The term "bio-acoustics" includes the direct non-auditory effects of high-intensity sound and vibration on man's body, the relevant problems of noise generation, measurement and control, and the psychological and social reactions of man and of animals to noise. The activities of CHABA are supported equally by the Army, Navy and the Air Force. One meeting of the full CHABA committee and 5 meetings of the CHABA Council have been held to date. 13 working groups have been appointed and 10 of them have accomplished their tasks and have been discharged. The most important single problem dealt with so far has been the possible effects on military personnel and operations of the intense noise caused by jet planes with afterburners on the decks of aircraft carriers and on flight lines. A CHABA working group guided the formation of a short-term study group ("BENOX") which during the summer of 1953 explored the biological effects of high-intensity noise on man and made recommendations for further research. The BENOX report was discussed at the first meeting of CHABA and its operational implications were evaluated by another working group in CHABA Report No. 1. The activities of the other 11 CHABA working groups are also summarized in the body of the present report, which is CHABA Report No. 2.

R 1

326

Duncombe, A. A SURVEY OF CURRENT ARMED FORCES RESEARCH ON PSYCHOLOGICAL SCREENING. Rep. HR 202/2, Dec. 1952, 15pp. US Research & Development Board, Department of Defense, Washington, D.C.

Armed forces research on psychological screening, for induction and for placement of marginal personnel, is surveyed. The topics covered are: a) development of the Armed Forces Qualification Test (AFQT); b) validation of the AFQT against combat performance; c) reports on the AFQT under operational conditions; d) malingering; e) administrative inductees; f) nonverbal tests of intelligence; g) utilization of personnel available for restricted assignment.

R 26

327

Forbays, D.G. & Irwin, J.A. MEASURES OF COMBAT CREW PERFORMANCE USED IN B-29 TRAINING. Proj. 511 023 0001, Tech Rep. 52 14, Dec. 1952, 13pp. USAF Combat Crew Training Research Lab., Randolph AFB, Tex.

327

In order to improve training and crew assignment of B-29 combat crews, the reliability of measures of crew effectiveness obtained during training was studied. This report analyzes such available objective measures of crew performance as: measures of radar bombing accuracy, scores on the ultrasonic trainer, measures of optical bombing accuracy, measures of navigation accuracy, and school grades. The interrelationships among these different measures, as well as instructor ratings, are presented. An attempt is made to assess changes in radar bombing scores resulting from training. Recommendations for further research are made.

T. R 3

329

Balke, B. RATE OF GASEOUS NITROGEN ELIMINATION DURING REST AND WORK IN RELATION TO THE OCCURRENCE OF DECOMPRESSION SICKNESS AT HIGH ALTITUDE. Proj. No. 21-1201-0014, Rep No. 6, Oct. 1954. USAF, School of Aviation Medicine, Randolph Field, Texas.

329

To determine the effects of pre-flight exercise, breathing ambient air or oxygen, on resistance to decompression sickness, 7 subjects performed calisthenics during simulated flights at 38,000 feet, while breathing oxygen. The flights were terminated when severe decompression pains developed. The results are analyzed in terms of the nitrogen elimination rate and the duration of decompression tolerance.

T. G. R 11

335

Dept. of Defense. MILITARY STANDARD-COLOR CODE FOR PIPELINES AND FOR COMPRESSED-GAS CYLINDERS. Mil-Std-101A, March, 1954, Superseding Mil-Std-101, July, 1949. Dept. of Defense, U.S. Government Printing Office, Washington, D.C.

335

This report specifies a military standard color and marking code for pipelines and compressed gas cylinders. Requirements met are: 1) unmistakable identification of contents of any system used for operational requirements, 2) distinctive markings to give immediate visual warning of systems that are dangerous, and the type of danger, and 3) markings for compressed gas cylinders compatible with attached piping. A general discussion of coding needs is included.

T. I.

336

Harris, J.D. THE ROLES OF SENSATION LEVEL AND OF SOUND PRESSURE IN PRODUCING REVERSIBLE AUDITORY FATIGUE. The Laryngoscope, Feb. 1954, 64(2), 89-97. (USN Medical Research Lab., New London Submarine Base, Conn.). (KRL Rep. 244).

A test for screening fatigue susceptible individuals was investigated. A tone of 2048 cps was sounded for 5 min. at 97 db sound pressure level (80 db on the audiometer). The individual's recovery curve was carefully plotted at 4096 cps., the region most affected by such stimulation. Results were analyzed in terms of sensation level (data of their own threshold) and physical intensity. Sensation level proved the more important parameter. Considerably more rapid recovery was found than reported previously by Wilson, who used, as a criterion of fatigue, inability to hear a tone 10 db over own threshold after 2 min. recovery. The present study shows a better criterion to be, either the time in seconds to return to within 5 db of own threshold, or the residual hearing loss after 1 min. It is of considerable importance to use a pulsing tone rather than a steady tone in determining threshold during recovery from stimulation, in order to minimize the irrelevant masking effects of the high tone tinnitus which very often follows stimulations such as used here.

R 6

337

Draper, J. A NOTE SUPPLEMENTARY TO "AN INTRODUCTION TO INFORMATION THEORY, WITH REFERENCE TO THE HUMAN OPERATOR". 1955, 4pp. Clothing and Equipment Physiological Research Establishment, Directorate of Physiological and Psychological Research, Ministry of Supply, London, England.

337

This is a supplementary note on a previous publication on information theory (see Acc. No. 232), in which the author defines and illustrates the derivation of formulae pertaining to the use of sample entropy as an estimate of population entropy.

338

Glichrist, J.C., Shaw, M.E. & Walker, L.C. SOME EFFECTS OF UNEQUAL DISTRIBUTION OF INFORMATION IN A WHEEL GROUP STRUCTURE. J. abnorm. soc. Psychol., Oct. 1954, 49(4), 554-556. Research Bull. AFPRC TR 54 116. (University of Wisconsin).

338

To test the effects of unequal distribution of problem-related information upon group performance in a four-person wheel group structure, an experiment was performed using 45 groups. Three conditions of information distribution were used: equal, unequal with most information located initially at center of structure, and unequal with a peripheral position initially receiving most information. Time, message units and errors were recorded and sociometric questionnaires on leadership and morale were analyzed. These data were studied by analysis of variance for effects of information distribution and of individual centrality.

T. R 2

339

Byrne, M.J., Willey, C.L., Weigle, Joyce M. & Luff, Ruth K. THE DEVELOPMENT OF QUALIFICATIONS STANDARDS FOR THE UTILIZATION OF CIVILIAN SKILLS IN THE NAVAL RESERVE. Contract NMR 883(00), June 1953, 27pp. Clifton Corporation, Washington, D.C.

339

The need for the establishment of standards for the enlistment of qualified civilians in the US Naval Reserve in advanced pay grades in various emergency service and exclusive emergency service ratings was the basis for the initiation of this research. An analysis of the enlisted rate and rating structure of the Navy was made to determine the possibility of preparing rating guides in terms of civilian qualifications. Such rating guides were then prepared for about 60 percent of the ratings. The methodology used for rating guide preparation was outlined. Experience and skill requirements, the most appropriate occupational and recruitment sources for ratings, and other relevant data of assistance to field recruits were included.

R 67

343 Duncombe, A.B. A REVIEW OF RESEARCH ON MILITARY INSTRUCTOR PROBLEMS. HR 202/3, April 1953, 23pp. Committee on Human Resources, Department of Defense, Research and Development Board, Washington, D.C.

One of the most crucial and difficult aspects of the management of training in the services is the selection of instructor personnel. The efficiency of any training program depends, in the last analysis, on the quality of the instructors who administer it. Until recently, the principal emphasis in selecting and training instructors has been based on subject proficiency, with relatively less weight placed on ability to teach. There has long been, within the services, a strong belief that any man who can perform a specific duty well can also be highly effective in teaching the performance of that duty to others. The ability to teach is now being recognized as a skill in itself, which requires aptitude, study, and practice to develop proficiency. Present research, in addition to continued concern with the development and validation of measurements of instructor proficiency, is increasingly emphasizing the determination of essential instructional and personal characteristics of effective instructors, based upon analysis of data obtained in a field situation. Studies of instructor morale, job satisfactions, and dissatisfactions are receiving increased attention and are particularly pertinent in view of the exceedingly high rate of turnover of instructor personnel. Quality of instruction suffers both from the forced utilization of a high percentage of inexperienced instructors and from the fact that instructors about to terminate service evidence low motivation.

345 McGehee, W. SURVEY OF PSYCHOLOGICAL PROBLEMS AND SERVICES IN NAVAL AVIATION. Contract N70NR 291, Rep. 12, June 1951, 4pp. USN Division of Aviation Medicine, Washington, D.C.

345 This report presents a survey of psychological research and services in naval aviation. Designed to discover which areas of research and service appear most likely to contribute to the improvement of naval aviation, the report offers observations and recommendations concerning such research areas as: the selection and classification of personnel training, equipment design, morale and operations fatigue, leadership, safety, communications, and so forth. Specific problems concerned with training aids, both their application and evaluation are presented.

349 Condit, D.M. A SYSTEM FOR HANDLING DATA ON UNCONVENTIONAL WARFARE (U). - INCLUDING A BIBLIOGRAPHY OF OPEN SOURCES. ORO Stud. 23. 5, TM ORO-T-339, May 1956, 185pp. Logistics Division, ORO, Johns Hopkins University, Chevy Chase, Md.

349 This document outlines a system for treating data on unconventional warfare so as to make such data available for immediate research. Mechanical information-holding systems, the M and addressograph machines, are compared with nonmechanical ones, the card catalogue and key-sort systems. Included is an extensive bibliography of open sources on the topic of unconventional warfare.
1. R many

360 Karcher, E.K., Jr., Dunn, T.F., Jensen, B.T. & Seeley, L.C. UNIT EFFECTIVENESS TESTS. Proj. DA 29565100, PJ 6502 01, PRS Rep. 923, Jan. 1952, 87pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

360 The problem studied here is that of evaluating the effectiveness of Army units as teams. This report contains both a manual on building tests for such evaluation and a model test. The manual treats three major problems: 1) general principles of unit evaluation, 2) developing the unit evaluation problems, and 3) planning the unit test administration. The model test for tactical operations (march, defense, and bivouac) of service units embodies the principles, techniques, and instruments discussed in the manual.

361 Havron, M.D., Fay, R.J. & Goodacre, D.M., III. RESEARCH ON THE EFFECTIVENESS OF SMALL MILITARY UNITS. Contract DA 49 063 OSAS1, PRS Rep. 916, April 1951, 92pp. USA Personnel Research Section, Adjutant General's Office, Washington, D.C.

361 This report presents the results of an extensive investigation on the effectiveness of small military units with specific emphasis on the development of small group training procedures and training aids. Utilizing a series of performance, interpersonal relations, and attitudinal scales, groups of rifle and scout squads were tested on two tactical field problems specifically defined for each type of squad. The results are presented and discussed in terms of the relationship among performance, attitudinal, and sociometric variables. Implications for selection and training procedures are presented along with some specific evaluative methods and training instruments.

364 Miller, R.B. ANTICIPATING TANKCROW'S MAINTENANCE JOB. Contract AF 33(033) 12921, Proj. 507 003 0001, Res. Rev. 53 1, March 1953, 21pp. USAF Human Resources Research Center, Lackland AFB, Tex. (American Institute for Research, Pittsburgh, Penn.).

364 This report covers research directed towards the development of a method for anticipating maintenance job requirements prior to the introduction of new equipment into the field. Procedures were developed for making complete concrete statements of the maintenance job. The methods rely on an analysis of what the man must do and are based on construction of the equipment plus data on malfunctions and corrective actions taken from maintenance activities. The technique was applied to Q-24 prototype data and compared with a similar analysis of the Q-24 production models used in the Strategic Air Command. Implications for training were discussed.
T. I. R 3

365 Quartermaster Food and Container Institute for the Armed Forces. FRI PREFERENCE RATINGS AS PREDICTORS OF FOOD CONSUMPTION. Proj. 7-64-15-007, Interim Rep. 1, Oct. 1956, 19pp. Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.

365 To determine the relation between food preference ratings and two measures of food behavior (consumption and acceptance on the serving line), 91 subjects rated 54 foods on a nine-point hedonic scale at the beginning and end of a four-week study. The 'A' ration was served cafeteria style and the subjects were at liberty to select type and amount of food. The amount of each food taken and eaten was recorded by individuals. Correlation coefficients were computed between mean preference ratings and average proportion of a normal serving consumed and also the proportion of subjects who accepted the items on the serving table. The two administrations were correlated. The results are discussed in relation to use of preference ratings in food acceptance work.
T. G. R 5

366

Glinos, A.D. BASIC CONCEPTS AND METHODS OF MEDICAL RESEARCH. Contract Nonr 401(2), 1954, 43pp. QMG. (Johns Hopkins University, Baltimore, Md.).

Scientific research methods are methods of isolating certain elements or aspects of physical reality. The methods in essence are conceived and designed to perform a specific kind of isolation. Medical research methods fall roughly into 3 categories according to the degree of complexity of the elements isolated: a) physical-chemical methods; b) biological methods; and c) clinical methods. The basic concepts of each of these methods are reviewed and their use described by examples. A final chapter uses case histories to illustrate the correct handling and proper integration of medical research methods.

R 57

367

Webb, W.B. ANNUAL REPORT. CONTRACT CMB 816-02. no date, 19pp. Washington University, St. Louis, Mo.

367

This study tests for Aviation Machinists Mates Class "A" School, the hypothesis that progressive retesting of previous course material at different stages of a course will increase retention of the earlier material at the end of the course. Three experimental groups consisted of a control, which had periodic tests only on the immediately preceding material, and two groups which expected to be tested on all preceding material, in each test. A discussion is concerned with problems in interpreting the results (test scores) and the implications for the Naval Air Technical Training program.

T.

370

Noble, C.E. SOME PHYSICAL SOURCES OF DIFFICULTY IN THE COMPLEX COORDINATION TEST CM701E. Proj. 509 020 0003, Res. Bull. 53 7, April 1953, 29pp. USAF Air Research and Development Command, Lackland AFB, Tex.

370^A

The research reported here was part of a large project directed towards improving tests of motor skills. This particular study represented a follow-up of previous research which established the difficulty of various parts of the Complex Coordination Test CM701E. In this test, the S was required to match the red light in a top row of lights with a green light in the bottom row by appropriate movements of stick and rudder controls. Certain physical sources of difficulty in performance were identified by investigating three apparatus variables: amplitude of response in ft., mechanical work in ft.-lbs., and degree of crossing of the aileron and rudder controls. A graphic technique was used to weight the importance of aileron, elevator, and rudder movements in each match.

T. G. R 7

374 Lyman, J. & Taylor, C.L. ELEMENTARY BIOTECHNOLOGY. Sept. 1953, 117pp. Engineering Dept., University of California, Los Angeles, Calif.

This report is a syllabus (circa 1953) on elementary biotechnology. It is designed to serve 2 aims: a) to familiarize the engineering student with some of the principles of human bio-science; and b) to lay a foundation for understanding of the problems arising out of the interaction between man and engineering systems. Background in chemistry, physics, engineering, and mathematics, as required in lower division engineering curricula, is prerequisite to the course. Topics covered include: a) the human body as a structure; b) biometry and measurement; c) basic principles of body function (biomechanics, circulation, and homeostatic processes); d) the mechanisms of physical actions (muscle structure and function, muscular-skeletal mechanisms, biomechanics of muscular activity, and physical labor); and e) the integration of human behavior (nervous mechanisms of behavior, learning and motivation, and man-machine stimulus and response systems).

R 8

376 Siegel, A., & Courtney, D. DEVELOPMENT OF PRACTICAL PERFORMANCE MEASURES. Contract Nonr 872(00), Institute Rep. No. 4, July 1953, 11. QMG, Psychology, Sciences Div., and Bureau of Naval Personnel, Personnel Analysis Div. (Institute for Research in Human Relations, Philadelphia, Pennsylvania).

The main objective of this study was to develop a manual which can be used as a guide in the construction of performance tests for Navy Personnel. Such a manual was constructed and the tests were administered by Naval personnel with minimal instruction in testing practice. It was found that enlisted men below the rate of Chief Petty Officers were not completely competent as test administrators, however, they did show acceptable inter-examiner reliability. The validity, reliability, and discriminating power of the tests in the Structural Mechanics and Aerial Photographers Batteries were evaluated. The acceptability of the tests was determined by interviews and the consensus of opinion indicated a desire and need for such a device. For the Aviation Structural Mechanic's Battery, it was found that the test-retest reliability was moderately high and that the tests in the Battery were adequately homogeneous and had acceptable discriminating power. For the Aerial Photographer's Battery, it was found that the tests in the Battery were adequately discriminating and seemed to demonstrate acceptable discriminating power.

R 6

378

U.S. Naval Training Device Center. SUPPLEMENT NO. 1 BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS. NAVEXOS P-1491, Sept. 1956, 1p. U.S. Naval Training Device Center, Port Washington, N.Y.

378

This supplemental bibliography lists ten reports from the Naval Training Devices Center, Port Washington, N.Y.

381

Melton, A.W. HUMAN RESOURCES RESEARCH CENTER PLANNING CONFERENCE ON PILOT TRAINING RESEARCH AT UNIVERSITY OF ILLINOIS, URBANA, ILLINOIS, 8-10 DECEMBER 1949. Conf. Rep. 50 1, Dec. 1950, 14pp. USAF Human Resources Research Center, Lackland AFB, Tex.

381

This conference on pilot training aimed to plan a comprehensive program of inservice and contract research. Eight training specialist participants, military and civilian, met for 3 days. A discussion of major needs and problems, such as research on proficiency measurement, and on training methods, started the program. Subjects discussed included flight checking, design of trainers, equipment design, activity analysis, and learning problems. Specific research recommendations were made.

382
Givens, M.D. (Chm.). SYMPOSIUM ON SCIENTIFIC AND SPECIALIZED MANPOWER. HR-RDP 200/1, June 1953, 12pp. Panel on Manpower, Committee on Manpower Resources, US Research & Development Board, Department of Defense, Washington, D.C.

382
This report includes 11 papers and a panel discussion given at the second symposium held by the Panel on Manpower of the Committee on Manpower Resources. The need for scientific and specialized (technical) manpower, in an environment of continuing partial mobilization and stepped-up defense research and production, have created a number of problems for industry, government, the armed forces, and educational institutions. The special need for scientific and engineering manpower is dealt with here by representatives of the various government agencies involved. The panel discussion evaluates the current situation and attempts to look ahead through the eyes of the US Department of Defense.
T. G. I. R 39

384
Munphrey, C., Thompson, J.E., & Versace, J. TIME SHARING AND THE TRACKING TASK. APL/AMU TG 201, July 1953, 4pp. The Johns Hopkins University, Applied Physics Laboratory, Baltimore, Md.

384
To establish the optimum rate of signal presentation (single-gun oscilloscope) for compensatory tracking, five trained subjects tracked a target on a rapidly changing course for varied rates of presentation (from five to fifty-five per second and constant). Mean errors and time on target data are given. Performance is discussed in terms of rate of signal presentation, time ratio of signal to no-signal, and subjective feelings of strain and fatigue.
T. G. I. R 3

388
Nickerson, J. L. THE ERGONOMICS RESEARCH SOCIETY SYMPOSIUM ON HUMAN PERFORMANCE, ITS MEASUREMENT AND LIMITATIONS. Tech. ONRL Rep. 84 53, June 1953, 12pp. ONR, American Embassy, London, England.

The papers presented at the Symposium illustrate the wide range of interests of this new Society. The first group of papers was concerned with information and communication and presented results on the measurement of selective power and the effect of "advance information." The second group of papers concerned the measurement of working performance and introduced the idea of the "steady-state" pulse as a practical indication of work tolerance. The third group concerned the applications of physiological measurement in actual factory working conditions and indicates the desirability of assigned rest periods and the importance of eliminating unnecessary stress, such as environmental temperature, dehydration and poor working posture. A fourth group of papers was represented by the presentation of an improved method of computing the average cycle time of a repetitive working performance.
R 0

390
Morris, Eugenia B. & Spragg, S.D.S. PERFORMANCE ON A FOLLOWING TRACKING TASK (MODIFIED SAM TWO-HAND COORDINATION TEST) AS A FUNCTION OF THE PLANES OF OPERATION OF THE CONTROLS. J. Psychol., 1953, 35, 107-117. (Psychology Dept., University of Rochester, Rochester, N.Y.).

The study was designed to investigate performance of a two-hand coordination task as a function of the planes of rotation of the controls. The SAM Two-Hand Coordination Test was modified so that each crank control could be placed so that it rotated in any 1 of the 3 following planes: a) horizontal, b) vertical and parallel to the frontal body plane, and c) vertical and perpendicular to the frontal body plane. The 9 resulting combinations necessitated 9 experimental groups and 1 control group (of 10 Ss each). The following 2 conditions were found to be superior to all others: a) with the 2 cranks rotating in the vertical plane parallel to the frontal body plane, and b) with the right crank rotating in the vertical plane perpendicular to the frontal body plane and with the left crank rotating in the vertical plane parallel to the frontal body plane. (MEIAS)
R 12

389
Morris, Eugenia B. & Spragg, S.D.S. PERFORMANCE ON A FOLLOWING TRACKING TASK (MODIFIED SAM TWO-HAND COORDINATION TEST) AS A FUNCTION OF THE RELATIONS BETWEEN DIRECTION OF MOTION OF CONTROLS AND DIRECTION OF MOVEMENT OF DISPLAY. J. Psychol., 1953, 35, 119-129. (Psychology Dept., University of Rochester, Rochester, N.Y.).

The present study was designed to investigate performance of a 2-hand coordination task as a function of the direction of rotation of the controls in relation to the direction of movement of the display. The SAM Two-Hand Coordination Test was used. 2 groups of 10 Ss each were given 4 trials, one on each of the following experimental conditions: a) clockwise (CW) rotation of the left crank moved the target follower to the left and counter-clockwise (CCW) rotation of the left crank moved the target follower to the right; b) CW rotation of the right crank moved the target follower towards S and CCW rotation of the right crank moved the target follower away from S; c) CW rotation of the left crank moved the target follower away from S and CCW rotation of the left crank moved it toward S; d) the left crank as in (a) and the right, as in (b). For Group I the right crank rotated in a vertical plane parallel to the frontal body plane and for Group II the right crank was placed so that it rotated in a vertical plane perpendicular to the frontal body plane. In terms of mean time on target (t) condition (b) was superior to (a), (c) and (d) both for Group I and Group II. In neither Group I nor II was any of the differences between conditions (a), (c) and (d) statistically significant. Group II was superior to Group I in terms of the overall estimate and in terms of each of the experimental conditions.
R 12

391

Simon, J.R., De Crow, T.M., Lincoln, R.S. & Smith, K.U. EFFECTS OF HANDEDNESS ON TRACKING ACCURACY. *PERCEPT. MOT. SKILLS* 1952, 5, 53-57. (University of Wisconsin, Madison, Wisc.).

391

This paper deals with two aspects of motion--hand usage and handedness--in relation to tracking accuracy. Forty subjects, half of whom performed a direct tracking task and half an aided tracking task, were used. Of each group of 20 subjects, ten were right-handed and ten were left-handed. Five of each of the groups were assigned at random to track with the right hand, while the other five used the left hand. The results were summarized in terms of the relative tracking accuracy obtained with preferred and non-preferred hands and of right- and left-handed individuals on both types of tracking tasks.

T. I. R 4

392

Dehoney, R.J. DAYLIGHT VIEWING CATHODE RAY TUBE INDICATOR FOR AIRCRAFT INSTRUMENTATION PRESENTATION COVERING PERIOD MAY 1, 1956 - July 31, 1956. Contract AP 33(600)-31115, SPS 4-(4-4156)-41727, Scientific Rep. 3, Aug. 1956, 13pp. Circuit Research Laboratories, Allen B. Du Mont Laboratories, Inc.

392

This is a progress report of the development of a small, compact cathode ray indicator package for use in aircraft under conditions of high ambient lighting. The general characteristics of the projected package are listed. Progress in development is noted and future work outlined.

393 Harris, S. & Smith, K.U. DIMENSIONAL ANALYSIS OF MOTION: V. AN ANALYTIC TEST OF PSYCHOMOTOR ABILITY. *J. Appl. Psychol.*, April 1953, 37(2), 136-141. (University of Wisconsin, Madison, Wisc.).

A special psychomotor test for separate measurement of the travel and manipulation components of motion has been described. The test, called the Analytic Reactionmeter, permits controlled variation and measurement of different bodily and space dimensions of motion which are involved in various types of motion patterns. Preliminary investigation employing the instrument have yielded the following general results: a) critical sources of variation in performance in various motion patterns of the type studied are related to the manipulation and travel components of motion; b) performances in different space dimensions of both manipulation and travel movements correlate highly with one another; c) the reliability of specific tests related to hands, planes, direction of travel, direction of manipulation and complexity of the manipulation pattern in the general test situation described typically exceeds + .80 for manipulation and + .75 for travel movements; d) the present test, and the principles behind it, provide one means of securing precise and analytical data for exact quantitative specification of motions and motion functions. Application of analytical methods described to studies of growth, aging, neurological deficiency, and to industrial selection may advance considerably the scientific validity of data concerning human motion.

R 6

394

von Trebs, Patricia & Smith, K.U. THE DIMENSIONAL ANALYSIS OF MOTIONS: IV. TRANSFER EFFECTS AND DIRECTION OF MOVEMENT. *J. Appl. Psychol.*, Oct. 1952, 36(5), 348-353. (University of Wisconsin, Madison, Wisc.).

394

This is a study in a series on training, and the components of certain complex motor activities. College students sat in front of a control panel, and turned switches according to prescribed patterns of movement. The apparatus allowed experimenter control of direction of motion, pattern, plane, distance of travel, etc. Each subject was trained for 8 days (32 trials) in one of four movement patterns, varying in direction, and was then tested for transfer on the others. Data were analyzed according to travel and manipulative components of motion. Results are reported for the various patterns.

T. G. R 3

395

Feiler, G. & Smith, K.U. LEARNING AND INTEGRATION OF COMPONENT MOVEMENTS IN A PATTERN OF MOTION. *J. Exp. Psychol.*, Nov. 1952, 44(5), 301-305. (University of Wisconsin, Madison, Wisc.).

395

The problem of the extent practice plays in the integration or correlation of component movements involved in a single motion pattern is investigated. The task consisted of turning switches--involving 5 manipulative and 4 travel movements which were measured by the "Universal Motion Analyzer"--arranged in 4 patterns of directional complexity. Four trials on each pattern were run on 4 successive days with female college students. Results are in terms of the intercorrelations between levels of complexity of the pattern and the days of practice with the movement components.

T. G. I. R 4

399

McKelvey, R.K. THE BEHAVIOR OF INDIVIDUALS AND PERSONNEL SYSTEMS IN THE SURVEILLANCE FUNCTIONS OF AN AIR DEFENSE DIRECTION CENTER: II. DISTRIBUTION OF VOICE COMMUNICATIONS AT FOUR CRITICAL CREW POSITIONS. Proj. 7712, Task 77207, AFTRC TR 54 99, Dec. 1954, 5pp. USAF Personnel & Training Research Center, Lackland AFB, Tex.

399

This report describes the frequency distribution of voice communications about certain critical points in the air surveillance section of an Air Defense Direction Center operating under standard system-maintenance conditions. The data (both direct and telephone communications) are analyzed and discussed with respect to directional characteristics, levels of activity as distributed among possible participants, relative utilization of available types of voice communication media, implications of limited manning and equipment utilization, and possible points of stress if present conditions should change.

T. G. I. R 1

400

USAF Office of the Inspector General. OPERATIONAL EXPERIENCE WITH EJECTION ESCAPE SYSTEMS FROM 1 JANUARY 1949 THROUGH 31 DECEMBER 1954. Publ. 23 55, AFR 190 16, Aug. 1955, 74pp. USAF Office of the Inspector General, Norton AFB, Calif.

400

This report presents an analysis of all (518) ejection seat bailouts from United States Air Force jet fighter and bomber aircraft since the beginning of ejection seat use (1 January 1949) through 31 December 1954. The efforts upon personnel as related to aircraft model, airspeed, altitude, crew training and other factors are presented; specific and general areas of difficulty in the operation of ejection seat and canopy systems are determined; and recommendations are presented for reducing the incidence of unsuccessful and/or accidental ejection. Some typical ejection briefs are included.

T. G.

401
 Spiehl, M. AN EXPLORATORY STUDY OF OPERATOR AND APPARATUS CHARACTERISTICS OF A FLEXIBLE GUNNERY RESEARCH DEVICE. Contract AF 33(038) 22936, Proj. 309 020 0007, Tech. Rep. 32 2, Oct. 1952, 13pp. USAF Perceptual & Motor Skills Research Lab. Lackland AFB, Tex. (State University of Iowa, Iowa City, Iowa).

401
 The need for economical research on perceptual and motor components of aerial gunnery has stimulated the use of simulators. Many such devices, however, contain inherent defects and are of questionable value for the improvement of performance through training. This report describes a redesigned Pedestal Sight Manipulation Test. The apparatus is evaluated on the basis of data obtained from 22 undergraduates (Ss), during seven days of four blocks of practice per day with 16 attack patterns of various speeds. Scores for azimuth, elevation, framing, triggering, and combinations are analyzed by days and calibration tests are reported. Modifications being made are detailed.
 T. G. I. R 3

402
 Taylor, C.L. ENVIRONMENTAL BIOTECHNOLOGY. Feb., 1951. Univ. of California, Dept. of Engineering, Los Angeles, California,

402
 This book is the syllabus of a course in human engineering designed for the training of undergraduate engineering students. It is organized in terms of the interaction between man and several physical parameters of his environment: temperature, atmospheric pressure and composition, visible and ionizing radiation, and mechanical and acoustic vibration. Under each topic the principal known biological facts are treated from the standpoint of their engineering implications.
 T.G. 855.

403
 Hamill, J.P. PROCEEDINGS OF FIRST FLIGHT SIMULATION SYMPOSIUM. NOVEMBER 1956. WSPG Special Rep. 9, Sept. 1957, 268pp. USA Ordnance Mission, White Sands Proving Ground, N.M.

403
 "Most of the papers concern simulation problems in the evaluation of missiles and other dynamic systems. Requirements and achievements in realistic simulation with particular regard to the solution of complex problems for advanced missile systems were discussed. Some papers also concern new equipment and arrangements."
 T. G. I.

404
 Warrick, M. J. COUNTERS FOR AIRBORNE USE. RDO No. 694-38, WADC Tech. Rep. 54-266. June 1954, 9pp. WADC, Aero-Medical Laboratory, Dayton, Ohio.

404
 This report is a survey and interpretation of psychological research pertinent to the design of counters for use on airborne equipment. Questions considered are: When should a counter be used? How fast should it rotate? In which direction should counter and its control rotate? Tentative recommendations for design are made and the need for further experimentation pointed out.
 I, R22.

405
 Baker, C.A. & Grether, Walter P. VISUAL PRESENTATION OF INFORMATION. Proj. No. 7180, WADC Tech. Rep. 54-160. August, 1954. 111 pp. USAF, Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio.

405
 This report (preliminary draft for one part of the Joint Services Human Engineering Guide to Equipment Design) presents recommendations, with some of the supporting data, which should aid the engineer in providing the most satisfactory visual presentation of information to the human operator. Chapter headings are Mechanical Indicators, Warning Devices, Cathode-Ray Tubes and Signal Coding, Printed Materials, Instrument Panel Layout, Lighting, and Visual Detection and Identification.
 T. G. I. R 92

406
 Madner, L., Zeeman, D. C. Pickett, J.H. PROPRIOCEPTIVE CONTROL OF A HAND. Contract Monr 631(00), Tech. Rep. 7, Aug. 1953, 9pp. Office of Naval Research. (University of Connecticut, Storrs, Conn.).
 An eyelid conditioning procedure was applied to three groups of subjects. Of the three groups, one (pre-tap) had organized a movement cycle in previous training, a second (tap) made identical repetitive movements during training but had no previous practice, and the third (no-tap) made no consistent overt movements. Conditioning was obtained in all three groups but learning was more stable when consistent proprioceptive feedback was present. The CR's of the pre-tap and tap group became highly synchronized with the beat-stroke of the movement cycle. The results are interpreted as indicative of a habit under proprioceptive control. Variation of the time relationship between internal and external cues is described. Current research in which overt and covert speech movements are used as the source of proprioception is discussed.
 R 3

407
 Graham, C.H. RESEARCH ON PERCEPTION, NATIONAL DEFENCE RESEARCH COUNCIL TWO, THE NETHERLANDS. Tech. Rep. ONWL-80-53. June, 1953. 6pp. Office of Naval Research, American Embassy, London, England.

407
 This report summarizes important research on perception and other sensory processes being carried on by the Research Unit for Observations, one of the groups working under the National Defence Research Council in The Netherlands, Dr. M.A. Bouman, Director. Included are summaries of research in visual thresholds, night myopia, electrical stimulation of the eye and some clinically oriented work in the auditory processes. Training in night vision is given on equipment in the laboratory.
 R 7

408
 Willis, M.P. & Farnsworth, D. COMPARATIVE EVALUATION OF ANOMALOSCOPES. Proj. NM 003 041.26.01, Rep. No. 190. Aug., 1954. 89pp. U.S. Naval Submarine Base, Medical Research Laboratory, Bureau of Medicine and Surgery, Navy Department, New London.

40
 To investigate the soundness of current ideas of anomalous color vision and the use of the anomaloscope as a color vision test, a selected sample of 14 individuals were examined on six types of anomaloscopes and a battery of color vision tests of progressive stringency. Conclusions were derived from the data concerning the relative diagnostic value of the various instruments, the theoretical significance of scores, distribution of anomalous trichromatism, and relations among types of anomalies. A scoring method is proposed that can be applied to all anomaloscopes to give comparable scores.
 T.G.I.R 37.

409 Spragg, S.D.S. & Rock, M.L. DIAL READING PERFORMANCE AS A FUNCTION OF BRIGHTNESS. J. Appl. Psychol., April 1952, 15(2), 128-137. (University of Rochester, Rochester, N.Y.)

Experiments are reported on the speed and accuracy with which subjects can read photographic reproductions of instrument dials as a function of the brightness of the dial markings. Young adult males, previously screened so that they constituted groups with excellent visual abilities, served as subjects in dial reading tasks. A brightness range of 0.005 to 6.0 foot-lamberts was used. Both for time and for error frequency scores a critical brightness level was found at approximately 0.02 foot-lamberts. At brightnesses below this level performance was increasingly impaired; above this level increases in brightness produced little or no improvement in visual performance. These findings suggest that for the nighttime operation of equipment where dial-reading and comparable visual tasks are involved brightness values should be kept safely above the critical 0.02 foot-lambert level. As long as this is done visual performance will be as rapid and as accurate as at higher levels (i.e., brightness ceases to be a significant variable.).

R 15

410 Blackwell, H. R. STUDIES OF THE FORM OF VISUAL THRESHOLD DATA. J. opt. Soc. Amer., Vol. 43, No. 6, June 1953, 456-463. Contract No. N5ori-116, Proj. NR-142-104, T.O. V. Office of Naval Research. (University of Michigan)

410 To study the form of visual threshold data so that the most appropriate procedure for analyzing the data can be selected, three alternative assumptions are compared and examined critically. The assumptions are that the data will conform to (1) Poisson sums, (2) normal ogives, or (3) log normal ogives. Experimental data (27,482 threshold measurements for four subjects under constant physical conditions) are reported and curves fitted to them by the three procedures. Both theoretical and practical implications of the comparisons are discussed.

T. G. R 15

411 Lincoln, R.S. & Smith, K.U. SYSTEMATIC ANALYSIS OF FACTORS DETERMINING ACCURACY IN VISUAL TRACKING. Science, Vol. 116, No. 3008, Aug. 1952, 183-187. (Dept. Psychology, University of Wisconsin, Madison.)

411 In this study of factors determining accuracy in visual tracking, systematic analyses were made of the following aspects of tracking precision: a) the instrumental relations of the tracking motions; b) the ratios of motion between hand controls and visual cursors; c) learning in relation to different component movements in the tracking response; and d) target characteristics. The results of a series of experiments designed to investigate these factors are presented and discussed in terms of the particular effect of each factor upon tracking accuracy and also in terms of the general aspects of the process of motion.

G. I.

412 Spragg, S.D.S. & Rock, M.L. DIAL READING PERFORMANCE AS A FUNCTION OF COLOR OF ILLUMINATION. J. Appl. Psychol., 15(3), June 1952, 196-200. Contract W3 038-16 18317. USAF AFMATERIAL Command, Aero Medical Lab. (University of Rochester).

To investigate the effect of color of illumination on dial reading performance, twenty young men with excellent visual abilities read dials (photographic reproductions) at two brightness levels (0.1 and 0.01 foot-lamberts) under four colors of illumination (yellow-green, yellow-orange, orange-red, deep red). Speed and accuracy scores are analyzed in terms of the four colors of illumination. Recommendations are made for illumination color to be used at these brightness levels.

T. G. R 3

413 USAF Directorate Flight Safety Research. OXYGEN EQUIPMENT PROBLEMS. PERIOD: 1 JULY 1953 THROUGH 30 JUNE 1954. Publ. 2 55, Feb. 1955, 52pp. USAF Directorate Flight Safety Research, Norton AFB, Calif.

413 The data relative to oxygen equipment problems that occurred during the period July, 1953 through June, 1954 were analyzed in an effort to determine the extent of the problem and to recommend remedial steps. The analysis was made relative to 1) oxygen regulators and 2) oxygen equipment other than regulators. Major causes of in-flight hypoxia were determined. Recommendations for corrective action are included.

T. I.

414 Lincoln, R.S. & Smith, K.U. **VISUAL TRACKING: II. EFFECTS OF BRIGHTNESS AND WIDTH OF TARGET.** *J. Appl. Psychol.*, Dec. 1952, 36(6), 417-421. (University of Wisconsin, Madison, Wisc.).

The present study comprises 3 experiments concerned with the psychophysical determination of error in direct tracking of a target. It has been found that the pattern relations of target and cursor are related to accuracy of visual tracking. A vernier relation of target and cursor generally produces more accurate performance than an overlapping pattern of target and cursor when the chief of the two elements of the visual presentation is the same. Illumination level of target and cursor affects accuracy in tracking. At low illuminations, accuracy drops off decisively for a cursor pattern which overlaps the target. Generally, the effects of change in illumination in relation to variations in the pattern of target and cursor, as well as alterations in the width of the target, are marked by complex interactions which make it difficult to formulate simple rules regarding these relations. By far the most significant result of this study is the observation that an increase in the width of the target produces no marked change in the level of tracking accuracy. Targets some thirty times the width of the controlled cursor are tracked with almost the same accuracy as targets equal to the width of the cursor. In fact, under some conditions, maximum levels of accuracy are found with targets of a width greater than the width of the cursor. These results are secured under conditions in which the criterion of error remains fixed for all target widths. The target-width effect, as observed here, suggests that the psychophysical laws of tracking behavior deal mainly with phenomena of organization of visual pattern rather than tolerances of alignment and misalignment of visual contours. The tracker's accuracy is determined by precision in scaling or bisection of the visual pattern rather than in terms of the optical resolution of limiting contours that define the visual presentation.

R 0

418 Stuntz, S.E. **CURRENT PROGRAM OF RESEARCH IN SELECTION OF SUBMARINE SONAR OPERATORS.** Proj. NM 003 041.07.02, Rep. 201, Dec. 1952, 25pp. USN Medical Research Laboratory, Bureau of Medicine & Surgery, Navy Department, USN Submarine Base, New London, Conn.

With the advent of new sonar gear and new sonar doctrines, present methods of selecting pre-submarine sonarman are found to be outdated. This paper is a prospectus for further research together with an account of the initial steps recently taken by the Naval Medical Research Laboratory. The problem is considered to have two phases: a) thorough analysis of the job to be performed; and b) evolution of selection tests which will predict success in that job. Each of these two areas has several aspects. In attacking the problem, eight specific research procedures have been devised and are being actively pursued. It is urged that anyone who has a positive contribution to offer in the guidance of such a program or in the interpretation of results communicate with the Officer-in-Charge, Medical Research Laboratory.

R 17

415 Lincoln, R.S. & Smith, K.U. **TRANSFER OF TRAINING IN TRACKING PERFORMANCE AT DIFFERENT TARGET SPEEDS.** *J. Appl. Psychol.*, Oct. 1951, 35(5), 358-362. (University of Wisconsin, Madison, Wisc.).

415 This study investigated the effect of training in tracking at one target speed upon later performance at different target speeds. The task was to maintain (by turning a crank) an indicator in alignment with a target traveling an erratic path, driven by a constant-speed motor. The sequence of training at three different motor speeds (23, 30, and 37 rpm) was varied among 36 Ss. Mean time on target is analyzed and discussed with regard to the transfer of training at one speed to performance at different speeds.

G. I. R 1

417 Williams, R.L. **STATISTICAL SYMBOLS FOR MAPS: THEIR DESIGN AND RELATIVE VALUES.** Contract NR 088-006, Nonr 609(G3), March 1956, 115pp. ONR, Yale University Map Laboratory.

417 This study is concerned with the manner in which value symbols used in maps are interpreted by the average map user. In particular, the author is concerned with establishing a table of values presenting necessary information to the cartographer with regard to the visual experience of spot and tone (or overall pattern) symbols. Having selected a series of appropriate symbols experiments were conducted to determine how the shapes of spot symbols are visually related, to ascertain the variation in size of any one symbol necessary for representation of a scale of values visually, and finally, with regard to tone symbols, to develop tables indicative of optimal area relations. More definitive aspects of the above questions were assessed and are discussed in detail.

T. G. I. R many

419 Hartman, B.O. **THE EFFECT OF TARGET FREQUENCY ON PURSUIT TRACKING.** Proj. 6 95 20 001, Rep. 263, March 1957, 14pp. USA Medical Research Labs., Psychology Dept., Fort Knox, Ky.

To determine the effect of target frequency upon two manual pursuit tracking of simple one-dimensional sine input, eight subjects were trained and then tested on six target frequencies (from ten to sixty cycles per minute). The target was a single vertical line moving on horizontal axis (maximum amplitude, 14 inches); the "following" cursor was a similar vertical line below the target and was controlled by a simple, springless joystick. Time-on-target and number of hits were obtained for 144 scoring periods of 75 seconds and were analyzed as functions of target frequency. In addition, a graphic record was taken for one trial period at each frequency and studied for characteristics describing tracking responses. The results are discussed in relation to man's basic motor performance.

T. G. I. R 5

420

Ramsley, Anita I. & Morris, J.D. COMPARATIVE ANALYSIS OF NORMAL SPEECH AND SPEECH WITH DELAYED SIDE-TONE BY MEANS OF SOUND SPECTROGRAMS. Proj. RM 003 041 .56 .03, Rep. No. 248. April 1954. 7pp. U.S. Naval Submarine Base, Medical Research Laboratory, Bureau of Medicine and Surgery, Navy Department, New London.

A delayed side-tone is defined as the sound of his own speech reaching a speaker's ear after a controlled delay interval. The effect of this echo of his own voice was investigated by having subjects read a simple story which included all the words in a phonetically balanced list. The story was first read and tape-recorded in the presence of a side-tone with a delay of .18 sec., and then repeated without a side-tone. The intensity of the side-tone was sufficient to mask the subject's voice at the moment of speaking. Analysis of recordings was undertaken with only those subjects whose speech was affected by the side-tone, i.e. showed stammering, stuttering, hesitation, or blocking. Recordings of a stuttered phrase and the same phrase spoken normally by the subject were analyzed spectrographically. In nearly every case, a phrase spoken in the presence of a side-tone was longer and more emphasized than it was in the absence of a side-tone. The frequency pattern of the word was very often dependent on what immediately followed. If a word was repeated, it resembled, in its first appearance, the word in isolation, but its repetition was more similar spectrographically to the word spoken in the same phrase without the side-tone. This shows the change which the word undergoes in anticipation of its connection with a following word: a) speech, analysis by sound spectrogram; b) sound spectrograms for speech analysis; c) delayed side-tones, effect of, on speech; d) stuttering, as caused by delayed side-tones.

R 4

422

Edwards, W. THE THEORY OF DECISION MAKING. Psychol. Bull., July 1954, 51(4), 380-417. (Johns Hopkins University, Baltimore, Md.). (DNR Rep. 166 1 182).

Economists and others have been developing mathematical theories about how people make choices among desirable alternatives. These theories center on the notion of the subjective value, or utility, of the alternatives among which the decider must choose. They assume that people behave rationally, that is, that they have transitive preferences and that they choose in such a way as to maximize utility or expected utility. The traditional theory of riskless choices, a straightforward theory of utility maximization, was challenged by the demonstration that the mathematical tool of indifference curves made it possible to account for riskless choices without assuming that utility could be measured on an interval scale. The theory of riskless choices predicted from indifference curves has been worked out in detail. Experimental determination of indifference curves is possible, and has been attempted. But utility measured on an interval scale is necessary (though not sufficient) for welfare economics. Attention was turned to risky choices by von Neumann and Morgenstern's demonstration that complete weak ordering of risky choices implies the existence of utility measurable on an interval scale. Mosteller and Nogee experimentally determined utility curves for money from gambling decisions, and used them to predict other gambling decisions. Edwards demonstrated the existence of preferences among probabilities in gambling situations, which complicates the experimental measurement of utility. Coombs developed a model for utility and subjective probability measured on an ordered metric scale, and did some experiments to test implications of the model. The theory of games presents an elaborate mathematical analysis of the problem of choosing from among alternative strategies in games of strategy. This paper summarizes the main concepts of this analysis. The theory of games has stimulated interest in experimental games, and a few bargaining experiments which can be thought of in game-theoretical terms have been performed. R 209

423

Special Devices Center. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS. Rep. No. NAVEXOS P 530 B Jan. 1954 (revised). Office of Naval Research, Special Devices Center, Port Washington, Long Island, New York.

This report is a bibliography of 435 reports in the area of human factors produced by the Office of Naval Research. The reports are organized under broad subject matter titles, and by report numbers within these categories.

R 435

425

Whiteside, T.C.D. VISION IN AN EMPTY VISUAL FIELD: RATE OF RELAXATION OF ACCOMMODATION. FPRC 897, Sept. 1954, 11pp. Flying Personnel Research Committee, RAF Institute of Aviation Medicine, Farnborough, Hants, England.

When a stimulus at a far point is suddenly removed, accommodation increases involuntarily until it reaches the resting level about 0.5 to 0.1 dioptre. It is possible to increase accommodation voluntarily by causing the eyes to converge, but it is not possible to remain focussed at the far point if the stimulus there has disappeared. This experiment measures the rate at which accommodation assumes its resting level after loss of a stimulus at the far point, and after looking at a near stimulus. It is not possible to give rigid values, since the "resting level of accommodation" fluctuates between 0.5 to 2 dioptres, but in general, the results show that after losing sight of a near and a distant stimulus, accommodation takes about 60 sec. to reach its resting value. After loss of the near stimulus, 60 sec. are required before relaxation can take place to the resting level, and after loss of a distant stimulus, although the S with normal eyesight tries to remain focussed at infinity, his eyes inevitably focus at the resting level about 1/2-2 meters away within 60 sec.

426

Simanorck, J.E. & Harris, I.D. PHASE V (ADVERSE WEATHER) FLIGHT TEST OF THE F-84F-15 AIRCRAFT. S 430 296, Tech. Note NCT 54 52, July 1954, 57pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

426

Flight tests were conducted to evaluate the suitability of the F-84F type aircraft for night and all-weather operation. Data obtained during the evaluation have been used to prepare recommended flight techniques and procedures. The F-84F is a single-place, swept-wing, high-altitude fighter aircraft.
T. G. I.

427

Roseboom, J.H., Jr. EFFECTS OF WEAPON-ASSIGNMENT DOCTRINES ON SMALL-SCALE SURFACE-TO-AIR MISSILE BATTLES. Tech. Memo. ORO-7-331, Feb. 1956, 45pp. Operations Research Office, The Johns Hopkins University.

427

This study was designed to determine the differential effects of weapon-assignment doctrines on small-scale surface-to-air missile battles. The investigation consists of analysis and computation of data concerned with uniform weapon-assignment doctrine, missile allocation, kill probability, decoy inclusion, etc. Conclusions are drawn concerning the interaction of such factors and their effects on defense systems. Included are tables of survivor probability distributions for uniform assignment of various numbers of missiles per battle.
T. G.

428

Robson, R.A.H. & Chapin, F.S. RESEARCH ON THE RELATION OF COMMUNICATION AND MORALE. FINAL REPORT ON PROJECT D. Contract NSCGR 66216, April 1953, 12pp. University of Minnesota, Minneapolis, Minn.

428

To ascertain the effects of various types of progress reports on the "morale" of a group, 240 subjects were assigned to nine different groups on the basis of high or low valence values held by the individual subject. The degree of valence was ascertained by observations made before the experimental session began. Six high valent and three low valent groups performed coding operations in a simulated Civil Defense Headquarters Communications Center. Six types of progress reports (continued failure or success, success followed by failure or the reverse, fluctuating success followed by failure, and success followed by no information) were given for 35 minutes, following which they could keep on working or could stop. Group performance and cohesiveness were then compared for the various valence groups. T. I.

431

Novick, D. WEAPON-SYSTEM COST METHODOLOGY. Proj. Rand, Rep. R-287, Feb. 1956, 52pp. The Rand Corporation, Santa Monica, Calif.

431

This article describes the development and technique of application of a method for estimating the cost of existent and hypothetical weapon systems of the U.S. Air Force. The role and methodology of cost estimates in system analysis is discussed along with specific aspects of Rand weapon system cost methodology.
T. G. I. R 25

432

Duerfeldt, C.H. AIRCRAFT PLASTIC INSTRUMENT LIGHTING PANELS AND INDIVIDUAL LIGHTING FIXTURES, LIGHTING EVALUATION OF F 52F-1. Proj. TFD PTR FL 52021, Rep. 2, Final Rep, July 1956, 8pp. Naval Air Test Center, U.S. Naval Air Station, Patuxent River, Md.

432

This study was designed to evaluate various non-standard plastic instrument lighting systems. Illumination levels, photographs of the panels, and the recorded observations and comments of pilot and co-pilot were used to evaluate and compare the non-standard plastic edge lighting (sandwich type) panels with the same panels equipped with standard individual shield lighting. The results are presented and discussed in terms of the relative adequacy of illumination provided by the various systems. Positive and negative aspects of plastic edge lighting are outlined.
T. I.

433

Keats, E.S. DAYTIME MARKER: DRIFT AND VISIBILITY TESTS OF. LETTER REPORT 1, FINAL REPORT. Proj. TED PTR AR 44308, AT31 3, Jan. 1954, 5pp. USN Air Test Center, Naval Air Station, Md.

433

To test the drift characteristics and visibility of the Tow Target Recovery Buoy, comparisons were made with a standard stock Mark 5 Drift Signal. Under conditions of a two to three knot wind and a 12 to 14 knot wind, the positions of the two markers, which had been simultaneously launched by hand, were noted at the end of one hour for the first condition and at the end of 20 minutes for the second. Visibility distances were estimated by a pilot of an airplane flying at altitudes of 100, 600, and 1,000 feet. Recommendations are included.
T. I. R 1

435

Pride, A.M. INVESTIGATION OF RADIO RECEIVER OUTPUT POWER REQUIREMENTS IN AIRCRAFT RADIO SYSTEMS. Proj. TED PTR EL 41005, ET314 7, Feb. 1953, 47pp. USN Air Test Center, Naval Air Station, Md.

435

Investigations of radio receiver audio output power requirements in various aircraft radio systems were carried out. Correlation among the several factors affecting the usable audio power levels is masked by the marked variations in the required levels among several individuals, as well as for a single subject at different times and under differing conditions. However, the average values of audio output power contained in this report are considered the minimum satisfactory values for the various aircraft in which the tests were conducted.
T. G.

436
Havron, M.D., Greer, F.L. & Galanter, E.H. AN INTERVIEW STUDY OF HUMAN RELATIONSHIPS IN EFFECTIVE INFANTRY RIFLE SQUADS. Contract DA 49 083 OSA 520, Proj. 295 35100, Subtask 81, Personnel Res. Section PR 35E1, PRS Rep. 983, Dec. 1952, 117pp. USA Personnel Research Section, Department of the Army, Institute for Research in Human Relations, Philadelphia, Penn.

The object of the study was to find out some of the factors present in individual squad members and their interpersonal relationships which contribute to small-unit effectiveness in combat. Rifle squads of an infantry division were graded on a 4-phase field problem. Members of the 13 highest-scoring and 13 lowest-scoring squads were interviewed and tested. From a comparison of results, it was found that the members of the more effective squads were better acquainted with each other, took more pride in their squad, and were more aware of each other's feelings and attitudes. The leaders of the better squads were more willing to act on their own initiative, paid more attention to the feelings of their squad members, were more level-headed in a tense situation, and were more often regarded as acting as squad leaders should act. These personal factors affecting squad performance can be grouped under 2 headings: a) those factors which make members of a squad willing to work toward a common purpose, b) those which hinder or help squad members in accomplishing their assignments.
R 17

437

Mahler, M.R. & Monroe, M.H. HOW INDUSTRY DETERMINES THE NEED FOR AND EFFECTIVENESS OF TRAINING. FINAL REPORT. Contract DA 49 063 CSA 313, PR 4477, PRS Rep. 929, March 1952, 152pp. USA Personnel Research Section, Adjutant General's Office, Washington, D.C. (The Psychological Corporation, New York, N.Y.).

437

Training techniques in industrial organizations were surveyed by a review of the literature, questionnaire material from 150 companies, and visits to 30 selected companies. A 20-page summary of the literature is included, with about 10 pages summarizing the questionnaire results, and case histories presenting material on training needs, methods, aids, and results occupying four more chapters. A sample of the questionnaire itself is included.
T. G. R 70

438

Gordon, D.A., Campbell, J.T., Johnson, C.D., Woods, I. A. & Yaukey, D. VALIDATION OF PERSONNEL MEASURES AGAINST COMBAT PERFORMANCE OF ENLISTED MEN IN KOREA. IIIB. VISION TESTS. Army Proj. No. 29535100, PJ 3512-11, PRS Rep. 942, Apr. 1952, 5pp. Dept. of the Army, Personnel Research Section, Adjutant General's Office, Personnel and Procedures Branch.

438

To determine the effectiveness of visual acuity tests for use in assigning men to combat duty, the Armed Forces Far Visual Acuity Test at high brightness and the Ortho Rater at three decreasing levels of illumination were administered to 467 enlisted men of the 35th Infantry in Korea. Combat ratings were obtained through individual interviews with from one to four noncommissioned officers who knew the men rated. Pearsonian correlation coefficients between test scores and the criterion ratings were calculated and are discussed in terms of the validity of acuity tests for predicting combat performance.
T.R3.

439

Richardson, Bellows, Henry & Co., Inc., New York, N.Y. EVALUATION PROCEDURE FOR TRAINING AIDS AND DEVICES. 1953 FORM. NAVEXOS P 1090, 1953, 46pp. USN Special Devices Center, Port Washington, N.Y.

439

This document contains several copies of a form designed for use in evaluating training aids and devices. The procedure has three parts: I. Method of Use; II. Educational and Training Characteristics; III. Device Limitations. The document includes instructions for using and scoring the form, a percentile table for interpreting scores, and a recommended form for reporting results of evaluation.
T.

440

Richardson, Bellows, Henry & Company, Inc. MANUAL FOR USING SOC-CAR EVALUATION PROCEDURE FOR TRAINING AIDS AND DEVICES. 1950, 33pp. Richardson, Bellows, Henry & Company, Inc., New York, N.Y.

440

This is a questionnaire for obtaining from instructors information to be used in the evaluation of training aids. It covers the purpose of the training, a description of the training device, rating of the device, and the use of the device. Included are manuals for use and for scoring of the questionnaire.

441

Mock, R.O. FEEDING ON A LONG-RANGE FIGHTER MISSION (OPERATION FOX PAT). Tech. Note 56-5, Proj. 7156, Jan. 1956, 6pp. Aero Medical Laboratory, WADC, Wright-Patterson, AFB, Ohio.

441

This study was designed to evaluate the utilization of liquid foods as solution to the problem of feeding pilots on long range fighter missions. Pilots were asked to demonstrate preference for eight liquid foods (consisting of juices and flavored milk) and then permitted to select four cans of liquid foods for use on a long over-water flight. In-flight ratings were obtained for initial and return flights (pilots also permitted choice prior to return flight). Mean number of hedonic ratings and number of units consumed during flight were computed. Conclusions are drawn concerning the general suitability of liquid foods and the popularity of juices vs. flavored milk drinks.
T. R 1

443

Klemmer, E.T. TIME SHARING BETWEEN AUDITORY AND VISUAL CHANNELS. Proj. 7682, ca. 1956, 5pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C.

Three Ss were given tests in which they attempted to follow flashing lights and brief tones by pressing appropriate keys. Only one channel was activated at a time and the rate of alternation between channels was varied systematically between tests. The rate of stimulus presentation in the active channel was 2 per sec. and 3 per sec. in separate tests. The results indicated that forcing S to alternate regularly between tasks more rapidly than once every 2 sec. lowers his over-all performance sharply. It also appeared that forced time sharing between tasks of different difficulties leads to a greater decrement in performance on the easier task. The average reaction time during alternation was close to that for the more difficult channel alone.
R 0

449

Grings, W.W. (Principal investigator) SHIPBOARD OBSERVATION OF ELECTRONICS PERSONNEL: IMPLICATIONS FOR CERTAIN OPERATIONAL AND ADMINISTRATIVE PROBLEMS. Contract Nonr 228(02), Proj. NR 153 093, Tech. Rep. No. 6, June 1953, 61pp. ONR, University of Southern California, Dept. of Psychology, Los Angeles, Calif.

This report is one of a series based upon descriptions of electronics maintenance as observed on twenty ships of the destroyer class within the Pacific Fleet. The descriptions themselves were objective in nature and they attempted to produce an accurate non-evaluative "picture" of the current electronics situation. The present report presents those elements of the situation which are relevant to problems of shipboard organization and matters of higher policy. The organization of various electronics technician's groups is described along with the effects of the various forms of organization. The electronics material officer's relation to the maintenance situation is discussed. Effects of certain shipboard administrative arrangements are described in the section concerned with the role of the bridge in the electronics situation. Formal and informal methods for relaying requests for repair are described, and the effects of each type are discussed. The feasibility of combining certain of the electronics ratings is considered, and some material problems affecting maintenance are pointed out.

450
Grings, W.W. & Bryan, G.L. SHIPBOARD OBSERVATION OF ELECTRONICS PERSONNEL: BRIEF DESCRIPTIONS OF RELATED ELECTRONICS JOBS. Contract N0NR 228(02), Proj. Des. NR 153 093, Tech. Rep. 5, April 1953, 99pp. Department of Psychology, University of Southern California.

450
This report is one of a series based on shipboard observation of electronics personnel aboard ships of the destroyer class. Job descriptions of five major job classifications (electronics technician, sonarman, radarman, radioman, and fire controlman) are presented in terms of duties and activities, time estimates for each activity during various shipboard conditions, and the materials and tools used. A discussion of the relationships among the ratings in terms of the above items is presented.
T. G.

451
Grings, W.W. SHIPBOARD OBSERVATION OF ELECTRONICS PERSONNEL: SHIPBOARD ACTIVITIES OF ELECTRONICS TECHNICIANS. Contract N0NR 228(02), Proj. NR 153 093, Tech. Rep. 4, March 1953, 95pp. Department of Psychology, University of Southern California.

451
This report contains a detailed and objective account of the electronics technician at work aboard ships of the destroyer class. A general description of the technician's job is given and the general maintenance situation is considered - types of repairs performed and activities associated with electronics repair. Material, as well as behavioral, factors influencing repair are discussed. Conditions that limit maintenance are considered in detail. An evaluation is made of the critical requirements of the electronics technician in terms of general abilities, job knowledge and skills.
T. R 6

452
Grings, W.W. (Princ. Investigator). SHIPBOARD OBSERVATION OF ELECTRONICS PERSONNEL: IMPLICATIONS FOR THE TRAINING OF ELECTRONICS PERSONNEL. Contract N0NR 228(02), Proj. NR 153 093, Tech. Rep. 3, Feb. 1953, 65pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

452
The data obtained in the course of an extensive series of observations aboard ships of the destroyer class are examined from the standpoint of the technical training of electronics personnel within the Navy. Descriptions of the kinds and amounts of training in electronics maintenance are presented with discussion of attendant problems. Judgments of the electronics technicians regarding the relevance of their training are presented and discussed. Evidences of specialization and its effects are treated. Attitudinal and other nontechnical aspects of training are discussed. Electronic training levels of the enlisted men who start electronics maintenance training are indicated along with attendant problems.
T.

456
Williams, S.B., Bare, J.K., Canestrari, R.E., Jr. & Zuidema, Doris. OPERATOR EFFICIENCY AS A FUNCTION OF SCOPE SIZE. FINAL REPORT. Contract AF 33(635) 2882, Task 75005, 1956, 31pp. College of William and Mary, Williamsburg, Va.

456
To investigate the relationship between signal size and display size as it affects operator efficiency, detectability thresholds (signal at any one of 72 positions) and visibility thresholds (signal position known) were determined for two practiced subjects on a simulated radar scope. Signal sizes varied from 2 to 16 millimeters in diameter; scope sizes from 7 to 28 inches in diameter; scope brightness, approximately 0.5 foot lamberts; signal brightness, average 5.57. Detectability thresholds are analyzed as functions of scope size and signal size and their interactions. The effect of area of search on detectability and visibility thresholds is demonstrated.
T. G. I. R 3

458
Abelson, R.P. SPECTRAL ANALYSIS AND THE STUDY OF INDIVIDUAL DIFFERENCES IN THE PERFORMANCE OF ROUTINE, REPETITIVE TASKS. Contract N6ONR 27020, Proj. NR 150 008, March 1953, 108pp. Educational Testing Service, Princeton, N.J.

458
Several methods of analyzing time-ordered data were considered for studying individual differences in the performance of routine, repetitive tasks; spectral analysis was selected and its suitability for analyzing such data was then confirmed by applying it to available psychological data from a study of 'mental blocking' and from one on serial patterns of response in auditory threshold. The experimental task of the present study was jabbing a stylus at a target; five variations of target area were presented to the 33 Ss; 15 Ss were retested a month later. Spectral densities, variance of the responses about the mean, and speeded response were computed. Reliabilities and validities of these measures were determined. The measures were related to general personality characteristics. T. G. I. R 44

460
McGuigan, F.J. THE RELATIONSHIP BETWEEN 1000" RANGE AND KNOWN-DISTANCE RANGE RIFLE SCORES. HUMPRO Res. Memo. 3, Dec. 1953, 5pp. Human Resources Research Office, George Washington University, Washington, D.C.

460
This study compared marksmanship with the M1 rifle using miniature targets at 1000" range with subsequent marksmanship at known ranges (100-500 yds). Approximately 550 Army basic trainees each fired 51 rounds at 1000" range and "... the usual practice and record courses at known-distance range." Scores at 1000" range are correlated with known-distance scores for slow, sustained, practice, and record firing. The results are discussed in terms of using 1000" range scores for predicting known-distance marksmanship, for matching Ss in training experiments, and for measuring proficiency.
T. G. R 1

462
Rock, R.T., Jr., Duva, J.S. & Murray, J.E. TRAINING BY TELEVISION. THE COMPARATIVE EFFECTIVENESS OF INSTRUCTION BY TELEVISION, TELEVISION RECORDINGS, AND CONVENTIONAL CLASSROOM PROCEDURES. Contract N7ONR 47602, Proj. 20 E 5A, Rep. SDC 476 02 2, 24pp. USN Special Devices Center, Port Washington, N.Y.

462
The relative effectiveness of training by live television, by sound moving pictures, and by lectures was investigated in three Naval Air Reserve groups, including officer pilots and enlisted personnel. Comparisons of results of types of training are presented by pairs of types, and differences statistically analyzed. There is a discussion of the different lessons included in the television presentations.
T. G. I.

463
Rock, R.T., Jr., Duva, J.S. & Murray, J.E. TRAINING BY TELEVISION. A STUDY IN LEARNING AND RETENTION. Contract N7ONR 47602, Proj. 20 E 5A, Rep. SDC 476 02 3, 24pp. USN Special Devices Center, Port Washington, N.Y.

463
This is a nontechnical report on a study of the effectiveness of television for rapid mass training. Approximately 3000 Army reservists (all ranks) viewed eight telecasts on infantry activities. Written multiple-choice tests on the contents of each presentation were administered before and after viewing. Use was also made of retention testing, an attitude questionnaire, comments, and ratings. Test-score gains and percent responses are interpreted regarding effectiveness of television in such training. Expert opinion is cited, and the content of the programs are analyzed in terms of good and poor teaching.
T. G. I.

475
Katchmar, L.T. PHYSICAL FORCE PROBLEMS: I. HAND CRANK PERFORMANCE FOR VARIOUS CRANK RADII AND TORQUE LOAD COMBINATIONS. Tech. Memo. 357, March 1957, 15pp. Human Engineering Laboratory, Aberdeen Proving Ground, Md.

475
To investigate hand crank performance in terms of normal work output, 75 subjects were instructed to turn a crank at a "rapid" rate until they could not continue or were told to stop (ten minutes). Three hand crank radii (four, five, seven inches) and five torque loads (10, 30, 50, 70, 90 inch pounds) were tested. Each subject had an initial ten-minute trial with no resisting load and two hours later had a second trial under one of the hand crank-torque conditions. The data consisted of time (seconds) horse-power and foot-pounds per minute. Cumulative work output is shown graphically for each hand crank-torque load combination.
T. G. R 5

476
Poulton, E.C. MEMORIZATION DURING RECALL. *Brit. J. Psychol.* (General Section), May 1953, XLIV(2), 173-176. (Applied Psychology Research Unit, 180c, Cambridge, England). (APU 164/53).

476
To study the effect of retention of earlier items on the memorization of later items, 16 members of the Royal Navy were Ss in an experiment. The Ss were required to make a manual choice response to a visual signal, but on certain trials they had to respond first to previously memorized signals while memorizing the signals being presented. Accuracy of responses is studied and discussed with regard to "... the detrimental effect of active retention upon the memorization of new items."
T. G. R 3

477
Walton, W.W. THE UTILIZATION OF ARMED FORCES TRAINING RESEARCH IN ARMY TRAINING ACTIVITIES. ABSTRACT OF DOCTORAL DISSERTATION. 1953, 6pp. Duke University, Durham, N.C.

477
This document is an abstract of a doctoral dissertation. In order to disseminate the results of training research to military instructors, the author, as part of his dissertation, developed a journal, Training Sense, intended to cover "... motivation of trainees, the use of instructional films, the value of synthetic training, the improvement of reading ability and the improvement of testing practices." Conclusions and recommendations are listed.

480
Miller, R.B. & Folley, J.D. THE VALIDITY OF MAINTENANCE JOB ANALYSIS FROM THE PROTOTYPE OF AN ELECTRONIC EQUIPMENT. PART I: AN/APQ 24 RADAR SET. Contract AF 33(038) 12921, Proj. 507 008 0001, June 1952, 127pp. American Institute for Research, Pittsburgh, Penn.

480
The effectiveness of early determination of maintenance job requirements for newly developed radar equipment by analyzing a prototype of the equipment was tested on the AN/APQ-24 radar set. Prototype data were gathered from the manufacturer's records and analyzed according to the maintenance behavioral activities required. A similar analysis was made for production models of the same equipment. The two analyses are compared, and the results are discussed with regard to their implications for predicting maintenance requirements from prototype equipment in order to start early training of maintenance personnel. Special attention is given to the problems of trouble shooting.
T. G. R

484
Winder, C.L. DECISION MAKING. Contract MONR 225(01), Proj. NR 150 087, Tech. Rep. 1, March 1953, 36pp. Department of Psychology, Stanford University, Stanford, Calif.

484
This report described and summarized studies undertaken for an exploratory project which had as an over-all goal the fuller understanding of decision-making. The studies were concerned with the development of measures of decision-making and the clarification and development of pertinent personality measures. The basic measures of decision-making used in the studies were from the psychophysical type situations involving matching of graded series of stimuli to a standard stimulus of a different modality. Individual differences for decisions of this type were studied. Various personality measures were investigated for their relations to the various decision-making characteristics.
G. I. R 5

485
Jones, Margaret M., Hulbert, S.F. & Heise, R.H. A SURVEY OF THE LITERATURE ON JOB ANALYSIS OF TECHNICAL POSITIONS. Person. Psychol., Summer 1953, 6(1), 173-194. (University of California, Los Angeles, Calif.).

485
"This paper presents a survey of the literature on job analysis of technical positions. A technical position is defined as one which is not of professional level, but which requires considerable background of knowledge in a rather narrow area, and some knowledge of general principles. Very little work has been published dealing with these positions, but there is some indication that they are more difficult to rate than are standard factory and office jobs. It is concluded that rather thorough study of technical positions is in order and that considerable emphasis must be placed on skills and knowledge rather than on supervisory factors."
R 307

487
Flanagan, J.C. (Dir.) THE DEVELOPMENT OF TESTS OF APTITUDE AND PROFICIENCY. Res. Note 5, June 1951, 4pp. American Institute for Research, Pittsburgh, Penn.

The method used in developing aptitude and proficiency tests for research personnel is described and illustrated. The method is considered applicable to other test development projects. It is believed that certain techniques used should contribute to the development of valid tests. These are: a) definition of what is to be measured in terms of the critical requirements for the job; b) the use of rationales containing explicit definitions and analyses of the critical behaviors, and item-specification; and c) preparation and editing of items by specialists in the subject matter field and review of each item by several critics.
R 5

488

Siegel, A. & Courtney, D. DEVELOPMENT OF PRACTICAL PERFORMANCE MEASURES, VOLUME I. Contract NMM 872(00). Series 1953. Institute Rep. 4, July 1953, 225pp. Institute for Research in Human Relations, Philadelphia, Penn.

488

This study was concerned with the development of a manual for both the construction and use of performance tests in the Naval situation. Two performance tests were constructed in accordance with manual procedures--Aviation Structural Mechanics' Battery and Aerial Photographer's Battery--and subjected to field tests. The development and testing of these batteries were described in detail. Data on interexaminer reliability, intraexaminer reliability, test-retest reliability, examiner errors, face validity, etc. were obtained and evaluated.
T. G. I. R 6

494

Fleishman, E. A. THE PERCEPTION OF BODY POSITION -- EFFECT OF SPEED, MAGNITUDE, AND DIRECTION OF DISPLACEMENT ON ACCURACY OF ADJUSTMENT TO AN UPRIGHT POSITION. Proj. 509-020-0003, Res. Bull. 53-1, Jan. 1953, 17pp. USAF, HARC, Air Training Command, Lackland AFB, San Antonio, Texas.

494

This experiment was designed to determine the relation between the accuracy of perception of the upright position and the speed and magnitude of prior displacement away from the upright. The blindfolded subject was tilted 15, 20, or 25° to the right or left at a rate of 4, 5, or 6° per second, and attempted to restore the chair to the upright position. One hundred and eighty airmen served as subjects in groups randomly assigned to each experimental condition. The average error in leveling the chair is analyzed with respect to the speed, direction and magnitude of the initial tilt and the subject's previous practice.
T.G.R.6.

498

Miller, R.B., Folley, J.D., Jr. & Smith, P.R. SYSTEMATIC TROUBLE SHOOTING AND THE HALF-SPLIT TECHNIQUE. Contract AF 33(038) 12921, Proj. 507 008 0001, Tech. Rep. 53 21, July 1953, 16pp. USAF Technical Training Research Lab., Chanute AFB, Ill. (American Institute for Research, Pittsburgh, Penn.).

498

A description of procedures for trouble shooting of electronics equipment which are based upon rational and logical considerations is presented. Two alternative methods are compared: trouble shooting from probability data and trouble shooting by logical elimination of malfunction sources. The latter method is the one developed in this report as being the most feasible. Two phases of the procedure for line trouble shooting are discussed step by step. The half-split technique (a specified check sequence based on mathematical considerations of efficiency) is of special relevance. A mathematical proof of the technique is presented in the Appendix. (See 3389).
T. I. R 3

499

Spieth, W. AN INVESTIGATION OF INDIVIDUAL SUSCEPTIBILITY TO INTERFERENCE IN THE PERFORMANCE OF THREE PSYCHOMOTOR TASKS. Contract AF 33(038) 13214, Proj. 509 020 0001, Res. Bull. 53 8, April 1953, 29pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex. (State University of Iowa, Iowa City, Iowa).

499

The focus of this study is the possibility of consistent individual susceptibility to interference as a result of practice on alternating standard and reversed forms of certain psychomotor tasks. The Two-Hand Coordination Test, the Complex Coordination Test, and the Pursuit Apparatus were used by 53 basic trainee airmen in the standard form only, and by 54 with short periods of practice on the standard form, alternated with short periods on the reversed form. Data include: individual performance variables; between-task correlations; and comparisons between pairs of such correlations from the two groups, as well as within-task measures.
T. G. R 3

501

Fleishman, E.A. AN EVALUATION OF TWO PSYCHOMOTOR TESTS FOR THE PREDICTION OF SUCCESS IN PRIMARY FLYING TRAINING. Proj. 509 020 0003, Res. Bull. 53 9, May 1953, 20pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

501

The Six-Target Rudder Control Test is a modification of the Rudder Control Test, which differentiates among pilot cadets even after considerable training. The Dynamic Balance Test requires balancing on a board and keeping shifting green and red lights matched. These are evaluated here with respect to their usefulness for the prediction of pilot success in Primary flying training. They were administered along with the Aircrew Classification Battery to 1000 unclassified pilot cadets before training. Extensive analysis of the reliability and validity (in predicting graduation), as well as factorial content of these tests is reported.
T. I. R 5

502

Tucker, J.A., Jr. RELATIVE PREDICTIVE EFFICIENCY OF MULTIPLE REGRESSION AND UNIQUE PATTERN TECHNIQUES. Proj. 503 001 0015, Res. Bull. 53 2, Feb. 1953, 25pp. USAF Personnel Research Lab., Lackland AFB, Tex.

502

This is an empirical investigation of the feasibility of using the unique pattern technique in personnel selection and classification. The chief emphasis is on methodology with major attention given to the relative effectiveness of multiple regression versus unique pattern techniques. Two types of Ss, pilot trainees and clerk-typists, are studied; the criteria are pass/fail in pilot training and final grade in technical training school. Using carefully selected predictor variables the two methods are compared for their success in predicting the criterion.
T. R 9

503

French, R.S. THE ACCURACY OF DISCRIMINATION OF DOT PATTERNS AS A FUNCTION OF ANGULAR ORIENTATION OF THE STIMULI. Proj. 509 019 0001, Res. Bull. 53 3, March 1953, 17pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

503

The accuracy of pattern discrimination was studied as a function of the relative angular orientation of the patterns compared. A total of 120 patterns from each of a two-, three-, and five-dot series was employed. The Ss' task was to indicate whether two patterns presented successively were either identical or different in terms of distance relations and spatial positions of the dots. Judgments were made on this basis while at the same time the second pattern of the pair was at any of ten angular orientations relative to the first. Error data were studied by analysis of variance for differences attributable to angular orientation, number of dots, and their interactions. Implications for radar scope interpretation were discussed.
T. G. R 3

505

Lewis, D., Adams, J.A. & Spieth, W. AN ANALYSIS OF PERFORMANCE ON THE IOWA PURSUIT APPARATUS. Contract AF 33(038) 13214, Proj. 509 020 0006, Res. Bull. 53 5, March 1953, 30pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

505

An attempt was made to find a short-cut method of measuring individual susceptibility to interference in the performance of motor tasks. A total of 132 airmen at Lackland Air Force Base were given four phases of practice on the pursuit apparatus: preliminary phase followed by original learning, interpolated learning, and relearning phases. Stanline scores for eight different aptitude indexes and preliminary trial scores were correlated with performance scores at the outset of the relearning phase when interference was at a maximum. Prediction of interference based on these two scores was discussed.
T. G. I. R 10

507
 Vasilas, J.M., Fitzpatrick, R., Dubois, P.H. & Youtz, R.P. HUMAN FACTORS IN NEAR ACCIDENTS. Contract AF 33 (038) 21662, Proj. 21 1207 0001, Rep. 1, June 1953, 65pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

507
 The objectives of this project were "to develop procedures for obtaining Hazardous Incident Reports; to try out various methods for obtaining these reports from groups of AF personnel; to collect a number of Hazardous Incident Reports, analyze the behaviors involved, and illustrate how such incidents might be used in a flight safety program; to devise a tentative system for classifying and utilizing near-accident incidents." Some 1,700 reports were collected via the Group Orientation Method and a classification system developed based on aircraft type, aircrew job, and flight phase involved. The effectiveness or ineffectiveness of the behavior evoked was analyzed and categories of corrective and unsafe actions derived.
 T. R 6

508
 Haley, J.A. "PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS"; LETTER CONCERNING. TED ADC AE 6303.1, BUAER LTR AER AE 631/56 of 19 Apr 1954, NAIC LTR MA 4 Serial 10467 of 3 Nov 1953, Ref. MA 4 9393, Sept. 1954, 5pp. USN Air Development Center, Johnsville, Penn.

508
 To determine the time a pilot requires to actuate the ejection seat controls of an F9F-6 under emergency conditions, the ejection system was installed in the gondola of a centrifuge. Navy pilots were tested while being subjected to fluctuating accelerations (from 1.5 to 7.0 positive g at rate of 8.0 g per second) for the time required to eject when dressed in full flight gear and in minimal flight clothing. In addition, motion picture coverage of subjects was made. The data were analyzed and recommendations for ways to decrease time requirements are made.
 f. I. R 2

510
 Smith, R.G., Jr. A COMPARISON BETWEEN EIGHT-WEEK AND TWELVE-WEEK BASIC TRAINING PROGRAMS. Proj. 503 004 0001, Tech. Rep. 53 5, March 1953, 4pp. USAF Personnel Research Lab., Lackland AFB, Tex.

510
 From data collected for other purposes, a comparison was made of the effectiveness of eight-week and twelve-week basic training programs of the Air Force. Material covered includes information tests, and attitude scales dealing with areas related to morale. Pre- and post-tests were available for the eight-week trainees, but only post-tests for the twelve-week group. Conclusions are drawn only for the particular course of training studied.
 T. R 4

511
 Ullett, G.A. & Gleser, G. PSYCHIATRIC SCREENING OF FLYING PERSONNEL: THE DEVELOPMENT OF EMPIRICAL SCALES FOR THE PREDICTION OF ANXIETY-PRONENESS FROM THE EEG AND REACTION TO INTERMITTENT PHOTIC STIMULATION. Proj. 21 0202 0007, Rep. 4, June 1953, 10pp. USAF School of Aviation Medicine, Randolph Field, Tex. (School of Medicine, Washington University, St. Louis, Mo.)

This is a supplement to a previous report which developed an experimental procedure for predicting anxiety-proneness by means of measures based on EEG responses to photic stimulation (flicker). The previous report was based on comparison of criterion groups with reference to specific measures based on the EEG response. The present report develops 3 empirical scales, based on the same data, for quantitative scoring of individual performance. The 3 scales are based on a) the basic EEG record taken with eyes closed and subject relaxed; b) the EEG response to photic stimulation over flicker frequencies ranging from 2 to 30 flashes per sec; and c) subjective sensations induced by the flickering lights. For the first scale (basic EEG) a cutting score of 2 or greater results in selection of 13.7% of non-anxiety-prone and 51.1% of anxiety-prone normal subjects and 48.3% of anxious patients. The second scale (EEG response to flicker), with a cutting score of 1 or greater, selects 35.6% of non-anxiety-prone and 63.3% of anxiety-prone normal Ss and 72.4% of anxious patients. The third (subjective sensation) scale, with a cutting score of 2 or greater, selects 16.4% of non-anxiety-prone and 40.6% of anxiety-prone normal Ss and 48.3% of the anxious patients. When used in combination, with a cutting score of 4 or greater on the combined scale, this procedure selects only 11% of non-anxiety-prone and 59.4% of anxiety-prone normal Ss and 65.5% of anxious patients. Cross-validation of these scales on a new population is in progress and will be reported in a later project report of this series.

515
 Duerteldt, C.H. ECLIPSE-PIONEER 5-INCH DIRECT READING SPHERICAL ATTITUDE INDICATOR, EVALUATION OF, REPORT # 1, FINAL REPORT. Proj. TED PTR AE 7375.6, ST38 55, May 1955, 13pp. USN Air Test Center, Naval Air Station, Md.

515
 To determine the performance characteristics and the suitability for service use of the Eclipse-Pioneer five-inch direct reading spherical attitude indicator, the equipment was installed in three aircraft. A total of 101.8 flight hours were performed by 16 pilots in a wide variety of flight maneuvers and weather conditions. Accuracy of indication and deficiencies in presentation were noted. Overall acceptabilities of this and three other indicators are given in rank order. Recommendations are included.
 T. I. R 4

516
 Loring, J.C.G. SELECTED BIBLIOGRAPHY ON THE EFFECTS OF HIGH-INTENSITY NOISE ON MAN. J. Speech Dis., Jan. 1954, Monogr. Suppl. 3, 38 pp. (Psych-Acoustic Lab., Harvard University, Cambridge, Mass.).

516
 This bibliography on the effects of high-intensity noise on man contains 741 references divided into eight sections: 1) deafening effects of noise; 2) effects on communication and intelligibility of speech; 3) aural protective devices and preventive measures; 4) effects on human behavior including mental tests and psychomotor efficiency; 5) physiological effects; 6) measurement and reduction of noise with suggested standards for noise control; 7) noise fields from engines including jet engines, and 8) general references on noise, reference works, medico-legal aspects, and those not otherwise classifiable.
 R 741

517

Kurke, R.L., & Stephens, J.A. SYSTEMS EVALUATION OF THE TANK. 76mm GUN. NIAI. Tech. Memo. 157, Jan. 1957, 57pp. Human Engineering Laboratory, Aberdeen Proving Ground, Md.

To perform a human factors evaluation of the 76 millimeter Gun Tank, NIAI and to develop a methodology and technique for evaluating Ordnance equipment from a human engineering point of view, the present study was performed. A frequency index of operational use derived from service school data was used in performing a job segment analysis. This was used in conjunction with a detailed study of user crews operating a combat loaded tank. Observations (and recommendations for some items) are reported on: size of crew; visual field and optical aids; working areas--access and egress; seating; hatches and hatchlocks; fire control, displays, and equipment; driver controls and displays; communications; noise levels; clothing; crew interactions. Optimum specifications are provided where possible.

T. G. I. R 51

518

Banan, A., & McFarland, R.A. THE PHYSIQUE OF BUS AND TRUCK DRIVERS: WITH A REVIEW OF OCCUPATIONAL ANTHROPOLOGY. AMER. J. PHYS. ANTHROP. 1955, 13 (4), 711-742.

518

This report presents a review of the literature on occupational anthropometry and the results of an anthropometric study of 375 professional drivers of heavy vehicles. The drivers included 103 bus and 104 truck drivers from New England and New York, 65 Texas truckmen and 103 champion truckmen representing every state. Average age was 36.8 years with ten years of professional experience. Classical anthropometry (including grip strength and endurance tests) and somatotyping were employed. The data were compared with measurements taken on various populations representing the "general population." The significance of the findings and their implications for the fields of medicine, engineering, psychology and vocational placement are discussed. T. R 98

519

Cox, D., Sharp, K.M.D. & Irvine, D.H. WOMEN'S ATTITUDES TO REPETITIVE WORK. Rep. 9, 1953, 59pp. National Institute of Industrial Psychology, London, England.

519

This is an extensive study of women's attitudes toward repetitive work. First, the job study and interview method are described in detail. The jobs studied are defined and categorized. This section of the report is followed by one in which a general statistical summary of the interview material is given. Finally, there is some discussion of the comments made by the interview sample.

T. R 17

520

Wilson, C.L., Salstrom, V.K., Mackie, R.R., & Bushner, D.W. THE RELATIONSHIP BETWEEN AIRCRAFT MAINTENANCE AND FLYING SAFETY: I. A CRITERION OF MAINTENANCE ADEQUACY. REPORT Memo. Rep. 32, Feb. 1953, 63pp. Human Factors Operations Research Laboratory, ARDC, Bolling AFB, Washington, D.C.

520

The use of measures such as accident, abort and in-commission rate to evaluate the quality of aircraft maintenance was investigated. A systematic method for randomly sampling aircraft parts to be inspected according to a pre-set check list is described and experience in its use is related. Deficiencies and possible sources of error in the system are pointed out and steps toward their elimination considered.

T. G

521

Spieth, W. ANNOYANCE THRESHOLD JUDGMENTS OF BANDS OF NOISE. J. acoust. Soc. Amer., 1956, 28 (5), 872-877. AFRC TR 55-6. Operational Applications Laboratory, AFRC, Bolling AFB, Washington, D.C.

521

The annoyance thresholds for 13 bands of noise from 50-13,000 cps were determined on 21 listeners. The subject was exposed to the noise over a loudspeaker in an anechoic chamber for a period of 3 minutes, while he set the noise to a level which, if any higher, would annoy him if it were present while he was working. A further group of 162 subjects made only one annoyance judgment each. The relation of the annoyance threshold to the center frequency of the noise and to the attitude and previous work experience of the subject is described.

G. R 3

522

Groth, Hilde, & Lyman, J. AN EXPERIMENTAL ASSESSMENT OF AMPUTEE PERFORMANCE WITH VOLUNTARY OPENING AND VOLUNTARY CLOSING TERMINAL DEVICES. Rep. 57-12, Special Tech. Rep. 23, Feb. 1957, 25pp. Department of Engineering, University of California, Los Angeles.

522

It evaluates the mode of control of prosthetic devices (Voluntary Opening, VO, and Voluntary Closing, VC), 17 amputees familiar with both types of control were tested. Simple performance tests requiring grasping and moving light objects were employed with performance time as the criterion measure in one series and prehension force in a second series. These data were analyzed for significance of differences among the various treatment conditions with non-parametric Signed Rank Test for Paired Observations. Supplementary information was obtained by means of a questionnaire or tape-recorded interview. The results are related to design improvement of such terminal devices.

T. G. I. R 9

524

Steindler, A. LOCOMOTOR MECHANICS AND OCCUPATION. IRCA, J.S.M.E., April 1945, 167-175. (State University of Iowa Hospitals).

524

This paper deals with the question, "Can time-and-motion study, as well as the mechanics of locomotion, be treated as a special case in mechanics?" The mechanics of human locomotion is analyzed followed by consideration of efficiency studies in the fields of physical training, industrial efficiency and orthopaedic reconstruction.

T. G. I. R 3

527

Graham, C. H. COLLOQUIUM ON OPTICAL PROBLEMS OF VISION, MADRID. Tech. Rep. ONRI-71-53. June 1953, 9pp. ONR, American Embassy, London.

527

This report contains abstracts of five papers given at the Colloquium on Optical Problems of Vision held in Madrid, Spain, 1953. They consider such topics as the physical limits of vision, binocular vision, chromatic vision, the chemical basis of visual excitation and visual mechanisms as studied by the two-color threshold method.

528

Pollack, I. IDENTIFICATION AND DISCRIMINATION OF COMPONENTS OF ELEMENTARY AUDITORY DISPLAYS. J. acoust. Soc. Amer., 1956, 28 (5), 906-909. AFRC-14-55-5. Operational Applications Laboratory, AFRC, Bolling AFB, Washington, D.C.

528

The ability of a listener to identify the loudness of a single 1000 cps tone taken from an ensemble of ten loudnesses is compared to his ability to discriminate between a standard and a variable loudness when the loudness of the standard varies over the same range as the single tone. The range of loudness in a single ensemble was divided into ten equal parts of 0.8 db, summing to a total range of 0-72 db. Six subjects identified the loudness of each of a series of 100 signals, or discriminated the difference between 100 standard and variable signals, or both identified the standard and discriminated the difference of the variable. The accuracy of identification is compared to the accuracy of discrimination in terms of the information transmitted as a function of the size of the scale interval. T. G.

529

Pierce, J.R., & Bennett, W.R. NOISE--PHYSICAL SOURCES; AND METHODS OF SOLVING PROBLEMS. Monograph 2824, 1956, 37pp. Bell Telephone System.

529

This document presents two articles on noise. The first deals with the physical sources of noise with particular emphasis on Johnson and shot noise. The second article presents an extensive treatment of various analytical concepts and techniques to be utilized in the solution of noise problems. The statistical discussion includes such topics as probability density, central limit theorem, semi-invariants, stationary and ergodic processes, power spectra, etc.
G. I. R. sum

531

Grakow, C.E. SOME RESEARCHES ON VISUAL PROCESSES IN SCOTLAND, ITALY AND FRANCE. Tech. Rep. ONRL-111-53, Aug. 1953. 13pp. ONR, American Embassy, London.

531

This report describes some research on visual processes now being conducted in Scotland, Italy, and France. Some of the studies relate to problems of the receptive field, visual acuity, space perception, convergence, and instrument design. In general, European studies are concerned with physiological and physical components of vision.
R3.

533

Heff, W. D. ANNUAL GENERAL MEETING OF THE ERGONOMICS RESEARCH SOCIETY. Tech. Rep. ONRL-44-54, May 1954, 5pp. ONR, American Embassy, London.

533

The papers presented at the 1954 meeting of the Ergonomics Research Society are abstracted. They include studies on the effects of high temperature on human comfort and performance, health hazards in underground factories, worker attitudes to repetitive tasks and factors influencing worker performance in small scale industry.
R10.

536

Heff, W.D. PROGRESS REPORT 1950-1953 OF THE APPLIED PSYCHOLOGY RESEARCH UNIT, CAMBRIDGE. ONRL TR 26 54, March 1954. 23pp. USN Office of Naval Research, London, England.

536

This report summarizes research studies (1950-1953) and includes a bibliography of published work for the Applied Psychological Research Unit, Cambridge, England. Main lines of research are under eight headings: unusual environments, vigilance tasks and skill consistency, information presentation and information measurement, training, motor performance, sickness and accident studies, and new devices and procedures. Future trends are mentioned.
R63.

537

Fehr, R.O. HEARING CONSERVATION DATA AND PROCEDURES. Contract Nonr 1151 (01), NR 140-069, Tech. Rep. 7, Memo. Rep. 2, Final Rep. Working Group 21, June 1956, 18pp. ONR, CHABA; Central Institute for the Deaf.

537

This report presents an audiometric data card form for use by the Armed Services. It is designed to elicit the minimum amount of information required for eventual correlation of hearing losses with noise exposure. Instructions for completing the hearing conservation data card are also given. It is recommended that copies of completed cards be sent to the Research Center of the Subcommittee on Noise in Industry for inclusion in their pool of noise exposure data.
I.

540

USN Medical Research Lab. SUMMARIES OF RESEARCH REPORTED ON DURING CALENDAR YEAR 1952. Jan. 1953, 25pp. USN Medical Research Lab., New London Submarine Base, Conn.

540

This report consists of abstracts of the research reports published by the Medical Research Laboratory, U.S. Naval Submarine Base, New London, during 1952. They cover a variety of problems in addition, vision, respiration and submarine escape procedures.
R32.

541

USN Medical Research Lab. SUMMARIES OF RESEARCH REPORTED ON DURING CALENDAR YEAR 1953. Jan. 1954, 20pp. USN Medical Research Lab., New London Submarine Base, Conn.

541

This report consists of abstracts of the research reports published by the Medical Research Laboratory, U.S. Naval Submarine Base, New London, during 1953. They cover a variety of problems in addition, vision, respiration, the selection of submarine personnel and submarine escape procedures.
R44.

544

Long, E.R. & Reid, S.L. FACTORS DETERMINING THE LEGIBILITY OF LETTERS AND WORDS PRINTED IN "DOT" PATTERNS WITH PURE BLACK AND WHITE WHEN THE PATTERNS ARE DEGRADED IN VARYING AMOUNTS. THE FIRST OF A SERIES OF REPORTS ON THE "INFOMAX" PRINCIPLE. Contract W33 (038) AC 21269, USAF TR 5922, April 1952, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Virginia, Charlottesville, Va.).

544

To explore some of the factors determining legibility of letter and word patterns formed by elements of "dots" such as would appear when transmitted by a pulse-activated elemental printer, 4 subjects made recognition judgments of stimulus patterns (single letters of alphabet, black on white). Other variables were: number and size of elements in letter, types and degrees of degradation, and viewing brightnesses. The data are evaluated by analysis of variance with attention given to the manner and degree of legibility as affected by all variables. (See also accession numbers 545 and 197)
T. G. I. R. 1

545

Long, E.R. & Reid, L.S. FACTORS DETERMINING THE LEGIBILITY OF LETTERS AND WORDS PRINTED IN "DOT" PATTERNS WITH DIFFERENTIAL BRIGHTNESS OF THE PATTERNS PROPORTIONAL TO THE AMOUNT OF DEGRADATION. THE SECOND OF A SERIES OF REPORTS ON THE "INFOMAX" PRINCIPLE. Contract W 33(038) AC 21269, RD 694 37, AF TR 5923, April 1952, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Virginia, Charlottesville, Va.).

545

To explore some factors determining legibility of letters and words formed by elements of "dots" (see accession numbers 544 and 197), stimulus patterns of single letters of the alphabet were prepared in a "gray scale" (signal and noise elements of brightnesses proportional to their respective intensities). Four subjects made recognition judgments. Other variables included number of elements in letter, type and degree of degradation. Data are evaluated by analysis of variance with attention given to the manner and degree of legibility as affected by all variables.
T.G.I.R.2.

546

Northrop, D.S. EFFECTS ON LEARNING OF THE PROMINENCE OF ORGANIZATIONAL OUTLINES IN INSTRUCTIONAL FILMS. Contract NSGMR 269, Human Engng. Rep. SDC 269 7 33, Oct. 1952, 24pp. USN Special Devices Center, Port Washington, N.Y.

546

To investigate the effects on learning of adding organizational titles and commentary at appropriate points in existing instructional films, three types of films were selected: "discrete items" (relatively unorganized); "logically developed" (content dictates the organization); and "chronologically developed" (dramatic or story organization). Three versions of each film were developed with different amounts of added titles and commentary and each version was viewed by two companies of Naval recruits. Informational tests were then administered to these recruits plus control groups who did not view the films. An analysis of covariance was made for each film type. The differential effects of intelligence were also studied since intelligence test scores were available. I.

547

Mercer, J. THE RELATIONSHIP OF OPTICAL EFFECTS AND FILM LITERACY TO LEARNING FROM INSTRUCTIONAL FILMS. Contract NSGMR 269, Rep. SDC 269 7 34, Nov. 1952, 19pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

547

As part of a study on learning from films, the use of optical effects (fades, wipes and dissolves), and of "film literacy" (the recognition of these effects) were investigated. Air Force recruits in training saw "Hunting Animals in the Past" with or without a preliminary 20-minute lecture on the optical effects. Naval trainees saw "Oxygen Breathing Apparatus" with and without the lecture. Multiple-choice tests on the material of the film literacy lectures and the films were measures of learning. Discussion included recommendations related to economical production of training films. I.

548

Adjutant General's Office. NEW TESTS OF NIGHT-VISION. FRB Bull. 53-1. Jan. 1953. 3pp. Adjutant General's Office, Personnel Research and Procedures Div., Personnel Research Branch.

548

This bulletin discusses the progress which has been made toward developing new tests of night vision for the armed forces. Emphasis is placed on seeing conditions of moonlight illumination with suitable instruments, test targets, and test procedures in the process of development. Validation will be made under field conditions. A sample of present test targets is included. I.

549

Brown, R.H. THE VISUAL DISCRIMINATION OF VELOCITY AS A FUNCTION OF THE RATE OF MOVEMENT AND OTHER FACTORS. NRL Prob. Y04 01, RDB Proj. NR 513 050, NRL Rep. 4299, Jan. 1954, 10pp. Naval Research Lab., (Psychol. Branch, Radio Div. III), Washington, D.C.

As part of a program of basic research on tracking, experiments to determine systematically how man discriminates velocity and acceleration were conducted. The method used involves the simplest discrimination man can make to visual movement. The observer, presented with a spot traveling at a controlled speed, reports its direction. The present report describes the results of an experiment in which eight observers made 120 discriminations when the spot was moving at each of ten speeds. Analysis of the results yields the following conclusions: a) within limits, as the speed with which an object travels increases, the frequency with which man discriminates its direction also increases. This frequency-of-discrimination function may be described as a logarithmic normal probability integral of the rate of movement, and the mean and standard deviation may be taken as representative of the function for a given observer. b) secondary and essentially irrelevant factors in the experimental situation do not affect the discrimination. c) man's sensitivity to differences in velocity improves with velocity at slow speeds. d) the results of this experiment provide for a fuller understanding of man's behavior in tracking. R 9

550

Arnault, M.D., Gagne, R.M., & Vanderplas, J. M. A COMPARISON OF FOUR MEASURES OF VISUAL DISCRIMINATION OF SHAPES. Proj. No. 21-09-001, Res. Bull. 51-23, Oct. 1951, 9pp. AFMTC, Air Training Command, Lackland AFB, San Antonio, Texas.

550

To compare four methods of measuring discrimination thresholds (two manipulated time of exposure, two measured speed of reaction), four groups of observers (50, 50, 47, 40) responded with "same" or "different" to pairs of irregular black shapes (a standard with one of five others in varying degrees of similarity). Results are given as speed of response and accuracy scores and are analyzed for reliability of differentiation among subjects and stimuli. T.G.I.R14.

551

Gibson, E.J. & Smith, J. THE EFFECTS OF TRAINING IN DISTANCE ESTIMATION ON THE JUDGMENT OF SIZE-AT-A-DISTANCE. Proj. 509 019 0002, Res. Bull. 52 39, Dec. 1952, 18pp. SAF Human Resources Research Center, Lackland AFB, Tex. Cornell University, Ithaca, N.Y.).

551

To investigate the effect of training in estimating distances on subsequent estimates of size viewed at a distance, one group (25 subjects) was trained to a given criterion of accuracy in estimating the distance of a stake set at varying distances (photographs) from the observer; another group (25 subjects) was not given training. Both groups estimated the size of the distant stake. The accuracy of the size estimates (average and constant errors) was compared for the two groups and discussed in terms of transfer of training. T.I.R14.

552

Jackson, R. LEARNING FROM KINESCOPES AND FILMS. Proj. NR 781, SDC TR 20 TV 1, April 1952, 15pp. USN Special Devices Center, Port Washington, N.Y.

552

The effect of knowledge of the kind of training aid used on the effectiveness of the aid was studied. Each of four pairs of matched groups of 30 airmen saw either a kinescope, a training film, or the film in color. Some groups were told they would see a kinescope, some a training film; all took written pre- and post-tests over the content of the aid actually seen. Gains in the post-test are discussed in terms of the importance of what the student thinks he sees as compared to what he actually sees. I.

553

Arnault, M.D. ACCURACY OF SHAPE DISCRIMINATION AS A FUNCTION OF THE RANGE OF EXPOSURE INTERVALS. Proj. No. 509-019-0001, Res. Bull. 51-32. Dec. 1951. 12pp. USAF, Air Training Command, Lackland AFB, San Antonio, Texas.

553

To investigate a common method of measuring perception in shape discrimination (minimum length of exposure required to make a given discrimination), forty subjects were presented with pairs of irregular black shapes at exposure intervals from 5 to 500 milliseconds and were required to judge the identity or nonidentity of each pair. Recognition thresholds are analyzed for each type of response and for total responses to show the effect of increasing exposure time on discrimination accuracy. T.G.I.R.14

554

Pickett, J.M. EFFECTS OF VOCAL FORCE ON THE INTELLIGIBILITY OF SPEECH SOUNDS. J. acoust. Soc. Amer., 1956, 28 (5), 902-905. AFRC-TH-56-1. Operational Applications Laboratory, AFRC, Bolling AFB, Washington, D.C.

554

The effects of varying the amount of vocal force on the intelligibility of speech in noise was determined on 6 listeners. Five talkers read lists of phonetically balanced words at loudness levels which produced SPLs of 36 to 90 db one meter from their lips. The speech was electronically mixed with white noise and played to the listeners at signal-to-noise ratios of -6, 0, and +6db. The relation of the level of vocal force to the intelligibility of the speech is described to evaluate the effects of shouting to overcome a noisy environment. T. G. R. 8

555 French, R.S., Crowder, M.A., & Tucker, J.A., Jr. THE K-SYSTEM MAC-1 TROUBLE-SHOOTING TRAINER: II. EFFECTIVENESS IN AN EXPERIMENTAL TRAINING COURSE. Proj. 7709, Tasks 77152 & 37301, Development Rep. AFTRC TN 56 120, Oct. 1956, 41pp. Maintenance Lab., AFTRC, Lowry AFB, Colo.

This report describes an experimental training program which was conducted to evaluate the K-System MAC-1 Trainer and to investigate the feasibility of teaching systematic trouble shooting to apprentice mechanics of average aptitude. The evaluation of the Trainer and the investigation into the feasibility of trouble-shooting training were both accomplished in an experimental arrangement comparing the effectiveness of trouble-shooting training conducted on the Trainer as against the equipment itself. Proficiency measures were taken before, during, and at the end of the training to assess the effect of the special training and to determine the strengths and limitations of the MAC-1 Trainer. The long-range effects of the special training were assessed through proficiency measures obtained on the trainees six months after their assignment to either of two Strategic Air Command bases. Since the Trainer or in question was not designed as an alternative to some other device or method, the conventional interpretation of the results where Method A is compared with Method B is not appropriate. The approach taken here was to "stack the cards" against the Trainer, i.e., to use it at the limits of its capability so that its limitations were made obvious. It was reasoned that if the Trainer proved effective when used as a substitute for the equipment, it almost certainly could be recommended as a supplement for classroom training. The results of the study support the conclusion that the MAC-1 Trainer, possibly with some modifications, could be used effectively in the classroom as a supplement to the equipment either in formal training courses or for GUT. The study further demonstrates that appropriate mechanics can learn systematic trouble-shooting procedures based on a logical analysis of the data flow of the system. R. 8

556

Murtz, A.K., Walter, Jeanette S. & Brenner, H. THE EFFECTS OF INSERTED QUESTIONS AND STATEMENTS ON FILM LEARNING. (RAPID MASS LEARNING). Contract N60NR 269, Proj. Nr 781 005, SDC TR 2697 16, Sept. 1950, 15pp. USN Special Devices Center, Fort Washington, N.Y.

556

Three different ways of enhancing learning from actual films are tested in this experiment. Audience participation in the form of answering multiple choice questions inserted into the film (with answers following), and repetition of the film immediately, or of main points by special titles were methods used with tenth grade students as Ss. The films were on the care and use of hand tools, and on snakes. The analysis of results on tests of content of the films was made by sex and intelligence, as well as experimental group. T.

557

Whittingham, D.G.V., & Ellis, W.H.B. COM-SPIGURITY OF COLOURED FLUORESCENT FABRICS FOR AIR/SEA RESCUE. P.P.R.C. 844. Aug. 1953. 7pp. Flying Personnel Research Committee, R.A.F. Institute of Aviation Medicine.

557

To investigate the detectability of colored fluorescent fabrics for air-sea rescue gear (daylight and twilight conditions), observers searched for targets (dinghies, each covered with different fabric: flame-orange and neon-red on rubber and cotton, aluminum foil cloth, standard yellow rubber) from aircraft flying air-search speed and closing at 500 and 1000 feet. During runs up-down- and cross-run with good (5 - 10 miles) visibility. Results are given as "order of contact"; discussion and recommendations are included. T.I.R.6.

558

Razran, G. ABSTRACTS OF AVIATION PSYCHOLOGY. Sept. 1941. US Civil Aeronautics Administration, Department of Commerce, Washington, D.C. (Queens College, New York, N.Y.).

558

The author has compiled a bibliography of 618 abstracts of articles pertinent to problems of aviation psychology with the specific purpose of aiding research in the selection and training of civilian pilots. Reflecting a broad coverage of the area, the articles include physiological and psychological factors, special environmental effects, and such topics as the following: safety procedures, flight equipment, flying aptitudes, learning factors, and so forth. Included is a bibliography. T.G.I.R.14

559

Riggs, L.A., Ratliff, F., Cornsweet, Janet C., & Cornsweet, T.M. THE DISAPPEARANCE OF STEADILY FIXATED VISUAL TEST OBJECTS. J. opt. Soc. Amer., 1953, 43, 495-501. Proj. NR-140-359, Contract N70nr-358, T.O. II. ONR, Psychol. Lab., (Brown U.)

559

This report describes a system for holding an image at one point on the retina regardless of eye movements. Data for two subjects are presented as percentage of time the test object (fine black lines of varying diameters) is seen during a one-minute exposure, for three conditions in which motions of the retinal image were "compensated", "normal", and "exaggerated". Fifty per cent thresholds are plotted from the data; discussion is in terms of the relation of visual acuity and eye movements. T.G.I.R.14

560
Stewart, J.L. BASE-CLIPPED SPEECH COMMUNICATIONS. Contract DA-36-039 ac-63803, Proj. 2282, Tech. Rep. 87, Dec. 1955, 20pp. Engineering Research Institute, University of Michigan.

560
The concepts of pre-emphasized and infinitely clipped speech are extended to suggest certain pulse communication systems. Methods of reducing the pulse rate to be transmitted are discussed. Speculations of scientific interest are made of the possibility of further reducing pulse rate and for increasing the fidelity of clipped speech at the receiving end of the system. Practical base-clipping circuits are described with particular attention given to a system utilizing a triggered free-running multi-vibrator. The construction of a microphone that directly realizes pulsed speech is discussed.
G. I. R 7

561
Landis, C. AN ANNOTATED BIBLIOGRAPHY OF FLICKER FUSION PHENOMENA, COVERING THE PERIOD, 1740-1952. June 1953. 129pp. National Research Council, Vision Committee Secretariat, U. of Mich. (Psychiatric Institute, Columbia U.)

561
This bibliography on flicker-fusion phenomena represents all pertinent work in the field up to December 1952. Brief notes amplify each title to give an idea of the coverage.
R1300 (approx.)

562
Kelemen, G. FENESTRATION OF THE LABYRINTH: A BIBLIOGRAPHY. PNR 143, Feb. 1954, 18pp. Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.
This bibliography covers articles written in the eighteenth-nineties to the end of World War I. The aim of the unannotated bibliography, containing 356 articles, is primarily historical. This list, arranged alphabetically according to author, covers the history of a significant development in aural surgery.
R 356

563
USN Physiological Psychology Branch. BIBLIOGRAPHY OF RESEARCH REPORTS, SUPPLEMENT NUMBER 1. JANUARY 1954-JUNE 1955. July 1955, 15pp. USN Physiological Psychology Branch, CGR, Washington, D.C.

563
This is the first supplement to a cumulative bibliography of technical reports from research projects covering the January 1954 to June 1955 period. Approximately 190 titles are listed.
R 191

564
Kohl, Jessie V. CUMULATIVE BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ORIGINATING IN USN MEDICAL RESEARCH LABORATORY 1942 THROUGH 1950. May 1951. 53pp. USN Medical Research Lab., USN Submarine Base, New London, Conn.

This report is an unannotated bibliography of research reports and publications originating in the U.S. Medical Research Laboratory in the period 1942-1953. The reports are listed chronologically and by laboratory section. An index of authors and subjects is also provided.
R 255

565
Leikind, W., & Weiner, J. VISIBILITY: A BIBLIOGRAPHY. July 1952. 90pp. Library of Congress, Reference Dept., Tech. Information Div. (Send to: Vision Committee Secretariat, 3435 Mason Hall, U. of Mich.)

565
This bibliography provides references gained from a survey of literature (1925-1950) on visibility as influenced by the various physical, psychological, and physiological factors inherent in the observer, target, background and atmosphere, and the engineering applications of visibility data.
R2000

566
Eisberg, H.B. & Owens, J.E. FUNDAMENTALS OF ARCTIC AND COLD WEATHER MEDICINE AND DENTISTRY. Proj. NM 013 009, NAVMED 1307, 1949, 204pp. USN Bureau of Medicine and Surgery, Research Division, Washington, D.C.

566
This book brings together facts and concepts important in the practice of arctic and cold weather medicine and dentistry. The various chapters include: environment, Alaska, Greenland, Canadian Archipelago, flora and fauna, environmental sanitation, medical supplies and equipment, amphibious operations, evacuation and treatment, aviation medicine, winter training, acclimatization, medical problems, hypothermia, survival and rescue, and arctic and cold weather dentistry.
I. J. P 114

567

Lundervold, A. ELECTRO-MYOGRAPHY AS A TEST FOR PILOT ASPIRANTS. *J. Aviat. Med.*, 1950, 21, 147-150. (Institute of Aviation Med., Oslo, Norway.)

To determine the usefulness of the electro-myogram as a screening device for Pilot Aspirants, 31 normals and 15 neurasthenics were examined with electro-myography. In 6 of the normal persons and in 10 of the others, it was possible to register insertion activity in some of the muscles, when the persons were sitting. These were classified as Group A, the remainder as Group B. Persons from Group A used on the average more muscles, and each muscle was used in a more uneconomical way, as the contractions were longer and more violent. This was found during a tapping operation, and on the average, an even greater difference between the 2 groups was registered when outside conditions were changed, i.e. lowered temperature, increased noise, poor lighting, and also after fatigue experiments. The timing of the reaction muscles shows the same grouping. On the average, members of Group A had a shorter reaction time than those of Group B. It was concluded that the members of each group were fitted for different types of work.

568

Lundervold, A. OCCUPATION MYALGIA. ELECTROMYOGRAPHIC INVESTIGATIONS. *Acta psychiat. neurol. Scand.*, 1951, 26, 359-369. (Neurological Clinic, University of Oslo, Oslo, Norway).

568

Persons suffering from occupation myalgia (46 female, 17 male) and 47 healthy Ss were examined electromyographically during typewriting. The muscle reaction to needle-electrode insertion was recorded prior to the experiment. Muscle action potential records were obtained during task activity, at rest, under nonoptimal environmental conditions, e.g., temperature, noise, and under various psychic influences. These were compared for healthy and diseased Ss. The susceptibility of persons to this disease was discussed in terms of constitutional factors. Some means of effective treatment for muscular hyperfunction were examined.

T. I. R 25

569

Lundervold, A. ELECTROMYOGRAPHIC INVESTIGATIONS DURING SEDENTARY WORK, ESPECIALLY TYPEWRITING. *Brit. J. Phys. Med.*, Feb. 1951, 1-5. (Neurological Clinic, University of Oslo, Oslo, Norway).

569

To investigate the effect of sitting position and manner of work upon muscle activity during typewriting, action potentials were recorded from the dorsal muscles of 47 Ss. The time at which continuous muscle activity began and stopped was recorded with relation to the form and location of the back-support, the height of the table, and the position and nature of the typewriter. Recommendations, designed to minimize expenditure of energy during typewriting, were made concerning the construction and placement of office furniture and the proper use of equipment.

T. I. R 26

570

Lundervold, A. ELECTROMYOGRAPHIC INVESTIGATION IN TRAINING AND FATIGUE. *Sport & Health*, 1952, 82-85. (Neurological Clinic, University of Oslo, Oslo, Norway).

570

To investigate muscle potentials during fatigue, 37 Ss performed rapid tapping movements with one finger while EMG were taken from muscles in the upper extremities, shoulder, back, and thorax. Motor unit potentials were recorded and discussed in relation to the effect of rate of movement, degree of fatigue, and amount of training of the S.

I. R 7

571

Lundervold, A. AN ELECTROMYOGRAPHIC INVESTIGATION OF TENSE AND RELAXED SUBJECTS. *J. nerv. ment. Dis.*, June 1952, 115 (6), 512-525. (Neurological Clinic, University of Oslo, Oslo, Norway).

571

To investigate muscular activity during typewriting, EMG were taken over a three-year period from 110 Ss classified as "tense" or "relaxed" on the basis of their muscular activity under resting conditions. Action potentials were recorded from the muscles of the upper extremities, shoulders, back and thorax during typewriting with one or more fingers. The effect of noises and the influence of cold on action potentials during typewriting was examined. The significance of psychic factors was discussed.

T. I. R 19

574

Imus, H. A., & Bell, M. E. THE CHARACTERISTICS OF TRITANOPIA. Tech. Rep. ONRL-1-52, Jan. 1952, 1p. ONR, American Embassy, London.

574

This note concerns the discovery and testing of 24 subjects having a rare form of partial color blindness, tritanopia. A color confusion test chart accompanied by a short explanatory article on color blindness was published in an illustrated English weekly paper of wide circulation and from the many correspondents writing in, these cases were found. Results of the examinations will be given at a later date.

576

Hodge, J., & Brown, A. METHOD FOR DETERMINING PINCH RETENTION. Tech. Rep. 5663, Nov. 1956, 2pp. Army Prosthetics Research Laboratory, Walter Reed Army Medical Center, Washington, D.C.

576

This paper describes a new pinch tester (used in determination of pinch retention for hands and books) and gives data on the precision obtainable. Procedure for use are included.

T. I.

577

Imus, H.A., & Aspinall, S.R. THE STATE OF ACCOMMODATION OF THE HUMAN EYE IN DARKNESS. Tech. Rep. ONRL-9-52, Jan. 1952, 1p. ONR, American Embassy, London.

577

To determine the state of accommodation of the human eye to darkness, photographs were taken of optoptric images reflected from the anterior surfaces of the human lens while the subject was exercising zero to six diopters of accommodation. Photographs were then taken during the course of dark adaptation and also after administration of homotropine. The size of the image per diopter of accommodation is the measure for the accommodation in force. Discussion is in terms of accommodation and night myopia.

578

Imus, H.A. DIALS AND INDICATORS. Tech. Rep. ONRL 36 52, April 1952, 4pp. Office of Naval Research, American Embassy, London, England.

578

This report gives brief summaries of a series of studies on the human engineering factors in the design and use of dials and gauges. Factors affecting the speed and accuracy of check reading instrument panels investigated were: 1) dial shape; 2) pointer alignment position; 3) dial size and reading distance; and 4) expected movement relation between the indicator and its control. A handbook on design of dials and indicators has been written based on these and related research studies.

R 5

562
 Lewis, H.A. THE INFLUENCE OF "ADAPTINGOL" AND VITAMIN A ON NIGHT VISION. Tech. Rep. ONRL-73-52. ONR, American Embassy, London. July 1952, 3pp.

582
 This report summarizes a study of the influence of "Adaptingol" (trade name for a solution in oil of the dipalmitin acid ester of xanthophyll) and Vitamin A on night vision. Adaptonometer measurements of night vision capacity of three groups of 25 men (19-22 years of age), given respectively "Adaptingol", Vitamin A, and salad oil, were made over a period of several weeks. Determinations of Vitamin A and carotene concentrations in the blood before and for three weeks following the period of dosage are compared with Adaptonometer results and discussed in terms of the effect on night vision.
 R9.

583
 Headquarters, Continental Army Command. SERVICE TEST OF HOT WEATHER UNIFORMS. Proj. Nr 2645, DA Proj. Nr 7-79-07-001, Dec. 1955, 43pp. COMARC, Fort Benning, Ga.

583
 To determine and compare the suitability of four hot-weather uniforms (Army), service tests were conducted at several stations. The tests covered: physical characteristics, sitting, laundering, durability, cold night protection, compatibility with load-carrying equipment, camouflage, airborne use, hot-dry use, summer-temperature use, hot-wet use, military characteristics, and general use. A further test of the chemical protective characteristics of the test items was made. Test results were summarized and observed deficiencies listed as either major or minor. Suggested modifications are described.
 T. I. R 9

584
 King, B.G., Ostrich, R., & Richardson, Mary C. EMERGENCY ESCAPE PROCEDURES. ARDC Proj. 504-025-0009, APCRC-TR-54-56, Aug. 1954, 96pp. Operational Applications Laboratory, APCRC, Bolling AFB, Washington, D.C.

584
 This manual brings together the knowledge which has been gained through studies of operational emergencies and tests on escape of personnel from aircraft following simulated landing emergencies. Principal supporting data were developed through a time and motion analysis of film records of the escape trials on the C-124 and C-54 military aircraft. Additional data were obtained from tests on civil air carrier aircraft. The several sections of the manual contain material on crew training for this type of emergency, recommended procedures, evacuation devices and equipment, evaluation of emergency exit provisions (for ground escape) and supporting data.
 T. I. R.

582
 Graham, C.H. NUFFIELD RESEARCH UNIT INTO PROBLEMS OF AGEING, CAMBRIDGE. Tech. Rep. ONRL-67-53. May 1953. 9pp. ONR, American Embassy, London.

592
 This is a report of the activities of the Nuffield Research Unit of London, England, into Problems of Ageing prepared by C.H. Graham on May 21, 1953. Primarily concerned with changes of skill in middle and old age, a summary is presented of five monographs dealing with motor skills (e.g., tracking, tracing, etc.) and experiments concerning mental skills (e.g., logical thinking, problem solving, etc.). Results are discussed in terms of change in function associated with the process of ageing. In addition, a brief description of ongoing research is presented along with a complete list of previous publications.
 R 9.

595
 Miles, W.R. METHODS OF USING BINOCULARS. From Minutes and Proceedings of the Armed Forces-NRC Vision Committee, November 16-17, 1951, Contract N7 ONR 288, TO V, Proj. NR 142 497, 89pp. Department of Psychology, Yale University, New Haven, Conn.

595
 To compare the relative merits of two methods of using handheld binoculars (used on target after location by the naked eye and used to locate and examine target) two groups of men (23 trained, 23 untrained) located five outdoor target stations and identified the orientation of a bar target (size series and contrast series). Data are presented as percent correct responses and response times, and are compared for both methods and groups.
 T. I. R 4

596
 Judd, D.B. STANDARD COLOR FILTERS FOR ELECTRONICS EQUIPMENT. July 1953. 9pp. Armed Forces-NRC Vision Committee Secretariat, Univ. of Mich.

596
 This report gives specifications for color filters to be used for signal lights on control panels of electronic equipment, which can be easily and surely recognized by normal and color defective observers under a maximum number of conditions of illumination and viewing distances. A discussion of the experimental basis from which these specifications were derived is given.
 G.R7.

597
 Grether, W.F. (Chm.). STANDARDS TO BE EMPLOYED IN RESEARCH ON VISUAL DISPLAYS. Oct. 1947, 5pp. Armed Forces-NRC Vision Committee, ONR, Washington, D.C.

597
 To obtain comparability of visual display research data from different laboratories and thereby increase its effectiveness and value, a subcommittee of Army-Navy NRC Vision Committee formulated standards to be used regarding subject groups, units of measurement, values for stimuli not under investigation, and methods of experimental measurement. Recommendations for stimulus dimensions for instrumental displays and the standard Army-Navy Aeronautical numerals and letters are appended.
 I.R3.

599
 Bullock, D.H., Meyer, Susan R., & Braley, L.S. ASPECTS OF SIMULTANEOUS AUDIO-VISUAL MONITORING. Contract AF 30(602)-574, Scientific Rep. 3, Nov. 1954, 62pp. Department of Psychology, University of Buffalo.

599
 To investigate some aspects of simultaneous audio-visual monitoring of channels containing independent information, a series of experiments were conducted. Messages were presented in the form of pairs of equal-unit sequences (dot-dash or single dot within a matrix) and subjects were required to (1) discriminate message sequences as same or different by pressing the appropriate button, or (2) locate the position of the "different" response. Proficiency was measured as percent correct discriminations, percent errors, and losses (non-simultaneous minus simultaneous proficiency). The various experiments dealt with interactions arising under simultaneous monitoring, effects of audio message complexity and rate upon visual monitoring, and effect of visual monitoring on audio monitoring.
 T. R 6

600

Grether, W.F. (Chm.). STANDARDS TO BE EMPLOYED IN RESEARCH ON VISUAL DISPLAYS. Rev. March 1950, 6pp. Armed Forces-NRC Vision Committee, ONR, Washington, D.C.

600

This report on standards for research on visual displays is a revision of an earlier report (accession number 597). The wording is a bit more precise and the section of experimental techniques has been cut. Other topics remain as before: subject groups, units of measurement, values for non-experimental variables, and the appended recommendations for dimensions for instrumental display and the Army-Navy Aeronautical numerals and letters. I.R.3.

601 Graham, C.H. ACCIDENT SUSCEPTIBILITY AMONG COAL MINERS AND ITS PSYCHOLOGICAL CORRELATES. Tech. Rep. ONRL 130 52, Nov. 1952, 6pp. ONR, American Embassy, London.

A study of accident susceptibility was made by J.W. Whitfield, (now of University College, London) at a colliery employing about 2000 men. The accident classification used by Whitfield has been modified to become a current Non-Fatal Accident Return Under Coal Mines Act (Ministry of Fuel and Power M.D., Return 39). Indices of accident risk were established to provide an average expectation of accident for an individual. A given individual's actual accident history could be compared with this figure. Statistical analysis of the data indicates that more multi-accident individuals exist than would be expected on the assumption of equal liability. Neither age nor family relationship seems to provide a simple correlation with accident susceptibility. A detailed analysis of some psychological correlates of accident susceptibility indicate that young accident prone men probably tend to show defective performance on tests of a perceptual and cognitive nature. Older accident prone men, on the other hand, may tend to show defective performance in tests of motor coordination. R.2

602

Hunsicker, P.A. ARM STRENGTH AT SELECTED DEGREES OF ELBOW FLEXION. Contract AF 18(600)-45, Proj. 7214, WADC-TR-54-548, Aug. 1956, 58pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

602

A selected summary of the strength testing literature forms the first part of this report. This is followed by a listing of the modifications that had to be made on the Kinematic Muscle Study Machine as a result of laboratory testing. The major portion of the investigation is concerned with the results of testing 35 young men on 60 arm strength tests in the sitting position and 60 in the prone position. Percentile tables and figures depicting arm strength in relation to degrees of elbow flexion are included. Recommendations for further use of the Kinematic Muscle Study Machine are offered. Also included is a full description of this apparatus. T. G. I. R 165

603

Dunham, T. STUDIES OF VISUAL TELESCOPE SYSTEM EMPLOYING REFLECTION OPTICS. Feb. 1951. 45pp. Armed Forces-National Research Council Vision Committee Secretariat, Univ. of Mich., Ann Arbor, Mich.

603

This report presents a summary of work by a committee formed to study the possible usefulness for military application of optical systems employing reflecting elements for visual systems. Included are: report on a test of the Bower's telescope for optical performance, design of a Gregorian telescope (a model has been constructed), measurements of visual resolution as affected by central stops in the system, and a comparison of reflection and refraction systems. Suggestions for further work are included. T.G.I.R.14.

604

Foitzik, L. THEORY OF SLANT VISIBILITY. Zeitschrift für Meteorologie, 1947, 1, 161-178. Armed Forces-NRC Vision Committee, (July 1952), Ann Arbor, Mich.

604

This paper first defines 'visual range' as a meteorological unit of distance up to which a black target can be seen, given certain conditions. Slant range is derived from the norm range by theoretical extension of the theory of visibility. Such an extension of Kechneider's theory is provided here, and a graphical method is given for determining the slant range of a black aerial target for any size and altitude, as well as for any condition of turbidity of the atmosphere for uniform decrease of turbidity with altitude. F.G.N.

605

Freedman, A., Huntington, E.C., Davis, G.C., Magee, R.B., et. al. FOOT DIMENSIONS OF SOLDIERS. Proj. T 13, 500 Proj. 611, Third Partial Rep., March 1946, 146pp. USA Medical Research Lab., Fort Knox, Ky.

605

This study measured the shape and dimension characteristics of men's feet and provided base line factual information for the design of footgear in terms of age, height, weight; anatomical description of foot; dimension and shape characteristics--length, toe region, metatarsal region, instep region, heel and ankle region; and differences between right and left feet. The data from 5,575 white and 1,200 Negro Ss were shown to be readily applicable to the alteration of the flare characteristics, toe curve, toe and ball height, and heel curve of present lasts. Comparisons between Negro and white measurements were noted. Further examination of the data was indicated for more complete recommendations in last pattern. T. G. I.

607

Byrnes, V.A. (Chm.). MANUAL OF INSTRUCTIONS: ARMED SERVICES VISION TESTER. April 1951, 22pp. Armed Forces-NRC Vision Committee Secretariat, ONR, Washington, D.C.

607

This manual includes (1) a description of the Armed Services Vision Tester, (2) directions for administering the standard tests (acuity at near and far, vertical and lateral phoria at near and far, and depth perception at far) and some optional tests (acuity for illiterates at far, binocular acuity at far and near, and prism divergence at near). (3) standard questions and scoring procedures, and (4) sample scoring key, record cards, and test slides. T.I.

608
Byrnes, V.A. (Chm.). MANUAL OF INSTRUCTIONS: ARMED FORCES VISION TESTER. Rev. Mv. 1952, 24pp. Armed Forces-NRC Vision Committee, ONR, Washington, D.C.

608
This is a revised manual of instructions for the Armed Services Vision Tester. The outline of topics remains the, (1) description of the instrument, (2) directions for administering standard tests (acuity at near and far, vertical and lateral phoria at near and far, and depth perception at far) and optional tests (acuity for illiterates at far, binocular acuity at near and far, and prism divergence at near), (3) standard questions and scoring procedures, and (4) sample scoring keys, record cards, and test slides.
T. i.

609
Scobie, R.G. (Chm.). MANUAL OF INSTRUCTIONS FOR TESTING HETEROPIORIA AND PRISM DIVERGENCE AT NEAR. Oct. 1947, 7pp. Armed Forces-NRC Vision Committee, ONR, Washington, D.C.

609
This manual describes the standard equipment and techniques to be used when testing for heterophoria (constant tendency of the eyes to deviate and for prism divergence at near fusion). Instructions include the use of (1) a binocular phorometer, (2) a monocular protable phorometer, and (3) a trial frame and 1 see prisms.
I.

610
Army-Navy-OSRD Vision Committee. TESTING VISUAL ACUITY. MANUAL OF INSTRUCTIONS. PRELIMINARY DRAFT COPY. r1954. 9pp.
Army-Navy-OSRD Vision Committee, Subcommittee on Procedures and Standards for Visual Examinations.

610
This is a preliminary draft of a manual of instructions for visual acuity testing, prepared by the Subcommittee for the Army-Navy OSRD Vision Committee. It covers the necessary conditions and procedures to be observed when testing for distant and near vision as well as standards relating to the room, illumination, test charts, and occluder.
I.

611
Scobie, R.G. (Chm.). MANUAL OF INSTRUCTIONS FOR TESTING VISUAL ACUITY. Oct. 1947, 10pp. Subcommittee on Visual Standards, Armed Forces-NRC Vision Committee, ONR, Washington, D.C.

611
A manual of instructions for visual acuity testing has been prepared by the Subcommittee for the Army-Navy OSRD Vision Committee. (See accession number 610 for preliminary draft). It covers the necessary conditions and procedures to be observed when testing for distant and near vision and standards relating to physical aspects of the room, illumination, and test charts. A diagram of a suggested occluder is appended.
I.

614
French, J.W. THE USE OF PERFORMANCE TEST IN CLASS "A" NAVAL TRAINING SCHOOLS (RADIO). NAVPERS 18078, Jan. 1948, 24pp. USN Training Research Div., Bureau of Naval Personnel, Washington, D.C. & College Entrance Examination Board, Educational Testing Service, Princeton, N.J.

This report is concerned with the development and use of performance measures for radio schools in the USN. 2 types of final tests for radionan trainees were developed: a) radio code receiving tests, and b) tests of performance on the use of radio equipment. Four forms of a message test in code were developed. Each form of the test contained a total of 432 characters divided into two messages. One message in each form was made up of ten complete alphabets distributed at random in five-letter groups, with a heading in standard form. The other message was made up of eight sets of digits distributed at random in five-digit numbers, and a similar heading. Each of the headings contained one complete alphabet and two sets of digits. 4 plain language tests were developed; each consisting of 100 words of an average length of 5 letters per word. These tests are of approximately equal difficulty and satisfactory reliability. These 4 plus 4 similar forms of plain language tests were used as the final forms. Studies of relationship between six classification and selection tests of the Navy Basic Test Battery and six measures of achievement in radio school were made. These studies indicate that the Radio Aptitude Test of the Basic Test Battery is the best predictor of the receiving tests, but the relationship is low. The Arithmetical Reasoning Test and the General Classification Test were found to be the best predictors for achievement as measured by the Final Achievement Examination. Examinations prepared by the Bureau of Naval Personnel.
R. i

618
Weitz, J. & Fair, K.L. A SURVEY OF STUDIES OF RHYTHM. Contract No. AF 33(038) 10413, Proj. No. 21 09 004, Res. Bull. 51 4, March 1951, 33pp. HRAC, Air Training Command, Lackland AFB, San Antonio, Tex. (Carnegie Institute of Technology, Pittsburgh, Penn.).

The present report is one part of an investigation of rhythmic performance carried out under Contract AF 33(038) 10413. It represents an attempt to bring up to date information about studies on rhythm and rhythmic ability and to fit these into a reasonable framework. Research studies are summarized under the following headings: Perceptual Studies of Rhythm; Studies of Accenting and Grouping; Rhythm Preferences, Time Estimation, Studies of Rhythm Involving Motor Performance, and Basis of Rhythm. Investigations falling in each of these categories are described briefly and cross-referenced to a bibliography of 339 titles. This work serves as background for a number of types of investigations of rhythm. Particularly, it will be of service in designing studies on the influence of rhythm on various kinds of motor performance, and on the identification and measurement of one or more rhythmic abilities. It is planned to explore these latter questions, and the relation to military problems of personnel classification and the training of motor skills.
R 344

619 Zechert, Virginia. JOINT CONVERSION TABLES FOR AIR FORCE APTITUDE INDICES AND ARMY APTITUDE AREAS. Proj. 21 02 34, Res. Bull. 51 5, March 1951, 32pp. USAF Human Resources Research Command, Lackland AFB, San Antonio, Tex.

The purpose of this study was to compare the standard scores of the Army aptitude areas and the related Air Force aptitude indices. Based on a stratified sample of 117 basic airman, tested at Lackland Air Force Base January-April 1950, two sets of equi-percentile conversion tables were prepared: a) Comparison of Air Force aptitude indices with the following related Army aptitude areas: Mechanical Aptitude Index with Aptitude Areas II, VI, VII, VIII, IX, and X; Clerical Aptitude Index with Aptitude Area IV; Equipment Operator Aptitude Index with Aptitude Areas VII and VIII; Radio Operator Aptitude Index with Aptitude Areas IV, V, and IX; Technician Specialty Aptitude Index with Aptitude Areas I, II, III, and IV; Services Aptitude Index with Aptitude Areas I, III, and VII; Craftsman Aptitude Index with Aptitude Areas II, III, VI, and VII; Electronics Technician Aptitude Index with the following related Air Force aptitude areas: Aptitude Area I with Technician Specialty and Services Aptitude Indices; Aptitude Area II with Mechanical, Technician Specialty, Craftsman, and Electronics Technician Aptitude Indices; Aptitude Area III with Technician Specialty, Services and Craftsman Aptitude Indices; Aptitude Area IV with Clerical, Radio Operator, and Technician Specialty Aptitude Indices; Aptitude Area V with Radio Operator Aptitude Index; Aptitude Area VI with Mechanical and Craftsman Aptitude Indices; Aptitude Area VII with Mechanical, Equipment Operator, Services, and Craftsman Aptitude Indices; Aptitude Area VIII with Mechanical and Equipment Operator Aptitude Indices; Aptitude Area IX with Mechanical, Radio Operator, and Electronics Technician Aptitude Indices; Aptitude Area X with Mechanical and Electronics Technician Aptitude Indices.

622 McClure, G. E., Tupes, E.C., & Dalley, J.T. RESEARCH ON CRITERIA OF OFFICER EFFECTIVENESS. Proj. No. 21 03 027, Res. Bull. 51 8, May 1951, 38pp. HRAC, Air Training Command, Lackland AFB, San Antonio, Texas.

The research on measurement of officer qualities reported in this bulletin represents logical expansion of work begun earlier and reported in Air Training Command Human Resources Research Center Research Bulletin 47 1(2). When the USAF decided to retain graduates of Officer Candidate School in the indoctrination division for a six-month on-the-job training tour immediately after commissioning, it became operationally possible to administer motivation and personality measures experimentally to samples that could not only be followed through Officer Candidate School but could also be evaluated for actual on-the-job officer proficiency. This report is a resume of criterion research within the Officer Candidate School structure, and the development of an on-the-job measure of officer performance for use as a criterion of officer quality. This study indicates that: a) officer quality can be rated with sufficient reliability to warrant use of such ratings as a criterion for evaluation of predictive devices; b) the reliability of on-the-job ratings of officers varies directly with the amount of prior briefing of raters as to what qualities to observe and with the amount of guidance each rater receives at the time of the rating; c) the three most important proficiency traits of newly commissioned lieutenants seem to be executive ability, conscientiousness, and cooperativeness; and d) ratings by peers (Buddy Ratings) during Officer Candidate School training have a higher positive relationship with later on-the-job performance ratings than do academic and military grades.

620 Swanson, R.A. A SURVEY OF RESEARCH PROBLEMS IN THE UTILIZATION OF MOBILE TRAINING UNITS. Proj. 21 07 026, Res. Bull. 51 6, April 1951, 10pp. USAF Technical Training Research Lab., Chanute AFB, Ill.

This summary report deals with the functioning of mobile training units in Air Force transitional aircraft mechanic training. The major purpose of these units is to go to wherever bases need special training for the maintenance of new aircraft models. To improve effectiveness of these units, two investigators, working independently, held interviews with a great variety of people who have a connection with the units' training at nine Air Force bases. Results of the survey pertaining to administrative problems affecting the use of the units are given, and detailed proposals for research into the specific training methods utilized are made.

621 Hagin, W.V. THE INFLUENCE OF TYPE OF INSTRUCTIONS ON THE PERFORMANCE OF A PERCEPTUAL-MOTOR TASK. Proj. 21 09 004, Res. Bull. 51 7, May 1951, 29pp. USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.

621 To investigate the influence of the media through which set is established by instructions upon a complex motor task, the SAM Complex Coordination Test was administered with standard time limits, under three different conditions of instruction to three groups of basic airmen. Group I (236 subjects) read the instructions from a typed card and were shown a demonstration with no oral explanation. Group II (194 subjects) were given oral instructions accompanied by demonstration. Group III (261 subjects) were given the standard instructions. Additional tests were given: 13 paper-and-pencil tests and five psychomotor tests. Inter-correlations were obtained between scores on these measures and scores on the coordination test. The data were analyzed for differences that could be attributed to instructions. T. R 4

624 Bilodeau, E.A. & Morin, R.E. RATE AND EXTENT OF IMPROVEMENT IN PERFORMANCE ON THE PEDESTAL SIGHT MANIPULATION TEST. Proj. 21 09 009, Res. Bull. 51 10, May 1951, 21pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

624 The main purpose of this experiment was to determine the rate and extent of improvement of performance on the Pedestal Sight Manipulation Test with practice. Twelve airmen practiced for about 40 min. a day including rests for 19 days. As a secondary experiment, on the next to last day, triggering was omitted, and on the last, the pipper was removed from the sighting reticle. Scoring included time in target area in azimuth, elevation, range, and combinations of these. Relations among scores, effects of practice by days and blocks of trials, and effects of secondary changes are reported.

T. G. R 19

625

Bilodeau, E.A. MODIFICATIONS OF DIRECTION OF MOVEMENT PREFERENCE WITH INDEPENDENT VARIATION OF TWO STIMULUS DIMENSIONS. Proj. No. 21 03 004, Res. Bull. 5: 12, June 1951, 7pp. NRRC, Air Training Command, Lackland AFB, San Antonio, Texas.

The present study was designed to yield information concerning the relative influence of two different stimulus dimensions upon verbally expressed preferences for directions of indicator movement. In a relatively simple situation, the attempt was made to measure the effects of systematic variations in these stimulus dimensions on the movement preferences of a sample of basic airmen. The equipment employed included a vertical bank of 41 lamps, which represented the indicator element, and a control lever limiting movement to the forward-backward directions. The influence on preferences for "up" and "down" movements of the indicator lights was measured for the variables: a) locus of a single lighted lamp, including the condition of no lamp lighted, and b) spatial orientation of the control lever within the forward-backward dimensions. The results indicate pronounced effects of each of these variables upon the expressed preferences for indicator movement. These results appear to have implications for at least two important problems. First, in the area of equipment construction, they indicate the necessity for basing design principles upon preference measurements which are taken throughout a wide range of variation in display and control characteristics. For example, the results show that preferences obtained from a given control position are completely reversed when the indicator light is at the lower end of the scale from what they are when the indicator is at the upper end of the scale. Second, with respect to individual differences, the results indicate that the relationship between preferences and a) susceptibility to interference, b) acquisition, and c) extinction might be profitably investigated.

R 12

627

Brown, C.W. & Ghiselli, F.E. INVESTIGATION OF BOMBING GROUND TRAINER (A-6) UTILIZATION IN THE USAF BOMBARDMENT SCHOOL: AN EVALUATION OF THE EFFECTIVENESS OF UTILIZATION OF THE A-6 GROUND TRAINER. Contract AF 33(038) 12776, Proj. 21 06 006, July 1951, 45pp. USAF Aircraft Observer Training Research Lab., Mather AFB, Calif. (Ames Institute of Research, Moffett Field, Calif.).

627

The over-all purpose of this investigation is to evaluate the effectiveness of the A-6 trainer in the USAF Bombardment School program, to make recommendations for increasing its effectiveness, and to suggest research on relevant factors. This report includes data from school records, experiments, suggestions from instructors and students, and professional judgment of research people pertinent to: reliability of scores used both in the trainer and in the air, effect of practice on level and variability of student performance in trainer, retention of skill in trainer over varying periods of time, and relation of performance on trainer to performance in visual bombing.

T.

630 Murray, N.L. ANALYSIS OF THE NAVIGATOR-BOMBARDIER JOB AND IDENTIFICATION OF FACTORS CONTRIBUTING TO SUCCESSFUL PERFORMANCE. Proj. 506 005 0001, Res. Bull. 51 20, Oct. 1951, 94pp. NRRC, Air Training Command, Lackland AFB, San Antonio, Texas.

This study was designed to analyze the job of navigator-bombardier and to identify factors that contribute to successful performance. The unique and complex character of the job make it impossible to employ the standard and sometimes rigid techniques used in job analysis. Thus, aside from the job description that has resulted, it is believed that the techniques evolved are important in the analysis of aircrew positions. A job description embodying a job summary, the work performed, worker characteristics, job characteristics, and factors contributing to successful performance are given. It is concluded that: a) the requirements for the job vary from aircraft to aircraft and that analyses of the job for each type aircraft will have to be undertaken in an attempt to discover the basic or common elements of the job; and b) training, based on these findings, must be instituted to impart the basic knowledge and skills, and special training must be given for the different types of cockpits. It is recommended that: a) the results of this project be extended to include a) methods not included in the final report and any new methods as they become standardized; b) the results be further verified with emphasis on a more representative sample; c) analyses of the job as performed in the various type aircraft be undertaken; d) differences in requirements for different type cockpits be studied to determine whether the differences are significant; e) the feasibility of designing a basic course based on the analyses in (c) should be investigated; and f) some measure of maintenance of proficiency be developed to: a) determine whether trialed observers on VLR type aircraft can be efficiently utilized, and b) determine whether present utilization of 1037's on VLR type aircraft is efficient in view of the logistic problems involved.

R 6

633

Hovgaard, P.E. BIOMECHANICS - A NEW APPROACH TO AIRPLANE SAFETY. Mech. Engrg., Sept. 1944, 613-614. (Curtis Wright Corporation, Buffalo, N.Y.).

633

This note presents a brief summary of a paper concerned with the approach to aircraft safety that is concerned with the human factors and their limitations in relation to the design and construction of the airplane. Features that will compensate for the conditions rather than attempting to avoid them are recommended. Specific examples from crash injury research are cited.

R 1

636

Barch, A.M. WARM UP IN EPICYCLIC PURSUIT PERFORMANCE UNDER MASSED AND DISTRIBUTED PRACTICE CONDITIONS AS A FUNCTION OF THE NUMBER OF PRACTICE SESSIONS. Contract AF 33(038) 13214, Proj. 509 020 001, Feb. 1952, 7pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

636

To investigate the "warming-up" period in the practice of manual skills, the decrement in performance occurring on the Epicyclic Pursuit Rotor (keeping a stylus on a moving target) was studied. There were two different practice schedules both having rest periods at rather short intervals: massed practice (rests only between blocks of trials), and distributed practice (rests between each trial). There is a theoretical discussion of warm-up decrement in the light of these and other results.

T. G. R 8

637

Bilodeau, E.A. MASSING AND SPACING PHENOMENA AS A FUNCTION OF PROLONGED AND EXTENDED PRACTICE. Proj. 509 020 0002, Res. Bull. 52 9, Feb. 1952, 6pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

637

As part of a larger project on maintenance of proficiency in motor skills, the effects on performance of practicing a simple motor activity over periods of several days was studied. Fifty-two airmen turned a crank manually as fast as possible, either without rest for eight minutes, or for two four minute periods separated by a rest of four minutes. The results related rate of turning (the performance measure) to trial number within practice sessions, and to days, with respect to massing or spacing of practice.

T. G. R 4

638

Beverly, R.F. & Kausler, D.H. THE EFFECT OF PRACTICE ON CIRCULAR ERROR AND ITS COMPONENTS IN VISUAL BOMBING. Proj. 505 006 0005, Res. Bull. 52 10, Feb. 1952, 4pp. USAF Aircraft Observer Training Research Lab., Mather AFB, Calif.

638

This study evaluates the effect of bombing practice on the two independent components of circular error—range and deflection. The scores of three bombardier classes on their last 12 training missions were grouped into three four-mission sequences, and the mean range and deflection errors were computed as well as the mean circular errors. These results are presented for each class and are discussed regarding their implications for the effects of practice on visual bombing efficiency. Implications for training and for future research are also discussed.

T. G. R 1

639

Bahrack, H.F., Rankin, R.E. & Fitts, P.M. THE EFFECT OF MOTIVATION UPON PERIPHERAL PERCEPTION DURING THE PERFORMANCE OF A CENTRAL PSYCHOMOTOR TASK. Contract AF 33(038) 10528, Proj. 509 020 0004, Res. Bull. 52 14, April 1952, 7pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex. (Ohio State University, Columbus, Ohio).

639

The hypothesis that "...a condition of high motivation facilitates performance of a central task but...interferes with...peripheral tasks," was tested. One hundred college students performed a "central" manual tracking task concurrently with "peripheral" visual and manual tasks. They performed under conditions of high motivation (cash bonus) and low motivation (thinking they were merely practicing). Results included: time on target, time to perform peripheral tasks, and frequency of looking at peripheral stimuli. They were discussed regarding the effect of motivation on selectiveness of attention.

T. I. R 7

640

Bilodeau, E.A. SOME EFFECTS OF VARIOUS DEGREES OF SUPPLEMENTAL INFORMATION GIVEN AT TWO LEVELS OF PRACTICE UPON THE ACQUISITION OF A COMPLEX MOTOR SKILL. Proj. 509 020 0007, Res. Bull. 52 15, April 1952, 18pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

640

The effect of knowledge of results on tracking and ranging performance was studied using the SAM Pedestal Sight Manipulation Test (a tracking and ranging task). Sixty airmen were divided into five groups with varying degrees of knowledge of results during five days of testing. Time on target was recorded for various combinations of azimuth, elevation, and range. Discussion concerns the effects of knowledge of results during training.

T. G. R 7

643

Deese, J. & Lazarus, R.S. THE EFFECTS OF PSYCHOLOGICAL STRESS UPON PERCEPTUAL-MOTOR PERFORMANCE. Contract AF 33(038) 13253, Proj. 509 020 0003, Res. Bull. 52 19, June 1952, 14pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex. (Johns Hopkins University, Baltimore, Md.).

643

To investigate the effects of psychological stress on perceptual-motor performance, personality measurements were obtained on 280 USAF personnel who were tested on a rotary pursuit task. The control group was tested under ordinary nonthreatening instructions; the experimental groups were given ego-involving instructions and then placed under failure-stress at various points in the learning sequence. Results were analyzed to determine 1) the effect of stress induced by the testing procedure itself, 2) the effects of failure-stress introduced either early or late in learning, 3) the effect of failure-stress upon within-subject variability, and 4) the relationship between personality variables and performance under stress

T. G. R 8

645 Warren, C.E., Fontaine, A.B. & Clark, J.R. A TWO-DIMENSIONAL ELECTRONIC PURSUIT APPARATUS. Contract AF 33(038) 10528, Proj. 509 020 0004, Res. Bull. 52 16, Aug. 1952, 10pp. USAF Air Training Command, Lackland AFB, San Antonio, Texas. (Ohio State University, Columbus, Ohio).

The apparatus described represents a device whereby tracking performance in 2 dimensions can be assessed. An important feature in this development is that the apparatus can be altered to provide for presentation of both a following pursuit (as in flexible gunnery) or a compensatory pursuit (as in the use of the artificial horizon) task, and to provide variety in the type of motor responses required of the persons taking the test. Therefore, the apparatus makes possible a wider variety of experimentation than do pursuit tests previously for only a single type of presentation or response.

646

Leiman, J.M. & Hill, F.L., Jr. THE CORRECTION OF ERRORS OF PLOTTING IN A ROTATED FACTOR MATRIX. Proj. 503 001 0003, Res. Bull. 52 28, Aug. 1952, 13pp. USAF Personnel Research Lab., Lackland AFB, Tex.

646

This paper presents "a mathematical solution to the problem of corrected error introduced by the graphical rotations of factor matrices when these rotations do not amount to an orthogonal rotation in the aggregate and when an orthogonal solution to the rotation problem is sought." The method can be used whenever a series of rotations results in too great a departure from an aggregate orthogonal transformation. A relatively simple procedure for finding a single transformation matrix is presented.

T. R 3

647

Reynolds, B. THE EFFECT OF LEARNING ON THE PREDICTABILITY OF PSYCHOMOTOR PERFORMANCE. J. exp. Psychol., Sept. 1952, 44(3), 189-198. (USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.).

647

To study the effects of learning on the predictability of psychomotor performance, about 150 basic trainee airmen were trained for 6 one-hour periods on the Complex Coordination test, a psychomotor task. The mean scores for each period were inter-correlated and were also correlated with scores on 20 written tests selected from the Airman Classification Test Battery. In analysis, primary attention is given to the variations in the correlations as a function of amount of practice on the psychomotor task. There is also some discussion of the acquisition curve for the task.

T. G. R 11

648

Tolson, J. COMPARATIVE PHYSIOLOGICAL TOL-
ERANCE OF BRITISH AND U.S. FORT WEATHER CLOTHING.
Rep. 31, 1955, 15pp. Clothing and Equipment
Physiological Research Establishment, Direc-
torate of Physiological and Biological Research,
Ministry of Supply, London, England.

648

To compare the physiological effects and subjective
sensations produced by British and American fort weather
clothing, eight men wore the two types of outfit for work
in the sun and in the day. The work consisted of walking
and carrying a 65 pound weight for 30 minutes, running
and carrying on eight days. The heat stress measured
was assessed by measuring oral and rectal temperatures,
heart rate, and pulse rate. Subjective opinion and
work performance were obtained by a "structured" inter-
view. The objective data were related by analysis of
variance for differences due to, working in day or sun
and type of outfit. Performance data were studied for
specific comfort and design features.
T. G. I. R 3

T. G. I. R 3

649 Price, Helen G. ANXIETY AND FAILURE AS FACTORS IN THE PERFORMANCE OF MOTOR TASKS. Proj.
509 020 006, Res. Bull. 52 34, Dec. 1952, 16pp. USAF Human Resources Research Command, Air
Training Command, Lackland AFB, San Antonio, Tex. (State University of Iowa, Iowa City,
Iowa).

The effect of anxiety and failure on performance of a psychomotor test was examined. 30
Ss were used. Half of them scored in the highest 20% of the normative distribution on the
Taylor Anxiety scale and half scored in the lowest 20%. The high anxiety (HA) and low anx-
iety (LA) groups were each divided into 3 equal subgroups. Each subgroup was given 20 trials
on the Turret Pursuit Apparatus (TPA). 2 subgroups from the HA and LA used the TPA in its
standard setting and upon completion of the 20 trials were given either "neutral" or "failure"
instructions. The remaining subgroup used the TPA in its reversed setting, followed by neu-
tral instructions. The TPA task was followed by 20 trials using the Epileptic Pursuit Motor
(EPM). Results were analyzed in terms of time-on-target scores both for the TPA and the EPM,
and in terms of the number of contacts and time-on-target-percentage for the EPM. No sig-
nificant differences on any of these measures were found between groups or subgroups.
T. G. I. R 18

650

Jones, E.J. & Bilodeau, E.A. DIFFERENTIAL TRANSFER OF
TRAINING BETWEEN MOTOR TASKS OF DIFFERENT DIFFICULTY.
Proj. 509 020 0001, Res. Bull. 52 35, Dec. 1952, 23pp.
USAF Personnel & Motor Skills Research Lab., Lackland
AFB, Tex.

650

To investigate transfer of training as a function
of the relative complexity of two tasks, 164 basic 12-
men trained successively on two modifications of the SAM
10-Hand Coordination Test. A metal pin had to be moved
in a metal groove on either a circular (simple) or clover-
leaf (complex) path. Time per trial, time of contact
of pin with side of groove, and number of contacts were
discussed in terms of transfer as a function of relative
complexity of task. A hypothesis for predicting transfer
was proposed, and the implications of the results for
training were considered.
T. G. I. R 5

651

Bilodeau, E.A. TRANSFER OF TRAINING BETWEEN TASKS DIFFER-
ING IN DEGREE OF PHYSICAL RESTRAINT OF IMPERATIVE RESPON-
SES. Proj. 509 020 0002, Res. Bull. 52 40, Dec. 1952,
11pp. USAF Personnel & Motor Skills Research Lab., Lack-
land AFB, Tex.

651

To study the relative effectiveness of guided and
unguided practice, 384 basic airmen practiced success-
fully on two modifications of the SAM 10-Hand Coordina-
tion Test. A metal pin had to follow a cloverleaf path, either
in a metal groove (guided) or flesh with a horizontal
surface (unguided). Performance was scored in terms of
contacts per one-minute interval with equally-spaced
inserts along the path. Mean contacts and standard
deviations were discussed with regard to transfer be-
tween guided and unguided tasks, reasons for the results
obtained, and implications for guided and unguided
training.
T. G. I. R 3

T. G. I. R 3

652

Smith, C.E. A REPRESENTATIVE SCALE OF DIFFICULTY IN THE
COMPLEX COORDINATION TEST (COW TEST). Proj. 509 020
0005, Res. Bull. 52 41, Dec. 1952, 11pp. USAF Personnel
& Motor Skills Research Lab., Lackland AFB, Tex.

652

To determine a representative scale of absolute
difficulty in the Complex Coordination Test, 156 basic
airmen made matches for 39 selected combinations of
aileron, rudder, and elevator control positions.
Median time per match was used as a measure of diffi-
culty and was compared with difficulty ratings made by
Ss on a five-point scale. The characteristics of the
derived scale were discussed, together with effects of
sequence, serial position, performance variability,
and massed and distributed presentation.
T. G. I. R 1

T. G. I. R 1

654

French, E.S. NUMBER OF CLONED ELEMENTS AND CONSISTENCY
OF REINFORCEMENT IN A DISCRIMINATION LEARNING TASK.
Proj. 509 020 0001, Res. Bull. 53 12, June 1953, 10pp.
USAF Personnel & Motor Skills Research Lab., Lackland
AFB, Tex. (Reprinted from *J. Gen. Psychol.*, Jan. 1953,
45(1), 25-34).

654

To study the interaction of similarity of stimuli
and consistency of reinforcement in discrimination
learning, 384 basic airmen viewed 96 pairs of abstract
forms, choosing one form each trial. "Correctness" of
choice was indicated to Ss after each trial, consistency
in such reinforcement varying from 0 to 100 percent.
Similarity of forms varied from 0 to 3 common segments.
Choice errors and time to make choice are analyzed as
functions of reinforcement consistency and similarity,
and the implications of the interaction of these vari-
ables for theories of discrimination learning and
transfer learning are discussed.
T. G. I. R 10

T. G. I. R 10

655

Fleishman, E.A. A FACTOR ANALYSIS OF INTRATASK PERFORM-
ANCE ON TWO PSYCHOMOTOR TESTS. *Psychometrika*, March
1953, 18(1), 45-55. (Yale University, New Haven, Conn.).

655

This paper described an application of factorial
methods to the trial scores of two forms of the Rudder
Control Test--Standard and Experimental Six-Target--to
determine if and when fluctuations occur in the abilities
sampled. These scores were obtained from 698 pilot-
cadets; the Standard was given first for 356, the Experi-
mental for 342. Correlation among all trial scores of
both tests were computed and 12 matrices obtained
for each administration order. I.e., intertrial correla-
tion matrix was factor analyzed by Thurstone's Centroid
Method, and the axes rotated to simple structure. Im-
plications for future psychomotor test development were
indicated.
T. G. I. R 4

T. G. I. R 4

656 Krumm, R.L. CRITICAL REQUIREMENTS OF PILOT INSTRUCTORS. Proj. 508 016 000. Tech. Rep. 52-1, Sept. 1952, 18pp. HRRC, Air Training Command, Goodfellow AFB, Texas.

The present report describes the procedures which were carried out to define the flight instructor's task, in arriving at a description of the job in terms of critical instructor behaviors, individual and group interviews were conducted with cadets and student officers, student instructors, instructors and supervisors at seven representative air fields in the Air Training Command. Approximately 4600 separate reports of effective and ineffective behaviors of flight instructors were obtained. In classifying the reported behaviors, identical behaviors were grouped together under a single statement summarizing the reported incident. These statements were then combined by grouping similar behaviors and a single phrase was developed which encompassed the various behaviors in the group. This procedure resulted in a reduction of the total number of behaviors reported to 13 independent "components" of behaviors under three general "areas." The complete classification was submitted to a number of experienced pilots and educators for their comments and suggested alterations. In addition, a small scale evaluation of the relative importance of the various behavioral statements was arrived at by administering the classification as a rating scale to a number of experienced pilot instructors. The general comments of the consultants and the results of the instructors' ratings indicated that the classification was a usable and useful device. The pilot instructor's job and, since it dealt completely with observable behaviors which are considered "critical," it would serve as a suitable basis for the development of an instructor proficiency evaluation device.

R 10

661 Sells, E. & Moore, J.T. A PRELIMINARY INVESTIGATION OF TROUBLE SHOOTING. Proj. 507 001 000. Tech. Rep. 53-2, Feb. 1953, 10pp. HRRC Human Resources Research Center, Lackland AFB, Tex.

661 This report describes a preliminary exploration directed towards determining characteristics of good and poor trouble-shooters. Malfunctions were inserted into each of three equipments: radar, reciprocating engines, and remote control turners; and observations were made of maintenance men who attempted to locate the malfunctions. Ten men worked on each equipment, the five best and the five poorest trouble-shooters as rated by their supervisors. Other tests given the men included a "symptoms-causes" test, biographical inventory, intelligence test, and concept formation test. Interviews were also conducted. On the basis of the results a number of hypotheses for further research were suggested.

T. 1. 2. 4

662 Lewis, D., McAllister, Dorothy E., & Bechtoldt, H.P. CORRELATIONAL ANALYSIS OF THE LEARNING AND RETAINING OF FOUR DIFFERENT TASKS ON THE MODIFIED WASHBURN APPARATUS. J. Psychol., 1953, 36, 63-109. Contract AF 33(033)-13214, Res. Bull. 53-35. HRRC, ARDC, Lackland AFB, San Antonio, Tex.

662 To isolate interference effects in changing a psychomotor task, 37 college students matched stimulus-light patterns by manipulating simulated aircraft controls (modified Washburn test). Four tasks were learned in sequence, then relearned, over a 13-day period. Different tasks consisted of different display-control relationships. Performance trends are analyzed in terms of number of matches and number of errors. "Matches" scores for 100 selected trials are inter-correlated and correlation patterns are subjected to detailed analysis, including factor analysis. Discussion covers effects of shifting task, interference measurement, and factors in proficiency loss.

1. 3. R 8

663 Lewis, D., McAllister, Dorothy E., & Bechtoldt, H.P. CORRELATIONAL STUDY OF PERFORMANCE DURING SUCCESSIVE PHASES OF PRACTICE ON THE STANDARD AND REVERSED TASKS ON THE SWI COMPLEX COORDINATOR. Res. Bull. 53-47, Dec. 1953, 14pp. HRRC Human Resources Research Center, Lackland AFB, Tex. (Reprinted from J. Psychol., 1953, 36, 111-122).

663 To study factors affecting performance in shifting complex coordination tasks, 43 college students matched stimulus-light patterns by manipulating simulated aircraft controls (SWI Complex Coordinator). Two tasks (standard and reversed display-control relationships) were learned in succession and then alternately relearned three times over a two-day period. Number of matches per trial was computed for selected trials, and these scores were intercorrelated. Correlational patterns were analyzed and some intercorrelations were factor-analyzed for information on coordination and interference as determinants of performance level. Performance curves were also plotted and discussed.

T. 1. 2. 3

664 Fick, F.C. PROGRESS REPORT: COMMUNICATIONS RESEARCH DIVISION. April 1952, 22pp. HRRC Human Resources Research Lab., Maxwell AFB, Ala.

664 This progress report presents informative abstracts of research in communications, covering language statistics used in aircraft control, written transcriptions, assimilation of sequentially encoded information, assimilation of information from visual and auditory displays of various types, rate of handling information, the noise filtering capacities of the human ear, and equipment development.

T. 1. 2. 2.

665 HOIT, D. AN INVESTIGATION OF THE PROFICIENCY OF GROUND CONTROLLED APPROACH FINAL CONTROLLERS. HRRL Rep. 2, April 1949, 13pp. HRRL, Hqs. Command & Operational Commands, Bolling AFB, Washington, D.C.

This is the first report on a series of attempts to measure the proficiency of GCA Final Controllers. A Rank-Order Scale wherein the GCA Final Controllers under test were ranked with regard to their proficiency on a particular task by other GCA personnel was considered the criterion of proficiency. A battery consisting of tests and experience scores was used to measure the criterion. The multiple correlation coefficient between the criterion and the measurement battery was found to be .65. After reworking the personal inventory in the manner most predictive of the criterion, as determined by an item analysis of this test, the multiple correlation was raised to .71. Although by usual standards this might be considered a satisfactory battery for measuring proficiency, it is felt that further research on this particular problem is advisable.

R 11

666
Frick, F.C. & Smedley, W.M. COMBINED TOWER LANGUAGE. *J. Acoust. Soc. Am.*, Nov. 1952, 24(6), 595-596. Human Factors Operations Research Lab., Reprint Rep. 2. (USAF Human Resources Research Lab., Bolling AFB, Washington, D.C.).

666
In order to estimate the effects of non-linguistic constraints on redundancy of message transmission, an informational analysis was made of the "nablanguage" used in the control of aircraft by Air Force control tower operators. Estimates were made of the reduction in transmission when (1) subjects guessed successive letters of English text, (2) the text of control tower messages and (3) control tower messages were predicted following description of a hypothetical situation. Analysis of the effects of both situational and linguistic contexts is made.
1. R 1

667
Kistler, G.A. FACTORS INFLUENCING THE EFFECTIVENESS OF AUDIO-VISUAL TRAINING MATERIALS. NO. 3. THE EFFECT OF "RESPONSE GUIDANCE" ON THE VALUE OF AUDIENCE PARTICIPATION IN TRAINING FILM INSTRUCTION. Contract AF 33(616) 1378, NR2 Rep. 26, Nov. 1951, 25pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C.

667
This is a preliminary pre-publication draft of a report on the effect of response guidance on the value of audience participation in the training film instruction (see Acc. No. 3445). Seven hundred subjects were shown two slide films designed to elicit frequent audience participation. Half of the subjects were presented with a film in which guided participation was incorporated while the others received the traditional type of film. Both films dealt with learning to read slide rule scales. The results are presented and discussed in terms of the relative amount of learning evidenced by each group of subjects as a function of the type of training film used.

668
Kistler, G.A. FACTORS INFLUENCING THE EFFECTIVENESS OF AUDIO-VISUAL TRAINING MATERIALS. NO. 1. THE INFLUENCE OF SIMPLE ANIMATION TECHNIQUES ON THE VALUE OF A TRAINING FILM. NR2 Rep. 24, April 1951, 24pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C.

668
This is a nontechnical report (with an appendix of technical information) of a study of the effectiveness of simple animation techniques in training films. A training film on reading a micrometer was shown to 1300 Air Force trainees; half saw the basic film, half the identical film with simple animation devices added. Pre- and post-tests of ability to read micrometers consisted of pictures of settings to be read. Results (percent correct readings in tests) are discussed regarding implications for use of animation techniques to improve effectiveness of training films. Specific recommendations are made.
1. G. 1.

669
Michael, D.W. SOME FACTORS INFLUENCING THE EFFECTS OF AUDIENCE PARTICIPATION ON LEARNING FROM A FACTUAL FILM. Contract AF 33(616) 22944, HRL Memo. Rep. 13, Dec. 1951, 46pp. HRL, Headquarters Command, Bolling AFB, Washington, D.C. (Boston University School of Public Relations).

669
To test the effects of audience participation, a training film was interrupted four times for practice (oral questions on content); a written test followed the showing. Twelve groups, of approximately 20 junior or senior high school students each, had the following conditions assigned in various combinations: overt (writing answers) and covert ("thinking" answers) practice; knowledge or no knowledge of practice results; prior or no knowledge of written test, and control conditions. Results (percent correct answers) are discussed regarding the relative influence of overt and covert participation, feedback, practice, motivation and intelligence in learning from films.
1. G. R few

670
Fellack, I. THE INFORMATION OF ELEMENTARY AUDITORY DISPLAYS. HRL Rep. 13, 5pp. USAF Human Resources Operations Research Lab., Bolling AFB, Washington, D.C. (Reprinted from *J. Acoust. Soc. Am.*, Nov. 1952, 24(6), 745-757).

670
To determine how much information can be transferred with a series of tones when each tone is presented individually for identification, the frequency of a single tone was varied in equal-logarithmic steps in the range between 100 and 8000 cycles per second and presented for identification at a level randomly adjusted to reduce loudness cues. Both group and individual testing was conducted for series of two, four, eight and 16 tones, closely spaced, widely spaced, with middle frequency tones omitted and with a restricted range. The data were analyzed for amount of information transferred and the number of perfectly identified tones.
1. G. 1. 1 e

671
Alvis, H.J. BREATHHOLDING BREAKPOINT AT VARIOUS INCREASED PRESSURES. BuMed NM 002 015 01. HRL Rep. 177, Aug. 1951, 110-120. USN Medical Research Lab., USN Submarine Base, New London, Conn.
This study confirms earlier findings that the duration of breathholding varies with the partial pressure of oxygen. Further, it indicates that the influence of oxygen partial pressure was not eliminated at the breathholding breakpoint even at pressure equivalent to four atmospheres absolute. It is shown that in the alveolar air at the breathholding breakpoint there is a linear relationship between pO_2 and $\log(pO_2)$ with 2 parameters which vary between individuals. It does not appear to be acceptable to apply the formula expressing the pO_2 - pO_2 relationship for normal respirations to the situation of breathholding.
A 3

672
Alvis, H.J. MANUAL OF FREE ESCAPE FROM SUBMARINES. BuMed Proj. NM 002 015.01.02, Rep. 184, Jan. 1952, 11pp. Medical Research Lab., U.S. Naval Submarine Base, New London, Conn.

672
This paper is a nontechnical discussion of the theoretical considerations in free escape (without breathing or depressurizing apparatus) from a submarine, and outlines the technique step by step. It is based upon experience with an escape training tank at depths of 50 and 100 feet.

673
Alvis, H.J. THEORETICAL CONSIDERATIONS OF THE USE OF THE AIR-FILLED SUBMARINE ESCAPE APPLIANCE FROM GREAT DEPTHS. Bulet. Proj. NM 002 015.08.01, NML Rep. 185, Jan. 1952, 14pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

674
The theoretical considerations involved in submarine escape from great depths with the use of external breathing apparatus are reviewed. Oxygen, nitrogen and carbon dioxide toxicity at high partial pressures, emesis, decompression sickness, and pressure equalization are discussed. Recommendations are made for practical escape procedures based upon theoretical calculations, and the results of experiments on related problems.
T.S.

674
USN Medical Research Lab. COLOR VISION TESTING. PRELIMINARY REPORT. Proj. NM 003 041.51, NML Rep. 7, Color Vision Rep. 1, Sept. 1952, 2pp. USN Medical Research Lab., New London Submarine Base, Conn.

675
This is a preliminary report on a color vision testing project using seven varied types of tests. Only test data on the Pseudo-Isochrome plates of the American Optical Company for 133 subjects are given. Subjects were assumed to have normal color vision on the basis of satisfactory scores on the other six tests. Analysis of error scores for each plate in the test was made. Recommendations as to the usefulness of the test are included.
T.S.

675
USN Medical Research Lab. COMMENTS ON TEST OF EYE SWEETENERS NIGHT DRIVING GLASSES WITH DOUBLE VISION INTERCHANGEABLE LENSES. Proj. NM 003 041.51, Memo. Rep. 52 1, Feb. 1952, 2pp. USN Medical Research Lab., New London Submarine Base, Conn.

675
To evaluate the usefulness of two sets of interchangeable plastic lenses for sunglare and headlight glare use (Eye-Savers, Inc.) laboratory tests were made as follows: (1) spectral transmission curves were calculated in the visible, ultra violet and infra red regions with the Beckman D.U. Spectrophotometer, and (2) surface abrasions were made with rubber abrasives. Results are discussed in terms of transmission of visible light and of surface hardness of the lens. Recommendations for use are made.

676
Medical Research Lab. THE DETERMINATION OF NIGHT VISION OF SUBMARINE PERSONNEL. Proj. X-49, Rep. No. 2, Apr. 1942, 9pp. Medical Research Lab., U.S. Submarine Base, New London, Conn.

676
The first five reports from the Submarine Base, New London, Connecticut, investigating night vision are included here. In summary, 3956 individual tests were made on submarine personnel. Experimental tests included effect of Vitamin A, effect of colored light exposure, effects of Elixir A and B (Miles), the use of object identification in the test, and a night vision training program. Discussion of progress and recommendations for further work were made.
T. G.

677
Medical Research Lab. REPORT ON NIGHT LOOKOUT TRAINING SCHOOL. Rep. 3, May 1942, 15pp. Medical Research Lab., U.S. Submarine Base, New London, Conn.

677
The procedure and apparatus for training night lookouts (with ship models on a training table) is described in detail, including the complete text of a lecture. Scoring method and a table for conversion to standard scores are presented. Distribution of scores obtained on 1325 trainees is given. Discussion covers effectiveness of training, modifications needed, and potential usefulness in research and training.
T.

678
Gratt, C.M. BIOMECHANICS A NEW APPROACH TO AIRPLANE SAFETY. Mech. Engrg., May 1944, 313-314.

678
Successful cooperation between surgeons and engineers leads to an exchange of techniques known as biomechanics, a division of the larger sphere of biological engineering. The application of these techniques to airplane safety is discussed. Many examples are given.
E 2

679
USN Medical Research Lab. LIST OF RED FILTERS FOR DARK ADAPTATION. Proj. NM 003 041.51, Memo. Rep. 53 10, July 1953, 4pp. USN Medical Research Lab., New London Submarine Base, Conn.

679
This memorandum report presents a list of red filters that have been laboratory tested for dark adaptation purposes. The list is limited to filters that were sent to the laboratory, and is not an exhaustive sampling of all sources.
T.

680
USN Medical Research Lab. ANALYSIS OF COLORS USED IN DIVERINE COLOR PERCEPTION TESTING CHARTS. Proj. NM 003 041.10, Memo. Rep. 52 9, Aug. 1952, 6pp. USN Medical Research Lab., New London Submarine Base, Conn.

680
This memorandum reports an analysis of the colors used in the Diverine Color Perception Testing Charts. The colors were visually compared with Munsell standards, and values were assigned which were then plotted on ICI Chromaticity Diagrams especially prepared for plotting Munsell values. The x,y coordinates thus obtained were plotted on MNL Mixture Diagrams. Analysis was directed toward the confusion zones of the various plates and the expected diagnostic value as compared with existing tests.
T.S.

681
USN Medical Research Lab. "OPTILITE" DARK ADAPTATION GOGGLES. MEMORANDUM REPORT. Proj. NM 003 041.51, Memo. Rep. 52 7, April 1952, 3pp. USN Medical Research Lab., New London Submarine Base, Conn.

681
To evaluate "Optilite" dark adaptation goggles, two samples each of three different types (spectacle, rigid one-piece cover type, cover goggle with soft frame and replaceable lens) were tested. Results include spectral transmission of the lens measured with the Beckman D.U. Spectrophotometer, a comparison with standard normal specifications, and a subjective evaluation by 12 members of the laboratory concerning coverage, comfort, and suitability for wear over prescription glasses.
G.

682
Schwartz, I., Lee, G. & Farnsworth, D. REPORT OF TWO PHOTOMETRIC SURVEYS OF RED LIGHTING ON THE SUBMARINE SSKI. Proj. NM 002 014.01, Memo. Rep. 52 13, Dec. 1952, 8pp. USN Medical Research Lab., New London Submarine Base, Conn.

682
This reports a photometric survey and evaluation of the low level red illumination on the Submarine SSKI. Discussion and recommendations from the standpoint of acceptability of the lighting under anticipated operating conditions include: spectral quality of illumination, dial brightness on some of the instruments, light leakage from various sources, need for shielding red-lighted rooms from adjacent white-lighted rooms, and the color of fluorescence on the computers.

685

Neer, E.N., & Dreher, J.J. OPERATIONAL TESTS OF MINIATURE MICROPHONES AND RECEIVERS. Contract AF 19(604)-1577, Proj. 668, Tech. Rep. 34, AFRC TR 54-57, Oct. 1954, 10pp. Operational Applications Laboratory, AFRC, Bolling AFB, Washington, D.C. (Ohio State University Research Foundation).

686

This article presents the results of operational evaluations of the X-33 microphone with selected ear insert and bone transducer (and used with the AIC-10 communication system). Utilizing two types of aircraft, the EC-97 and C-124, a list of 200 Harvard TB words were transmitted by pilots using the ear and bone microphones. A panel of ten listeners were used to evaluate the intelligibility and general characteristics of the transmissions. The results are presented in the form of percent correct word identification scores for each of the microphones. Additional experimentation on reception equipment provides a basis for conclusions concerning the efficiency of headset-microphone combinations. T. R. 9

684

USN Medical Research Lab. REQUIREMENTS FOR GENERAL PURPOSE SINGLES FOR OVER-THE-COUNTER SALE. Proj. NM 003 041-51, Med. Rep. 32 6, April 1952, 3pp. USN Medical Research Lab., New London Submarine Base, Conn.

686

This memorandum report summarizes requirements for general purpose singlasses for over-the-counter sale. Standards are given for light and non-visible radiation transmission, color, size, base curvature, refractive power, optical quality, and frames. I.

682

Brown, W.B. THE VESSEL LENGTH CALCULATOR. NRL Rep. 78, Oct. 1946, 5pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

672

This report describes the design and use of a Vessel Length Calculator intended for use in computing lengths of vessels sighted at sea. Other problems of navigation and surveying with common factors (range, angle formed by lines of sight to the extremities of object, angle of divergence from the perpendicular of the line connecting the extremities) can be solved within the limits of the Calculator - width of harbor entrance, dimensions of small island or reef, are examples. A model Calculator is included. I.

693

Cook, E.B. VISUAL ACUITY MEASUREMENTS WITH THREE COMMERCIAL SCREENING DEVICES. Bull. Res. Proj. X-493 (Av-263-p), Progress Rep. 2, A revision of report by Sulzman, Cook and Bartlett, Feb. 1946, Apr. 1946. Medical Res. Lab., U.S.N. Submarine Base, New London, Conn.

693

To evaluate the reliability and validity of visual acuity measurements obtained with three commercial screening devices (Bausch and Lomb Company Ortho-Rater, American Optical Company Sight Screener, Keystone View Company Telebinocular), 128 observers were examined twice in a test-retest situation. A standard letter reading test (New London Chart) was the criterion. Consistency of measurements for test-retest given and comparisons are made with the criterion. The devices are discussed in terms of their use in practical situations. T.G.I.R.I.

694

Cook, E.B. A FACTOR ANALYSIS OF ACUITY AND PHORIA MEASUREMENTS OBTAINED WITH COMMERCIAL SCREENING DEVICES AND BY STANDARD CLINICAL METHODS. Bull. Res. Proj. NM 003 011 (X-493), Progress Rep. 4, Aug. 1946. Medical Res. Lab., U.S.N. Submarine Base, New London, Conn.

694

To investigate sources of test score variance found in measuring visual functions (acuity and phoria) with commercial screening devices and by means of standard clinical procedures (see accession number 695), a factor analysis was made of visual measurements obtained on a reasonably heterogeneous population of 123 persons in a test-retest situation. Factors are identified and discussed in terms of the various measuring devices and their implications for establishing visual standards for military and industrial purposes. T.G.I.R.I.

695

Cook, E.B. COMPARATIVE PERFORMANCE OF COMMERCIAL SCREENING DEVICES AND FAR AND NEAR WALL CHARTS UTILIZING THE SAME TEST TARGETS. Bull. Res. Proj. NM 003 011 (X-493), Progress Rep. 5, Aug. 1946. Medical Res. Lab., U.S.N. Submarine Base, New London, Conn.

699

To investigate the causes of differences in visual acuity scores yielded by commercial screening devices (Ortho-Rater, Sight Screener, Telebinocular) and clinical methods of testing (New London Letter Chart), scores from 126 relatively heterogeneous observers were obtained under two conditions: using the devices in standard manner, and using their test targets, photographically enlarged, in a visual alley. The data are analyzed in an effort to determine the factors causing differences. T.G.I.R.I.

696
Cook, E.B. & Wherry, R.J. A STUDY OF THE INTERRELATIONSHIPS OF PSYCHOLOGICAL AND PHYSIOLOGICAL MEASURES ON SUMMARY ENLISTED CANDIDATES: I. HISTORY, EXPERIMENTAL DESIGN, AND STATISTICAL TREATMENT OF DATA. Bull. Res. Proj. NM 003 017, Rep. 1, March 1949, 45pp. USN Medical Research Lab., USN Submarine Base, New London, Conn.

This report introduces a series of papers to be presented on the interrelationships of some 330 physiological and psychological measures obtained on a population of 120 submarine enlisted candidates. For convenience in handling the mass of data, the 330 measurements were subdivided into logical subject matter fields and factor analyzed. Individual papers are in preparation on the main areas covered: physical fitness tests, urinary 17-ketosteroid and androgen output and stress tolerance, psychiatric interview, Rorschach, physical characteristics, anthropometric and somatotyping data, blood data and psychological tests. Significant factors which emerged from the area studies will be combined in final relational study. A detailed discussion of the nature of the correlation coefficient and the technique of factor analysis is included. It is hoped that a small battery of relatively independent tests will be established from the total study, for validation on a subsequent group of subjects prior to suggesting revisions of the submarine selection program. Inasmuch as the variables studied are not peculiar to the submarine service alone, findings should be of interest to the general selection problems of other military organizations and to industry as well. Area studies have suggested worthwhile leads for further investigations in the individual fields covered. It is anticipated that valuable indications of area interrelationships will be forthcoming from the final relational study.

698
Dinnick, F.L., & Rudolph, L.M. CHECKERBOARD VISUAL ACUITY TARGETS: AN EXPERIMENTAL VALIDATION. BuMed Proj. NM 003 008(X-423), Rep. 1, Dec. 1948, 14pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

699
To validate checkerboard targets for use as a test of visual acuity, three observers (vision 20/20) made 20 position judgments under constant illumination for each of 111 targets (individual checkerboard extending one minute visual angle) at five distances (7.05 to 67.40 feet). Distribution curves of correct judgments against distance are compared to the normal curve; those targets giving abnormal curves are rejected. This study also throws light on the relation of visual angle to testing distance.
T.G.20.

700
Farnsworth, D. DEVELOPMENTS IN SUBMARINE AND SMALL VESSEL LIGHTING. BuMed Proj. NM 002 041.01, Rep. 209, Sept., 1952, 6 pp. U.S. Submarine Base, Medical Res. Lab., New London, Conn.

701
This is a reprint of a paper concerning submarine and small vessel lighting. Problems discussed are: space and shape limitations of vessel; lighting of instruments, of living and working quarters; limitations on generator capacity; red-lighting for dark adaptation; and coordination of lighting with compartment design.
T.I.22.

702
Farnsworth, D. STANDARDS FOR GENERAL PURPOSE SUN GLASSES. BuMed NM-000-009, Color Vision Rep. 17, Sep. 2, Sept. 1948. 27pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

703
To establish standard specifications for general purpose eyeglasses, pertinent literature, laboratory, and field tests were surveyed. Specifications were derived from these sources and are presented with full discussion for the following factors: light, heat, and ultra-violet transmissions; color; size of lenses; curvature; geometric optics; frame design; and physical specifications.
T.I.220.

704
Farnsworth, D. INSPECTION GOGGLE FOR CHECKING VISIBLE SPECTRAL QUALITY OF LIGHTING FOR DARK ADAPTATION. BuMed Proj. NM 003 041.40, Rep. 170, Mar. 1951. 17pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

705
This report describes an inspection goggle which will enable an observer of normal color vision to determine whether red-lighted units and installations conform to naval specifications for dark adaptation. A comparison is made between results from the inspection goggles and measurement of transmission for various re-appearing filters. Recommendations for use are included.
T.G.I.27.

706
Farnsworth, D. PROPOSED SPECIFICATIONS OF RED AND GREEN NAVY SIGNAL LIGHTS. BuMed Proj. X 265(Av 153 c), Color vision Rep. 16, Mar. 1948. 17pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

707
This report proposes standards for colored signal lights to replace the diverse ones in use. Specifications for yellow, white and blue as drawn from several sources are recommended as satisfactory while new specifications for red and green are presented. The report includes letters from several authorities in the field commenting upon this proposal.
T. G. R 9

708
Farnsworth, D., & Millman, B. A COMPARISON OF SPECIFICATIONS FOR DARK ADAPTATION RES. BuMed Proj. NM 002 014 01 01, Rep. No. 219, Feb. 1953, 18pp. Medical Research Laboratory, U.S.N. Submarine Base, New London, Conn.

709
To unify standards for red filters to be used for dark adaptation purposes, current specifications for red goggles, red compartment lighting fixtures, and red panel illumination were compared and evaluated. Standards for measuring the spectral quality of the filter material are recommended and a computation form is proposed which incorporates red and cone stimulation factor limits based on the most recent luminosity-energy data.
T. G. R 17

710
Farnsworth, D., Sperling, H.G., & Kiable, P.F. A BATTERY OF PASS-FAIL TESTS DETECTING DEGREE OF COLOR DEFICIENCY. BuMed Proj. NM 003 018, Rep. No. 147, Aug. 1949, 8. 39 68 Medical Research Lab., USN Submarine Base, New London, Conn.

711
To determine a suitable combination of tests for classifying color vision deficiency, an unselected population of 1440 young males (17 - 38 years) were screened with 14 American Optical Company Plates and the Binick Anomaloscope; deviants were then examined on the Anomalight, Navy Lantern, Farnsworth Dichotomus 6-20, and F-20 Dichotomus tests. Standardized conditions prevailed for all testing. Data are analyzed to show population incidence for different classes of deficiency. Tests are evaluated for validity and reliability, and a battery of five tests is recommended.
T. G. R 26

712
Farnsworth, D. PROPOSED ARMED FORCES COLOR-VISION TEST FOR SCREENING. BuMed Proj. NM 003 04: 10 01, Rep. 180, 1951. 16. 146 155. Medical Research Lab., USN Submarine Base, New London, Conn.

713
A set of 15 pseudo-isochromatic plates (14 diagnostic, 1 demonstration) has been selected from the American Optical Company test for use as a mass screening test to segregate color normals from color defectives. Selections were based on information derived from various studies conducted at the Medical Research Laboratory from 1943 to 1950 on the relative diagnostic value of these plates. Specifications are given for an easel lamp for standard illumination and viewing conditions and a draft of instructions covering physical arrangements, administration, scoring and purpose are included.
T. G. I.

714
Farnsworth, D. COLOR VISION. Handbook of Applied Psychology, Ninth Edition, 1950, pp. 308-311. BuMed Proj. NM 003 041.08.02 (formerly NM 003 016), Rep. 159. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

715
This report is an offprint from Handbook of Applied Psychology, Ninth Edition, 1950 of Chapter 48 prepared by Dean Farnsworth. The need for normal color vision in many industrial situations is pointed up and a simplified discussion of color anomaly (deficiency) and tests used to detect such conditions is presented.
R).

708
Farnsworth, D. STANDARD FOR SUNGLASSES. Sight-Saving Review, 1950, XI, 81-87. BuMed Proj. NM 003 041 18 04 (formerly NM 000 009), Rep. 158. Nov. 1950. Medical Research Lab., USN Submarine Base, New London, Conn.

709
This report (offprint from Sight-Saving Review, Vol. 20, No. 2, 1950) discusses standards for sunglasses, both commercial and scientific, in terms the average consumer can understand. Answers are given to some commonly asked questions concerning sunglasses and headlight glare, mist or fog, sunglasses and television viewing, actual needs for sunglasses, and so on.

700
Farnsworth, D., & Foreman, P. A BRIEF HISTORY OF LANTERNS FOR TESTING COLOR SENSATION AND DESCRIPTION OF THE ESSENTIAL PRINCIPLES. BuMed X-497 (Av-041-k), Rep. 104. Apr. 1946. 11pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

709
This report examines critically various features of lanterns used for color vision testing. Included are: (1) a brief description of lanterns which have received official acceptance for color vision testing from 1891 to 1945; (2) an analysis of the diagnostic principles which have made lantern testing efficient (size of aperture, brightness contrast of paired colors, number of colors, etc.); (3) a summary of mechanical features found necessary to promote efficiency and standardization of usage. A proposal to build a prototype lantern to incorporate all the desirable features is set forth.
G.I. 210.

710
Farnsworth, D. CONFUSIONS OF COLORED LIGHTS AT SMALL SUBTENSE BY PROTANS AND DEUTANS. BuMed X 263 (Av 151 c), Rep. 108. Sept. 1946. 19pp. Medical Research Dept., USN Submarine Base, New London, Conn.

710
This preliminary report investigates recognition of colored signal lights by partially color-defective subjects (six each of deuterans, protans, normals). Standard signal glass and certain special filters were identified verbally and by matching: yellowish to bluish-green series, red, and metameric pairs of orangish-red and purplish-blue. Results are analyzed with emphasis on color confusion areas, and for practical implications in the selection of signal lights and for lantern tests for color vision.
T. G. R. 13

713
Cloonan, T. & Thackray, R. ANALYSES OF ACUSTICAL AND INTELLIGIBILITY RELATIONSHIPS OF MILITARY RESPIRATORS. Contract Da 18 1808 (CHL 403), Rep. 15. Dec. 1955. 70pp. Voice Communication Laboratory, Purdue University, Lafayette, Ind.

A study was conducted to determine the relationships between intelligibility and the frequency, intensity and duration characteristics of 4 respirator mask-talker combinations. Intelligibility was found to be significantly related to both fundamental frequency and duration. Contradictory to previous findings, no relationship was found between intensity and intelligibility. Inconsistent relationships were found between acoustical properties of the respirators and intelligibility. Although different respirators contributed differential acoustic impedance to different talkers, this did not appear to have any relationship to intelligibility. In general, the conclusion is warranted that acoustical measurements involving talkers, electronic signal sources and respirators may reveal between-mask differences related to intelligibility. However, the results clearly demonstrate that large samples of talkers are required if generalizations drawn from the data are to be broadly applicable. Suggestions for further research are made.
R 5

714
Harris, J.D. COMPREHENSIVE VALIDATION OF SUBMARINE SONAR SELECTION TESTS. BuMed & Surg Proj. X 327, X 330, X 331, X 632, Sept. 1946. 32pp. USN Medical Research Dept., USN Submarine Base, New London, Conn.

4 classes in the West Coast Sound School were given a battery of 37 selection tests. These men were followed through 5 weeks of training and 30 measures of proficiency recorded at various stages. All men of this study were already so highly pre-selected for psychomotor coordination that no test of coordination, or of motor learning, was effective. The same state of affairs holds for mental and emotional stability. The success of present selection methods is reflected in the fact that none of the 120 men of this study failed for mental, psychomotor, or auditory reasons, but all passed the course successfully. The prediction of ability at written examinations and of a final total mark was as good as usual in studies of this sort. Use of the Navy Basic Battery, and of scores from previous Navy Schools, yielded coefficients ranging up to .41. The best way to predict a man's final standing in sound school is to use his Navy score in Basic Submarine School. The next best predictor is the General Classification Test, and this study recommends that sound school candidates have as good a GCT score as the manpower situation permits. Some success was achieved in relating selection tests to the SRTG records; one test with a propeller noise injector correlated .47 with the SRTG turn-count record. Suggestions for further research are made.
R 12

711
Farnsworth, D., & Reed, J.D. COMPARATIVE REACTION TIMES TO CHRISTMAS TREE SIGNAL LIGHTS WITH RESPECT TO COLOR DEFICIENCY. BuMed X-245 (Av-153-e), Color Vision Rep. 10, NRL Rep. 98. Feb. 1946. 11pp. Medical Research Dept., U.S. Submarine Base, New London, Conn.

711
To compare abilities of color-normal and color-deficient men to make quick and accurate red and green discriminations, six color-normal and four color-deficient men reacted to a panel of lights (red, green, or both) by indicating when all were the same or different, under two conditions - full brightness of lights, and yellow filter on green light to simulate reduced sun brightness. As a control task, responses were made to position of lights. Reaction times, in hundredths of a second, and error scores are presented, with implications for submarine service indicated.
G.I.

712
de Groot, S.G., Dodge, J.M., & Smith, J.A. FACTORS IN NIGHT VISION SENSITIVITY: THE EFFECT OF BRIGHTNESS. BuMed Proj. NM 003 041.09.04, Rep. 194. Mar. 1952. 17pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

712
To further explore (see 777 and 157) the scotopic (night) sensitivity of the dark adapted eye, three trained observers made position judgments of a stimulus of variable brightness (4.48 to 5.973 log micro-microlamberts) and constant size presented at nine points between 1 and 27 degrees from fixation in each of four positions (up, down, right, left). Results are given as 50% limens in terms of brightness for the various positions and a pictorial summary is given of sensitivity differences in the visual field.
T. G. I. R 1

715
Harris, J.D. THE DECLINE OF PITCH DISCRIMINATION WITH TIME. Proj. NM 003 041.22.03. NRL Rep. 186, Jan. 1952. 13pp. USN Medical Research Lab., New London Submarine Base, Conn.

715
To investigate pitch discrimination as a function of the interval between two tones. 213 Ss judged a test tone with reference to both a fixed and a roving standard tone. Intertone intervals of .1, .3, .5, 1, 2, 3, 3.5, 7, 15, and 25 sec. were used. Differential thresholds were measured and discussed with reference to the interaction of interval and type of standard on pitch discrimination.
T. G. I. R 5

716
Harris, J.D. FUNCTIONS OF LOUDNESS DISCRIMINATION IN SUBMARINE SONAR OPERATIONS. Proj. X 53, April 1945. 23pp. USN Medical Research Lab., New London Submarine Base, Conn.

716
This paper describes the experience of the Submarine Laboratory with Auditory Test No. 7 of the Harvard Psycho-Acoustic Laboratory, "Loudness Discrimination for Bands of Noise." This test consists of four 12-inch record sides containing 110 items, each item being a complex tone (500 to 2,000 cps) which increases or decreases in intensity. S judges the change as louder or softer and records this or an answer blank. Day-to-day score variations and reliability coefficients for some 1,000 Ss given a routine administration are presented. Results of a short-form administration are compared to the full test for 277 Ss. Item analysis data, time-error considerations, and differential loudness thresholds are discussed. Finally, preliminary tests relating test score to sonar performance are reported. T. G.

717
Harris, J.D. FUNCTIONS OF PITCH IN SUBMARINE SONAR OPERATION. Proj. X 330, Jan. 1945, 16pp. USN Medical Research Lab., New London Submarine Base, Conn.

717
This paper presents a brief history of the Submarine Base's study of pure-tone pitch discrimination as it relates to submarine sonar operation. The remainder is devoted to describing the laboratory's experience with the University of California Division of War Research Pitch-Memory Test. Included are equipment and administration information, reliability, validity data, and item analysis of some 590 scores for each of three groups--upper, middle, and lowest 50. These latter data are used to evaluate the reliability and validity of a short-form administration. The pitch function for the group is shown and described.
T. G. R 1

718
Harris, J.D. AN HISTORICAL AND CRITICAL REVIEW OF LOUDNESS RECRUITMENT. Proj. NM 003 041.21.07. NRL Rep. 200, May 1952, 47pp. USN Medical Research Lab., New London Submarine Base, Conn.

718
This critical review of loudness recruitment presents 122 references including many from little-known or foreign-language sources. A lengthy summary and historically-oriented review of the literature are followed by a brief discussion of 13 methods of determining recruitment, its clinical significance, rates and types of recruitment, some theoretical explanations, and certain analogies in the normal ear.
R 122

719
Harris, J.D. INTERPRETATIONS OF MEASUREMENTS OF AUDITORY THRESHOLDS. Proj. NM 003 021, Prog. Rep. 1, Feb. 1948, 7pp. USN Medical Research Lab., New London Submarine Base, Conn.

719
This report interprets the results of auditory threshold measurement in terms of occupation requirements. Three hearing tests are described: pure tone audiometer, voice tests, and monitored voice tests or phonograph voice tests. A conversion table for speech intelligibility scores is given; it includes classification of test results in everyday terms, conversion of scores into percentage hearing loss for speech, average loss in db for speech range (512-2,048 cps), db loss below normal level of speech, and spoken voice and whispered voice distance-fractions. Auditory functioning (e.g., pitch and loudness discrimination) as it relates to the requirements of various categories of occupation is discussed, and the augmentation of residual hearing considered. T. R 1

720
Harris, J.D. PITCH DISCRIMINATION AND ABSOLUTE PITCH. Proj. NM 003 026, Prog. Rep. 1, Jan. 1948, 4pp. USN Medical Research Lab., New London Submarine Base, Conn.

720
The relation between pitch discrimination and absolute pitch was examined. The method of Constant Stimuli was used, S judged whether the variable was higher or lower than the standard; equal numbers of higher and lower items were given at 20, 15, 10, 8, 6, 4, 2, and 1 cycles difference. The effect of time interval between Standard and Variable on discrimination judgments was tested using a range of 0.3 to 25 sec. The establishment and stability of a psychological midpoint for such judgments was investigated by eliminating the presentation of the standard. Finally, a technique was devised and tested to compare the effect of the psychological midpoint with that of the actual Standard.
G.

721
Harris, J.D. PRELIMINARY REPORT ON PROPELLER NOISE DISCRIMINATION. Proj. X 53, Rep. 50, Dec. 1944, 14pp. USN Medical Research Lab., USN Submarine Base, New London, Conn.

The present in-progress report introduces the Propeller Noise Injecture (PNI) which injects simulated propeller noise into a continuous noise and analyzes some preliminary data on 249 Ss. The PNI is intended for pre-selection of sonar operators. From preliminary studies it was concluded: a) an efficient group test has been constructed; b) there is enough range of ability at propeller noise discrimination that the test can be related to other tests. The distribution of this ability approximates the so-called "normal" curve; c) the effect of changing the frequency-composition of the two noises is described; d) intelligence and learning are ruled out as major factors; e) the effects of changing the overall loudness level, and of changing the propeller speed, are described; f) the test is not highly related to any of 9 other auditory tests; g) the direction future research will take is indicated.

723
Harris, J.D. THE RELATION BETWEEN THE AUDIOGRAM AT HIGH FREQUENCIES AND PROFICIENCY IN SONAR PERFORMANCE. BuMed Proj. X 329 (Sub. 58), Interim Rep. 1, June 1945. 9pp. USN Medical Research Dept., USN Submarine Base, New London, Conn.

37 Ss with normal auditory acuity at 4096 and 8192 cy. per sec. were compared on a sonar job sample with a group of 36 Ss whose acuity at these frequencies was lower than 30 db. Ss were required to report bearings of a motor launch performing a standard evolution in a river. The lowest volume setting at which this could be done, and the accuracy of reported bearings were recorded. The JP sonic sonar gear was used, with the frequency filter set at the 6000 cy. position. The volume control settings were reliably in favor of the normal group; the normal group was likewise superior in accuracy of reported bearings by approximately 2/3 of a degree. It is concluded that this experiment furnishes further confirmation of the standards already in use for the disqualification of candidates for underwater sonar training.
R 1

724
Harris, J.D. SOME RELATIONS BETWEEN VISION AND AUDITION. Proj. NM 000 009, Prog. Rep. 1, July 1948, 22pp. USN Medical Research Lab., New London Submarine Base, Conn.

724
This evaluative review of the relations between vision and audition presents a brief review of theory and experimentation on sensory interaction followed by a consideration of sensory and neural activities common to both sight and hearing. Included are comparisons of sensitivity, range of intensities, energy integration, growth of sensation, critical flicker and flutter frequencies, bilateral interaction, and single nerve fiber activity for both modalities. The report concludes with a discussion of peripheral and central mechanisms of acuity and a consideration of the quantum theory of threshold.
R 95

725
Harris, J.D. SOME SUGGESTIONS FOR SPEECH RECEPTION TESTING. BuMed Proj. NM 003 021, Progress Rep. 2, July 1948, 23pp. USN Medical Research Lab., USN Submarine Base, Conn.

Electronic helps to supersede the traditional free voice test are described. Use of the sound-level meter is recommended as the minimum aid. The reporting of hearing deficit in terms of decibels below normal is urged to replace the relatively meaningless distance-fraction. Use of a high-fidelity communication system, costing no more than a good radio, is described briefly, and recommended wherever possible, either with a microphone or a phonograph pickup at the input, or both. The microphone input (the so-called monitored live-voice test) and the phonograph input each have advantages; the former is more flexible in the clinic, the latter somewhat more precise. Especially, by a re-recording technique, the phonograph input is able to take any desirable sample of speech sounds and render them more nearly equal in intelligibility, thus contributing greatly to the validity and efficiency of speech reception testing.
R 10

726
Harris, J.D. STUDIES ON THE COMPARATIVE EFFICIENCY OF THE FREE VOICE AND THE PURE TONE AUDIOMETER FOR ROUTINE TESTING OF AUDITORY ACUITY. Proj. X 487 (Sub. No. 103), Rep. 78, Oct. 1945, 27pp. USN Medical Research Dept., USN Submarine Base, New London, Conn.

This paper is designed to help the beginning worker reach a decision as to which test or tests of auditory acuity he should use and to provide a body of data against which the experienced worker may check his procedures. Data is summarized from this and other laboratories bearing on the relative usability of the free voice and the pure tone audiometer as tests of auditory acuity. A novel method of measuring sound decay as a function of distance is presented. Data are analyzed to show that for a deafened population it is necessary to vary the voice from an average whisper to a loud shout. It is concluded that such control is beyond what can be expected from routine testers. A summary is given of relative testing times for several modifications of acuity test. A statement is given of the relative applicability of voice and pure tone testing for a variety of specific situations.
R 15

727
Harris, J.D. STUDIES IN GROUP AUDIOMETRY ON SUBMARINE PERSONNEL. Proj. X 328 (Sub. 57), Rep. 49, Nov. 1944, 39pp. USN Medical Research Dept., USN Submarine Base, New London, Conn.

In order to handle more efficiently our taking pure-tone audiograms of men undergoing selection for submarine sonar operator, and in response to the needs of other groups in the Navy and elsewhere, we attempted the standardization of a group audiometer test which could truly substitute for the laborious and time-consuming individual examination. This paper presents data on one such group test which we have found satisfactory as a replacement for an individual test. Individual and group tests are of comparable reliability, and label a population in essentially the same manner. In terms of deviation from an individual test, it makes little difference whether the second test is an individual or group examination. The equipment necessary is commonly available. Scoring may be adapted to machine procedure. The number of subjects tested simultaneously is limited only by the amount of sound-treated space and equipment available. We reason that these statements establish the principle of group audiometry as valid, and that the actual performance of the group test is such that it should replace the individual test for many purposes.
R 6

729
Harris, J.D. STUDIES IN SHORT DURATION AUDITORY FATIGUE: II. THE EFFECT OF THE DURATION OF THE STIMULATING TONE: III. THE EFFECT OF THE INTERVAL BETWEEN STIMULI. BuMed Proj. NM 003 041.34.02, Rep. 168, Dec. 1950, 2, 291-300. USN Medical Research Lab., USN Submarine Base, New London, Conn.

This series of 2 experiments investigated the auditory fatigue caused by pure tones up to 70 db sensation level and .1 to 10 sec. in duration, and charted the very quick recovery from these relatively mild stimuli. No cumulative fatigue effects were found up to 5 sec. of stimulation, and only a slight cumulative effect between 5 and 10 sec. at the louder levels. The fatigue occasioned by such tones is transitory, disappearing within a half-second or less. The course of its disappearance is exponential or nearly so for all stimuli used.
R 6

730

Harris, J.D. STUDIES OF PITCH DISCRIMINATION IN MASKING. II. THE EFFECT OF SIGNAL/NOISE DIFFERENTIAL. BuMed Proj. NM 003 022 (X 747) (Sub. 154). Rep. 3, Jan. 1948, 7pp. USN Medical Research Lab., US Submarine Base, New London, Conn.

36 Ss were given tests of pitch discrimination at signal/noise differentials of 5, 7, 10, and 15 db at random. All Ss followed a general trend, in that discrimination became poorer as the signal/noise differential decreased, becoming asymptotic at something less than 5 db. However, there was usable discrimination at 5 db. The hypothesis tentatively proposed is that, within limits, pitch discrimination for a certain tone depends upon the loudness of that tone.

R 4

731

Kulowksi, J. ROENTGENOLOGIC ASPECTS OF MOTOR VEHICLE ACCIDENTS. Amer. J. Roentgenology, Medium Therapy and Nuclear Medicine, 1957, 22 (1), 115-130.

731

The typical patterns of injury sustained by drivers and passengers in motor vehicle accidents are presented from the experience of a radiologist. The mechanics of collision are reviewed and related to clinical and pre-clinical conditions. The effects of safety belts are described in some cases of abdominal injury. The injuries of a sample of 19 fatal accident victims are given in tabular form, and a few case histories are presented with illustrations.

T. G. R 69

732

Harris, J.D. NOTES ON GROUP PURE TONE AUDIOMETRIC TECHNIQUES. Proj. NM 003 141.21, Memo. Rep. 53 6, April 1953, 15pp. USN Medical Research Lab., New London Submarine Base, Conn.

732

This manual in group audiometry provides practical instruction for those who have the responsibility of testing large numbers of individuals, some of whom may be hard of hearing. A brief review of the development of group testing methods is given; the type of situations where such methods are called for is indicated; the type of audiometry which is most suited to particular situations is discussed; and the particular equipment which will best suit any especial installation is indicated.

T. R 19

733 Harris, J.D. & Charney, D. A REVISION OF THE NAVY PITCH-MEMORY TEST. BuMed Proj. NM 003 041.07.01, Rep. 152, April 1950, 10pp. USN Medical Research Lab., USN Submarine Base, New London, Conn.

The desirability of revision of Dr. Adelbert Ford's 1944 edition of the Navy Pitch-Memory Test is indicated. The revision reported in this paper is particularly suited to the task of eliminating men of below-average ability in frequency discrimination. Major changes were in the masking of items at various levels of difficulty and in shifting the standard stimulus gradually rather than in jumps of 25 or 50 cps. per sec. The revision was assessed with 92 men. The 1944 edition and the present revision are equal in reliability, and equivalent in meaning; prediction from the newer to the older was as precise as test-retest prediction on the older test alone. On this basis, a raw score conversion table is presented so that the 2 editions may be used interchangeably. The present revision represents an improvement in group test construction in 2 directions: a) the form of the psychophysical function (percent items correct versus level of difficulty) was very much smoother, so that thresholds are determined with greater precision, and b) the 1944 edition yielded a group threshold of 10-12 cps. per sec., while the revision yielded one of 5.0 cps; the latter figure being much closer to the threshold of 4.9 cps obtained on an earlier group of 225 men in which frequency discrimination had been assessed with laboratory precision. We conclude that when it is desired to reject men with poor frequency discrimination, the present revision offers advantages over the 1944 edition, and can immediately be substituted.

R 4

734

Harris, J.D., Helms, H.L., & Myers, C.K. A HELMET-HELD BONE CONDUCTOR VIBRATOR. Laryngoscope, Oct. 1953, 63(10), 998-1007. (USN Submarine Base, New London, Conn.). (Rep. 238).

A Sonotone Model 21-308 bone conduction vibrator was mounted in a helmet, making it possible to adjust and standardize the position of the vibrator tip on the mastoid process of either side, the angle of thrust, and the applied force. It was hoped by this means to improve the interpretability of bone conduction audiometry, an extremely valuable clinical tool where it can be trusted. Test-retest thresholds with the helmet and with the hand-held vibrator were collected on experienced and inexperienced subjects, at 6 octaves from 256 through 8,192 cycles per sec. 10 repetitions were performed for each experienced subject, deliberately extended over several weeks or months. The difference between successive thresholds was somewhat less with the helmet than without; furthermore, the helmet significantly reduced variance among thresholds repeated over extended periods. Evidently, the increased precision of a single threshold (the usual clinical situation) makes worthwhile some such standardization as used here. It was recommended that applied force be standardized anywhere between 200 to 400 grams.

R 7

735

Harris, J.D. & Myers, C.K. EXPERIMENTS ON FLUCTUATION OF AUDITORY ACUITY. Proj. NM 003 041.21.08, MRL Rep. 196, June 1952, 29pp. USN Medical Research Lab., New London Submarine Base, Conn.

735

To study the stability of the absolute auditory threshold, air and bone conduction intensity thresholds for 11 Ss were determined by the serial method of limits at each of 11 frequencies ranging from 125 to 8,192 cps. Minute-to-minute, hour-to-hour, day-to-day, and week-to-week variability was studied. Variability over various time periods was analyzed and discussed with reference to 1) threshold fluctuations, 2) relative precision of air versus bone conduction thresholds, 3) the effect of frequency on stability, 4) maintenance of a stable criterion, 5) optimum number of threshold crossings. (See Accession Numbers 753 and 754)

T. G. I. R 14

736

Harris, J.D. & Myers, C.K. INTENSITY DISCRIMINATION FOR WHITE NOISE. Proj. NM 003 020, Prog. Rep. 3, Aug. 1948. 25pp. USN Medical Research Lab., New London Submarine Base, Conn.

736

To determine differential intensity thresholds for white noise and to explore the effect of interstimulus interval (ISI) on time error, 19 Ss judged the loudness of noise by the method of constant stimulus differences. Twelve levels of difficulty for intensity differences were presented at each ISI (0, .1, .2, .35, .5, and 1 sec.). Differential thresholds (DT) for loudness as a function of ISI and the relation of time error to ISI were analyzed and discussed in relation to individual differences, the definition of DT, comparison with previous data, the relation of DT to masking, and the course of the time error with increasing ISI.
T. 1, R 12

737

Harris, J.D., Myers, C.K., Stover, A.D. & Stuntz, S. E. THE EFFECT OF SENSATION LEVEL ON INTENSITY DISCRIMINATION FOR WHITE NOISE. Proj. NM 003 020, Rep. 4, Medical Research Lab., Rep. 145, Aug. 1949, 26pp. USN Medical Research Lab., New London, Conn.

The just noticeable difference in the intensity of random noise was measured by three different psychophysical procedures, at each of several sensation levels ranging from very weak to moderately loud. The JND ranged from .41 to .65 db at its best. With weak sensation levels these values rose to about 1.6 db. From this and other lines of evidence it was concluded that the limits for discrimination range from about .5 to 1.5 db. The psychophysical method wherein the subjects were forced to guess the direction of a change in intensity produced consistently smaller differential thresholds, and was affected least by sensation level. We conclude that such a method offers the best insight into the ultimate potentialities of the peripheral organ.
R. 7

738

Harris, J.D., Ramsley, A.I. & Kelsey, P.A. STUDIES IN SHORT-DURATION AUDITORY FATIGUE: I. FREQUENCY DIFFERENCES AS A FUNCTION OF INTENSITY. BuMed Proj. NM 003 041.34.01, Rep. 167, Dec. 1950, 9, 278-290. USN Medical Research Lab., USN Submarine Base, New London, Conn.

The method of short-duration auditory fatigue allows for rapid accumulation of data since all effects of stimulation with brief tones disappear in usually less than a second. In this experiment, Tone A of 300 ms was followed after 80 ms by Tone B of 30 ms. Both A and B were the same frequency, either 256, 512, 1024, 2048, 4096, 5747, or 8192 cps. Tone A was set at intensities ranging from 20 through 70 db sensation level. Fatigue was calculated as the difference in threshold of Tone B preceded and not preceded by Tone A. A comparison among frequencies was made when they were equated as to intensity, loudness, and sensation level. Equating as to intensity led to curves which bear similarities to isophonic contours, and lends some support to Lüscher and Zwillock's view that the frequency characteristic depends upon intensity rather than loudness. A family of fatigue curves equated for loudness shows that, especially at equal-loudness levels of 40 phons and above, fatigue is a decided function of frequency. At the 70 phon level, 8192 suffers 27 db more fatigue than 256 cps. This differential effect is considerably less evident when frequencies are of equal sensation level.

739

Hayter, R., & Bateman, J.G. OBSERVATIONS MADE DURING SIMULATED SNORCHEL OPERATIONS CARRIED OUT AT PORTSMOUTH NAVY YARD ABOARD USS SIRAGO ON 11, 12, and 13 SEPTEMBER 1945. Proj. Nos. X-605 and X-606, Rep. No. 81, Nov. 1945. 8pp. Medical Research Dept., U.S. Submarine Base, New London, and Naval Medical Research Institute, Nat. Naval Med. Center, Bethesda, Md.

739

Simulated submarine snorchel operations were carried out to determine the atmospheric pressure variations produced in the hull by periodic submergence of the snorchel (maximum continuous submergence--45 seconds), and their effects upon the ears of the 19 crew subjects.
T. G.

740

USA Board Number 3. SERVICE TEST OF EXPERIMENTAL INDIVIDUAL LOAD CARRYING EQUIPMENT, PARTIAL REPORT OF PROJECT 2646. Proj. DA 7 82 05 005, Jan. 1955, 3pp. USA Board Number 3, Fort Benning, Ga.

740

A belt with web equipment and a new quick-release type buckle was given a service test. Twenty experimental belts and 20 standard belts were worn with the Experimental Load Carrying Equipment, T-64-10, by an infantry rifle platoon over a 30-day test period. Five test subjects were timed as the belt was donned and removed five times. The findings were reviewed and recommendations concerning the suitability of the belt were made.
1.

741

Kelsey, Patricia A. & Ramsley, Anita I. ADAPTATION OF THE EAR TO SOUND STIMULI: THE INTENSITY-TIME RELATIONSHIP. Proj. NM 003 041.34.06, Rep. 224, May 1953, 9pp. USN Medical Research Lab., New London Submarine Base, Conn.

741

A study was made of the extent to which stimulus intensity and stimulus duration were interchangeable in producing subsequent shifts in auditory threshold. In the first part of the experiment, two successive 1000 cps tones were used; durations of the first tone were varied from 10 to 100 msec.; intensities were 30, 50, 70, or 90 db sensation level. Threshold shifts were calculated by subtracting threshold of the second tone alone from its threshold when preceded by the first. The second part dealt with longer duration auditory fatigue up to five minutes. Recovery thresholds were obtained. The intensity-time relationship was analyzed for these conditions.
G. I, R 5

742

Kinsey, J.L. A REPORT OF THE USE OF THE SUBMARINE EXPOSURE SUIT IN COLD WEATHER OPERATIONS. BuMed Proj. NM 002 013.01.01, Rep. 191, Mar. 1952, 16pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

742

Special clothing for use on the submarine bridge during foul weather was designed and tested, in the North Atlantic, for such features as: water- and wind-resistance, roominess, restriction of movements, comfort, ease of donning, efficacy of certain colors, etc. The results pertain to various clothing components.
I,T,R3.

743

Sponsler, G.C. MARKOV-PROCESS REPRESENTATION OF RADAR DETECTION-TRIAL BINARY-DATA SEQUENCES. Contract AF 19 122 458, Tech. Rep. 114, April 1955. 60pp. Lincoln Laboratory, MIT.

743

Study of radar detection-trial data has indicated the possible existence of interscan correlation in the statistical representation of such data. The probability theory of Markov processes is here applied to characterize the statistics of sequences of correlated binary data consisting of detections and nondetections upon individual radar scans. Simple and higher-order Markov processes are discussed with particular emphasis upon the theory of stationary discrete-parameter and non-stationary continuous-parameter, first order processes. Likelihood ratio tests and maximum-likelihood parameter estimators are presented for the stationary discrete-parameter representations.

G. I. R 30

744

Goodeve, C. USING SCIENCE TO REACH DECISIONS. THE MANAGER, May 1953, 6pp. (British Iron and Steel Research Association, London, England).

744

This article discusses operations research as an aid to management. The subject is handled through examples in the iron and steel industry—for example, balancing losses in manufacture by quantitative analysis, productivity problems, handling imported ore, minimizing unloading costs, investigation of defects, and problems of accident proneness.

T. G. R 4

746

MacMartin, L.S., & Dimmick, P.L. MAPPING THE CENTRAL SCOTOMA OF THE DARK ADAPTED RETINA: COMPARISON OF A MOVING STIMULUS WITH A STATIONARY PRESENTATION. BuMed Proj. NM 003 041.09.02 (formerly NM 003 026), Rep. 150. Nov. 1949, 8, 94-112. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

746

To compare methods of mapping the central scotoma of the dark adapted eye, six subjects made judgments (eye fixated) as to presence or absence of a target as it was (1) moved in toward the center of vision, (2) moved out from the center of vision, and (3) presented stationary at discrete points. The target was presented along twelve meridians for both eyes. Results in degrees from fixation point on every radius are mapped and discussed as to the most reliable method.

T. G. R 11

749

Malone, Florence L. A PRELIMINARY FIELD EVALUATION OF THE RELATIVE DETECTABILITY OF COLORS FOR AIR-SEA RESCUE. BuMed Proj. NM 003 014.09.01, Rep. 257. Nov. 1953. 9pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

749

To investigate color detectability of air-sea rescue gear under field conditions, observations were made from a plane (500, 1000 feet altitude, 3/4 to 1 3/4 miles distance) of 34-inch spherical targets towed in groups of five. Colors used: Munsell reds (10 YR to 10 R 6/10, 5/10) fluorescent paints, international orange and standard lifeboat yellow. Observations were made in the spring and fall on sunny days with a minimum of haze. Results are presented in rank order of detection and percent times seen in each position. Conclusions are drawn as to most detectable color.

T. G. I, R 2

750

Mitchell, R.T. THE EFFECT OF LOW COLOR TEMPERATURE ILLUMINATION AND RED ILLUMINATION UPON SUBSEQUENT DARK ADAPTATION. BuMed Proj. NM-003-006, Rep. 146. Aug. 1949, 8, 27-38. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

750

To determine the relative effects of red and low color temperature illuminations upon subsequent dark adaptation three complete dark adaptation curves were taken (modified "one-direction" method of limits) for one observer following 25 minutes adaptation to four conditions: (1) 6.0 footlamberts at 2800°K, (2) 0.40 footlamberts at 2800°K, and (3) 0.40 footlambert at 1950°K, and (4) red goggles worn in 6.0 footlamberts at 2800°K. Evaluation is made in terms of mean time required to reach a given threshold. An additional note concerns comparative current consumption.

T. G. R 11

751

Myers, C.K. & Harris, J.D. DETECTION THRESHOLDS AND PURE TONE THRESHOLDS IN AUDITORY ACUITY. Proj. NM 003 022 (X 74) (Sub. No. 154), Prog. Rep. 2, Jan. 1948. 5pp. USN Medical Research Lab., New London Submarine Base, Conn.

751

To determine whether Ss could set up and maintain some criterion of minimum tonal quality, tones of five frequencies between 500 and 14,000 cps were presented to Ss who were asked to report two thresholds simultaneously—a threshold of detectability and a pure-tone threshold. For each tone the S stated whether he heard nothing, something, or a tone. Percent response as a function of stimulus intensity was plotted for both the detection and pure-tone thresholds. The relative characteristics of the two thresholds as a function of frequency and masking were analyzed and discussed in relation to pitch detectability and discrimination.

G.

752
Myers, C.K. & Harris, J.D. THE EMERGENCE OF A TONAL SENSATION. BuMed Proj. NM 003 022, Progress Rep. 4, March 1948. 10pp. USN Medical Research Dept., USN Submarine Base, New London, Conn.

When the absolute threshold of auditory acuity for pure tones is carefully explored with fine intensity steps, a region called the "zone of detectability" can be noticed by experienced subjects. In this zone, pure tones can be detected but cannot be said to have a true pure-tone quality. This zone of detectability is defined as the intensity area between a 50% detection threshold and a 50% pure-tone threshold. In Part I, these two thresholds were simultaneously determined at each of 6 frequencies, 500, 1000, 2000, 4000, 8000, and 14,000 cps. Two experienced subjects were used. The zone of detectability varied at random from 2-4 db independent of frequency. In Part II, it was shown that particularly for the higher frequencies, an experienced subject can select a certain criterion of tonality and maintain it with considerable precision. In Part III, subject matched a variable frequency of very low sensation level to a standard frequency of 10 db sensation level. The frequency-matching was progressively better as the intensity increased from 0 to 10 db sensation level, and the course of this improvement was taken to symbolize the gradual nature of the emergence of a tonal sensation from an indefinite "something" to the sharp sensation of a clear pure tone. It was reasoned that the subjective criterion of "tonality" which a subject can select and maintain is indeed one of pitch rather than of loudness; but it was concluded that the phenomenon depends upon the intensity of the stimulus rather than upon a change in its frequency-composition.

R 12

753
Myers, C.R. & Morris, J.B. THE IMMEDIATE STABILITY OF THE AUDITORY THRESHOLD. Proj. NM 003 021, Prog. Rep. 3 April 1949, 20pp. USN Medical Research Lab., New London Submarine Base, Conn.

753
To determine the stability of the absolute intensive threshold over short periods, the auditory acuity of three Ss was tested by air conduction and bone conduction at each of 11 frequencies ranging from 125 to 8,000 cps. Each frequency was tested continuously over a five-to seven-minute session. The serial method of limits was used with descending and ascending series in one-to steps. Results were discussed with reference to 1) the extent of short-term threshold fluctuation, 2) the precision of bone conduction thresholds, 3) the effect of frequency on threshold stability, 4) the effect of practice on threshold judgments, and 5) the optimum number of crossings of the threshold.
T. I. R 6

754
Myers, C.R. & Morris, J.B. VARIABILITY OF THE AUDITORY THRESHOLD WITH TIME. Proj. NM 003 041, 21.05, NM Rep. 165, Dec. 1950, 20pp. USN Medical Research Lab., New London Submarine Base, Conn.

754
To study the variability of the auditory threshold, air- and bone-conduction intensity thresholds were determined on 10 Ss by the serial method of limits using steps of one db. Test time varied in frequency from 125 through 8,192 cps. The stability of the threshold over minute-to-minute, hour-to-hour, day-to-day, and week-to-week periods was tested. Variation in auditory acuity due to headphone placement and the type of headphone cushion used was considered also.
T. G. R 6

755
Myers, C.R., Harris, J.B. & Fowler, E.P. THE FEASIBILITY OF GROUP AUDIOMETRY. BuMed Proj. NM 006 007, X 761, (Sub. 163), Terminal Rep., Feb. 1948, 40pp. USN Medical Research Lab., USN Submarine Base, New London, Conn.
In this survey, complete 6-octave audiograms for both ears of 1440 Veteran students. A group audiometry technique was the primary method. The number of answer sheets which could not be scored due to unexplained irregularities (headphone trouble, inattention) was 1.8%. All other individuals were handled at or nearly at its peak efficiency by the group procedure. Satisfactory audiograms were provided for 86.5% of all ears. The rest were given individual testing because one frequency (4000), two frequencies (2000), or more than two frequencies exhibited hearing impairment greater than that which the group equipment was designed to test. The average acuity of this population compares within a few decibels of that of earlier surveys on similar age and sex groups by the U.S. Public Health Service and by Bell Telephone at the 1939 World's Fair. Between 2 and 3% had hearing impairment at least sufficient to begin to impair social communication. On the basis of this survey it would appear that about 1% of our college group had hearing loss, directly war-incurred, sufficient to impair social communication. (This is in addition to the 2% of the same group suffering like impairment but not war-incurred.) But many hundreds of men of the total group had been exposed to as much noise and blast as the 1% impaired group, and it would appear that for the most part our Veterans were amazingly resilient in recovering from the effects of the tremendous noises to which they were subjected.
R 29

756
Hoff, V.B. MEMORANDUM OF THE SELECTION AND TRAINING OF SOUND OPERATORS. Rep. 4, July 1942, 33pp. USN Medical Research Lab., USN Submarine Base, New London, Conn.

Records of the grades made by 210 men during and upon completion of their training at the Sound School at the Submarine Base, New London, or the Sound School for the Inshore Patrol on the USS Sylph were obtained. With these records as a criterion, an analysis of the predictive value of 8 "selective" tests were made. It was found that by use of the selective tests a large number of "poor" sound operators may be eliminated before they entered the school, while most of the "good" ones are retained. It was concluded that use of the selective tests appears to be a valuable means of securing men capable of becoming good sound operators and of saving time and effort which would otherwise be wasted upon those lacking the necessary abilities.

758
Pashallan, S., Crissy, W.J.E., Siegel, A.L. & Buckley, C.P. THE INTERVIEW: I. A SELECTIVELY ABSTRACTED BIBLIOGRAPHY. BuMed Proj. NM 002 016.01.01, Rep. 202, June 1952, 57pp. Medical Research Lab., USN Submarine Base, New London, Conn.

This bibliography is a compilation of materials considered relevant to the problem of "The reliability and validity of the assessment interview as a screening and selection technique in the submarine service". Three major aspects were involved in the selection of the material: a) the interview as a screening technique; b) the use of the interview in the armed forces; and c) factors in the submarine frame of reference. Covered is the literature included in the Psychological Abstracts up to April 1952. The bibliography is divided into 2 sections with section A containing abstracts of papers found to be relevant to the scope of the problem, and section B containing a listing of references which may be related to the problem. The entries are listed alphabetically by author and have been numbered consecutively. There are 3 indexes prepared using the author's, subject, and journal for the listings. A total of 183 articles are included.
R 183

759

Pratt, Cornelia, & Dimick, F.L. AN OPHTHALMOLOGICAL STUDY OF VISUAL ACUITY UNDER DIM ILLUMINATION. Naval Proj. NM 003 04: 04 04, Rep. 173. June 1951, 10, 42 55. Medical Research Lab., USN Submarine Base, New London, Conn.

759

To study the relation between refractive error and loss of acuity under low illumination, both eyes of 558 subjects were tested for acuity on the Snellen Chart at 24 light levels (2 footcandles to .0027 footcandles, illumination of target and eye); subjects were also refracted for best acuity. Data are analyzed in terms of mean acuity scores at the various light levels for 15 different refractive groups. The bearing of the results on tests for night vision screening is discussed. T. G. R 3

760

Ramsley, Anita J. & Harris, J.D. STUDIES IN SHORT-DURATION AUDITORY FATIGUE. IV. RECOVERY TIME. Proj. NM 003 04: 34 03, NRL Rep. 187. Jan. 1952, 11pp. USN Medical Research Lab., New London Submarine Base, Conn.

760

To study the time course of recovery from auditory fatigue, four Ss were presented with a fatiguing tone (FT) of 500, 3,000, or 5,000 cps, allowed a short recovery period, and then tested with a brief probe tone (PT) of the same frequency. The FT was of either 10, 30, 50, or 70 db sensation level; the recovery period between tones varied from 20 to 300 msec. The method of constant stimuli was used to determine thresholds for 1) FT alone, 2) PT alone, and 3) PT preceded by FT. The course of recovery from fatigue as a function of stimulation frequency and intensity, and of recovery interval was analyzed and discussed with reference to neural mechanisms of fatigue. G. R 11

761

Ramsley, Anita J. & Harris, J.D. STUDIES IN SHORT-DURATION AUDITORY FATIGUE. V. AN INVESTIGATION OF THE SPREAD OF FATIGUE WITHIN NARROW FREQUENCY LIMITS. Proj. NM 003 04: 34 04, NRL Rep. 199. May 1952, 14pp. USN Medical Research Lab., New London Submarine Base, Conn.

761

To determine the range of tonal frequencies affected by auditory fatigue following the presentation of a stimulating tone (ST), five Ss were given a 1,000-cps ST varying in sensation level from 30 to 90 db, followed by a silent interval and a test tone (TT). The frequency of the TT was varied randomly from 900 to 1,100 cps. The serial method of limits and the method of constant stimuli were used to obtain thresholds for 1) ST alone, 2) TT alone, and 3) TT preceded by ST. Fatigue effects as a function of the frequency of the TT and the intensity of the ST were discussed with reference to peaking, masking, and masks. G. R 15

762

Rose, G.L. & Harris, J.D. SUGGESTIONS FOR CONSTRUCTING TESTS OF PITCH DISCRIMINATION. BuMed Proj. NM 003 026, Progress Rep. 2, Feb. 1948, 20pp. USN Medical Research Dept., USN Submarine Base, New London, Conn.

This paper presents a study of certain intra-series effects in the Method of Constant Stimuli, and some suggestions as to how they may be controlled. Each of 515 men was given one or more tests of pitch discrimination. Over 12 different patterns of Constant and Variable Stimuli were investigated. The objective was to discover the pattern which gave the truest differential threshold. It was found that by arranging the Variable Stimuli symmetrically around the Standard, and making them progressively more and more difficult (as in the traditional test) tended to provide Ss with an extraneous clue; they could use the distance from High-Variable-to-Low-Variable as a basis for judgment rather than the distance from Standard-to-Variable. When the possibility of comparing juxtaposed Low and High Variables was lessened by completely randomizing all items, both as to level of difficulty and as to Highs and Lows, Ss were, nevertheless, able to use some average of all the foregoing Variables as a judgmental anchor against which to relate any succeeding Variable. This averaging tendency was reduced to an insignificant level by placing the standard at random within a relatively short range around the desirable frequency, or by gradually changing it throughout the range. A random pattern was discarded on the basis of the heterogeneity of difficulty within any level of difficulty. The final test-form evolved was one with a Standard gradually ascending and descending in frequency, with the Variables placed quite at random around these values; it was found that S was using the true magnitude of the Standard stimulus as a reference point for judgment. R 31

763

Schaefer, E.E. STUDIES OF CARBON DIOXIDE TOXICITY. (1) CHRONIC CO₂ TOXICITY IN SUBMARINE MEDICINE. Naval Proj. NM 003 015, OS, OS, Rep. 181. Aug. 1951, 10, 156-176. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

763

The effects on submarine crews of long term exposure to high concentrations of carbon dioxide (CO₂) combined with low oxygen (O₂) ambient air as found in German submarines during World War II are contrasted with the results of short term experimental studies under simulated conditions. Changes in circulation, respiration, body temperature regulation, and behavioral observations are reported. T. G. R 26

764

Macdonald, D.E., & Watson, J.T. DETECTION AND RECOGNITION OF PHOTOGRAPHIC DETAIL: I. EMPIRICAL DATA APPLIED TO THE PREDICTION OF PERFORMANCE OF DIFFRACTION LIMITED SYSTEMS. Tech. Note 127, June 1966, 25pp. Optical Research Laboratory, Boston University.

764

This article presents the results of studies concerned with the visual detection and recognition of photographic detail as recorded on the photographic negative. A system (i.e., the Laboratory Camera System) is described which permits controlled and independent variation of such experimental parameters as scale, object contrast, image quality, etc. Techniques for analyzing pertinent data are presented along with the predicted performance of diffraction-limited systems with six emulsions. T. G. R 4

765
Schaefer, K.E., Alvin, H.J., Webster, A.P. & Willmer, T.L. STUDIES OF OXYGEN TOXICITY. I. PRELIMINARY REPORT ON UNDERWATER SWIMMING WHILE BREATHING OXYGEN. BuMed Proj. NM 002 015.03. 01. Rep. 149, Oct. 1949, 8, 84-93. USN Medical Research Lab., USN Submarine Base, New London, Conn.

Twelve trained underwater swimmers swam in the 100-foot lock of the Submarine Escape Training Tank, wearing either the Liberator or the Brown Underwater Swimming Unit. These swimmers were observed while swimming at various depths to determine the main physiological hazards in using oxygen breathing equipment. Of particular concern was the development of oxygen toxicity. Gas analysis was made by the Van Slyke method and the majority of the carbon dioxide determinations were checked by the Haldane method. The swimmers for different lengths of time ranging from 15 to 93 minutes duration. The data obtained included the time to symptoms and the concentration of oxygen and carbon dioxide in the unit at the end of the swim. The data was examined to determine the relation between the average exposure time and the partial pressure of oxygen (depth) for a constant criterion of oxygen toxicity. Only 1 point was obtained on the curve representing this relationship. The average exposure time to produce symptoms was 61.7 ± 21.5 min. The Liberator Unit was considered to be superior to the Brown Unit.

766
Holding, D.H., & Dennis, J.P. LOCALIZATION IN THE COMBAT CAP, JANUARY 1954-NOVEMBER 1954. Rep. 47, Feb. 1955, 14pp. Clothing and Equipment Physiological Research Establishment, Directorate of Physiological and Biological Research, Ministry of Supply, London, England.

766
To investigate the effect of wearing a combat hat with flap down on the ability to localize a source of sound, sixteen subjects were tested. Localization in eight directions, with and without the combat hat, and at two sound intensities (25 and 70 decibels above 0.0002 dynes per centimeter squared) were measured. The criteria used were correctness of response and time taken to respond. The data were studied by analysis of variance for differences due to wearing of the cap, direction of stimulus, and intensity of the stimulus. The discussion relates the findings to classical experimentation in localization.

T. C. I. R 13

767
von Schelling, H. & Farnsworth, D. TRICHROMATIC SPECIFICATIONS OF THE MUNSELL 100 HUES AT 5/5 FOR ILLUMINANT A. Proj. NM 011 119, Rep. 144, Color Vision Rep. 20, April 1949, 3pp. USN Medical Research Lab., New London Submarine Base, Conn.

767
The series of painted papers known as the Munsell 100 Hues at 5/5 have been used so extensively in research that trichromatic specifications were calculated for Illuminant A to supplement those previously published for Illuminant C. The positions of the hues are plotted (both A and C) in diagrams to the same scale as the 1931 ICI Standard Observer and Coordinate System. A conversion table is given between production numbers of the series and the numbers of the F-M 100-Hue Test for Color Vision.

T.G.R.1.

768
von Schelling, H. A METHOD FOR CALCULATING THE EFFECT OF FILTERS ON COLOR VISION. BuMed Proj. NM 000-000, Rep. 148, Sept. 1949, 8, 89-93. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

768
This report proposes to construct spectral curves which will indicate in general how colors shift if a filter is applied. Mathematical formulae are developed and the method then applied to a study of absorption by the ocular pigment and by intravascular media. A further application is made to color blindness caused by different light sources.

T.G.R.3.

769
Von Schelling, H. SOME STATISTICAL REMARKS ON THE METHOD OF CONSTANT STIMULUS DIFFERENCES. BuMed Proj. NM 003 020, Progress Rep. 1, Feb. 1949, 7pp. Medical Research Lab., US Sub Base, New London, Conn.

The probit method for fitting an ogive can be used for data obtained by the method of constant stimulus differences. This method is seen to have several refinements over the usual method. However, the real value of the probit method as against the usual method is that, for any point P in a psychometric function, a confidence interval can be fixed in which with a given probability the proportion P is situated. Using some loudness discrimination data the probit method is compared with Miller-Urban weights. The Miller-Urban weights overestimated the reliability of the observation around the PSE and underestimated the reliability on the extremes. (NRAS)

R 8

772
von Schelling, H. REMARKS ON THE CLIMATE IN ALASKA. BuMed Proj. NM 002 015.07.02. Rep. No. 190, Mar. 1952, 12pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

772
A mathematical theory of climate is explained as applied to Alaska as a test case. Detailed meteorological data are not considered.

T.G.R.2.

773
von Schelling, H. THICKNESS ADJUSTMENTS OF GLASS FILTERS TO GIVEN TOTAL TRANSMITTANCE. BuMed Proj. NM 003 041.40.02, Rep. 193, Mar. 1952, 14pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

773
To provide an abbreviated method for calculating the thickness of glass filters to obtain a given transmittance and chromaticity, a graph has been developed from which the transmittance of filters of the same melt, but of different thicknesses, can be determined for any wave-length. Eight transmittance curves are given as a key for finding a good first approximation for the thickness of a filter which will produce a specified total transmittance. A summary of step-by-step procedures is included.

T.G.R.3.

774 Shilling, C.W. THE DEVELOPMENT OF METHODS FOR THE SELECTION OF SOUND LISTENING PERSONNEL. USN Medical Research Lab., USN Submarine Base, New London, Conn. 1. March 1943. 70pp.

This report gives an account of the procedures and steps taken to arrive at a method for selecting personnel for sound operating duty in submarines. The report includes the preliminary stages of the project and the final products of the search for the measuring devices. The tests being used include the Otis Self-Administering Test of Mental Ability, the 30-second Test of Musical Talent, Series A; a complete audiogram; a test for pitch discrimination under conditions similar to those of actual ringing. A brief questionnaire is administered to each. It is felt that tests of visual-motor and auditory-motor coordination may be of value. An adjustment inventory is also considered relevant but an appropriate one remains to be found. The validity of the present selection method remains to be tested. Thus, some of the above procedures may have to be eliminated and replaced by others.

775 Shilling, C.W. A REPORT ON SIMPLE BINOCULAR SERIAL #6268, MARK I, MODEL 2. USN Medical Research Lab., U.S.S. Submarine Base, New London, Conn. July 1943. 15pp.

775 To evaluate a simple binocular with the focus and interpupillary distance (IPD) fixed, experimental field testing of visual acuities of 97 men using four comparison binoculars (two standard adjustable with focus and IPD set, two standard adjustable) was conducted. A supplementary statistical check was made of the accuracy with which an individual is able to make his own focus and IPD settings. Performance scores are analyzed for the various binoculars and recommendations are made for modification of the design of the standard type. An interpupillary distance gauge was also evaluated.

T.G.

776 Shilling, C.W., Everly, I.A. & Harris, J.D. HEARING TESTS: AN EVALUATION. USN Med. Bull., 1945, 44, 100-116. USN Medical Research Dept., US Submarine Base, New London, Conn.

The present study was undertaken in an effort to determine the true significance and value of the common clinical tests of hearing. Data was collected from 1000 ears relating the 6-octave audiogram to the Spoken Voice, Whispered Voice, Coin Click, and Watch tick tests. The Spoken Voice test was found to be practically worthless as an index of acuity. The Whispered Voice test was found to be very effective in screening out that type of ear seriously defective for high tones and concomitantly more or less defective for low tones; the correlation between extent of low tone audiometric loss and whispered voice score was significant, but not high ($r=+.30$). The Coin Click, as used here, produced results very similar to those of the Whispered Voice Test, but for several reasons the latter is to be preferred. The Watch Tick Test differs from the preceding tests in that low tones are involved only slightly. However, the Watch Tick Test is as satisfactory as a differential test of high tone hearing. None of the clinical tests used showed any tendency to measure low tone hearing independently from high tone hearing.

777 Smith, John, & Blumick, J.L. THE PARAMETERS OF SCOTOPIC SENSITIVITY: (1) THE EFFECTS OF SIZE. Unpub. Proj. NM 003 041.09.03, Rep. 174, June 1951, 10, 56-75. Medical Research Laboratory, USN Submarine Base, New London, Conn.

777 To explore the scotopic (night) sensitivity of the dark adapted eye, four trained observers made position judgments for circular stimuli of variable size (8 to 26 min. visual angle) and of constant brightness presented at nine distances from fixation point (from 1" to 27") along four radii (up, down, right, left). Results are given as 50% lines in terms of the angular subtense (size) of the stimuli and the sensitivity gradients of the eye are mapped for the entire visual field.

T.G.I. & 7

778 Sperling, E.G., & Farnsworth, D. THE DISCRIMINATION OF COLOR: I. AN EXPERIMENTAL EVALUATION OF FOUR METHODS FOR MEASURING THE DIFFERENCE LINES CHROMATICITY. Unpub. Proj. NM 003 041.19.01, Rep. 154, Sept. 1950, 9, 54-89. Medical Research Lab., U.S.S. Submarine Base, New London, Conn.

778 To compare four standard psychophysical procedures applied to judgments of color differences (two variations of method of constant stimulus, paired comparison, adjustment) four trained color normal observers made judgments in one dimension through a single point in the ICI Chromaticity plane. Difference lines are evaluated using the Latin square design and analysis of variance. Discussion is in terms of magnitude, precision, and reproducibility of judgments from the four methods.

T.G.I. & 1513.

779 Report No. 157

Sperling, Barry G., & Farnsworth, Dean

Periscope acuity at night. (Control and para-central acuity as a function of contrast and adaptation.)

USN, Med. Res. Lab., Unpub. Project NM 003 041.39.01, 28 Nov 1950, Vol. 9

779 To determine the need of dark adaptation for submarine periscope operators for night observation, discrimination of a target, approximating the visual subtense of a ship at 5000 yards, was measured with the right eye (one observer) at nine retinal positions (0° to 15°); contrast of target and background were varied to simulate atmospheric conditions. After viewing three visual indicators commonly located near the periscope, the subsequent effect on discrimination was measured as before. Threshold measurements are presented for both conditions and discussed for their operational applications.

T. G. I. R 4

780

Stevens, S.F. THE EFFECTS OF SOUND INTENSITY LEVEL ON JUDGMENTS OF "TONE RANGE" AND "VOLUME LEVEL" AND INTERPRETATION OF THE LOUDNESS FUNCTION. BuMed Proj. NM 003 041.20.5, Rep. 163, Dec. 1950, 2, 104-194. USN Medical Research Lab., USN Submarine Base, New London, Conn.

The intensity-level-versus loudness-level data of Fletcher and Munson, when interpreted according to the loudness function, provides a basis for measuring the ear's effective frequency response. It can be shown that there is a striking relationship between pure-tone intensity and relative sensitivity for the average ear. For example, increasing signal intensity-level from 70 db to 75 db re: 10-16 watt per square centimeter extends the subjective frequency range (at 1 sec loudness) downward more than three octaves below 400 cycles. This concept is applied to an evaluation of the listener preference tests conducted by Olson and by Eisenberg and Chinn. The conclusion is offered that the disagreement between their conclusions is more apparent than real.

R 7

782

Verplanck, W.S. THE EFFECTS OF PARETHINE ON NIGHT VISION TEST PERFORMANCE. Proj. X-226 (Av-123-W), Rep. 40, May 1944, 11pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

782

Two experiments are presented on the effect of parethine on night vision performance. The first utilizes 17 sophisticated subjects who were tested under controlled conditions on three types of adaptometers. Results are presented in terms of effect of drug on performance on each adaptometer and the possible effects of subjective motivational factors. The second experiment utilizes 124 subjects tested on the Navy Radium Plaque adaptometer. Results are discussed in terms of the sophistication and morale of the subjects as well as the effects of the drug on performance.

T.

783

Verplanck, W.S., Watson, G.E., & Reed, D.T. FIELD TESTS OF THE RADIUM PLAQUE ADAPTONETER. Rep. 33, Nov. 1943, 30pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

783

Two Radium-Plaque Adaptometers were used routinely over a period of time for rapid testing of night vision efficiency; about 500 navy men were tested. This report presents: (1) an examination of certain mechanical difficulties of the test with recommendations for correction, (2) data relating to test usefulness in accurately determining night vision efficiency, and (3) an analysis of the instructions for use and the testing method with modifications proposed.

T.

784

Verplanck, W.S. NIGHT VISION TESTING OF MEMBERS OF THE CREW OF THE USS NEW JERSEY. Rep. 21, 11pp. Medical Research Lab., U.S.N. Submarine Base, New London, Conn.

784

This report presents data obtained incidentally while testing 325 men on the crew of the USS New Jersey for night vision. Visual acuity scores (standard letter chart) for three categories of night vision (superior, pass, disqualified), test-retest was for 54 men on whom a new testing procedure was used, and scores classified according to operator administering the test are analyzed. Suggestions for improving testing methods are made.

T.C.

785

Willmon, T.L. CONSIDERATION OF SUBMARINE MEDICAL PROBLEMS AND CURRENT STATUS OF INVESTIGATIONS AT U.S. NAVAL MEDICAL RESEARCH LABORATORY. Feb. 1948, 13pp. USN Medical Research Dept., US Submarine Base, New London, Conn.

This report is divided into 2 sections. Section I, problems in submarine medicine, discusses the following problems: a) snorkelling; b) protective clothing; c) lighting; d) submarine escape and rescue. Section II, Medical Research Laboratory, discusses the following ongoing research projects: a) evaluation of tests for night vision; b) the effect of illumination on visual acuity; c) evaluation of commercial optical devices for measuring such visual functions as acuity and phorias; d) development of tests for color blindness; e) auditory acuity; f) pure tone discrimination, both for pitch and for loudness; f) the effect on auditory discrimination of a masking background of noise. (HEIAS)

790

Wing, K.G. THE MICROPHONIC ACTION OF THE COCHLEA: A SELECTED BIBLIOGRAPHY. BuMed Proj. NM 003 041.27.2, Rep. 164, Dec. 1950, 2, 195-229. USN Medical Research Lab., USN Submarine Base, New London, Conn.

This report is a bibliography of reports on cochlear microphonics. The reports are arranged alphabetically by year of publication. The bibliography covers the period from 1896 to 1949.

R 310

791
Meadt, G.R. OF WHAT IMPORTANCE ARE PSYCHOLOGICAL FACTORS IN NOISE STRESS?. *J. Aviat. Med.*, Feb. 1948, 19(1), 24-32. (University of Rochester).

791
To assess the role of psychological factors in motion sickness, in particular anxiety (fear), vs. nonpsychological factors (for example, physiological state, posture) field and experimental findings are summarized and examined. From the evidence, general conclusions are drawn, optimum psychological procedures set forth, and promising lines of research on physical and physiological procedures suggested.
R 19

793
Ackoff, R.L. OPERATIONS RESEARCH IN BUSINESS AND INDUSTRY. *Industr. Quality Control*, May 1952, 1-8. (Case Institute of Technology).

793
Operations Research is defined in terms of the underlying principles of method and the manner in which they are combined into a comprehensive method of problem solving. Five principles are distinguished: measurement, operational, feedback, cooperative, and practical. From a discussion of the principles, accompanied by examples from business and industry, an over-all picture of the method is formulated and its value to business and industry discussed.
R 25

794
Allphin, W. A STUDY OF EYE COMPLAINTS FROM FLUORESCENT LIGHTING. Presented at the Northeastern Regional Conf., Illuminating Engineering Society, June 19-20, 1952. 6pp. (Sylvania Electric Products, Inc., Lighting Div., Salem, Mass.).

794
To explore the effect of the small component of ultra-violet below 4000 Angstroms (present in the radiation from fluorescent light) on eyestrain and other fatigue factors, a field test was devised involving a shift of 81 employees from a work illumination level of 8 footcandles to 70 footcandles; half worked under fluorescent lamps treated to cut off radiation below 4000 Angstroms, the other half under untreated lights. Results from questionnaires administered after three months work and from subsequent examination by an ophthalmologist are presented and discussed for their bearing on the problem.
T.G.I., R2.

797
University of Iowa. THE EFFECT OF NOISE AND VIBRATION ON CERTAIN PSYCHOMOTOR RESPONSES. Dec. 1947, 21pp. Dept. of Psychology, University of Iowa, Iowa City, Iowa.

797
To evaluate the effects of noise and vibration on pilot efficiency, 80 male college students performed on the Hashbain apparatus--a joystick and rudder coordination task--for a period of one hour in one experiment, and for 4 1/2 hours in another. The experimental conditions were silence, 85 db or 110 db white noise, vibration of the subjects' chair, and a combination of vibration with each noise level. Measures of psychomotor performance, respiration, heart rate, the perception of chair tilt and electro-encephalogram were made.
G. R 4

798
Empire Central Flying School. PROBLEMS AFFECTING APPROACHES AND LANDINGS. Mar. 1942. 7pp. Empire Central Flying School, Research Flight.

798
This report is a preliminary survey of the optical illusions which affect approach and descent judgments of aircraft pilots. Perspective illusions, and apparent movement of objects in line with, and at right angles to, the approach path are described.
I.

800
Amer. Optometric Assoc. MANUAL OF OCULAR TESTS. 1944. 78pp. The American Optometric Assoc., Council on Standards & Professional Guidance.

800
This manual presents, in tabular form, various ocular tests used by various branches of the armed forces and in commercial aviation in 1944. Visual qualifications, examination procedures, and standards used by each are given. The visual functions covered are: acuity, depth perception, heterophoria, accommodation and convergence, color vision, and field of vision.
T,R100 (approx.)

801
Coleman, K.S., Coleman, Madeline F., Clark, D.G., & Harding, S.W. STRAY LIGHT IN OPTICAL SYSTEMS. NAVORD Rep. 437. Mar. 1948. 58pp. Navy Dept., Bureau of Ordnance, Washington 25, D.C. (Penna. State College, Optical Inspection Lab.)

801
This report describes an objective method for measuring the stray light in optical systems, expressed as "contrast rendition" (contrast of an image formed by the optical system compared with contrast of object under observation given in percentages). The importance of this concept in predicting performance of optical systems was tested experimentally. Measurements for a variety of optical systems and types of targets are included.
T,G,I,R4.

802
USA Chemical Corps, Adjutant General's Office, Washington, D.C. SYMPOSIUM ON MILITARY PHYSIOLOGY. ARMY MEDICAL CENTER, 4-6 DECEMBER 1947. Digest Series 4, GE 61/1, 310pp. Committee on Geophysical Exploration, Military Establishment, US Research & Development Board, Washington, D.C.

This report contains a symposium on physiological research conducted in military laboratories. Also included are research projects supported by military contracts. One major division of the research falls under the heading of Research on Respiration. Other areas of research include studies on Biological measurements as a basis for establishing dimensions of cockpit working area for operation of manual controls in aircraft; metabolic effects of Folic Acid, concepts concerning effects on man of abrupt deceleration; factors influencing endurance in a wet-cold environment and others. The symposium contains 48 reports covered in 310 pages including diagrams and references.
R Navy

803

Reynolds, G.E., Hutchins, M.C., Werner, A.V. & Philbrook, F.R. AERODONTALGIA OCCURRING DURING OXYGEN INDOCTRINATION IN THE LOW-PRESSURE CHAMBER. *Naval Med. Bull.*, June 1946, 56(6), 845-876.

809

To investigate the etiology of aerodontalgia (tooth ache following a change in atmospheric pressure) 320 men underwent simulated ascents to 30,000 feet at the rate of 4000 feet/minute, remained there for 15 minutes, descended to 15,000 feet in one minute, and completed the descent at 4000 feet/minute. The incidence of aerodontalgia is analyzed with respect to the exposure condition, dental abnormalities, history of auxiliary sinusitis and present upper respiratory infection, and the efficacy of the Valsalva Manoeuvre and Politzerization in relieving the symptoms. T.O.M.13.

804

Berry, W. REVIEW OF WARTIME STUDIES OF DARK ADAPTATION, NIGHT VISION TESTS, AND RELATED TOPICS. Dec. 1949. 96pp. Armed Forces-NBC Vision Committee Secretariat, Univ. of Mich., Ann Arbor, Mich.

804

This report gives a review of wartime research of night vision (dark adaptation, night vision tests, and related topics). It consists primarily of informative abstracts of reports and three tabular summaries of data on reliability, inter-correlations, and validity of several adaptation and night vision tests. Also included are comments and evaluations by several men intimately concerned with this work. T.O.M.6.

805

Henneman, R.H., & Outcalt, M.R. THE INFLUENCE OF SETTING CUES ON MANUAL RESPONSES MADE TO FOLLOWING-INSTRUCTIONS MESSAGES. Contract # 33(G39)-ac-21269, Proj. 7192, WADC-TR-54-365, April 1955, 14pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

805

To discover the effectiveness of setting cues in facilitating manual responses made to following-instructions messages, subjects (64) were required to locate and manipulate in a definite sequence designated switches on a panel matrix of 64 switches. "Messages" conveyed the instructions indicating the specific switches to be thrown on each trial. Setting cues were of two types (area and pattern) each having four degrees of restriction, thus providing different degrees of information to location or sequence of switches to be thrown. Response efficiency was measured in total response time and was studied by analysis of variance techniques for the effect of the experimental variables. The findings are discussed in relation to "set" as a determinant of perceptual responses.

806

Blackwell, H.R. SUMMARY OF RESULTS OF THE STUDY OF CONTRAST THRESHOLDS. Proj. 30. 4pp. Univ. of Mich., Vision Research Lab., Ann Arbor, Mich.

806

This report summarizes data from an investigation of contrast thresholds in which relations between accuracy of performance, time of exposure, and target size were determined at various levels of background brightnesses (luminance). Percentages of detection (from zero to 100%) are plotted as a function of the brightness involved and intervals of normal probability distribution are fitted to the data. Practical applications for use in specifying illumination levels for a visual task of detecting bright targets against a uniformly bright background are discussed. G.

808

Brown, J.S. & Jenkins, W.O. A PRELIMINARY ANALYSIS OF HUMAN MOTOR ABILITIES IN RELATION TO THE DESIGN OF EQUIPMENT AND A SUGGESTED PROGRAM OF RESEARCH. Report from: Fitts, P.M. (Ed.). "Psychological Research on Equipment Design." AAF Aviation Psychology Program Rep. 19. 1947. 35-63. US Government Printing Office, Washington, D.C. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

808

This report attempts "to classify motor reactions into several fairly distinct types and to suggest experimental procedures and significant variables in each case...the scope of the treatment is restricted to the study of movements of the articulate members of the body. The primary concern is with the individual's basic initial abilities to perform various tasks. The research here outlined deals with problems of operating controls and is intended as a basis for further studies. The available literature pertaining to motor abilities also has been summarized. R 66

810

Calvert, E.S. THE INTEGRATION OF THE VISUAL LANDING AIDS, WITH PARTICULAR REFERENCE TO PROPOSALS SUBMITTED BY CAPT. G.J. WALCOTT TO THE 4th MEETING OF THE FLIGHT TECHNICAL GROUP OF I.A.T.A. RI/G.3638/93. Aug. 1951. Royal Aircraft Establishment, Farnborough, England.

810

This memorandum concerns the integration of visual landing aids (markings on the approach to promote more adequate guidance for the pilot) and landing areas of an airfield. The concept of integration is defined; present guidance patterns are analyzed, and possible methods (based on experimental and operational data already available) of insuring that visual guidance over the runway will be adequate for safety in all conditions in which approaches are permitted are discussed. RI.

811

Witkin, H.A. & Asch, S.E. STUDIES IN SPACE ORIENTATION. III. PERCEPTION OF THE UPRIGHT IN THE ABSENCE OF A VISUAL FIELD. *J. exp. Psychol.*, Oct. 1948, 32(5), 603-614. (Brooklyn College & Swarthmore College).

811

To determine how the upright is established in the absence of a surrounding visual field, subjects in a completely darkened room adjusted a luminous rod to the horizontal (H) and vertical (V) while in each of four head and body positions: 1) head alone tilted (right and left), 2) whole body tilted (right and left each at 42 and 28 degrees), 3) body horizontal (right and left side), 4) standing erect. Tables are presented of mean errors in degrees (H and V judgments combined), mean range in degrees (H judgments), and direction of errors (H and V judgments combined) for each head and/or body position. The effectiveness of postural factors as an adequate and stable basis for such judgments is discussed. T. R 8

812

Churchman, C.W. PROBLEM APPROACH TO OPERATIONS RESEARCH. Sept. 1952, 21pp. Cite Institute of Technology.

812

This paper discusses operations research in terms of the questions it raises and the problems it faces. The practice of operations research in military and non-military situations is compared and the fundamental question of all such research stated as "What assistance can the scientist offer a particular policy maker or decision maker at the present time with respect to operation?" In answer, other problems are raised and discussed. Who is the decision maker? What are the possible decisions that can be made? What are the objectives? What is the best decision in terms of the objectives? How do we get the decision maker to adopt the best course of action? K 7

813 King, B.G. (Chm.). **AIRCRAFT EMERGENCY EVACUATION. OPERATING EXPERIENCE AND INDUSTRIAL TRIALS.** Rep. 2. May 1952, 29pp. CAA, Office of Aviation Safety, US Department of Commerce, Washington, D.C. (CAA-CAB Subcommittee Working Group, Washington, D.C.).

This report reviews the aviation industry's experience with the problem of emergency evacuation. The review is presented in 4 major parts, with section I dealing with Field Experience With Emergency Evacuation Procedures and Devices. 122 reports of accidents to tri-cycle gear transport aircraft in 1948, 1949, 1950 and 1951 were analyzed and it was found that partial gear failure and fire caused reduction in emergency evacuation. Section II, Aircraft Manufacturers' and Airline Operators' Emergency Evacuation Tests, reported tests simulating "wheels-up landing" conditions and the times for evacuating through doors and emergency exits. Section III, Airline Operations' Tests of Evacuation Slides, reports test conducted by 2 major commercial airlines to determine time required for escape by jumping into the slide as compared to sitting and scooting onto it. Slides constructed of 3 different fabrics were also tested. No definitive conclusions based on the results could be made. Section IV, Airline Operators' Provisions for Air Carrier Personnel Training in Emergency Evacuation of Passengers, reviews a survey of the operations manuals of 27 airlines. It was indicated that the information provided in these manuals was stated in general terms. Additional or revised instructions on emergency evacuation and supplementary course material were recommended in a number of cases.

817 Bartlett, F. **WHY HUMAN-FACTORS RESEARCH WILL CONTRIBUTE MOST TO SYSTEMS DESIGN.** HPS 206/1, March 1953, 7pp. Committee on Human Resources, Office of the Assistant Secretary of Defense, London, England. (University of Cambridge, Cambridge, England).

817 Systems design research is defined in terms of a multiplicity of items, individual or group, and that the efficiency of performance of any one item depends not alone on its own immediate conditions but also its relation to other items, some of which may be simultaneously present, and others may precede or succeed it in sequence. Key problems for research in such systematic performance are seen to be concerned with temporal structure, performance under stress, process of decision making and development of a new statistic. Problems of organization in systems design and research are discussed briefly.

818 Bartlett, F. & Mackworth, N.H. **PLANNED SEEING. SOME PSYCHOLOGICAL EXPERIMENTS. I. VISIBILITY IN THE CONTROL ROOMS OF FIGHTER COMMAND. II. THE SYNTHETIC TRAINING OF PATHFINDER AIR BOMBERS IN VISUAL CENTERING ON TARGET INDICATORS.** Air. Publ. 3139B, 1950, 76pp. Air Ministry, London, England.

818 This is a detailed review of some World War II research in Great Britain. Under "Visibility in the Control Rooms of Fighter Command" are several studies of the visibility of grids, arrows, letters, and numbers of various designs as a function of viewing angle and distance. Under "The Synthetic Training of Pathfinder Air Bombers in Visual Centering on Target Indicators" is reported a systematic experimental investigation of visual factors in the visual bombing problem followed by experiments on the design of a synthetic training device and the development of training procedures.

T. G. I. R 14

821 Davis, D.R. **PILOT ERROR: SOME LABORATORY EXPERIMENTS.** AP 2139A, 1948, 40pp. HM Stationery Office, York House, London, England. (Applied Psychology Research Unit, NEC, Cambridge, England).

821 This article presents the results of a series of experiments concerned with determining the nature and causation of pilot error. Utilizing the Cambridge Cockpit, pilot error was investigated as a function of such variables as noise, drugs, fatigue, and the type of instructions given to the subject. The results are discussed in terms of the types of errors induced by the various conditions of performance with specific emphasis upon the implications for the selection and training of pilots. Also included is a discussion of the individual differences manifested in these laboratory tests of pilot performance.

823 Edelman, H.R., Jr. **POLICY-WHERE WANTED FACTS.** *Ergonomics*, April 1953, 11(4), 13-16. (Neyl & Patterson, Inc., Pittsburgh, Penn.).

823 This paper presents a brief summary of the methods used by a management-research team in studying the problems of efficiency in a particular industrial organization from the point of view of the management itself. Both immediate and long-term values to management are discussed.

824 Edwards, T.M. **DEVELOPMENT OF AN INSTRUMENT FOR MEASURING AIRCRAFT COCKPIT VISIBILITY LIMITS.** Tech. Development Rep. 155, Jan. 1952, 8pp. Civil Aeronautics Administration, Tech. Development and Evaluation Center, Indianapolis, Ind.

824 A binocular-strip film camera for measuring and recording cockpit visibility is described. A photographic record of the outlines of windows in aircraft cockpits as seen by the pilot when he turns his head from extreme left to extreme right can be obtained. A grid of horizontal and vertical lines of 5° is automatically superimposed on the picture giving a reading of the angles of vision. Other practical uses for the device are suggested.

825 Edwards, T.M. & Howell, W.D. **A STUDY OF PILOTS' EYE MOVEMENTS DURING VISUAL FLIGHT CONDITIONS.** Tech. Development Rep. 179, June 1952, 23pp. US Technical Development and Evaluation Center, CAA, Indianapolis, Ind.

825 This study was conducted "to obtain further substantial information for establishing minimum angles of vision from the cockpit of airplanes." Motion pictures records were obtained using three cameras simultaneously: two recorded pilot's eye movements through a system of mirrors; one photographed the horizon out ahead of the airplane. The 11 pilots flew Boeing 377 Stratocruisers during daytime visual flight conditions. The film was analyzed frame-by-frame to determine windshield and window usage during each of ten defined flight phases ranging from taxi before takeoff to taxi after landing. Results were presented in terms of percentage of frames showing use of each windshield section which was five degrees high and ten degrees wide.

825
Flexman, R.E., Matheny, W.G., & Brown, E.L.
EVALUATION OF THE SCHOOL LINK AND SPECIAL
METHODS OF INSTRUCTION IN A TEN-HOUR PRIVATE
PILOT FLIGHT-TRAINING PROGRAM. Aeronautics
Bull. 9, April 1950, 44pp. University of
Illinois, Institute of Aviation, Urbana.

826
To evaluate proposed changes in training for the
Private Pilot Flight Test, 42 college students were
trained under a revised training syllabus. Half also
practiced in a synthetic trainer (the School Link);
half did not. All were given the CAA Flight Test,
both by CAA Examiners and by Private Pilot Examiners,
after ten hours of flight time. Test scores and in-
structors' grades are compared and are analyzed with
respect to the effectiveness of the Link. Suggestions
for improving training and for additional research are
discussed. The report has 12 appendices.
T. G. R. few

827
Fleming, J.C. IMPROVE POWER-PLANT INSTRUMENTATION BY
APPLYING HUMAN-ENGINEERING DATA. Power, Jan. 1954, 86-
89, 206, 208, 210. (The Bristol Co., Waterbury Conn.).

827
This article discusses the application of human engi-
neering data to instrument design with particular empha-
sis on power plant instruments and controls. Several ex-
amples of improved scale readability are described and
illustrated, and an experimental evaluation of two dials
is presented in brief. The need and value of increased
communication of techniques and knowledge between the
psychologist and engineer is indicated.
G. I.

828
Giles, J.M. THE DISTRIBUTION OF VISUAL DE-
FECTS IN THE POPULATION. May 18, 1950. 23
pp. Owen Aves Memorial Lecture delivered to
the members of the Yorkshire Optical Society
at Leeds, England.

828
This paper considers the distribution of visual
defects in the population of Great Britain. The ana-
lysis of distribution, incidence of pathology, dia-
tribution of heterophoria and congenital color defici-
encies are based on existing data from many sources.
An assessment of the relative necessity for correction
of refractive errors in the population is made based
on the analysis.
T.R.

829
Goldman, D.E. A REVIEW OF SUBJECTIVE RE-
SPONSES TO VIBRATORY MOTION OF THE HUMAN
BODY IN THE FREQUENCY RANGE 1 TO 70 CYCLES
PER SECOND. Proj. NM 004 001, Rep. No. 1.
Mar. 1948. 7pp. Naval Medical Research
Institute, National Naval Medical Center,
Bethesda, Md.

829
This study presents an analysis of the data of
seven investigations on subjective responses to mech-
anical vibration in the range of 1 - 70 cps. The fol-
lowing three reference levels are employed: the thresh-
old of perception; the threshold of discomfort; the thresh-
old of tolerance. A set of reference curves of
amplitude as a function of frequency are presented,
subject to an estimated uncertainty of about one-half
a log unit.
F.T.R.13.

830
Gowdy, C.W., & Pearce, J.W. A SELECTED BIBLIOGRAPHY OF
THE OPEN LITERATURE ON AVIATION MEDICINE 1945-1955. DR
97, July 1955, 55pp. Reference Research Board, Department
of National Defence, Canada.

830
This is a selected bibliography of the open litera-
ture on topics in or related to Aviation Medicine (1945-
1955). Emphasis is placed on basic rather than applied
research in order to serve as a guide to more important
problems and recent experimental findings in the field.
Coverage is restricted to those journals which are likely
to be available in a medical library of average size with
no references to technical or project reports. These
topics receive special emphasis: air sickness, altitude
effects, anoxia and hypoxia, blood gases and respiratory
physiology, decompression aerobolism, explosive decom-
pression, hyperventilation, negative and positive G,
oxygen toxicity, pressure breathing, stress and fatigue,
and vestibular apparatus. R 724

832
Hoban, C.F., Jr. & van Ormer, E.B. PRACTICAL PRINCIPLES
GOVERNING THE PRODUCTION AND UTILIZATION OF SOUND MOTION
PICTURES. Spec. Rep. 1, Aug. 1950, 16pp. Instructional
Film Research Program, Pennsylvania State College, State
College, Penn.

832
This report is an abstract of the concluding chap-
ter of "Critical evaluation and summary of experimen-
tal literature on instructional films." It summarizes
results simply and with recommendations for the guidance
of film sponsors, producers, distributors, and users.
Material is included on values of films in instruction
and principles governing film influence such as pre-
vious knowledge, motivation, content of film and in-
structional techniques.

833
Hooton, E.A. (Dir.). A SURVEY IN SEATING. 1945, 101pp.
Haywood-Wakefield Company, Gardner, Mass. (Anthropology
Dept., Harvard University, Cambridge, Mass.).

833
This project consisted of three phases: "1. taking
eight measurements on each individual of a group consti-
tuting a reasonably representative sample of the popula-
tion of the U.S.; 2. reducing these measurements statis-
tically so that the mass of data can be easily compre-
hended and used for manufacturing specifications; 3. mak-
ing certain recommendations, on the basis of the statis-
tics thus obtained, pertaining to the design of seats." A
special measuring chair, accurate to 1/8 in., and a
weighing scale with measuring rod were used. Some 3,800
persons representing a satisfactory distribution of age
and economic level were measured. The data were evalu-
ated in terms of percentiles and correlations, the sexes
being treated both separately and combined.
T. G. I.

834
Schutz, H.G., & Paull, D.M. MODIFICATION OF
FOOD INTAKE BY THE USE OF DRUGS. Proj. 7-84-
15-007, Interim Rep. 1, March 1956, 30pp.
Food Acceptance Branch, Food Laboratories,
Quartermaster Food and Container Institute
for the Armed Forces, Chicago, Ill.

834
To study the nature of the mechanisms regulating
food intake, the effects of specific drugs and combina-
tions of drugs (either known to influence intake or
seemed likely to have such an effect) were measured on
adult male albino rats. Two groups of studies were
reported: (1) those related to neuro-hypothalamic
theories (a. reserpine; b. Benodaine and Urecholine; and
c. insulin-Desocyn, trained eating versus normal eating);
and (2) those related to glucostatic hypothalamic
theories (a. insulin-Desocyn, blood sugar; b. insulin-
glucose; and c. self-selection). In all studies food
intake was measured and in some blood sugar values were
obtained. The results were analyzed and discussed in
relation to the two theories of hunger regulation.
T. G. R 36

835

Kleeser, R.W. SECOND ANNUAL REPORT OF THE DIRECTOR OF THE MOOSEHAVEN RESEARCH LABORATORY TO THE NATIONAL ADVISORY COUNCIL FOR RESEARCH. March 1951. 92pp. Moosehaven Research Lab., Moosehaven, Fla.

835

This is a report of the Moosehaven Research Laboratory prepared by R.W. Kleeser in March, 1951. Seven studies which deal primarily with change as a function of age cover the following: 1) the comparative reaction times of 124 subjects, 65-86 yrs of age to an auditory stimulus; 2) the comparative strength of grip of 122 subjects, divided into four groups with mean ages of 67.9, 72.9, 77.7, and 82.5 yrs, on a dynamometer; 3) the comparative performance of 140 subjects, 65-85 yrs of age in an audiometer examination; 4) the comparative visual performance of 24 subjects, 65-70 yrs of age; 5) a study of attitudes in an aged population; 6) intelligence changes in old age; and 7) a series of psychophysiological studies on an old age population. T.O.I.R-26.

837

Korn, K.T. WHAT IS MANAGEMENT RESEARCH? Ergonomics, March 1953, 11(3), 9-12.

837

In this note, management research is explained by discussing what it does. The development and the philosophy which underlie the activity are discussed.

838

Kruee, G.K. & Sinclair, E.J. SOME BEHAVIORAL IMPLICATIONS OF INFORMATION THEORY. RDB Projs. NR 507 430 & NE 090 501, NRL Prob. ROT 43, NRL Rep. 4119, Feb. 1953, 11pp. USN Research Lab., Washington, D.C. (Tufts University).

838

This report summarizes the first phase in a sequence of studies designed to investigate the relevance of information theory to decision making processes of the human operator. Four experiments concerning the ability of subjects to sort cards into categories were completed and the various tasks performed analyzed in terms of information theory. The tasks involved a study of the effect on performance of (1) increasing the number of categories, (2) inappropriate tuning (more sorting bins than were necessary), (3) anticipatory information (cards in an ordered sequence) and (4) irrelevant information. T. R 7

840

Seaman, E.A., & Lutz, H.B. A PORTABLE HEART BEAT RECORDER. Tech. Memo. 1/56, March 1956, 7pp. Defence Research Northern Laboratory, Defence Research Board, Canada.

840

A portable self-contained unit for recording the heart beat of test subjects in the field is described. A recorder with spring driven chart together with photoelectric heart beat pick-up and associated amplifier are discussed. I. R 2

841

McFarland, R.A., Holway, A.H., & Hurvich, L.M. STUDIES OF VISUAL FATIGUE. Apr. 1942. 255pp. Harvard Univ., Graduate School of Business Administration.

841

To establish valid and reliable criteria for the detection and measurement of visual fatigue, a series of experiments were performed based on a functional analysis of the factors of clear seeing: reading and the visual near point; reading and size of pupillary aperture; blinking and visual fatigue; reading, eye-movements and exercise; perceptual factors (differential brightness sensitivity, color contrast, critical flicker); and physiological factors (respiration, anxiety, bodily posture). Results are discussed with a view to a better understanding of factors affecting visual fatigue. T.O.I.R-26.

842

McLaughlin, S.C. THE BLUE-WEAKNESS OF THE I.C.I. STANDARD OBSERVER. 1952. 2pp. Tufts College, Medford, Mass.

842

This short note presents evidence from the literature and from direct observation in explanation of certain anomalies in the colorimetry of samples having a color depending heavily on energy below 450 millimicrons. This is called the "blue-weakness" of the ICI Standard Observer. T.R.11.

843

Mottley, C.H. OPERATIONAL RESEARCH: IN GOVERNMENT ADMINISTRATION. Working Paper No. 7. Oct. 1950, 15pp. USAF Assistant for Operations Analysis, Operations Headquarters, Washington, D.C.

843

Operational research is defined as the application of the scientific method to operating problems for the purpose of providing executives with a sound basis for decisions regarding the administration of affairs that are under their control. The use of statistical methods is cited as an important part of the research operation. Examples of the application of operational research to various types of governmental problems are presented. The characteristic features of the method are described and a model developed. I. R 12

844

Murrell, M. NOTES ON THE DESIGN OF EQUIPMENT FOR EASE AND ACCURACY OF OPERATION. Naval Motion Study Unit Rep. 36, April 1950, 6pp. Department of Operational Research, Admiralty, London, England.

844

This report contains a data summary on the layout and design of equipment for easier and more accurate operation. Principles are set down in four major categories: equipment location--operator position, working area, display position; control design--cranks, hand-wheels, knobs, joysticks and levers, foot pedals and pushes, control coding; control-indicator relationship--cranks and knobs, levers, left-handed controls; indicator design--choice and arrangement of indicators, scale pointers. The data thus included are intended to assist equipment designers. I.

847

USN Training Section. I. A PRACTICAL EXPERIMENT IN SIMPLIFIED KEYBOARD RETRAINING. A REPORT OF THE RETRAINING OF FOURTEEN STANDARD KEYBOARD TYPISTS ON THE SIMPLIFIED KEYBOARD. JULY 1944. II. A COMPARISON OF TYPIST IMPROVEMENT FROM TRAINING ON THE STANDARD KEYBOARD AND RETRAINING ON THE SIMPLIFIED KEYBOARD. A SUPPLEMENT TO "A PRACTICAL EXPERIMENT IN SIMPLIFIED RETRAINING," 18 OCTOBER 1944. Jan. 1946, 29pp. USN Training Section, Division of Shore Establishments and Civilian Personnel, Washington, D.C.

847

To study the feasibility of converting to the Simplified Keyboard, 14 Civil Service typists were retrained from Standard to Simplified Keyboard (96 hours at two hours per day). Performance on Standard (before training) and Simplified (after training) Keyboards is compared in terms of speed and errors. Cost of retraining is estimated. Retraining progress is plotted. Results are compared with progress of 18 typists in refresher course on Standard Keyboard. Implications for future Navy typing training and for adoption of the Simplified Keyboard are discussed. T. G. R few

842

Small, A. (Dir.). STUDIES OF THE RECOGNITION OF SHAPING EDGES. FINAL REPORT. Contract NME 2894, Sept. 1946, 10pp. Nav Electronics Lab., San Diego, Calif. (Navar Data Div., Univ. of California, San Diego, Calif.)

The audibility of submarine echoes when masked by reverberation, with and without doppler, and by noise was studied. The 24 Mc echoes and reverberations were heterodyned to a frequency of about 800 cps. Recognition differentials, (20 log echo amplitude/reverberation, or noise amplitude for 50% recognition of the echo) were determined, together with the effect of a number of physical and psychological factors upon them. (JEMS)

R 39

849

O'Brien, Ruth & Shelton, W.C. WOMEN'S MEASUREMENTS FOR GARMENT AND PATTERN CONSTRUCTION. Misc. Publ. 454, Dec. 1941, 73pp. US Bureau of Home Economics, Department of Agriculture, Washington, D.C.

849

This research provided measurements for improving the fit of women's garments and patterns. The weight and 58 body measurements were taken on each of 14,638 women living in the U.S. The data were subjected to a detailed statistical analysis; from these results key predictive measures were proposed as the basis for classifying women's body types for the establishment of a standard size system.

T. 1.

850

Fitts, P. (Chm.). PANEL ON HUMAN ENGINEERING AND PSYCHOLOGY. AGENDA OF THE TWENTY-FIFTH MEETING, MARCH 26-28, 1953. NPS 2/25, March 1953, 8pp. Committee on Human Resources, Research & Development Board, Washington 25, D.C.

850

The program outline for a three-day symposium on automation in man-machine systems is presented in this document. Major topics are listed: (1) steps in the conception, design and development of several man-machine systems; (2) how far should we go in automation; (3) reports on new developments, survey and research techniques applicable to systems' problems, and (4) what human factor research will contribute most to systems design planning.

R 10

852

Pfeffmann, C. AN EXPERIMENTAL STUDY OF DEPTH PERCEPTION IN LANDING AIRPLANES. 1943. 20pp. UNR.

852

To explore some of the cues which aid the airplane pilot to judge depth and distances, 7 pilots made both regular and precision landings under 2 conditions: elimination of the stereoscopic visual field and elimination of the peripheral visual field. A summary of observations of landing patterns and subjective reports from each pilot are presented and discussed with reference to the relative roles of stereoscopic and peripheral cues in flight. The use of the Mark II flight goggles and a screening test of depth perception are discussed.

T, I.

853

Phillips, W. NIGHT-DRIVING MOTORISTS WARNED AGAINST COLORED GLASSES AS HEADLIGHT GLARE 'GUNE.' June 1952, 4pp. Margha-Rotman, Inc.

853

This is a brief paper presenting opinions held by some authorities in the field of vision and highway safety on the use of colored glasses for night driving as a means to eliminate headlight glare.

854

Roos, S.W. FLIGHT BY PERISCOPE. I. PERFORMING AN INHERENT FLIGHT PATTERN: THE INFLUENCE OF SCREEN SIZE AND IMAGE MAGNIFICATION. Univ. of Ill. Bull., Mar. 1951, 49, 46pp. Univ. of Ill. Institute of Aviation,

854

To evaluate a realistic pictorial attitude display, eleven pilots flew a standard instrument flight pattern using a periscope display which presented an image of what lay ahead of the aircraft. Factors varied were size of screen (3, 4, and 2 fathoms) and magnification of image (2.0X, 1.25X, and 0.5X). Two control conditions consisted of flight with unrestricted direct visibility and flight with no outside visibility, one attitude display. Error scores of altitude and direction are analyzed and discussed in terms of the conditions which affect the usefulness of this type display.

T, P, I, R, 3.

856

Schafer, T.M. DETECTION OF A SIGNAL BY SEVERAL OBSERVERS. FINAL REPORT. Problem MEL-181, NE 121304, USNEL Rep. 101, Jan. 1949, 9pp. Nav Electronics Lab., San Diego, Calif.

856

To determine whether an improvement in the detection of sonar signals may be made by the use of more than one observer on the same piece of equipment, sets of data from previous laboratory studies were re-examined. The tests used three-second pure-tone signals with random noise background or echoes from short pings with sea reverberation background, presented through headphones or on a cathode-ray oscilloscope with linear sweep. A wide range of signals and backgrounds was represented. The records of three observers from each set of data were studied for agreement with predictions from theory developed to cover the use of several observers.

T. G. R 1

857

Jones, L.V. METHODOLOGY OF PREFERENCE MEASUREMENT. Contract DA-15-129-QM-272, Proj. 7-84-15-007, Rep. 6, Final Rep., 1956, 27pp. Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

857

This report summarizes a series of investigations conducted to develop a general methodology for the study of consumer preferences and behavior. Application of techniques from the field of psychometrics and psychophysics is made to predict choice and purchases of consumers on the basis of previously expressed preferences. The studies are divided into two areas: (1) methods of obtaining and quantifying preference ratings; (2) the use of quantified ratings in connection with models for predicting consumer behavior. Plans for future research are included.

R 5

860 Steinman, Albert A. REACTION TIME TO CHANGE COMPARED WITH OTHER PSYCHOPHYSICAL METHODS. Arch. Psychol., May 1944, 22, 60pp. (Columbia University, New York, N.Y.).

The purpose of the study was to examine the adequacy of simple reaction time (RT) to change as a psychophysical method. In the first of 4 experiments the relation of RT to changes of brightness and stimulus intensity was investigated. It was found to decrease as the magnitude of the change increased, for the mean RT the decrease showed a hyperbolic function. RT was found to decrease as intensity increased up to a medium level, there after RT increased with increasing intensities. In the second experiment the stimulus ratio required for the liminal brightness increment was shown to decrease as a function of intensity in the manner described by the data of Feig and Brudun. In the last 2 experiments, it was found that over a portion of the stimulus range, the speed of response was related in a regular manner to apparent magnitude as judged by the method of single stimuli. For equal decrements and increments of brightness, RT was found faster for decrements. Similarly, decrements were shown to be judged greater than objectively equal increments. It may be concluded that simple RT to change is an adequate psychophysical method. (MGIA) R 25

861 Tinker, M.A. INTERPRETATION OF ILLUMINATION DATA. Amer. J. Opt. and Arch. Amer. Opt., 1952, 29, 293-300. U. of Minnesota.

862 The focus of this paper is an examination of the validity of the practice of recommending illumination levels for specific visual tasks derived from basic laboratory data obtained in studies on visual acuity, speed of vision, and visibility as affected by brightness levels, nervous muscular tension and performance while working under different brightness levels. The data, as plotted on a logarithmic scale, is compared with the same data on a linear scale and the question of statistically significant increases in any of these functions at higher levels of brightness is examined.

862 Ohwaki, Y., & Onizawa, T. THE FUNCTION OF THE GROUND AS "FRAME-WORK" IN THE PERCEPTION OF SIZE. Tohoku Psychologica Folia, 1951, Tomus XII, Fasciculus 3-4, 53-66. (Tohoku Univ., Sendai, Japan.)

863 To study the effect of framework on perception of size, four subjects observed a geometric figure drawn on a card and later watched it for size from ten comparable figures of varied sizes, distributed at random on a table top, either with a frame (drawn on a card) or without a frame (cutouts on large gray background). Errors are analyzed for quantitative and directional effects of the framework on perception of size. Practice effects of the four testing periods are noted. T.G.I.R.

864 Ohwaki, Y., & Kihara, T. A NEW RESEARCH ON THE SO-CALLED "BOCCI IMAGE". Tohoku Psychologica Folia, 1953, XIII(3-4), 158-180. (Institute of Psychology, Tohoku University, Sendai, Japan)

This report is the third of a series of three studies. Observations of the "Bocci image" as produced by indirect light reflected from colored paper were made. These observations were compared with those of the ordinary afterimage. Investigations of individual differences in the ability to produce image and of various qualities of the image were made. T. G. I. R 16

865 Vest, J.P.W. MODIFIED SPOTLIGHT ANIMATOR, DEVICE NO. 3-C-14-E. Bull. 240, April 1945, 3pp. USM Office of the Chief of Naval Operations, Department of the Navy, Washington, D.C.

866 This leaflet describes the Modified Spotlight Animator, an aid for training in tracking and ranging. The device projects an image on a screen, the image varying continuously in length (3" to 12") and moving in any predetermined path. Details of construction and operation are given. I

867 Viteles, M.S. & Thompson, A.S. THE USE OF STANDARD FLIGHTS AND MOTION PHOTOGRAPHY IN THE ANALYSIS OF AIRCRAFT PILOT PERFORMANCE. Rep. 15, May 1943, 104pp. CAA Division of Research, Washington, D.C. (University of Pennsylvania, Philadelphia, Penn.).

867 This progress report summarizes several early studies in a program for investigating patterns of motor performance as a function of flying proficiency. Standard flights were established as representative work samples, and small groups of Ss were observed or recorded by motion pictures while flying. Detailed analysis of the records is reported and discussed with regard to criteria of successful flying, optimal control movements, and training and evaluation procedures. A manual of standard check flight procedures is appended. T. G. I.

864
Brown, I.D. SIGNAL CONSPICUITY AND DISCRIMINATION IN SEA RESCUE WORK. U.S. 78, March 1956, 3pp. Royal Naval Personnel Research Committee, N.C., Cambridge, England.

865
This report reviews some work on the attention-getting value (or conspicuity) of light signals and discrimination cues in a complex signalling system. The results are related to the problem of "bringing together" raft and survivor in naval rescue work. Recommendations are given for the personal signal which is fitted to the life-jacket and for the signal to be used on the raft.
29

863
Webster, A. P. & Reynolds, C. E. TIME OF CONSCIOUSNESS DURING EXPOSURE TO VARIOUS PRESSURE ALTITUDES. Rep. x-716 (AO-399-k) Aug. 1946, 23pp. Naval Department, Biodynamics Branch, Research Division, Bureau of Medicine and Surgery.

869
The available information on the time to loss of consciousness due to anoxia as a function of barometric pressure is treated in relation to the theoretical considerations of oxygen exchange with the atmosphere. A set of rational equations are fitted to the empirical data giving the duration of consciousness and the duration of useful consciousness as a function of the atmospheric pressure of ambient air and pure oxygen.
T.C.39.

970
Land, E. H., Hunt, J. H., Roper, V. J. THE POLARIZED HEADLIGHT SYSTEM. Bull. No. 11, June, 1948, 36pp. Highway Research Board, National Research Council, Division of Engineering and Industrial Research.

870
This bulletin is concerned with the polarized headlight system for eliminating glare in night driving. The following reports are given in full: Land, Edwin H., "The Polarized Headlight System"; Hunt, J.H., "The Automobile Industry Survey of Polarized Headlighting"; and Roper, Val J., "The General Electric Company Tests on Polarized Headlighting". Recommendations for future action are included.
G. I. R 3

875
Hilgard, E.R. REPORT OF HIGHWAY SAFETY RESEARCH CORRELATION CONFERENCE, WASHINGTON, D.C. June 5 and 6, 1952, 67pp. Committee on Highway Safety Research, National Academy of Sciences-National Research Council, Washington, D.C.

A group of sixty scientists and engineers selected from various specialties met for two days of intensive consideration of a nationwide research program on human factors in relation to physical factors of the vehicle and the highway as causes of traffic accidents. An introductory briefing session was followed by a panel discussion designed to present to the research scientists the problems as seen by practical traffic people. Then followed an afternoon, evening and morning of group discussions on ten different topics to draw up recommendations as to areas of most needed information. Lists of specific projects were purposely avoided, since good research people like to formulate their own detailed problems and methods. Finally the chairmen of these sub-groups reported the recommendations to the group as a whole.

876
Hilgard, E.R. (Chm.). THE FIELD OF HIGHWAY SAFETY RESEARCH. A BRIEF OUTLINE. FIRST REVISION. ca. 1952, 42pp. Committee on Highway Safety Research, National Academy of Sciences-National Research Council, Washington, D.C.

This report outlines the field of Highway Safety Research. The performance of automobile driving is analyzed and a theory of accident causation proposed. Chapter II summarizes human factor's research which has "paid off". Chapter III presents an analysis of traffic fatalities and injuries based on national figures over a 10-yr. basis. Chapter IV discusses the types of approach which have been used in highway safety research. Chapter V summarizes the present status of highway safety research. This outline is not intended as an exhaustive or complete treatment, but rather as a brief sketch of the situation after intermittent research and practical efforts in the field by many people.
R 44

877
Viteles, M.S. (Chm.). ANNUAL MEETING OF COMMITTEE ON SELECTION AND TRAINING OF AIRCRAFT PILOTS. June 1946, 68pp. CAA Division of Research and Division of Aeropsychology and Psychology, National Research Council, Washington, D.C.

877
This report contains the texts of 5 papers on experimental work in selection and training of pilots as well as some more general talks. Subjects covered include: directed attention to instruments, inspectors' ratings w. photographic records, training in slow flight and landing, visual acuity and flying, visual and cardiovascular standards in relation to flight training success, aviation psychology in the U.S. Navy, and suggestions for future research in civilian aviation.
C. 6

878
Bromer, J.A. A COMPARISON OF ULTRA-VIOLET AND INDIRECT RED SYSTEMS OF ILLUMINATION FOR AIRPLANE INSTRUMENT PANELS. Rep. TED No. NAM 4422. July 1945. 11pp. Naval Air Experimental Station, Naval Air Material Center, Aero Medical Dept., U.S. Naval Base Station, Philadelphia, Pa.

7-0
To compare relative efficiencies of two systems for instrument panel lighting of aircraft (indirect red illumination and floodlighting ultra-violet), six subjects were required to look at the illuminated panel then locate a faint target projected against a simulated night sky background. Other subjects flew a given course in the Link Trainer under both lighting systems. Time to locate the target and deviations of flight performance from the "perfect" performance are analyzed and discussed in terms of the two lighting systems.
T.I.

879

Brown, F.R., & Lowery, E.A. A STUDY OF THE REQUIREMENTS FOR LETTERS, NUMBERS AND MARKINGS TO BE USED ON TRANS-ILLUMINATED AIRCRAFT CONTROL PANELS. PART I. THE EFFECT OF STROKE WIDTH UPON THE LEGIBILITY OF CAPITAL LETTERS. Rep. TED No. NAM EL 606. Sept. 1949. 19pp. Naval Air Experimental Station, Naval Air Material Center, U.S. Naval Base Station, Aeronautical Medical Equipment Lab., Philadelphia, Penna.

879

To determine the effect of varying stroke width on legibility of capital letters of fixed height and width, 23 subjects identified test letters (light on dark, five stroke width-height ratios from 1:5 to 1:15) viewed under simulated daylight and varying brightnesses of red trans-illumination for 1/25 and 1/5 seconds. Mean error scores are analyzed for differences due to the varying conditions. An optimal stroke width-height ratio is recommended for use on trans-illuminated aircraft control panels for combined day and night use.
T,G,I,R16.

880

Brown, F.R. SURVEY OF LIGHTING PREFERENCES OF A GROUP OF NAVAL AVIATORS IN THE XAM-2 COCKPIT MOCKUP. Rep. TED No. NAM EL 600. Oct. 1948. 24pp. Naval Air Experimental Station, Naval Air Material Center, U.S. Naval Base Station, Aeronautical Medical Equipment Lab., Philadelphia, Penna.

880

To determine preferences for lighting plans for console and instrument panel in the XAM-2 cockpit mockup, twelve experienced aviators were asked to examine these areas under conditions of (1) no lighting, (2) indirect lighting only, (3) flood-lighting only, and (4) a combination of both. They rated the lighting in order of preference for both console and instrument panel. The results are discussed in terms of illumination for aircraft cockpits; recommendations are included.
T.I.

881

Bromer, J.A. INSTRUMENT LIGHTING- INVESTIGATION OF ULTRA-VIOLET REFLECTIONS. Rep. TED NAM 31334. Naval Air Experimental Station, Naval Air Material Center, Aero Medical Dept., Navy Yard, Philadelphia 12, Penna.

881

To study some problems of ultra-violet floodlighting of instruments and cockpit, measurements were made in 13 aircraft of the reflected light from all sources (1) with lights at all brightness settings, and (2) with only auxiliary lights. The amount of brightness at the level of the pilot's eyes was also measured. Subjective evaluation was made of other aspects of the lighting. Results are discussed in terms of glare at the pilot's eyes and recommendations are made for improving the lighting installation for increased visibility and maintenance of dark adaptation.
T.

882

Vaccaro, J., Jr. DESIGN OF VISUAL TESTING DEVICE. Rep. No. NAES-INSTR 86-49. Apr. 1950. 6pp. Naval Air Experimental Station, Naval Air Material Center, Aeronautical Instruments Lab., U.S. Naval Base Station, Philadelphia, Pa.

882

A visual testing device which may be used to study performance of a subject reading instrument dials illuminated by various methods is described. The device has been tested for reliability of dial readings. Specifications for construction are given.
T.I.

883

Wagner, E.G., & Blaisdel, Irene C. VISIBILITY STUDIES OF EXTERIOR COLOR SCHEMES FOR AIRCRAFT AT PRESENT ALUMINUM COLORED. Rep. TED NAM AE-525044. May 1948. 50pp. Naval Air Experimental Station, Naval Air Material Center, Aero Medical Equipment Lab., Philadelphia, Penna.

883

To explore means for increasing the visibility of aluminum-colored aircraft when airborne; model aircraft, painted in varying patterns and amounts of glossy sea blue, were viewed in four directions against backgrounds of white, gray, and black by 122 observers. Visibility scores are analyzed in terms of the color schemes studied and recommendations are made.
T,G,I,R17.

886

Wilcoxon, H.C., Johnson, M. & Golan, D.L. THE DEVELOPMENT AND TRYOUT OF OBJECTIVE CHECK FLIGHTS IN PRE-SOLO AND BASIC INSTRUMENT STAGES OF NAVAL AIR TRAINING. Joint Proj. Rep. NM OGI 058.24.01, July 1952, 152pp. USN School of Aviation Medicine, Pensacola Air Station, Fla. & The Psychological Corporation, New York, N.Y.

886

This report summarizes the development and testing of objective check flights in pre-solo and basic instrument stages of Naval Air Training. First approximately 100 students in each stage had two successive check flights with different instructors, graded on the current Navy form. Then approximately 100 students in each stage had two successive check flights with different instructors, graded on two objective rating forms developed for the project as well as on the standard form. Reliabilities of the standard and experimental grading procedures are compared and implications for training flight evaluation discussed. Samples of all forms are presented.
T. I. R 12

887

McLaughlin, S.C., Jr. A FACILITATIVE EFFECT OF RED LIGHT ON DARK ADAPTATION. Proj. No. NM OGI 059.28.01. May 1952. 7pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

887

To determine the effect of red-light exposure upon the process of dark adaptation, threshold measurements were taken for 10 subjects after 20 minutes in total darkness, and after 10 minutes in red light (effective brightness--0.0056 footlamberts) followed by 10 minutes in total darkness. Thresholds are compared for the two conditions for differential effects. The theoretical and operational implications are discussed.
T. R 10

888

Black, J.W. SOME EFFECTS UPON VOICE OF HEARING TONES OF VARYING INTENSITY AND FREQUENCY UPON READING. Speech Monographs, 1950, 17, 3-6. Research Proj. NA 142 592, BuMed Proj. NM 001 064.01.01, Joint Proj. Rep. 1, Jan. 1950, 6pp. USN School of Aviation Medicine, NAS, Pensacola, Fla. (Ohio State University, Columbus, Ohio).

The present study was designed to find in what manner the reading voice was influenced in pitch (frequency of the fundamental) and over-all intensity by the speakers hearing pure tones as he read. 15 Ss individually read from a list of nonsense words as they listened to tones over earphones. Tones of 90, 121, 161, 216 and 287 cps, and 40, 55, 65, 75, 90 and 98 db were used. The data gave no indication that vocal pitch (frequency of the fundamental) was affected by the frequency of a stimulus tone that sounded in a speaker's ear during reading. Clearly, however, both the intensity and pitch of voice were affected by the level of the tone that was heard. These effects, however, appeared not to be a function of the intensity of the tone but rather of its loudness. Moreover, they were differential. As the tones were increased from loudness level 10 to 65 through 11 points of measurement vocal intensity and frequency increased linearly. Responses to tones of higher loudness levels were not in keeping with these patterns. Both vocal pitch and intensity increased with greater rate per unit change of the loudness level of the stimulus tone at higher levels, and the acceleration rate was greater for vocal intensity than for frequency. The possibility is suggested that in the production of vocal intensity there is more 'control' in the lower portion of the continuum from soft to loud than in the upper part of this range.

889

Walker, C. & Black, J.W. THE INTRINSIC INTENSITY OF ORAL PHRASES. Contract N60NR 22525, BuMed Proj. NM 001 064.02, Joint Rep. 2, May 1950, 40pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla. (Ohio State University, Columbus, Ohio).

The primary objective of this study was to establish lists of phrases, equated in natural intensity and duration, that might serve as test materials in studies involving comparisons of either rate or intensity of reading. Each of 24 readers repeated 450 phrases of five-syllable length. The three highest root-mean square values of intensity throughout the duration of each reading of a phrase were measured and reduced to a single value. The mean intensity and standard deviation of each phrase as read by 24 speakers were computed. Two sets of lists were constructed: Set A with 29 equated lists of eight phrases each; and Set B with 50 equated lists of five phrases each. There was high consistency in the intensity pattern of a phrase as read by 24 speakers. However, the intensity pattern of one phrase was not indicative of the pattern of another phrase of similar length.

R 26

891

Atkinson, C.J. A STUDY OF VOCAL RESPONSES DURING CONTROLLED AURAL STIMULATION. Contract N60NR 22525, BuMed Proj. NM 001 064.01.05, Joint Proj. Rep. 5, Dec. 1950, 15pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

Some aspects of the involuntary control of the voice by means of the acoustic environment were investigated. Pure tones of 80, 100, 150, 250, 500, 1000, 2000 and 4000 cps, and up to 100 db in one earphone provided the acoustic environment for 24 speakers. The intensity of the tones was found to have differential effects upon both the mean fundamental frequency and the mean intensity with which the speaker said monosyllables. The frequency of the tones had no effect upon either the mean fundamental frequency or the mean intensity of the responses. This ignores what were apparently significant effects when the level of the stimulus was very high.

R 16

892

Black, J.W. THE EFFECT OF DELAYED SIDE-TONE UPON VOCAL RATE AND INTENSITY. Contract N60NR 22525, BuMed Proj. NM 001 064.01.06, Joint Proj. Rep. 6, Jan. 1951, 7pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

Twenty-two subjects read 11 series of short phrases. With each series the subject heard his side-tone in a different time relationship with his speaking. These relationships were .00, .03, .06,30 sec. delay of the side-tone. A relatively constant intensity of side-tone was maintained. The effects of delayed side-tone were: a) reduced rate of reading; and b) increased vocal intensity. The maximum single decrement in rate occurred with the change from .03 to .06 sec. delay; the maximum over-all reduction in rate occurred with .18 sec. delay; and maximum vocal intensity, with .27 sec. delay (not significantly different from .09 sec. or any longer delay).

R 6

893

Black, J.W. THE EFFECT OF NOISE-INDUCED TEMPORARY DEAFNESS UPON VOCAL INTENSITY. Contract N60NR 22525, BuMed Proj. NM 001 064.01.07, Joint Proj. Rep. 7, Jan. 1951, 7pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

24 groups of males, 6 members per group, read phrases before and after 120 mins. exposure to simulated cockpit noise. At the time of the reading a threshold measurement was secured of the readers' auditory acuity at 512 cps. The exposure to noise reduced the mean hearing values 9 db and increased the vocal intensity half of this amount. The recovery in either instance was complete after 15 mins. of silence. The trends of recovery, in so far as they progressed, were linear in both sets of measures. Vocal intensity is apparently not solely a function of the intensity of the airborne side-tone.

R 6

894

Marple, H.B. & Merrill, S.H. A DEVICE FOR THE PRODUCTION OF DELAYED SIDE-TONE. Contract N60MR 22525, BuMed Proj. NM 001 064.01.08, Joint Proj. Rep. 8, Aug. 1951, 24pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

Part I of this report describes the Audio Signal Delaying Unit, a machine that was constructed to provide a time delayed side tone for use in experiments in acoustics, speech, and psychology. By the use of a magnetic tape recorder with a fixed playback and a movable record head, and the use of a high tape speed (60-65 in. per sec.), continuously adjustable time delays were obtained from a minimum of 0.02 sec. to a maximum of 0.35 sec. The signal-to-noise ratio of the machine was about 40 db, with essentially uniform frequency response from 90 to 8000 cps. A simple method for measuring the time delay introduced by the machine, requiring only an a.c. voltmeter and calibrated audio oscillator as additional equipment is also described. Part II of this report is a description of a portable model with improved frequency response. Notes on construction and operation are included.

R 9

895

Black, J.W. ACCOMPANIMENTS OF WORD INTELLIGIBILITY. Contract N60MR 22525, BuMed Proj. NM 001 064.01.09, Joint Proj. Rep. 9, Feb. 1952, 15pp. USN School of Aviation Medicine, Naval Air Station, Fla.

This study was concerned with the relationships between word intelligibility and aspects of the syllabic pattern, word familiarity, phonetic characteristics of words and the relative intelligibility of words based on a sample of 3657 words of medium (20-80%) intelligibility. 10,000 words were screened from Thorndike's 1a-10 categories to give the final experimental list. 80 panels of listeners, 3-12 subjects per panel, listened to the words in classroom "quiet" (65 db of white noise), each panel heard some 450 words. Another 80 panels listened to the words in noise (110-118 db aircraft type) at approximately 2 db signal-to-noise ratio. The analyses indicate that the more familiar words are more accurately identified. Structural characteristics also contribute to recognition; words with many sounds are more intelligible than words with fewer sounds. Thus, three influences, two of them contrary, operate in the auditory recognition of a word. Word familiarity and word complexity operate against each other while phonetic elements add a third dimension that differs from each of the preceding factors, but may not necessarily operate against either of them. 18 sounds tend to enhance the recognition of words; 7, to detract. An intelligible word would seem to be a familiar one, with more than one syllable, the accent on the second syllable and composed of combinations of the 18 more intelligible sounds. Either alternately to the criterion of familiarity, or imposed upon it, the word to be intelligible should contain more instead of less sounds.

R 17

897

Tulhurst, G.C. AUDIBILITY-RECOGNITION SOUR. PRESSURE FUNCTIONS OF THE VOICED COGNATE CONSONANTS. Joint Proj. NM 001 064.01.11, Rep. 11, May 1952, 14pp. USN School of Aviation Medicine, Naval Air Station, Fla.

The present study was concerned with the audibility and recognition sound pressure level functions of the voiced cognate consonant sounds (g, b, v, d, z, z^h , and dz). From these functions the psychophysical thresholds in each syllabic position in relation to the constant vowel (U) were derived. The eight consonant sounds and the single vowel were combined in a random manner into nonsense syllables of the CV, VC and CVC type. These recorded combinations were presented by a high-fidelity magnetic-tape recorder to 288 listeners in groups of 12 who listened binaurally over earphones in a soundproofed room. Some of these subjects listened for audibility and others for recognition. A correlation (r) of .86 was found between initial and final audibility series. A distance "aphonemic interval" between the recognition and audibility thresholds was found. Significant differences were found between the 2 recognition thresholds at each syllabic position. The sounds that were heard as substitutions for the stimulus sounds by the listeners were tabulated and percentages of the total number of substitutions for each sound were calculated. The only consistent patterning of the substitutions was for the final (z), substitutions (the three most frequent) all continuant in character. The calculated sound pressure levels, while they must be considered as rough approximations, indicate that the syllables, hence the vowel, were detected at very low levels in comparison to the arbitrary acoustic reference of .000205 dynes/cm². These calculations give a value of threshold of the vowel (U) as 25 db above the acoustic zero reference point.

R 11

898

Atkinson, C.J. ADAPTATION TO DELAYED SIDE-TONE I. Joint proj. NM 001 064.01.12, Rep. 12, May 1952, 5pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

The side-tone of speakers was delayed while 60 phrases were read. These 60 phrases were read slower and louder than phrases read without delayed side-tone. There was no trend demonstrated in the course of reading the 60 phrases to indicate that speakers adapt to a delayed side-tone; that is, there was no trend in either the duration or sound pressure level toward the duration or sound pressure level of like phrases spoken with normal side-tone. While no adaptation was shown in either the duration or the sound pressure level of speech, there was some evidence that, perhaps, more reading periods might show significance in these aspects. Further, these results do not rule out adaptation in quantities not measured, such as perspiring palms, breath control, quality of speech, or repetitions and mispronunciations of words.

R 5

899

Atkinson, C.J. SOME INFLUENCES OF DELAYED SIDE-TONE UPON INTELLIGIBILITY. Joint Proj. NM 001 064.01, Rep. 13, July 1952, 6pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

Groups of listeners heard intelligibility tests in noise and in quiet. The speakers read with delays of .02 to .09 sec. introduced into their side-tone. The listener heard either the original saying or the original plus the delayed saying of speech material. Speech was received less accurately in every condition, except when the speakers read with a .05, .08 or .09 sec. delay in their side-tones. It was concluded that: a) Listeners hear words more accurately if words are received only as an original message; superimposing an original and a delayed rendition of a word renders the word less intelligible under the delay times studied; b) The delay of .05 sec. in the side-tone of the speaker appeared to affect the reception of his speech beneficially; the intelligibility scores for this condition were significantly higher than at other delay times; c) An intelligibility increment similar to but less than that observed for the .05 sec. delay was present for the .08 and .09 sec. delay of side-tone; d) The effects of the delayed side-tone upon the intelligibility of a speaker became evident in a period of less than 2 min.

R 4

900

Atkinson, C.J. INTELLIGIBILITY OF SPEECH HEARD AT HIGH ALTITUDE AND SEA LEVEL. Joint Rep. NM 001 064.01, Rep. 14, Oct. 1952, 7pp. USN School of Aviation Medicine, Pensacola, Fla.

This investigation was conducted to determine how well speakers were able to make themselves understood over an aircraft intercommunication set while at 43,000 ft. and breathing pure oxygen at 10 in. of water pressure. 4 groups of speakers in units 10 per group took part in speech intelligibility testing conducted during altitude runs in a low-pressure chamber taken to 43,000 ft. Approximately one-half of each panel served as speakers-listeners at altitude and the other half functioned at sea level only as listeners. The speech materials were 4 forms of multiple-choice intelligibility tests. Each group made some 15 altitude runs of one-half hour at altitude. Speaker scores at altitude, listener scores at altitude, and listener scores at sea level were obtained. Listening was done monaurally, one ear open to ambient sounds. The tests were scored in percentage of correct responses. The scores from the listeners at altitude were compared with the scores from the listeners at sea level. All groups start low at Day 1 and rise in percentage of correct responses up to Day 15. The variance due to days was significant in all 4 groups tested but the difference in variance between sea level and altitude was small and not significant. It was observed that speaking at altitude tended to restore O_2-CO_2 balance in the blood.

R 7

901

Tolhurst, G.C. LOCALIZATION ACCURACY RESULTING FROM ISOLATED BINAURAL STIMULATION. Joint Rep. NM 001 164.01, Rep. 15, Jan. 1953, 8pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

Judgments of apparent azimuth of the source of 5 different types of sound stimuli were made by 250 young adults, 30 judgments each. The subjects, in groups, listened over an isolated dual-channel system using split headsets to a single sound source. In effect this eliminated visual, muscle tonus and proprioceptive muscle cues. Subjects were unable to localize the 5 sound types better than chance within a quadrant of $\pm 45^\circ$, except music. There were significant differences between localization frequency when the "correct" criterion was $\pm 90^\circ$. The subjects made judgments, at a highly significant level better than chance, that the sound source was exactly 180° from the stimulus.

R 9

902

Black, J.W. MULTIPLE-CHOICE INTELLIGIBILITY TESTS. Joint Rep. NM 001 064.01, Rep. 17, Nov. 1953, 20pp. USN School of Aviation Medicine, Naval Air Station, Fla. (Acoustic Lab., Ohio State University, Columbus, Ohio).

24 equivalent multiple-choice intelligibility tests were constructed. Each test is comprised of 27 single-word items that are read by speakers in sequences of 3 words. Panels of 11 listeners respond by individually selecting the "heard" word from a group of 4 possible responses. The error items on the listeners' answer form were derived from the errors that were made by the listeners who heard the test items in a "write-down" testing situation. The 24 tests are not dissimilar in the mean values of the items, nor in the variance of the item-values from list to list. The scores assigned by the tests: a) Have split-half reliability or r_{ss} .70-.80; b) Correlate with earlier multiple-choice tests and PB tests r_{ss} .72 and .60 respectively; and c) Vary with noise level in the testing room, approximately 1.5% per db. The tests appear also to be useful in an environment of "classroom noise", or "free-room" testing. The circumstance for which the tests were designed would allow for testing groups of 12 members, and require a new group with either: a) each testing situation, or b) each pair of such situations. The administration time of the test to a panel of 12 persons is approximately 20 minutes.

R 16

903

Black, J.W., Atkinson, C.J., Bragg, V., Merrill, S.W., et al. A MEASUREMENT OF THE TEMPORARY EFFECT OF NOISE UPON HEARING. Proj. NM 001 064.01.18 & Contract NCOM 22525, Proj. NR 145 573, Rep. 18, Nov. 1953, 18pp. USM School of Aviation Medicine, Pensacola Air Station, Fla. (Ohio State University Research Foundation, Columbus, Ohio).

903

A pulse-type hearing test was constructed for assessing the temporary hearing loss of personnel exposed to controlled levels and spectra of noise for specified times. Pulses of 'white' noise and 500-cycle tone were employed in a series of 2 db decremental steps. 1. The two types of pulses measure different aspects of the hearing function. 2. Five administrations of equivalent forms of the test are required for indoctrination. 3. A deviation up to 0.7 db., seems to be 'expected' in the preparation and administration of the tape-recorded test. The test was adapted and coupled with a multiple-choice word-reception test and...compared with more conventional pulse-type tests."

T. G. R 8

904

Black, J.W., Tolhurst, G.C. & Merrill, S.W. APPLICATIONS OF MULTIPLE-CHOICE SPEECH INTELLIGIBILITY TESTS IN THE EVALUATION AND USE OF VOICE COMMUNICATION EQUIPMENT. Joint Rep. NM 001 064.01, Rep. No. 19, Nov. 1953, 22pp. US Naval School of Aviation Medicine. (Acoustic Laboratory, The Ohio State Univ.).

Multiple-choice intelligibility tests were developed during World War II for measuring the results of training in voice communication. The tests have been applied only in situations in which only an occasional measurement was required that employed the same personnel, as before and after classroom instruction. This restriction arose because of the inflexibility of the multiple-choice tests and the restrictions imposed by a single formal printed answer form. More recently, additional forms have been devised and the tests have been used extensively in evaluating equipment and the performance of operators. Summaries of approximately 20 such applications comprise this report. The topics of typical uses include evaluations of visual monitoring of voice level, temporal regularity of voice signals, the relative intelligibility of recorded speech, a relationship between side-tone and "free-room" intelligibility, the components of the tower-to-aircraft radio system, comparisons of alternative headsets and microphones, and bone-conduction masking. A singular utilization of the multiple-choice tests is through controlling the separation time of the test items and determining the rapidity with which the test items can be identified through comparison systems.

R 15

905

Lightfoot, C. EFFICIENCY OF IMPAIRED EARS IN NOISE: D. RELATIONSHIP BETWEEN TYPE OF IMPAIRMENT AND AUDITORY MASKING. Rep. 55-121, June 1956, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

905

To investigate the relation between type of impairment (auditory and auditory masking, pure-tone and spondee thresholds were obtained for 31 normally hearing subjects and 59 with impaired hearing (17 with conductive impairment; 42 with perceptive). Measurements were made in quiet and two levels of white noise (group 1: 60 and 80 decibels; group 2: 80 and 95 decibels). The amount of masking (m) of thresholds was studied as a function of effective level (Z) of masking noise for various types of subjects. Discrepancies between obtained data and that estimated from previously established M-2 functions were analyzed. Discussion relates the findings to the concept of "critical band" in studies on masking.

T. G. R 8

906

Corbett, H.R. EVALUATION OF THE MK-51 SKY SCREEN SYSTEM. Quality Control Tech. Note 25-A, AFMTC-TN-56-98, Dec. 1956, 14pp. Quality Control Group, Air Force Missile Test Center, Patrick AFB, Fla.

908

To evaluate the capabilities and limitations of the MK-51 Sky Screen (optical system for providing an analogue output for real time data presentation during missile take-off), static tests were conducted to measure the various electrical and mechanical parameters that might affect system accuracy. Data display devices were checked for accuracy of calibration procedures. Operational testing for error was accomplished by comparing simultaneous data from other instrumentation systems during three live missions. The systematic and operator errors and the presentation and interpretation errors were analyzed. Recommendations are included.

T. G. I.

912

Fishman, S. DEVELOPMENT OF A SHORT BATTERY OF TESTS TO PREDICT PHYSICAL EFFICIENCY GRADES OF WEST POINT CADETS. PJ 4086 03, R and A RCS, PHS Rep. 735, Feb. 1947, 12pp. USA Personnel Research Section, Adjutant General's Office, Washington, D.C.

915

To develop a short battery of physical proficiency tests from a preliminary battery of 19 tests which could be used to predict several criteria of cadet performance at West Point during the first year, data were gathered on cadets in the graduating class of 1949. At time of entrance (1945) 598 cadets had been given ten tests and 110 had been given nine additional tests. Scores on the tests were analyzed for their relationship to 1) total physical education grade at end of first year, 2) MPP-1 IV/IV, a "buddy rating" on physical competence, and 3) discharges and resignations during the first year.

T. G.

917 Brogden, H.E., Burke, L. & Lubin, A. A FACTOR ANALYSIS OF MEASURES OF PHYSICAL PROFICIENCY. Proj. 29534100, PHS Rep. 937, April 1952, 16pp. US Department of War, TAGO, Personnel Research Section, PR & PBR-Pers Bur, Washington, D.C.

The purpose of this study was to identify basic physical abilities underlying 31 physical proficiency test scores. The physical proficiency test scores, height, weight, and grades were obtained for 217 cadets of the U.S. Military Academy. This data was analyzed by: a) Determining product-moment correlations of all variables; b) Factoring the matrix of inter-correlations employing Thurstone's Group Centroid Method; c) Performing orthogonal rotations of the centroid factors to achieve as close an approximation to simple structure as possible; d) Where the factor plots indicated correlation between 2 clusters of tests, a rotational technique was used employing an additional orthogonal axis. No one factor was found in all the tests. 6 factors were narrow and specific in content and believed to be of no value outside the areas in which these specific activities were involved. These 6 factors were identified as size, course grades (gym, wrestling, boxing, and swimming), throw, jump, run, and broken run. 6 general factors were found. These 6 factors were: a) General (factor of) leg movement, e.g., broad jump; b) Arm extension, e.g., floor push-ups; c) Arm flexion, e.g., rope climb; d) General (factor of) arm movement, e.g., chin; e) Endurance, e.g., chin; f) Ability to mobilize quickly a maximum of force or speed, e.g., soft ball throw.

R 0

922

Navron, M.D., Fay, R.J. & McGrath, J.E. THE EFFECTIVENESS OF SMALL MILITARY UNITS. FINAL REPORT. Contract DA 49 083 OSA 365, Proj. 29565100, Subtask 79, PRS Rep. 980, Sept. 1952, 135pp. USA Personnel Research Office, Office of the Adjutant General, Washington, D.C. (Institute for Research in Human Relations, Philadelphia, Penn.).

922

The purpose of this study was to develop useful measures of rifle squad performance and of the individual and group characteristics contributing to effective teamwork. These measures included tests of four basic combat tasks: attack, defense, point of an advance guard, and reconnaissance patrol; job knowledge; attitudes and interpersonal relationships within the team; and rating forms for evaluating squads and squad leaders. Comprehensive directions for use of these tests by Army units were developed; also a handbook of directions for the construction and use of similar small-unit tactical tests was presented. Predictors of group performance were hypothesized and field trials of some were summarized.

926

USA Surgeon General (Dir.). NOTES ON PSYCHOLOGY AND PERSONALITY STUDIES IN AVIATION MEDICINE TECHNICAL MANUAL. TM 8 320, Jan. 1941, 335pp. USA Surgeon General, Washington, D.C.

This manual is a survey of psychology in general and in particular on those aspects of psychology and personality studies relevant to aviation medicine. Chapter I contains sections on: a) subject matter of psychology; b) methods of psychology; c) attention; d) sense perception; e) memory; f) imagination; g) learning process; h) emotion; i) instinct; j) consciousness; k) unconsciousness; l) affectivity; m) intelligence measurement; n) word association tests; o) reaction time; p) foreign research; q) American research; r) psychological functions pertaining to the aviator; and s) selection of trainees for military aviation. Chapter II--personality study--contains sections on: a) personality and individual difference; b) heredity and environment; c) manifestations and types; and d) application and interpretation in rating flying adaptability. R 71

928

Sharp, L.H., Gordon, D. & Reuder, Mary. REVIEW OF STUDIES ON THE EFFECTS OF TRAINING ON NIGHT VISION ABILITY. DA Proj. 29530100, PRS Rep. 974, Aug. 1952, 10pp. USA Personnel Research Section, Adjutant General's Office, Washington, D.C.

929

To study the question of whether testing, training, or both are required to obtain a group of individuals for key assignments in night operations, a survey was made of evidence in the technical literature concerned with night vision testing and training. A critical analysis of the data presented in these studies is made and suggestions for further research are given. T.R.10.

930

Wherry, R.J. & Corbin, H.M. STUDIES IN VISUAL ACUITY. PRS Rep. 742, 1948, 161pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

930

is a first move to improve wall chart tests as measuring instruments. 14 tests of visual acuity (far) were administered to 792 enlisted men at Fort Dix, New Jersey. Data collected from the administration of vision tests in 7 commercial devices and other tests at the U.S. Submarine Base, New London, Connecticut, were also studied. Factors in far and near acuity, depth, and phoria tests are identified and discussed. Test-retest reliabilities of 7 methods of scoring the wall charts, a frequency distribution of test scores, and an analysis of test difficulty are included. T.G.I.

931

Uhlauer, J.E., Gordon, D., Woods, I., & Zeldner, J. A PILOT STUDY OF THE RELATIONSHIP BETWEEN SCOTOPIC VISUAL ACUITY AND ACUITY AT PHOTOPIC AND MESOPIC BRIGHTNESS LEVELS. Army Proj. No. 29530100, PRS Rep. No. 963, July, 1952. Dept. of the Army, TAGO, Personnel Research Section, PR & PR-Pers Bur, Washington, D.C.

931

To investigate the relationship between scotopic (starlight), mesopic (partial moonlight), and photopic (daylight) visual acuities, nineteen subjects, tested previously on the Army Night Vision Tester, were retested on four types of alley charts and three Ortho-Rater plates at varied levels of brightness (0.0.1 to 13.5 foot-lamberts). Correlations of acuity scores were obtained and are discussed in terms of the feasibility of developing a test of mesopic acuity for practical use in assessing night vision ability of military personnel. T.I.R.5.

932

Keats, J.A. FORMAL AND CONCRETE THOUGHT PROCESSES. Contract N6ONR 270 20, Proj. NR 150 088, Aug. 1955, 93pp. Princeton University & Educational Testing Service, Princeton, N.J.

932

This project was an empirical investigation of predictions derived from a theory by Piaget concerning the development of intelligence. In particular, three content areas were studied (arithmetic, probability, and inequalities) making use of group testing procedures and special statistical techniques for analysis. A test, consisting of 74 specially prepared items dealing with the three areas, was administered to children from grades four through ten (approximately 200 in the first two grades and 300 in the others). The results were compared with predictions derived from theory. T. G. I. R 24

934

Biel, W. C., Eckstrand, G. A., Swain, A. D., & Chambers, A. N. TACTUAL DISCRIMINABILITY OF TWO KNOB SHAPES AS A FUNCTION OF THEIR SIZE. Contract No. AF 33(038)-15474, RDO No. 694-1", WADC Tech. Rep. 52-7, Jan. 1952, 14pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

934

To determine the tactual discriminability of two knob shapes as a function of their size, five groups of twenty subjects each discriminated tactually between wheel (round) and flap (square) airplane control knobs. Five knob sizes varying in one-fourth inch steps between one and two inches were used and each of the five groups were tested with a different knob size. Discrimination errors and response time for each discrimination were recorded. T.T.R.2.

- 935
Duncan, C.P. & Underwood, E.J. RETENTION OF TRANSFER IN MOTOR LEARNING AFTER 24 HOURS AND AFTER 14 MONTHS AS A FUNCTION OF DEGREE OF FIRST-TASK LEARNING AND INTER-TASK LEARNING. Contract AF 33(038) 11396, RDO 694 44, WADC TR 52 224, Oct. 1952, 22pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Northwestern University, Evanston, Ill.).
- 936
This is an investigation of retention of positive transfer after 14 months without practice. Undergraduate subjects positioned levers to colored light stimuli, with differing amounts of practice on the first task, and differing similarity of second task to first. The second task was learned immediately after the first, and relearned after twenty-four; fourteen months later it was again relearned. Error and time scores are reported, and effects of degree of learning, similarity of tasks, and individual differences within groups are assessed. Implications with respect to optimum degree of simulation in training equipment are discussed.
T. G. 9 9
- 936
Gilinsky, A.S. & Brown, J.L. EYE DOMINANCE AND TRACKING PERFORMANCE. Contract AF 33(038) 22616, Proj. RDO 694 45, WADC TR 52 15, April 1952, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.).
- 936
This experiment compared the efficiency of compensatory tracking performance with the dominant eye and with the nondominant eye. The task required S to keep an irregularly moving stimulus within a circumscribed area by means of a joystick. Two groups of eight male Ss with marked eye dominance were used; one received training with the dominant eye followed by successive practice with the nondominant; the other had these conditions reversed. Each S tracked 80 two-min trials, 40 with one eye followed by 40 with the other. Performance was measured in terms of time on target and number of errors. Differences in these were evaluated statistically by t.
T. G. 1. R 11
- 937
Krendel, E.S. THE SPECTRAL DENSITY STUDY OF TRACKING PERFORMANCE. PART 2. THE EFFECTS OF INPUT AMPLITUDE AND PRACTICE. Contract AF 33(038) 10420, RDO 694 39, WADC TR 52 11, Jan. 1952, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Franklin Institute Laboratories, Philadelphia, Penn.).
- 937
The application of spectral density analysis to the study of performance in a perceptual-motor task was illustrated. Using two Ss in a simple tracking task, the amplitude part of the frequency response was computed for statistical inputs of two different motion amplitudes and for two different stages of practice. It was hoped that this analysis would indicate whether a rough linear time invariant approximation could be used to describe the tracker's behavior. The results indicated need for further research.
G. I.
- 938
Krendel, E.S. THE SPECTRAL DENSITY STUDY OF TRACKING PERFORMANCE. PART 1. THE EFFECT OF INSTRUCTIONS. Contract No. AF 33(038)-10420, E.O. No. 694-39, WADC Tech. Rep. 52-11, Part 1, Jan., 1952, 16 pp. WADC, Air Research and Development Command, Aero Medical Laboratory, Wright-Patterson AFB, Ohio.
- 938
To illustrate an application of the spectral density approach to the study of human responses in a perceptual motor pattern, the influence of instructions (for accuracy and for speed) on a simple compensatory tracking task is studied. Data on the amplitude characteristics of the responses for 2 Ss are analyzed and related to an analysis of the spectral densities of the output and input signals. Further research is suggested.
G. I. R 3
- 939
Gilinsky, A.S. A REVIEW OF LITERATURE ON THE RELATIVE EFFICIENCY OF THE DOMINANT AND THE NON-DOMINANT EYE. Contract AF 33(038) 22616, WADC TR 52 13, Jan. 1953, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.).
- 939
This report summarizes evidence from the literature on the incidence of ocular dominance in the population and presents the findings relevant to the comparative efficiency of the dominant and non-dominant eye in various perceptual-motor skills and visual functions. The limitations involved in the concept of eye-dominance and its determination are discussed.
T.R52.
- 940
Milton, J.L., & Wolfe, P.J. THE EIGHTH OF A SERIES OF REPORTS ON EYE FIXATIONS OF AIRCRAFT PILOTS: FIXATIONS DURING ZERO-READER APPROACHES IN A JET AIRCRAFT. RDO No. 694-37, WADC Tech. Rep. 52-17, Feb., 1952, 15 pp. WADC, Air Research and Development Command, Wright-Patterson AFB, Dayton, Ohio.
- 940
To obtain a record of pilot eye movements during Zero Reader approaches in a jet aircraft, photographic recordings were made during the period of approach and letdown. (The Zero Reader is an instrument which, when proper adjustments are made, shows aircraft control movements necessary for flight along an established path). Frequency, duration, and sequence of eye fixations are presented with comparisons between results from other instrument approaches using a somewhat similar panel. Discussion is in terms of instrument panel arrangement.
T,I,R6.
- 941
Montgomery, V.E., Duncan, C.P. & Underwood, B.J. TRANSFER OF TRAINING IN MOTOR LEARNING AS A FUNCTION OF DISTRIBUTION OF PRACTICE. Contract AF 33(038) 11396, RDO 694 44, WADC TR 52 115, Oct. 1952, 24pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Northwestern University, Evanston, Ill.).
- 941
This study deals with the effects of distribution of practice on transfer to a very similar task. The subjects (undergraduates) had to hold one lever steady with the left hand, while positioning a right-hand lever to the appropriate slot for one of six possible colored lights. The only difference between original and final trials was the pairing of lights and slots. Some groups had continuous practice (no intertrial rests) with the first task on one day, the second on either one or two days. Others had 10 sec. intertrial rests, and completed their practice in 1, 2, or 3 days. Correct responses and shallow errors (incomplete positioning) are reported.
T. G. R 7
- 942
Schapiro, H.B. FACTORS AFFECTING LEGIBILITY OF DIGITS. Contract No. AF 33(038)-18517, RDO No. 694-41, WADC Tech. Rep. 52-127, June, 1952, 17 pp. WADC, Air Research and Development Command, Aero Medical Laboratory, Wright-Patterson AFB, Ohio. (Univ. of Rochester.)
- 942
To study legibility of single digits as affected by the interactions of four illumination levels, digit styles and stroke width-height ratios, twelve subjects read 3200 digits in a factorially designed experiment permitting all possible combinations of the variables. Scores for speed of reading are analyzed for the significance of the interactions affecting. Recommendations as to letter style and stroke width-height ratio are made.
T,I,R28.

943

Spragg, S.D.S. & Kewisher, Joan. THE EFFECTS OF BRIGHTNESS AND COLOR OF ILLUMINATION ON PERFORMANCE OF A COMPLEX PERCEPTUAL-MOTOR TASK. (FLYING A LINK TRAINER). Contract W33 038AC 18317, RDO 694 41, WADC TR 52 203, July 1952, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Rochester, Rochester, N.Y.).

943

To determine the effects of brightness and color of illumination on performance of a complex perceptual motor task, subjects (9,12,4 in different experiments) flew modified "Charley" courses (an almost purely visual task) in a Link Instrument Trainer. Conditions varied were: brightness--0.01 to 1.0 foot-lamberts; color--white, red, orange-red, orange-yellow; and length of task--one to four hours. Performance data in deviations from a calculated perfect course are interpreted in relation to aircraft instrument lighting for satisfactory visual performance at low photopic brightness.
T.I.R4.

944

Wickens, D.D. AN INTERPRETATION OF THE DEVELOPMENT OF A PERCEPTUAL SET IN S-R TERMS. Contract AF 18(600) 78, RDO 694 44, WADC TR 52-305, Sept. 1952, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

944

This article is a theoretical study in which an attempt is made to "interpret in S-R terms the development of perceptual biases of the sort wherein the subject acquires tendencies to respond to certain classes or dimensions of stimuli as opposed to others." A hypothetical experiment is presented, in which a perceptual bias is developed, to respond to the dimension of color (as opposed to, e.g., shape) in a transfer situation. A number of experimentally testable predictions are made.
T. G. R 11

945

Wulfeck, J.W. REVIEW OF THE LITERATURE ON AERONAUTICAL CHART DEVELOPMENT AND DESIGN FOR USE UNDER RED LIGHTING. Contract No. W33(038) ac-14559, RDO No. 694-15, WADC Tech. Rep. 52-306, July, 1952, 19 pp. WADC, Air Research and Development Command, Aero Medical Laboratory, Wright-Patterson AFB, Ohio. (Tufts College)

945

A brief review of research directed toward improvement of the design of aeronautical charts for use under red light is presented. Map development in this country is described and a tabular comparison made of design elements (projection, color scale, general use of color for information, elevation designation, type face and size, symbols, radio data, and special color techniques) in British and American maps. Organizations in this country working on various aspects of the problem are listed with notations as to their specific area of concern.
T.R17.

946

Brues, Alice M., & Damon, A. EYE MOVEMENT IN SIGHTING AS RELATED TO DESIGN OF TURRET SIGHTING PANELS. Contract N-51-2-1386, Tech. Rep. No. 4990, Aug., 1943, 9 pp. Headquarters, Air Technical Service Command, Wright Field, Dayton, Ohio.

946

To study the probable path of movement of a sun-sight, measurements were taken of the arc of head-movements made by 21 young men while following with their eyes a series of points at various angles from directly above to directly below the body (no body movement allowed). The results are related to average body measurements of the assumed operator of the sun-sight and applied to the design for a turret sighting panel.

947

Randall, F.E., Damon, A., Benton, R.S. & Pratt, G.I. HUMAN BODY SIZE IN MILITARY AIRCRAFT AND PERSONAL EQUIPMENT. Proj. RDO 695 43, Tech. Rep. 5501, June 1946, 333pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio.

947

This report deals with the relation of human body size to military aircraft and equipment. "It contains the necessary data and functional material to guide the designers of aircraft and associated flying equipment in the proper use of anthropometry... The functional man is fully described and the spatial requirements of his personal equipment are evaluated. Finally, the complete functional man is considered in his air crew position and as an integral part of the functional aircraft."
T. G. I.

948

Fetcher, E. S., Rapaport, S. I., & Hall, J. F. THE BIOPHYSICAL REQUIREMENTS FOR VENTILATED CLOTHING. AF Tech. Rep. 5702, May 1948, 61pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

948

This report attempts to describe the efficacy of and requirements for the design and execution of ventilated clothing. Theoretical considerations and physical formulae are presented. The results pertain to (1) the clothing being worn in different ambient environments and (2) the different temperatures of the ventilating currents. General effects on different body areas and extremities are considered.
T.G.R24.

949

Houston, R.C. & Walker, R.V. THE EVALUATION OF AUDITORY WARNING SIGNALS FOR AIRCRAFT. Contract W33 038 AC 14701, Proj. RDO 694 16, Tech. Rep. 5762, June 1949, 41pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Maryland, College Park, Mo.).

949

The effectiveness of klaxon horns, ditching bells, and several pure tones as warning signals was determined by tests conducted in specified levels of simulated cockpit noise. Ss made equal loudness judgments for 1,050, 2,500, and 3,000 cps paired to the horn and bell signals; made detection judgments of these signals in both steady and intermittent form against four noise spectra of varying intensity; made detection judgments of these signals presented through a loudspeaker or earphones at several db levels against six db levels of each noise spectra either with or without crash helmets. The results were evaluated statistically by variance and chi-square techniques.
T. G. R 3

950

Kaplan, W.E. STUDIES PERTAINING TO THE DESIGN OF VISUAL DISPLAYS FOR AIRCRAFT INSTRUMENTS, COMPUTERS, MAPS, CHARTS, TABLES, AND GRAPHS: A REVIEW OF LITERATURE. AF Technical Rep. No. 5765, April, 1949, 100 pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (Princeton Univ.)

This is a review of the literature relating to problems of design and use of certain visual displays in aircraft. Types of sources used are personal experience and opinion, experimental and physical visual literature on vision and perception, and limited research on specific design problems. Various sections are devoted to (1) problems of research, (2) characteristics of human vision and perception important to the design of visual displays, (3) problems specific to the design of instruments, and (4) computers, maps, charts, tables, and graphs.
G.I.R11.

951

Christensen, J.M. IN-FLIGHT ACTIVITIES OF NAVIGATORS IN THE ATLANTIC AND PACIFIC AREAS. AF Tech Rep 5771, May 1949, 17pp. USAF Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio.

The activities of navigators of the Military Air Transport Service engaged in mid-latitude flying in the Atlantic and Pacific areas are reported. Similarities between the two areas are noted. It is concluded that an inordinate amount of time is devoted to paper work in both areas, and that effort aimed at reducing this amount by development of computers, elimination of unnecessary recordings, and streamlining of work forms would be well rewarded. It is suggested that pilots of the Military Air Transport Service be trained in elementary dead reckoning navigation and Loran so that one of them may relieve the navigator on extended missions. It is believed that the development of more efficient celestial devices and of simplified Loran will enhance the efficiency of the navigator in mid-latitude operations of the Military Air Transport Service.

R 4

952

Marrick, M.J. EFFECTS OF MOTION RELATIONSHIPS ON SPEED OF POSITIONING VISUAL INDICATORS BY ROTARY CONTROL KNOBS. Contract W33 032 AC 16011, Proj. RDO 694 24, Tech. Rep. 5812, July 1949, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

952

"Four experiments are described in which Ss alternately adjusted two semicircular indicators by means of rotary control knobs. The position of each indicator in respect to its control and the relationship between the direction of movement of the controls and the direction of movement of the corresponding indicator were varied." Ss made 18 adjustments of each indicator for a given control-indicator arrangement or motion-relationship combination. Performance was measured in terms of response time. Means, standard deviations, significance of differences between means, and correlations between the right and left indicator data are presented.

T. G. I.

953

Ellson, D.G., & Wheeler, L. Jr. THE RANGE EFFECT. AF Tech. Rep. 5813, May 1949, 8pp. Air Materiel Command, Wright-Patterson AFB, Ohio. (Indiana University).

953

This study was designed to determine whether the range effect observed in tracking is attributable to the range of stimuli presented or to the absolute magnitude of the individual stimuli. Two groups composing a total of 50 subjects were required to track a stimulus of 1, 0.5, and 0.25 inches for the first group, and 1, 1.5, and 2 inches for the second group with the total tracking time consisting of 12 minutes per subject. Response amplitude was measured and input compared with output amplitude. The results are presented and discussed in terms of group differences as indicative of the relative role of range vs. magnitude of stimuli as determiners of range effect (i.e., the non-linearity of operator responses in tracking).

T. G. R 7

954

Rock, M.L. ANNOTATED BIBLIOGRAPHY ON VISUAL PERFORMANCE AT LOW PHOTOPIC ILLUMINATION LEVELS. AF Tech. Rep. No. 5822, May, 1949, 27 pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (Univ. of Rochester.)

954

This report is an annotated bibliography on visual performance at low photopic illumination levels. The references are categorized under the headings of: General References, Visual Acuity, Vernier Acuity, Accommodation, Convergence, Fusion, Adaptation, Speed of Vision, Visual Fields, Distance (Depth Stereoscopic Vision), Form Discrimination, Motion Discrimination, Contrast, Night Vision, and Practical-Field Studies.

R149.

955

White, W.S. THE EFFECT OF DIAL DIAMETER ON OCULAR MOVEMENTS AND SPEED AND ACCURACY OF CHECK READING GROUPS OF SIMULATED ENGINE INSTRUMENTS. Tech. Rep. No. 5826, June, 1949, 16 pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio.

955

To determine the effect of size of dial on check reading performance, 24 subjects read three groups of 16 dials, varying in diameter from 1 to 2 3/4 inches, for deviation of pointer alignment from a fixed reference position. Eye movements were recorded by the corneal reflection technique. Response time, errors, frequency and duration of fixations are analyzed as a function of dial size. The implications of the results for design and grouping of instruments are discussed.

T. G. I. R 9

956
Fitts, P.M. PSYCHOLOGICAL ASPECTS OF EQUIPMENT DESIGN. USAF Tech. Rep. 5829, Aug. 1949, 99pp. USAF Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (Psychology Branch, Aero Medical Lab.)

Human Engineering concerns the design of equipment and man-machine systems in relation to the abilities of human operators. It is a new field of applied science. Its data are drawn from psychology, anthropology, bio-physics, engineering, and many other sources. The present report is a systematic review of psychological facts and experimental results of significance for human engineering. Systems research is considered first. It contributes to the discovery of critical human "links" and sources of human error in man-machine systems. The design of visual, auditory, and tactual displays are considered next. Here many problems of transmitting and presenting information are considered. The design of controls is treated next. This last section is organized around the concept of man as a link in a control system. Dynamic aspects of human controller processes are considered in relation to servo engineering. Optimum location and mode of actuation of control are among the problems treated.

R 158

957
Finn, J.L., Finn, Sarah C. & Horton, L.R. A REVIEW OF REPRESENTATIVE TESTS USED FOR THE QUANTITATIVE MEASUREMENTS OF BEHAVIOR-DECREMENT UNDER CONDITIONS RELATED TO AIRCRAFT FLIGHT. Contract W33 038 AC 15-17 (19576). Proj. RAO 696 61. Tech. Rep. 5839, July 1949. 27pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Merlin College, Berlin, Ohio).

957
"This report summarizes and attempts to correlate and evaluate quantitative tests, reported in English since about 1930, used to measure behavior-decrement under the following principal conditions: altitude, vibration, noise, temperature, humidity, 'fatigue', apprehension, stress, and others... In Section I tests are described, statistics data tabulated, and analysis-variables discussed. Results obtained under altitude, noise, vibration, and temperature are summarized... Section II - various studies on 'fatigue', loss of sleep, apprehension and stress, with concluding emphasis upon configuration of the complex reaction pattern and motivation..."
T. R 500(approx.)

958
Blockley, W.V., & Taylor, C.L. STUDIES IN TOLERANCE FOR EXTREME HEAT. SECOND SUMMARY REPORT. AF Tech. Rep. No. 5831, July 1949, 84pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (U. of Calif.)

958
This report summarizes several experiments on tolerance for extreme heat. Twenty-six male college students were exposed for 30 minutes to air at each of two temperatures (130 and 180°F with 20mm Hg. vapor pressure) while rectal and skin temperature, electrocardiogram, respiratory rate and volume, oxygen consumption and weight loss were measured. In a further series of experiments, two subjects were exposed, for as long as they could tolerate, to temperatures of 160, 180, 200, 212, and 240°F at vapor pressures of 7-10, 19-21, and 32-37mm Hg. The physiological measures are analyzed as a function of exposure and recovery time, and their use in the prediction of tolerance time is discussed.
T, 8, 212.

959
Fitts, P.M. & Simon, C.D. THE ARRANGEMENT OF INSTRUMENTS, THE DISTANCE BETWEEN INSTRUMENTS, AND THE POSITION OF INSTRUMENT POINTERS AS DETERMINANTS OF PERFORMANCE IN AN EYE-HAND COORDINATION TASK. Contract W33 038 AC 19816, Proj. RAO 694 31, Tech. Rep. 5832, Feb. 1952, 26pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

959
In experiment I, the relative efficiency of ten different pointer-position patterns was studied using S's performance in a continuous dual-pursuit task as the criterion of effectiveness. The on-target scores were evaluated mainly by analysis of variance technique. In II, the 9 and 12 o'clock pointer positions for both vertical and horizontal separations were studied more extensively. Differences between mean scores for the three successive five-day periods were examined statistically by t. In III, the effect on performance of the distance between instruments was studied. Mean performance scores as a function of the experimental variables were evaluated statistically by t and correlation techniques.
T. G. I. R 16

960
Elison, D.G. & Wheeler, L., Jr. RESONANCE IN THE HUMAN OPERATOR. Contract W33 038 AC 13968, Proj. RAO 649 39, Tech. Rep. 5834, April 1951, 30pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Indiana University, Bloomington, Ind.).

960
To determine whether the human operator in a sine wave transmission situation is subject to resonance effects as input frequencies increase, 22 Ss were presented a sinusoidal tracking task in which the linear components of sine wave trains of varying frequencies occurred as horizontal pointer movements. S tracked the input pointer (0.5 to 5.0 cps) with a second pointer using only vertical movements of the lower right arm. Continuous records of S's tracking movements and of action potentials from the forearm were obtained. Data were used only for the range of frequencies within which S maintained synchronism with the frequency of the input signal - 360 degrees. Mean differences between input and output amplitudes, mean action potentials, and mean phase shifts were evaluated. T. G. I. R 8

961
Long, G.E. SPEED AND ACCURACY OF READINGS AS A FUNCTION OF DESIGN IN THE SENSITIVE AIRSPEED INDICATOR. USAF Tech. Rep. No. 5836, Aug., 1949, 13 pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (Aero Med. Lab., Psychology Branch)

961
To explore some ways of displaying airspeed information, 10 experimental indicator designs were studied. Each used the same non-rotative printer making a complete rotation for ranges from 50 - 760 miles per hour but with a different type of sensitive indicator for precision readings (counters, printer, rotating card, rotating drum). One hundred college students were subjects. Speed and accuracy scores are analyzed and interpreted in terms of the design of the sensitive airspeed indicator. Recommendations are included.
T, J, 27.

962
Jones, R.E., Milton, J.L. & Fitts, P.M. EYE FIXATIONS OF AIRCRAFT PILOTS. I. A REVIEW OF PRIOR EYE-MOVEMENT STUDIES AND A DESCRIPTION OF A TECHNIQUE FOR RECORDING THE FREQUENCY, DURATION, AND SEQUENCES OF EYE FIXATIONS DURING INSTRUMENT FLIGHT. Projs. RAO 694 28 & 694 31, Tech. Rep. 5837, Sept. 1949, 27pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

962
This report summarizes from the literature some of the facts about eye-movements during reading and related visual tasks, and reviews one previous study in which pilot's eye movements were recorded during instrument flight. The apparatus and techniques to be employed in the present series of studies, the flight procedures, and the methods used for analyzing the eye-movement records are described in detail.
T. I. R 49

963
Milton, J.L., Jones, R.E. & Fitts, P.M. EYE FIXATIONS OF AIRCRAFT PILOTS. II. FREQUENCY, DURATION, AND SEQUENCE OF FIXATIONS WHEN FLYING THE USAF INSTRUMENT LOW APPROACH SYSTEM (ILAS). Projs. RAO 694 28 & 694 31, Tech. Rep. 5839, Oct. 1949, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

963
Frequency, duration, and sequence data were obtained from analysis of the photographic records of eye fixations of 40 USAF pilots each making two landing approaches using standard ILAS procedure under simulated instrument conditions. Means and SDs were computed for the number of fixations per min. and length of fixation on each of the basic flight instruments. Also, differences between means, correlations, and t ratios for length of fixation on the four major instruments and for number of fixations for all instruments for the four recording periods were computed. The relation between frequency and duration of use and between flying experience and these two factors were obtained.
T. I. R 3

964
Elison, D.G., Hill, H. & Craig, D.R. THE INTERACTION OF RESPONSES TO STEP FUNCTION STIMULI: II. EQUAL OPPOSED STEPS OF VARYING AMPLITUDE. Contract W33 038 AC 13968, Tech. Rep. 5911, Aug. 1949, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Indiana University, Bloomington, Ind.).

964
"Research reported here was designed to provide information on the linearity of operator performance in a direct tracking situation by determining the extent to which the responses of the operator-apparatus combination to superimposed inputs conform to the responses of a linear system to such inputs. S tracked a spot which made step-function movements away from and back to a center position. Four different amplitudes of displacement were used. The time interval between members of each pair of opposed steps was varied so that both uncomplicated responses to single steps and overlapped responses were obtained. Mean predicted and obtained response times and amplitudes for each displacement at each interval were evaluated by t.
T. G. I. R 11

965
Craig, D.R. EFFECT OF AMPLITUDE RANGE ON DURATION OF RESPONSES TO STEP FUNCTION DISPLACEMENTS. Contract W33 038 AC 13968, Tech. Rep. 5913, Sept. 1949, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Indiana University, Bloomington, Ind.).

965
This paper presents an analysis of the response duration data obtained from two groups of 25 Ss tracking a point which moved with step function displacements of varying amplitudes: 1, 1/2, 1/4 in. and 1, 1 1/2, 2 in. Response duration (expressed as Peak Time) was measured from the stimulus displacement to the initial peak of the response movement. Means and standard deviations were compared by t for the two groups. An hypothesis concerned with the non-linear relationship between displacement and response time is outlined and discussed. T. G. I. R 4

966
Kappauf, W.E., & Smith, W.A. DESIGN OF INSTRUMENT DIALS FOR MAXIMUM LEGIBILITY: III. SOME DATA ON THE DIFFICULTY OF QUANTITATIVE READING IN DIFFERENT PARTS OF A DIAL. Contract W33-038-ac-14480, AF Tech. Rep. 5914, Part 3, May, 1950, 14 pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (Princeton Univ.)

966
To explore the relative difficulty of quantitative scale reading on different portions or sectors of a dial, error data was gathered from two experiments involving 28 subjects and 15 types of dials, varied as to scale range and scale units. Errors are classified as to local or large and systematic and are examined for each portion of the dial where they occur. The relation of errors to scale range and units is also discussed. T.G.I.R15.

967
Kappauf, W.E., & Smith, W.M. DESIGN OF INSTRUMENT DIALS FOR MAXIMUM LEGIBILITY: PART 4. DIAL GRADUATION, SCALE RANGE AND DIAL SIZE AS FACTORS AFFECTING THE SPEED AND ACCURACY OF SCALE READING. Tech. Rep. No. 5914, Part 4, Feb., 1950, 22 pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio.

967
To investigate the effect of some dial design factors on reading performance, twenty subjects read at 28 inches fifty dials (white on black) which varied in size (2.8 and 1.4 inches), scale values (from 0 to 50, 100, 200, 400, or 600 units), and spacing of graduation marks (10's, 5's, 2's and units). Reading errors are classified as local or large and systematic and are presented with reading times. Discussion focuses attention on the direction of these data in terms of the design factors; magnitudes of errors are also analyzed. T.G.I.R17.

968
Werrick, M.J. EFFECT OF TRANSMISSION-TYPE CONTROL LAGS ON TRACKING ACCURACY. Proj. RDO 694 39, Tech. Rep. 5916, Sept. 1949, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

968
This study investigated the relationship between tracking accuracy and temporal lag between control and resultant indicator motion for a simple compensatory pursuit tracking task. Ss were 25 males; the task was "to maintain an indicator pointer on center in such a manner as to compensate for what otherwise would be a complex oscillatory motion of the pointer"; the delay intervals were 0, 40, 80, 160, and 320 msec. Each S performed the task under each time lag for a 30-sec. period. Time-on-target was the measure of performance. Means, standard deviations, and standard error of the means of these scores were presented tabularly and graphically. An hypothesis is examined to describe the relationship between lag time-on-target and control lag. T. G. I. R 1

969
Curvey, V.D. & Hennehan, R.H. PRACTICAL LIMITS OF SPEEDED SPEECH. AF Tech. Rep. 5197, May 1950, 22pp. USAF Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (University of Virginia, Charlottesville, Va.).

As part of a program of research comparing the relative efficiency of auditory and visual communication, an experiment was designed to determine the limits of speeding up recorded speech without undue sacrifice of intelligibility. A new technique was evolved based on chopping segments from a speech record on a plastic base recording tape, then splicing together the unremoved segments of the tape. The resulting abbreviated tapes were found to provide an increased rate of speech without an attendant frequency increase or other indication of translation of the auditory pattern. Using discrete spondaic words from the Harvard Psycho-Acoustic Laboratory Auditory Test No. 14, 11 experimental tapes were prepared with different chop ratios, yielding speed-up rates varying from 1.5 to 4.00 times that of the original speech. Intelligibility scores (number of words correctly heard) remained higher than 90% for speeds up to 2.5 times that of the original test. The implication of the above findings for aviation communication depends upon whether or not they also apply to continuous messages, e.g., questions and sentences. Further experiments are planned to answer this question. Also planned is a visual analysis of the chopped words to determine the word elements essential to the understanding of rapid work. R 18

970
Cheatham, P.G. A COMPARISON OF THE VISUAL AND AUDITORY SENSES AS POSSIBLE CHANNELS FOR COMMUNICATION. AF Tech. Rep. No. 5919, May, 1950, 28 pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (Univ. of Va.)

970
This report presents a review of the literature relevant to a research program comparing the relative efficiency of the visual and auditory senses for communication purposes. The 139 references are distributed as follows: vision, 84; audition, 45; comparison of the two senses, 4; sensory interaction, 3; additional, 3. R 139

972
Brown, C.W., Ghiselli, E.E., Jarrett, R.F., Minium, E.W., et al. MAGNITUDE OF FORCES WHICH MAY BE APPLIED BY THE PRONE PILOT TO AIRCRAFT CONTROL DEVICES. 3. FOOT CONTROLS. Tech. Rep. 5955, Feb. 1950, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of California, Berkeley, Calif.).

972
This study determined the forces which may be applied by extension of the foot from each of five initial positions: when the foot is placed at right angles to the axis of the lower leg, and when it is placed at angles of 10 and 20 degrees on either side of the right angle position. Leg extension was constrained by requiring the Ss to kneel with the sole of the foot against a pressure plate and the knee touching a vertical block. Ss were 27 male students (25 with pilot experience); right and left foot determinations were counterbalanced. Means, standard deviations, reliability coefficients, and coefficients of variation for all positions, and correlations between height, weight, and ankle-strength were computed.

973
Brown, C.W., Ghiselli, E.E., Jarrett, R.F., Minium, E.W., et al. COMPARISON OF AIRCRAFT CONTROLS FOR PRONE AND SEATED POSITION IN THREE-DIMENSIONAL PURSUIT TASK. Contract W33 038 AC 15098, Proj. RDO 694 17, Tech. Rep. 5956, March 1950, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of California, Berkeley, Calif.).

973
This study evaluated pursuit task performance as a function of three kinds of controls operated from the seated or prone positions. Ss were 111 students divided into four groups: conventional stick and rudder controls seated, California three-dimensional hand controls seated and prone, and Amptmann three-dimensional hand controls prone. Each S made 35 four-minute runs of placing the plane "on target" (within scoring tolerance in all three dimensions). Performance was measured in terms of time on target (percent of total time) for each dimension of control. Performance differences were examined as a function of both the controls and the physical characteristics of the Ss.
T. G. R 6

974
Loucks, R.B. AN ANALYSIS OF THE TYPES OF ERRORS MADE BY NOVICES IN INTERPRETING AZIMUTH INDICATORS WHEN THE BEARINGS ARE ADMINISTERED VERBALLY. Contract W33 038 AC 15230, Proj. RDO 694 19, Tech. Rep. 5958, Oct. 1949, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Psychology Dept., University of Washington, Seattle, Wash.).

974
This study analyzed the types of errors made when two types of verbal heading instructions were given to novices as they utilized certain kinds of direction indicators in maneuvering an azimuth ground trainer. A total of 256 Ss were tested; instructions were of the form "turn right(left)--degrees" or "turn to--degrees"; indicators were stationary dial (two kinds of scales) or moving dial with fixed lubber lines; heading commands were short turns (5 or 10 degrees) or long turns (55 to 165 degrees). Performance measures include: corrected, direction, heading, and reversal errors; reaction time; pedal movements; and pursuit-meter score. T-values were computed for performance scores as a function of type of instruction and heading command.
T. I. R 2

975
Loucks, R.B. AN EXPERIMENTAL STUDY OF THE EFFECTIVENESS WITH WHICH NOVICES CAN INTERPRET A LOCALIZER-GLIDEPATH APPROACH INDICATOR. Contract W33 038 AC 15230, USAF TR 5959, Oct. 1949, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Department of Psychology, University of Washington, Seattle, Wash.).

975
To study movement compatibility of display and control relations on a specific aircraft instrument (Localizer-Glidepath Approach Indicator), two groups of novices (58,69) were given a series of test periods on one of two forms of the indicator: 1) movement of needle opposite to that of control stick, and 2) movement of needle same as that of control stick. Performance scores are given as number of seconds the needles were not centered. Learning curves are compared for the two groups for the most favorable movement relation. A proposed design for an indicator is included.
G. I. R 4

976
Horton, G.P. AN ANALYSIS OF ERRORS MADE ON A SCHEMATIC PPI DISPLAY. Contract No. W33-038-ac-15230, E.O. No. 694-19, AF Tech. Rep. 5960, Oct. 1949, 14pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (University of Washington)

976
To study the relation between various factors of a polar-coordinate display design and accuracy of performance, analysis is made of error data from a previous study (see 977) wherein subjects were presented by projection technique with schematic abstraction of a PPI display and required to read azimuth and range location of single targets. Two types of errors are defined and interpreted as functions of display size and target location.
T. G. I. R 1

977
Horton, G.P. ACCURACY OF READING TARGET LOCATION AND SIZE OF SCHEMATIC PPI DISPLAY. Contract No. W33 038 AC 15230, E.O. No. 694 19, AF Tech. Rep. 5961, Oct. 1949, 44pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (University of Washington).

977
To study some factors influencing the reading of radar-type information, 180 schematic polar-coordinate displays (PPI), each containing a single target, were presented by projection technique to 240 subjects who estimated target location to the nearest mile and degree. Factors varied were: size (3 to 7 inches), number of radii (10°, 20°), exposure time (3, 5, or 15 seconds), and order of reading (miles first or degrees first). The number of correct responses are presented and the relative effects of the variables on reading accuracy are discussed. Design recommendations are included.
T. G. I. R 7

978
Horton, G.P. TARGET SHAPE AND ACCURACY ON A SCHEMATIC PPI DISPLAY. Contract W33-038-ac-15230, E.O. 694-19, AF Tech. Rep. 5962, Oct. 1949, 9pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (Univ. of Washington).

978
To investigate factors influencing accuracy of estimating target information from a polar coordinate system, 108 schematic PPI displays, each containing a single target (either a circle, ellipse, or an arc) were observed by 30 subjects; range and azimuth locations were read to the nearest mile and degree. The number of correct responses are analyzed and interpreted as a function of shape of target and method of reading, e.g., range first or azimuth first.
T. I. R 5

979
Loucks, R.B. AN EXPERIMENTAL COMPARISON OF THE RELATIVE EFFECTIVENESS WITH WHICH TWO TYPES OF MAP READING PROCEDURES CAN BE UTILIZED BY NOVICES. Contract No. W33-038-ac-15230, E.O. 694-19, AF Tech. Rep. 5963, Oct. 1949, 9pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (Univ. of Washington)

979
To investigate the relative effectiveness of two map-reading procedures as used by novices flying a trainer on instruments, one group (14) read a flight course map in a fixed position, and a second (11) rotated the map so that flight stations were successively oriented with nose of trainer as it assumed the corresponding bearing. Errors in heading, direction, reversals, and time are analyzed for differences between the methods.
I, RL.

980
Louchs, R.B. HIGH-SPEED GRAPHIC SWEEP RECORDERS DERIVED FROM THE KEINATH SCANNING TECHNIQUE. Contract W33-038 ac 15230, E.O. 694-19, AF Tech. Rep. 5964, Oct. 1949, 5pp. WADC, Aero Medical Laboratory, Dayton, Ohio

Several types of 'inertialless' graphic sweep records have been developed by utilizing the scanning principle previously described by Keinath. The present models of these sweep recorders have a frequency ceiling of 60 sparks per second, but methods are described for constructing units which would register 400 or more sparks per sec. The techniques which have been developed are particularly designed for inertialless recording of isotonic muscle contractions or for making continuous multi-trace records of autonomic responses. The recorders which are described are relatively inexpensive vs. and obviate the time and labor involved in photographic techniques.

981
Pitts, P. M., Jones, R. E., & Milton, J. L. EYE FIXATIONS OF AIRCRAFT PILOTS. III: FREQUENCY, DURATION, AND SEQUENCE OF FIXATIONS WHEN FLYING AIR FORCE GROUND-CONTROLLED APPROACH SYSTEM (GCA). E.O. Nos. 694-28 & 694-31, AF Tech. Rep. 5967, Feb. 1950, 19pp. WADC, Aero Medical Laboratory, Dayton, Ohio

981
To investigate a pilot's eye movements during instrument flight, 40 USAF pilots of varying amounts of flying experience made two approaches for a landing using Ground Control Approach (GCA) procedures under simulated instrument conditions. Eye movements were recorded photographically. Frequency, duration, and sequence of eye fixations are analyzed and eye movement link values are determined. The discussion relates these values to optimum instrument panel arrangement. T,I,R5.

982
Jenkins, W.L., Haas, L.O. & Rigler, D. INFLUENCE OF FRICTION IN MAKING SETTINGS ON LINEAR SCALE. Contract W33-038 AC 22561, Proj. 200 694-30, Tech. Rep. 5968, Sept. 1949, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Lehigh University, Bethlehem, Penn.).

982
This study investigated the effect on linear scale setting performance of artificially equalizing the friction at all pointer-movement knob-turn ratios and of varying the friction at the previously found optimal ratio. Four Ss matched the position of a lighted insert in a black bakelite scale with a pointer controlled by a rotary knob, 2 3/4 in. diameter. The equalized friction condition required a pull of 300 grams; for the optimal ratio, pulls of 100, 400, 700, 1,000, and 1,300 grams were tested. Mean total time (travel plus final adjustment) and mean total potential (forearm action potential for total time) were the basis for comparison of the several conditions. T. G. R 1

983
Ford, A., Rigler, D., & Dugan, G. E. PANTOGRAPH FADAR TRACKING: POINT CENTERING EXPERIMENTS. Contract W33-038-ac-22561, E.O. 694-30, AF Tech. Rep. 5969, Sept. 1949, 31pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

983
To study the accuracy of tracking a spot signal as a function of the method of controlling the cursor, 5 operators centered the signal with a single point cursor controlled by a pantograph system of levers for some runs, and by finger centering technique for others. Other variables were: lever reduction ratios (2/1, 4/1, 6/1), hand-rest versus no hand-rest, time limitations (2, 4, 6 seconds). Accuracy scores (mean and standard deviation in decimal fractions of an inch) are analyzed and interpreted in terms of a desirable hand control for accurate centering. Types of errors are discussed. T,G,R5.

984
Jones, R. E., Milton, J. L., & Pitts, P. M. EYE FIXATIONS OF AIRCRAFT PILOTS. IV: FREQUENCY, DURATION, AND SEQUENCE OF FIXATIONS DURING ROUTINE INSTRUMENT FLIGHT. E.O. Nos. 694-28 & 694-31, AF Tech. Rep. 5979, March 1950, 30pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

984
To investigate eye movements made by a pilot during instrument flight, 36 USAF pilots, experience ranging from 700 to 500 hours, made five specific maneuvers frequently performed on routine flights as a photographic recording was made of their eye movements. Frequency, duration, and sequence of eye fixations are analyzed and eye movement link values are determined. Discussion relates these values to the arrangement of the instrument panel. T,I,R5.

985
Wilson, D.G., & Coppock, H. FURTHER ANALYSIS OF THE PSYCHOLOGICAL RANGE EFFECT. Contract W33-038-ac-13968, E.O. 694-30, AF Tech. Rep. 6012, Aug. 1951, 5pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Indiana University).

985
In this study of the range effect occurring in tracking, an attempt is made to assess a predicted proportionality between response and input amplitudes hypothesized to occur as a function of stimulus amplitude being held constant. Three groups totalling 60 subjects were required to track step inputs of 0.5, 1.0, and 1.5 in. amplitude with each subject tracking only one input amplitude. Mean response times were recorded and analyzed. The degree of variation occurring in early and late trials is evaluated in terms of its implication for predicted response-input proportionality and the consequent magnitude of range effect. E. I. R 5

986
Rock, M.L. VISUAL PERFORMANCE AS A FUNCTION OF LOW PHOTOPIC BRIGHTNESS LEVELS. Contract W33-038-ac-18317, E.O. 694-41, AF Tech. Rep. 6013, Nov. 1950, 31pp. USAF, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio. (University of Rochester)

986
To investigate performance under low photopic brightness levels, four visual tasks (Judgment of the Muller-Lyer figure, absolute threshold for movement, depth perception, simple addition) were studied under five brightness levels ranging from 0.005 to 1.0 foot-lamberts. Performance scores (speed and errors) are analyzed and interpreted as a function of illumination and task difficulty. Recommendations are made for levels of illumination permitting maximum performance while maintaining dark adaptation. T,G,R75.

987

White, W.J. THE EFFECT OF POINTER DESIGN AND POINTER ALIGNMENT POSITION ON THE SPEED AND ACCURACY OF READING GROUPS OF SIMULATED ENGINE INSTRUMENTS. Contract W33 038 AC 15927, Proj. RDO 694 27, Tech. Rep. 6014, July 1951, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

987

Three experiments were conducted: I determined the effect of pointer design on speed and accuracy of check reading a group of 16 simulated engine instruments with horizontal pointer alignment. Ss check read the panel and indicated alignment or misalignment by a hand-held toggle switch. Five pointer modifications were examined in relation to response time and errors. II determined the effect of pointer alignment position on qualitative reading in terms of comparative speed and accuracy of reading and responding. S corrected the appropriate switch. The 9, 12, 3, and 6 o'clock positions were evaluated in terms of exposure time and as in I. III required S to check read the panel of instruments aligned as in II and indicate same by a hand-held toggle switch; evaluation was as in I. T. G. I. R 6

988

Simon, C.W. INSTRUMENT-CONTROL CONFIGURATIONS AFFECTING PERFORMANCE IN A COMPENSATORY PURSUIT TASK. Contract W33 038 AC 19816, Proj. RDO 694 31, Tech. Rep. 6015, Feb. 1952, 40pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

988

The first two studies of the five reported were designed to discover the effect on task performance when the zero position for a moving pointer is located in each of the four cardinal positions with the control located below the dial. In the first, a knob control 2 1/2 in. diameter was used; in the second, a 12-in. lever was used in the conventional upright position. In the third and fourth, the position and location of the lever control was shifted to determine whether a corresponding shift occurred in performance on each of the pointer positions. The fifth combined all of the variations of the first four. S's task was to keep a constantly moving pointer on a designated spot by a continuous adjustment of a control; mean time-on-target scores and subjective preferences were given. T. G. I. R 15

989

Gardner, J.F. DIRECTION OF POINTER MOTION IN RELATION TO MOVEMENT OF FLIGHT CONTROLS. CROSS-POINTER TYPE INSTRUMENT. Proj. RDO 694 19, Tech. Rep. 6016, June 1950, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

989

To determine the optimal relationship between pointer movement and control movement for a cross-pointer type instrument with a vertical and horizontal needle, 48 pre-flight cadets were given a two-dimensional pursuit task executed with a single stick in a closed cockpit. Four combinations of movement relationships were tested: vertical and horizontal pointers having direct relationships to aircraft motions, having indirect relationships, vertical direct and horizontal indirect, vice versa. Performance was measured in terms of time-on-center scores: vertical, horizontal, and both pointer times. Differences in mean performance scores under the motion relationships were examined for the series of trials: 1-12 (one of above relationships), 13-24 (reversal of 1-12), 25-28 (unannounced return to 1-12 condition). T. G. I. R 11

990

Eckstrand, G.A. RESPONSE PRACTICE AS A FACTOR IN TRANSFER OF TRAINING. Contract W33 038 AC 15927, AF TR 6017, July 1950, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Miami University, Oxford, Ohio).

990

This investigation is relevant to the problem of simulation in training, and particularly to what extent the training of specific motor responses to "training" stimuli will be an adequate substitute for training, of such responses to "operational" stimuli. The training task consisted of pressing the proper key when a particular one of four letters appeared in an aperture. Number of training trials for three experimental groups and a control group (students) ranged from 0 to 64. The test for transfer was learning key-depression to color stimuli. Results include times required to perform the training trials, and the test trials, and errors (striking a wrong key). T.G. R 7

991

Milton, J.L., Jones, R.E., & Pitts, P.M. EYE FIXATIONS OF AIRCRAFT PILOTS. V. FREQUENCY, DURATION, AND SEQUENCE OF FIXATIONS WHEN FLYING SELECTED MANEUVERS DURING INSTRUMENT AND VISUAL FLIGHT CONDITIONS. AF Tech. Rep. No. 6018, Aug., 1950, 33 pp. USAF, Air Materiel Command, Aero Medical Laboratory, Engineering Div., Wright-Patterson AFB, Dayton, Ohio.

991

To investigate a pilot's eye movements during instrument flight, 10 USAF pilots with varied hours of flying experience made one flight during which eye movements were photographed for straight and level flight and standard rate turns performed under simulated instrument conditions, and take-offs and landings performed under contact conditions. Frequency, duration, and sequence of eye fixations are summarized and eye movement link values determined for each of the maneuvers. Discussion relates these data to optimum arrangement of instruments on a panel. T. I. R 5

992

Chalmers, E.L., Goldstein, M., & Kappauf, W.E. THE EFFECT OF ILLUMINATION ON DIAL READING. Contract No. W33-038-ac-14480, E.O. No. 694-15, AF Tech. Rep. No. 602, Aug. 1950, 25pp. USAF, Air Materiel Command, Aero Med. Lab., Engineering Div., Wright-Patterson AFB, Dayton, Ohio. (Princeton U.)

992

To explore various aspects of dial reading performance under low level illumination, eight subjects read dials (varied in difficulty and size) and Landolt ring stimuli (varied in size and contrast direction) under brightness levels ranging from 0.00 to 2.7 foot-lamberts. Two subjects determined subjectively the minimum brightness under which they could work. Errors of interpolation, cross errors, and reading times are interpreted as a function of illumination and task difficulty. Various methods for determining a minimum satisfactory level of illumination in practical situations are discussed. T.G.R 2

993

Blockley, W.V., & Lyman, J. STUDIES OF HUMAN TOLERANCE FOR EXTREME HEAT. III. MENTAL PERFORMANCE UNDER HEAT STRESS AS INDICATED BY ADDITION AND NUMBER CHECKING TESTS. Contract No. W33-038-ac-14504, AF Tech. Rep. No. 6022, Oct. 1950, 54pp. USAF, Air Materiel Command, Aero Med. Lab., Engineering Div., Wright-Patterson AFB, Dayton, Ohio. (U. of Calif.)

993

To investigate the effects of extremely hot environments on the performance of paper and pencil mental tasks, 8 young men were exposed to air at temperatures of 160, 200, and 250°F and a vapour pressure of 20±2 mm Hg. The duration of exposure depended on the heat tolerance of the subject. The rectal temperature, weighted average skin temperature, heart rate, and mental test scores are compared as functions of time and air temperature. The physiological measures are correlated with the mental test scores and the tolerance limit. T.G.R 9

994 McCutchen, J.W. & Taylor, C.L. RESPIRATORY HEAT EXCHANGE WITH VARYING TEMPERATURE AND HUMIDITY OF INSPIRED AIR. Contract W33 038 ac 14504, AF Tech. Rep. 6023, Oct. 1950, 38pp. USAF Air Materiel Command, Aero Medical Lab., Engineering Div., Wright-Patterson AFB, Dayton, Ohio.

Respiratory heat exchange has been measured by determinations of temperature, humidity and mass flow of inspired and expired air. The ranges of inspired temperatures and humidities were 80 to 180°F and 0.2 to 1.2 in. Hg vapor pressure resp. Five normal young men served as Ss in 61 experiments. Specific enthalpy difference between inspired and expired air proved to be the most fundamental heat quantity; a) as judged by satisfactory predictive relationships which are independent of rate and volume of respiration; b) as established by satisfactory theoretical accountings for the heat and mass transfer process. By setting specific enthalpy difference equal to zero it was found that inspired and expired wet bulb temperatures agreed very closely. This permits the interpretation that adiabatic sensible and latent heat exchanges, between inspired and expired air, take place at constant total heat. The temperature, humidity and enthalpy properties of expired air are described mathematically and graphically. Discussion of these results with other investigations in the literature, where comparison is justified, reveals satisfactory agreement when states of unsaturation of the expired air are considered.

R 13

995 Blockley, W. V., & Lyman, J. STUDIES OF HUMAN TOLERANCE FOR EXTREME HEAT. IV: PSYCHOMOTOR PERFORMANCE OF PILOTS AS INDICATED BY A TASK IMULATING AIRCRAFT INSTRUMENT FLIGHT. Contract No. W33-038-ac 14504, E.O. No. 696-69, AF Tech. Rep. No. 6521, May 1951, 45pp. WADC, Aero Medical Laboratory, Dayton, Ohio

995 To evaluate the effects of extremely hot environments on pilot performance, four experienced pilots flew a preset course in a Link Trainer in ambient temperatures of 80, 160, 200 and 235°F at 0.8 inches Hg. The results are analyzed with respect to the duration of absolute tolerance (by previously determined criteria), the weighted average skin temperature, rectal temperature, heart rate, weight loss, and subjective symptoms of heat stress.

T. G. R 5

996 Connell, S.C. SOME VARIABLES AFFECTING INSTRUMENT READING. E.O. No. 694-27, AF Tech. Rep. No. 6024, Aug., 1950, 11 pp. USAF, Air Materiel Command, Aero Medical Laboratory, Wright-Patterson AFB, Dayton, Ohio.

To determine the influence of mode of indication on check reading a group of instruments, and to investigate the relation between the number of digits presented and counter reading performance, two experiments were performed. (1) Three panels of indicators (rotating pointers, rotating dials, counters) were checked for significant deviations in alignment from a reference position. Reading time and errors are compared. (2) Digits (1 to 9) presented orally were compared with visual presentation in a counter instrument; time and error scores are analyzed. The discussion relates these results to instrument design.

T.I.,

997 Christensen, J.M. A COMPARISON OF NAVIGATOR ACTIVITIES IN THE HIGH AND MID-LATITUDES. AF Tech. Rep. No. 6027, Aug., 1950, 31 pp. USAF, Air Materiel Command, Aero Medical Laboratory, Engineering Div., Wright-Patterson AFB, Dayton, Ohio.

997

The activities performed by USAF navigators in high and mid-latitudes are compared to evaluate the adequacy of currently used equipment, procedures, work sync and division of labor among the crew. Differences in the proportion of time spent utilizing various navigational devices-- sextant, astrocompass, gyroscopic compass, Loran, radar and driftmeter-- are analyzed with respect to the characteristics of the work and flight situation.

T.G.R.

998

Grether, W.F. A DUAL COMPENSATORY PURSUIT APPARATUS FOR USE IN PSYCHOLOGICAL RESEARCH. Proj. RDO 694 17, Tech. Rep. 6036, Sept. 1950, 7pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

998

"A description is presented of a Dual Compensatory Pursuit Apparatus which has potential usefulness for measurement of psychomotor ability, for measurement of environmental influences upon human performance, and for general research on human visuo-motor skills in relation to equipment design. The apparatus is very flexible with respect to the types of control movements by which it is operated, the location and nature of the visual display which is controlled, and the difficulty of the task. Experience with the apparatus has shown that it has high reliability as a test and that the mechanism has satisfactory stability and durability."

T. I. R 3

999

Jenkins, W.L., Meas, L.O. & Olson, M.W. THE INFLUENCE OF INERTIA IN MAKING SETTINGS ON A LINEAR SCALE. Contract W33 038 AC 22561, Proj. RDO 694 31, Tech. Rep. 6038, Nov. 1950, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Lehigh University, Bethlehem, Penn.).

999

The effects on making linear scale settings of inertia alone and in interaction with backlash, friction, friction and pointer-movement knob-turn ratio, friction and knob diameter under normal tolerance, and friction and knob diameter under severe tolerance were investigated. Eight Ss were used; their task was to match the position of a lighted insert in a black bakelite scale with a pointer controlled by a rotary knob. Mean total time (travel plus final adjustment) and mean action potential (active forearm potential during travel and adjustment) were obtained and compared for the several conditions.

T. G. R 2

1000

Spragg, S.D.S. & Rock, M.L. DIAL READING PERFORMANCE AS RELATED TO ILLUMINATION VARIABLES. III. RESULTS WITH SMALL DIALS. Contract W33-038-ac-18317, E.O. 694-41, AF Tech. Rep. 6040, Nov., 1950, 8pp. WADC, Aero Medical Laboratory, Dayton, Ohio. (University of Rochester)

100

To study the effect of size upon dial reading performance under low photopic illumination, ten subjects read fifty dials (1.4 inch, scale, 100 x 1) at five brightness levels ranging from 0.05 to 1.0 foot-lamberts. Performance scores (speed and error) are discussed as a function of illumination and are compared with results from a study having identical conditions but using a dial size of 2.3 inches with a 10 x 10 scale.

T.G.R.

1001

Crook, M.W., Harber, G.S., Hoffman, A.C., & Kennedy, J.L. EFFECT OF AMPLITUDE OF APPARENT VIBRATION, BRIGHTNESS, AND TYPE SIZE ON NUMERICAL READING. Contract W33-038-ac-14559, E.O. 694-15-PO-12, AF Tech. Rep. 6246, Sept., 1950, 54 pp. WADC, Aero Medical Laboratory, Dayton, Ohio. (Tufts College)

1001

To explore various factors influencing the legibility of numerals, performance on a simple addition task of printed numerals at 14 inches from eye position was studied under varied conditions of brightness (0.01 to 15.0 foot-lamberts), type size (6, 7, 8, and 10 point) and amplitude of apparent vibration (0 to 0.03 inches). Vibration was introduced by a pair of rotating prisms at a frequency of 1050 cycles per minute. Time and error scores are presented; interactions and quantitative relationships among the variables are analyzed and discussed.

T. G. R 14

1002

Kappauf, W.E. DESIGN OF INSTRUMENT DIALS FOR MAXIMUM LEGIBILITY: PART V. ORIGIN LOCATION, SCALE BREAK, NUMBER LOCATION, AND CONTRAST DIRECTION. Contract W33-038-ac-14460, E.O. 694-15, Tech. Rep. 6366, May, 1951, 26 pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

1002

To investigate the effect of some dial design factors on reading performance, 45 subjects made 40,400 readings of 15 different dial designs varied as to origin location, scale break, number location, and contrast direction (black on white or the reverse). Reading times and errors are presented; specific errors of reversal and of plus one numbered scale division are examined in relation to the design variables. Specific design recommendations are included which will minimize these errors.

T.G.I.R.7.

1003

Crook, M.W., & Baxter, Frances S. RECOGNITION TIME FOR DIAL-TYPE NUMERALS AS A FUNCTION OF SIZE AND BRIGHTNESS. Contract No. W33-038-ac-14559, E.O. No. 6694-15, AF Tech. Rep. No. 6465, March 1951. 26pp. USAF, Aero Medical Laboratory, Wright Air Development Center, Wright-Patterson AFB, Dayton, Ohio.

1003

To study the effect of brightness and size on recognition time for white dial-type digits on dark background, a series of experiments (brightness from 0.03 to 0.1 foot lambert, and numeral size from 0.12 to 0.90 inches) required subjects (16, 4, 6) to identify digits when presented singly or in groups. The mean and median recognition times (seconds) are presented and analyzed as affected by the primary variables. Attention is given to secondary factors of individual differences and grouping of digits. Recommendations are made for operational conditions.

T.G.J.R.7.

1004

Narasimhan, R. & Berge, O.J. THE USE OF AUTOCORRELATION FUNCTIONS IN THE HARMONIC ANALYSIS OF HUMAN BEHAVIOR. Contract W 33 038 AC 13968, E.O. 694 39, AF TR 6529, Oct. 1951, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Indiana University).

1004

The tenability and possibilities of harmonic analysis of continuous human behavior are discussed and the Wiener method of analysis presented. The auto-correlation and spectral density functions are analytically defined along with the approximations necessary for their practical application. The limitations and assumptions of the method as applied to practical problems are discussed and research problems pointed out.

G. R 10

1005

Kappauf, W.E. SOME DATA ON THE INFLUENCE OF ATTEMPTED INTERPOLATION ON THE SPEED AND ERRORS OF SCALE READING. Contract W33-038-ac-14480, E.O. 694-15, AF Tech. Rep. 6530, May, 1951, 14 pp. WADC, Aero Medical Laboratory, Dayton, Ohio. (Princeton University)

1005

To study the influence of attempted interpolation on scale reading performance, twenty subjects read a series of simply designed straight scales (graduated every unit and numbered every ten) under two types of instructions: (1) read to the nearest scale mark, and (2) read to the nearest tenth of a scale division. Reading times and errors are compared for the "rounding off" and "interpolation" procedures. The discussion is concerned with the most accurate method for scale reading.

T.I.R.5.

1006

Jenkins, W.L. & Olson, M.W. THE USE OF LEVERS IN MAKING SETTINGS ON A LINEAR SCALE. Contract W33 038 AC 22561, Proj. ADO 694 17, Tech. Rep. 6563, Aug. 1951, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Lehigh University, Bethlehem, Penn.).

1006

This study compared the use of right-left-moving levers of various lengths with that of rotary knobs for making settings on a linear scale. Ss. matched the position of a lighted insert in a black bakelite scale with a pointer controlled by the knob or lever turning in a plane parallel to the movement of the pointer. Performance was measured in terms of travel plus final adjustment time. The six experiments examined this datum for: knobs versus 6 and 12 in. levers with a tolerance of .016 in., same with tolerances of .016 and .100 in., same with .016 in. tolerance with narrow and wide inserts, knob versus lever with both tolerances at turn ratios above 4.08 and up to 16.3, levers up to 30 in. in length and levers with added friction (400 grams).

T. G. I. R 3

1007

Rulon, P.J., Sampson, P.B., & Schohan, B. THE EFFECTS OF "G" FORCES ON THE PERFORMANCE OF TELETYPE OPERATORS. Contract AF 33(038)-13233, RDO 102-22-SA-9, AF Tech. Rep. 6568, Oct., 1951, 45 pp. WADC, Aero Medical Laboratory, Dayton, Ohio. (Educational Research Corporation)

1007

To determine the effects of violent maneuvers on the performance of airborne teletype operators, 12 teletype operators (6 skilled and 6 unskilled) typed set messages while seated in one of three positions--facing forward, rearward and laterally. The aircraft followed a straight and level course for a part of the 18 minute test period, and performed various more-or-less violent maneuvers during the remaining time. Speed and accuracy of typing is analyzed with respect to the maneuver being performed, the nature of the errors, typing skill and the amount of previous practice under the experimental conditions.

T.G.

1008

Kappauf, W.E. A DISCUSSION OF SCALE-READING HABITS. Contract W33-038-ac-14490, E.O. 694-15, AF Tech. Rep. 6563, July, 1951, 50 pp. WADC, Aero Medical Laboratory, Dayton, Ohio. (Princeton University)

1008

This report summarizes data on scale-reading habits which have been collected as by-products of a series of studies on the design and use of instrument scales. Error scores are classified as to type and the conditions under which they occur are explored. Explanations for the errors are attributed to either the habits and classes of the reader or to the nature of the task. Influence on the range of individual differences in scale reading situations is presented. Recommendations are made for designing scales to minimize particular types of errors.

T.I.R.7.

1009

Milton, J.L., McIntosh, B.B. & Cole, E.L. FIXATIONS DURING DAY AND NIGHT GCA APPROACHES USING AN EXPERIMENTAL INSTRUMENT PANEL ARRANGEMENT. Proj. R00 694 31, Tech. Rep. 6709, Feb. 1952, 35pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1009

In this study, seventh in a series, film records were obtained of the eye movements of 15 USAF pilots while flying both day and night GCA approaches under simulated instrument conditions, using both the standard AF and an experimental instrument panel. Frequency, duration, and sequence of eye fixations were measured; means, standard deviations, "d" ratios, and correlation coefficients were computed for the frequency and duration data; eye movement link values between the aircraft instruments were computed for the sequence data.

T. I. R 8

1010

Krendel, E.S. A PRELIMINARY STUDY OF THE POWER-SPECTRUM APPROACH TO THE ANALYSIS OF PERCEPTUAL-MOTOR PERFORMANCE. Contract AF 33(038) 10420, E.O. 694 39, AF TR 6723, Oct. 1951, 39pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Franklin Institute, Philadelphia, Penn.).

1010

Quantitative information about human frequency response functions in the control of a piloted aircraft would provide a rational basis for stability and control criteria. The amplitude part of the transfer function for a linear time invariant system over a particular bandwidth is the square root of the ratio of the power spectrum of the output to the power spectrum of the input. The applicability of this method for determining the transfer function was explored using one subject and a tracking task having some similarity to an aircraft control problem. Power spectra and several amplitude ratios were determined and discussed.

G. R 16

1012

Mahler, W.R. & Channell, R.C. THE SPECIAL DEVICES USED IN THE PENSACOLA PILOT CANDIDATE SELECTION RESEARCH PROGRAM. INTERIM REPORT. Contract NSORI 151, Proj. 20 A 2, Feb. 1948, 51pp. USN Special Devices Center, Port Washington, N.Y. (The Psychological Corporation, New York, N.Y.).

1012

This is an interim progress report on a study undertaken to evaluate the 12 BK Flight Trainer, the Cycloramic Link, and the Stability of Orientation Test as predictors of success in Naval Aviation. The report reviews the proposed program, problems in selection of Ss, installation and maintenance problems of the equipment, initial standardization data, and the development of syllabi.

T. G. I.

1013

Mahler, W.R. & Bennett, G.K. SPECIAL DEVICES IN PRIMARY FLIGHT TRAINING: THEIR TRAINING AND SELECTION VALUE. SUMMARY REPORT. (PSYCHOLOGICAL EVALUATION OF TRAINING DEVICES). Contract NSORI 151, Proj. NR 780 D08, SDC Proj. 20 A 2, SDC Rep. 151 118, Aug. 1949, 120pp. USN Special Devices Center, Port Washington, N.Y. (The Psychological Corporation, New York, N.Y.).

1013

This summary report is in two sections, the first of which is a summary of results of a study on the value of synthetic flight trainers (12BK Landing Trainer, C-3 Link Trainer and SNJ Link Trainer) in Primary Training. Three experimental groups, a control group, and a "lo group (previous solo flight time) provide the data in the form of measures from the flight performance records. The second section deals with the predictive value of a spatial orientation test, the Flight Attitude Rating battery, and performance on training devices, with respect to Primary and Basic Training success or failure. Both reports present detailed results and procedures.

T. G. I. R 10.

1014

Knauff, E.B. & Buxton, C.E. AN EXPERIMENTAL STUDY OF THE EFFECTIVENESS OF VARIOUS TRAINING PROCEDURES USED WITH THE AERIAL GUNNERY TRAINING DEVICE 3-A-35 AND 3-A-2. Contract NSORI 57, Proj. 20 B 1, Rep. 2, July 1946, 15pp. Department of Psychology, State University of Iowa, Iowa City, Iowa.

1014

Five groups of Ss (college students) were trained in an experiment on the 3-A-35 and 3-A-2 aerial gunnery training devices to determine effectiveness of various training programs. Variations included the use of "on-target" lights (signifying correct point of aim) and greater or less azimuth movement of target. A post-test provided data on the relative efficiency of the training methods, especially the percent hits scores; time-on-target and "total rounds fired" data are also given. Qualitative reports and data and recommendations concerning the apparatus were included.

T.

1015

Knauff, E.B. MEMORANDUM ON PROGRESS OF LEARNING STUDY ON AERIAL GUNNERY TRAINING DEVICE 3-A-2. Contract NSORI 57, Proj. 20 B 1, Rep. 3, Oct. 1946, 3pp. USN Special Devices Center Library, Port Washington, N.Y. (Department of Psychology, State University of Iowa, Iowa City, Iowa).

1015

This is a progress memorandum reporting a preliminary experiment with 12 Ss using the 3-A-2 aerial gunnery training device. They practiced for 17 days for 20 minutes a day. Each session included three practice blocks of eight attacks using the "familiarize" condition (correct point of aim visible to gunner when trigger is depressed) and one block with the "test" condition (no point of aim visible to gunner). Scoring included the rounds fired, number of hits, total time on target, and percent of hits. Time on target scores were not reported here.

T.

1016

Rhoads, C.S. EFFECTIVENESS OF EJECTION SEAT TRAINING WITH SPECIAL REFERENCE TO SDC DEVICE NO. 6EQ-2. Contract N70nr-38305, Tech Rep. SDC 383-5-1, Nov. 1950, 19pp. ONR, Special Devices Center, Richardson, Bellows, Henry, & Co., Inc.

1016

This is a report of a comparison of SDC Device No. 6EQ-2, a mobile ejection seat trainer with the Research Tower used in England as aids in indoctrination of pilots in the use of ejection seats. Attitudes of Navy and Marine pilots towards the ejection seat were tested before and after the training program, by a questionnaire. This training program included an actual practice ejection on either the SDC device or the Research Tower, a preliminary lecture and a training film. Questionnaire results are analyzed in detail, and suggestions for training are made. A sample of the questionnaire is included.

T.

1017

Knauff, E.B. MEMORANDUM ON THE USE OF THE CORRECT POINT-OF-AIM IN GUNNERY TRAINING DEVICES. Contract NSORI 57, Proj. 20 B 1, Rep. 4, Oct. 1946, 8pp. State University of Iowa, Iowa City, Iowa.

1017

This memorandum discusses the use of "correct point of aim" information in gunnery training devices. The presentation reflects "training staff experiences" and is qualified in light of "very limited quantitative data." A number of methods (and combinations thereof) and different times for their inclusion in the course of training are described. Tentative recommendations are made.

1019

Knauff, E.B., Hamilton, C.E. & Spence, K.W. AN EXPERIMENTAL STUDY OF LEARNING ON THE AERIAL GUNNERY TRAINING DEVICE 3-A-2. Contract NSCRI 57, Proj. 20 B 1, Rep. 3, April 1947, 16pp. State University of Iowa, Iowa City, Iowa.

1019

This is a report of an experiment carried out with 12 college student subjects on aerial gunnery training device 3-A-2. It was designed to provide information on the limit of skill attainable on this device, the amount of practice required to reach this limit, and the nature of the learning curve. Daily practice sessions of 22 min. were held on 18 days, successive except for two breaks. On the eighteenth day new attacks were presented, for a test of transfer of training. Eight of the subjects practiced for a further 17 sessions, several months later. Results are in terms of percent hits.
T. G.

1020

Tufts University, Medford, Mass. EVALUATION OF GUNNERY TRAINING DEVICES 3-E-7 & 3-A-40 (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract NSCRI 58, Proj. NR 782 001, SDC Proj. 20 C 1, SDC Rep. 58 1 6, April 1950, 6pp. USN Special Devices Center, Port Washington, N.Y.

1020

Part I of this report provides a summary of the experimental evaluation of the Ranging, Tracking, Aiming-Point Assessor (No. 3-E-7, a device for measuring accuracy of gun-pointing). This included testing accuracy of gunsight systems, and studying performance of operators in training, with respect to individual differences, aptitudes, and training times. The Mark 18 Coordination Trainer (No. 3-A-40), to provide training in simultaneous tracking and ranging with a floating reticle, is described and the results of training experiments are summarized. Part II is a bibliography of 8 interim and progress reports on these devices.
R E

1021

Jacobius, A.J., & Wilkins, Madeleine J. AVIATION MEDICINE: AN ANNOTATED BIBLIOGRAPHY, 1952 LITERATURE. Government Order NAONR-211-56, Nov. 1956, 204pp. Technical Information Division, The Library of Congress, Washington, D.C.

1021

This is an extensive annotated bibliography of the 1952 literature pertinent to the general area of aviation medicine. The specific topics reflected among the various citations include the following: pilot instrument design, air safety, special environmental effects, protective clothing, motion sickness, tactual discrimination of knobs, depth perception, etc. A subject index is included.
R many

1022

Gottsdanker, R.M. & Armington, J.C. RANGING TRACKING AIMING POINT ASSESSOR DEVICE 3-E-7. FINAL REPORT. Contract NSCRI 58, Rep. 3, July 1948, 28pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

1022

This final report summarizes work done on the Ranging Tracking Aiming Point Assessor (a device presenting a simulated target and a system for assessing the accuracy of pointing, with a free gunnery sight). In addition to a history of the project, the report outlines the major steps of the work finally accomplished, and describes in detail the apparatus, and the difficulties encountered in its use. There is a summary of a training experiment carried out with three subjects training for 10 days each.
T. G. I.

1023

Gottsdanker, R.M. THE RANGING TRACKING AIMING POINT ASSESSOR DEVICE 3-E-7. INTERIM REPORT. Contract NSCRI 58, Proj. 20 C 1A, Rep. 1, Sept. 1946, 14pp. Psychology Dept., Tufts University, Medford, Mass.

1023

This interim report on the Ranging Aiming Tracking, Point Assessor as a method for measuring accuracy of gun pointing with free gunnery sights includes a full description of the device, with proposals for research. Experience with the device to that time was mainly pertinent to its construction, as many operating problems were present. There is a section suggesting supplementation of the scoring system.
I.

1024

Crook, M.N. LEARNING STUDIES WITH THE MARK 18 COORDINATION TRAINER DEVICE 3-A-40. INTERIM REPORT. Contract NSCRI 58, Proj. C 1, Rep. 58 1 1, April 1951, 12pp. Psychology Dept., Tufts University, Medford, Mass.

1024

This interim report summarizes progress in the evaluation of the Mark 18 Coordination Trainer, involving tracking and ranging on a projected spot of variable size and course. The device is described in some detail with regard to appearance and operation, validity, reliability, differentiation, knowledge of results, and maintenance problems. Plans for use in learning studies are discussed.
I.

1025

Crook, M.N. REPORT OF RESULTS OF LEARNING STUDIES WITH THE MARK 18 COORDINATION TRAINER DEVICE 3-A-40. Contract NSCRI 58, Proj. 20 C 1B, Rep. 2, Aug. 1946, 31pp. Psychology Dept., Tufts University, Medford, Mass.

1025

The Mark 18 Coordination Trainer, involving tracking and ranging on a projected light spot of variable size and course, was evaluated in a series of experiments. Subjects were 31 male college students. Practice periods (4 or 5 trials spaced by 5-minute discussions of scores) were spaced by 0 to 3 days. Variables included number of different target cycles and concurrent knowledge of performance through earphones. Scores (% accuracy) are discussed regarding: progress of learning, training variety, effectiveness of cues through earphones, transfer of training, motivation, effectiveness of score analysis in rest periods, generalization of training, and improvements in trainer.
T. G

1026

Crook, M.N. REPORT OF RECOMMENDATIONS FOR THE MARK 18 COORDINATION TRAINER DEVICE 3-A-40. Contract NSCRI 58, Proj. 20 C 1B, Rep. 3, Oct. 1946, 35pp. Psychology Dept., Tufts University, Medford, Mass.

1026

The Mark 18 Coordination Trainer, involving tracking and ranging on a projected spot of variable size and course, is described, and recommendations for modifications and changes are made and justified.
R. F

1027

Travis, R.C. & Kennedy, J.L. REVIEW OF LITERATURE AND SOME PRELIMINARY RESULTS IN THE DEVELOPMENT OF AN ALERTNESS INDICATOR. Contract NSORI 58, Proj. 20 C 2, Rep. 1, June 1946, 16pp. Navy Dept., Office of Research & Inventions, Special Devices Division. (Lab. of Sensory Psychol. & Physiol., Tufts College, Medford, Mass.).

Reported was an effort to develop an alertness indicator which will offer information concerning the wakeful state of an individual by monitoring brain wave, eye-movements, muscular-activity and other psycho-physical behaviors during wakefulness. Also reported was a survey of the literature and technical investigation which appeared to be relevant to the problem and which afforded information concerning the possibilities for such a device. Some preliminary results of investigations on muscle action potential were reported as well as the description of some future problems for investigation.

R 44

1028

Travis, R.C. & Kennedy, J.L. INTERIM PROGRESS REPORT-ALERTNESS INDICATOR LABORATORY OF SENSORY PSYCHOLOGY AND PHYSIOLOGY, TUFTS COLLEGE. Contract, NSORI 58, Proj. 20 C 2, Rep. 2, Jan. 1947, 19pp. ONR, Special Devices Center, Port Washington, New York. (Tufts College, Medford, Mass.).

The major steps in the development and refinement of the Tufts College electronic-amplification and recording techniques for brain-waves and muscle action potential were reported. The findings of the work conducted show that brain-wave change fails to exhibit significant correlations with changes in alertness. Some conclusions arrived at from the work on muscle action potentials and alertness are reported as are some experimental results from several pilot studies.

R 13

1029

Lane, J.C., & Cumming, R.W. THE ROLE OF VISUAL CUES IN FINAL APPROACH TO LANDING. Human Engng. Note 1, May 1956, 48pp. Research and Development Branch, Aeronautical Research Laboratories, Department of Supply, Melbourne, Australia.

1029

This article presents an extensive review of the literature and investigation of the role of visual cues in the final approach to landing on aircraft. The study is divided into three sections as follows: (1) a review of the factors involved several phases of approach and landing (e.g., selection of approach, descent, etc.); (2) a definition and evaluation of various airborne approach aids and a proposed aid (i.e., a universal approach sight); and (3) a proposed research program on visual cues and approach aids. Among the aids discussed are the following: airborne angle of depression sight, airborne aiming point sight, Navy mirror sight, tri-colour angle of approach indicator, etc.

G. I. R 22

1033

Pressey, S.L. BRIEF PRELIMINARY MEMORANDUM REGARDING THE "CLASSROOM COMMUNICATOR." A DEVICE INTENDED TO INFORM AN INSTRUCTOR IMMEDIATELY, DURING LECTURE OR DISCUSSION, OF EXTENT TO WHICH ALL MEMBERS OF CLASS UNDERSTAND WHAT IS BEING PRESENTED. Contract NSORI 17, Proj. 20 E 1, Rep. 1, Feb. 1947, 10pp. Department of Psychology, Ohio State University, Columbus, Ohio.

1033

This is a brief memorandum on the Classroom Communicator, a device designed to permit an instructor to know the extent to which his lecture or discussion is being understood by the members of his class. Details of construction of the device are presented along with the results of preliminary trials with small groups. The results are discussed in terms of the relative advantages of such a device over the traditional methods of ascertaining student comprehension. Suggested applications of the device are also presented.

1030

Kennedy, J.L. & Travis, R.C. INTERIM PROGRESS REPORT-ALERTNESS INDICATOR. Contract NSORI 58, Proj. 20 C 2, T.O.2, Rep. 3, July 1947, 7pp. ONR, Special Devices Center, Port Washington, New York. (Tufts College, Medford, Mass.).

Reported here is the progress made toward the goal of a simple, automatic electronic device for signalling when a person is becoming dangerously inalert. Experiments using total electrical energy from a frequency band above 40 cps., obtained from electrodes placed on the forehead above the eyes have been conducted. This represents a change from the technique previously used by the investigators to count frequency of spike emission. The total electrical energy function (frequency and amplitude) is a more precise measure of the alertness status of the subject than is frequency alone. Total electrical energy is measured by storing muscle spikes in an RC circuit, the rate of leaking of which may be controlled. These experiments were carried out with a time-constant of approximately one second, i.e. the function measured was total electrical energy placed on the condenser during the previous second. Experimentation on shorter time constants will be started shortly. The data of this report suggest the presence of a critical level of muscle activity, rather uniform from subject to subject, below which performance to peripheral stimuli reaches dangerous levels. Further experiments on exhausted subjects and subjects under the influence of drugs are in process to determine how this critical level is affected by extreme fatigue and drugs. Cursory analysis of the results obtained so far suggest that extreme fatigue and sodium pentobarbital raise the critical level.

R 3

1032

Pressey, S.L. DEVELOPMENT AND APPRAISAL OF DEVICES PROVIDING IMMEDIATE AUTOMATIC SCORING OF OBJECTIVE TESTS AND CONCOMITANT SELF-INSTRUCTION. J. Psychol., 1950, 22, 417-447. (Dept. of Psychology, Ohio State University, Columbus, Ohio). (Contract NSORI 17, Proj. 20 E 2, SDC TR 17 11).

1032

To assess the effectiveness of a self-scoring testing device (the "punchboard"), various groups of college students were required to take tests using the punchboard in English vocabulary, Russian vocabulary, and psychological material. The effect of the punchboard test on the range of scores, on subsequent performance on a recall test, and on subsequent performance on the same test is appraised. The general usefulness and convenience of the self-scoring test in instruction are discussed, as are some specific applications to special classes.

R. R 10

1034

Greenhill, L.P. & Tyb, J. INSTRUCTIONAL FILM PRODUCTION, UTILIZATION AND RESEARCH IN GREAT BRITAIN, CANADA AND AUSTRALIA. (RAPID MASS LEARNING). Contract NSONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 71, May 1949, 27pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1034

This is an incidental report reviewing production and utilization of instructional films, and related research activities, in Great Britain, Canada, and Australia. General research findings are reported, but details of the research and experimental data are not given.

R 10

1035
Zuckerman, J.V. MUSIC IN MOTION PICTURES: REVIEW OF LITERATURE WITH IMPLICATIONS FOR INSTRUCTIONAL FILMS. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 2, May 1949, 17pp. USN Special Devices Center, Port Washington, N.Y.

1035
This is a review of the literature on the use of music with motion picture films. It includes discussion of: general literature, functions of music in motion pictures, techniques of music in motion pictures, functions of the film music composer, and applications to learning from films.
R 45

1036
Ash, P. THE RELATIVE EFFECTIVENESS OF MASSED VERSUS SPACED FILM PRESENTATION. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 0005, SDC Proj. 20 E 4, SDC TR 269 7 3, June 1949, 79pp. USN Special Devices Center, Port Washington, N.Y.

1036
Two experiments were conducted to explore the relative effectiveness of massed and spaced presentation in training films. Subjects were 11 classes of undergraduate psychology students and 10 companies of Navy recruits. In each experiment, groups saw 2 film series; distribution of presentation varied from 1 to 4 sessions. Immediately after seeing film, subjects rated it for interest; after 1-2 weeks, they took a written test on film content. Test scores and film ratings are discussed regarding the influence of massed vs. spaced presentation on interest and learning and general implications for film length.
T. R 37

1037
Zuckerman, J.V. COMMENTARY VARIATIONS: LEVEL OF VERBALIZATION, PERSONAL REFERENCE, AND PHASE RELATIONS IN INSTRUCTIONAL FILMS ON PERCEPTUAL-MOTOR TASKS. (RAPID MASS LEARNING). Contract N6ONR 269, SDC Proj. 20 E 4, Proj. NR 781 005, SDC TR 269 7 4, Dec. 1949, 63pp. USN Special Devices Center, Port Washington, N.Y.

1037
To investigate factors influencing the effectiveness of the commentary accompanying instructional films, several versions were made of a film teaching how to tie some simple knots. Variables were: level of verbalization (none, low, medium, high), personal reference (first person, second person, third person passive, and imperative), and sound-picture phasing (sound leading and lagging). Subjects (1787 Naval trainees) were tested on ability to tie knots after seeing one of the films. Results (percent correct knots) are discussed regarding their implications for the preparation of sound tracks for training films.
G. T. I. R 16

1038
Roshal, S.M. EFFECTS OF LEARNER REPRESENTATION IN FILM-MEDIATED PERCEPTUAL-MOTOR LEARNING. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 5, Dec. 1949, 40pp. USN Special Devices Center, Port Washington, N.Y.

1039
To study the effects of degree of realism in training films, eight experimental versions were made of a film showing how to tie knots. Variables studied were: camera angle (whether from point of view of observer or participant), motion (continuous motion vs. series of static pictures), portrayal of hands (hands showing or not showing in static shots), and participation (tying knots during presentation, or not). Ss (about 3500 Naval recruits) saw one of the films and then were tested on ability to tie the knots. Results (success in tying knots) are analyzed for implications for the preparation of training films.
T. I. R 15

1039
Smith, K.R. & vanOrmer, E.B. LEARNING THEORIES AND INSTRUCTIONAL FILM RESEARCH. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 6, June 1949, 12pp. USN Special Devices Center, Port Washington, N.Y.

1039
This document is an outline of five potential areas for research on instructional films. The areas are: psychological learning principles, film characteristics, development of equipment and testing procedures, film utilization, and literature review. The importance of each area is discussed briefly, and, where available, current principles, potential problems, or useful variables are listed. The purpose of the outline is to provide a conceptual framework to indicate areas where research may be profitable.
R 15

1040
Vincent, W.S., Ash, P. & Greenhill, L.P. RELATIONSHIP OF LENGTH AND FACT FREQUENCY TO EFFECTIVENESS OF INSTRUCTIONAL MOTION PICTURES. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 7, Nov. 1949, 14pp. USN Special Devices Center, Port Washington, N.Y.

1040
To test the effect of information concentration in a training film, four versions of an informational film on weather were prepared. Two films ran 29 minutes; one contained 224 facts, the other 112. The other two films ran 14 minutes, with 112 facts and 56. All films were shown to different groups from each of three populations: high school students, Air Force basic trainees, and college students. All Ss were immediately tested on film content; some groups were retested after four or seven weeks. Test results are interpreted regarding implications for the preparation of training films.
T. R 1

1041
Lathrop, C.W., Jr. & Norford, C.A. CONTRIBUTIONS OF FILM INTRODUCTIONS AND FILM SUMMARIES TO LEARNING FROM INSTRUCTIONAL FILMS. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 8, Nov. 1949, 23pp. USN Special Devices Center, Port Washington, N.Y.

1041
To study the contributions of introductions and summaries in training films to learning, 261 training films were studied and three were selected as having good introductions, three with good summaries. An alternate version of each film was prepared omitting the introduction (or summary). Each version of each film was shown to a different group of high school students, followed by a test on film content; control groups took tests without seeing films. Test scores are analyzed for differences due to summaries or introductions. Results are discussed with regard to implications for film preparation and need for further research.
T.

1042
Neu, D.M. THE EFFECT OF ATTENTION GAINING DEVICES ON FILM-MEDIATED LEARNING. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 9, March 1950, 21pp. USN Special Devices Center, Port Washington, N.Y.

1042
To investigate factors influencing the effectiveness of attention-gaining devices in training films, 5 versions were prepared of a film on use of shop instruments. Variables were: redundancy of device to film objective and medium of device (visual or auditory). Subjects (Army and Navy recruits) saw one of the films (control groups saw no film) and were then given tests on learning of factual information and on recall of attention-gaining devices. Test scores are analyzed regarding relative effectiveness of relevant and irrelevant devices and of visual and auditory devices, and relation between memory of device and its effectiveness.
T.

1043

Kishler, J.P. THE EFFECTS OF PRESTIGE AND IDENTIFICATION FACTORS ON ATTITUDE RESTRUCTURING AND LEARNING FROM SOUND FILMS. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 10, March 1950, 11pp. USN Special Devices Center, Port Washington, N.Y.

1043

To investigate the influence of established attitudes on the effectiveness of a film for teaching and for restructuring attitudes, 815 college students were shown a film about a Catholic priest. Subjects were grouped by church affiliation and attitude toward the occupation of Catholic priest. Attitudes about occupations and religion were tested before and after the film showing; informational content of film was tested after showing. Mean test scores for the various groups are compared and interpreted regarding the importance of consideration of audience identification in producing training films.
T.

1044

Jaspen, N. EFFECTS ON TRAINING OF EXPERIMENTAL FILM VARIABLES. STUDY II. VERBALIZATION, "HOW-IT-WORKS", NOMENCLATURE, AUDIENCE PARTICIPATION, AND SUCCINCT TREATMENT. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 11, March 1950, 13pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1044

To study the influence of several variables on the effectiveness of film training, 14 different versions were prepared of a film describing a manual assembly task. The variables included number of words per minute (45-142), use of an explanation of function of the unit to be assembled, audience participation (assembly during showing), succinctness of treatment in the film, and learning nomenclature as incidental result of viewing. Time to perform the assembly was tested after showing. Subjects were 1818 Naval trainees. Results are discussed regarding the importance of the various variables in training with films.
T. G. R 1

1045

McTavish, C.L. EFFECT OF REPETITIVE FILM SHOWINGS ON LEARNING. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 12, Nov. 1949, 7pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1045

To study the effects of repetitive showings of training films, 319 college students were shown 4 general science films. Each of the subjects saw one of the films once, one twice, one 3 times, and one 4 times. There was a pre-test over all 4 films and an individual post-test over each film. Test-score gains are evaluated as a function of number of repetitions, and the effectiveness of repetition is discussed.
T. G.

1046

VanderMeer, A.W. RELATIVE EFFECTIVENESS OF INSTRUCTION BY: FILMS EXCLUSIVELY, FILMS PLUS STUDY GUIDES, AND STANDARD LECTURE METHODS. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 13, July 1950, 51pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1046

One of a series of studies on the use of films for training, this article reports an experiment with ninth grade high school students in general science. For a full semester, one group saw 44 films only, one group saw the films and also worked on special short study guides before and after each film, while the third group used a standard textbook with a teacher using the customary classroom methods. Results are reported as factual information test scores, before and after film showings, after each of the academic quarters, and after three months following the end of the course.
T.

1047

Carpenter, C.E., Eggleton, R.C., John, F.T. & Cannon, J.B., Jr. THE CLASSROOM COMMUNICATOR. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 14, Oct. 1950, 30pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1047

This is a description of the planning, design and construction of apparatus which administers multiple-choice tests to a class in such a way that the correct answers are immediately available to the group, and individual responses are visible to the teacher or experimenter. Details of functions to be served are included as well as actual construction, uses in research, and other possible uses.
I.

1048

Carpenter, C. ., Eggleton, R.C., John, F.T. & Cannon, J.B., Jr. THE FILM ANALYZER. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 15, Oct. 1950, 17pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1048

The functions and construction of the Film Analyzer are described in detail in this report. This apparatus is useful in research on training or other films when knowledge of audience reaction synchronized with the film is desired. The device allows responses of up to 40 viewers to be made on a five point scale, and recorded on a chart having reference marks related to the film footage and elapsed time. Operational requirements are outlined, possible uses suggested, and questions raised with respect to the participants' performance on the analyzer.
I.

1049

Walsh, R.K. CAMOUFLAGE SCHEMES FOR HELICOPTERS FOR CONCEALMENT AGAINST TERRAIN BACKGROUNDS FINAL REPORT. Proj. T 973, March 1956, 32pp. USMC Development Center, Quantico, Va.

1049

To develop suitable camouflage for Marine Corps helicopters operating in combat areas, tests were conducted in three phases: 1) laboratory investigations were initiated to formulate paints; 2) panel tests were made to ascertain, on a small scale, the adequacy of the paints; and 3) a full scale field test was carried out utilizing these paints applied to a helicopter. Various seasonal schemes were tested by visual inspection including color photographic coverage for recording purposes and visual inspection with infrared viewing devices including infrared coverage.
I. R 5

1050

Jaspen, N. EFFECTS ON TRAINING OF EXPERIMENTAL FILM VARIABLES. STUDY I. VERBALIZATION, RATE OF DEVELOPMENT, NOMENCLATURE, ERRORS, "HOW IT WORKS", REPETITION. (RAPID MASS LEARNING). Contract N6ONR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 17, Oct. 1950, 25pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1050

This is one of a series of experiments dealing with variables in instructional films possibly affecting training outcomes. The task here was assembly of the breech block of the 40mm antiaircraft gun. Seventeen different film versions were made, differing with respect to the following six variables: high or low number of words per minute (verbalization), slow or fast rate of pictorial development, use of technical nomenclature, showing of common errors to be avoided, "how-it-works" sequence ("logic" of breech-block), and repetition of the demonstration of assembly. Results of a post-test (actual assembly) with apprentice seamen Ss are reported and analyzed.
T. I.

1051
Welson, H.E., Will, E.R. & Jaspert, N. COMPARISON OF THE AUDIO AND VISUAL ELEMENTS OF INSTRUCTIONAL FILMS. (RAPID MASS LEARNING). Contract NSCNR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 18, Nov. 1950, 15pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1051
Three instructional films were used in an experiment to determine the effectiveness of auditory commentary, visual elements, and the two combined, for learning of factual information. Two films on aerodynamics and one called "Land and Live in the Desert" were used with and without commentary, and in the dark with commentary. Eight test groups of 400 ROTC trainees viewed the aerodynamics films, and college students saw the other. Paper and pencil tests were administered at the end of the viewing. Results are given, and implications for training by film and television discussed.
T.

1052
McBar, C.F., Jr. & van Ormer, E. INSTRUCTIONAL FILM RESEARCH 1918-1950. (RAPID MASS LEARNING). Contract NSCNR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 19, Dec. 1950, 179pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1052
This is a summary of research pertaining to the instructional use of films, 1918-1950. The authors' aim is to analyze, interpret, and synthesize the knowledge resulting from their survey. The data are discussed with respect to objectives of production or use of film, characteristics of the audience affecting reaction to the picture, content and structure of the film, and context in which the film is presented. Major subdivisions of the presentation include description of major film research programs, imparting knowledge, teaching perceptual-motor skills, influencing motivation, attitudes and opinion, comparison of films and other media and methods, audience characteristics, and variables of film production and use.
G. R 300 (approx.).

1053
Ash, P. & Carlton, B.J. THE VALUE OF NOTE-TAKING DURING FILM LEARNING. (RAPID MASS LEARNING). Contract NSCNR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 21, Nov. 1951, 10pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1053
This experiment tests the value of college students' taking notes during the viewing of instructional films--"High Altitude Flying" and "Ocean Survival and Safety." One group saw the film and then took the paper and pencil test. A second took notes on the film, then had the test and a third had a chance to review their notes for 10 minutes before the test. Results of this study are given with a discussion of the present as well as other experimental findings on this subject.
T.

1054
Twyford, Loran. FILM PROFILES. (RAPID MASS LEARNING). Contract NSCNR 269, Proj. NR 781 005, SDC Proj. 20 E 4, SDC TR 269 7 23, Nov. 1951, 16pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1054
This experiment concerns the usefulness of a "rating profile" (which describes the audience's opinion as to whether they are learning during an instructional film) as a predictor for actual learning from the film. The audience--high school and college students--pressed buttons to indicate their reactions as the film proceeded. The graphic profile was derived by summing responses every 10 seconds. Three different types of reactions were tested: "I am learning", "I predict that my classmates are learning", and "I like (dislike) this film." Results are presented relating film information learned and audience reactions during learning.
T. G.

1055
Allison, Sarah G. & Ash, P. RELATIONSHIP OF ANXIETY TO LEARNING FROM FILMS. Contract NSCNR 269, SDC TR 269 7 24, April 1951, 15pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1055
This report presents an investigation of the effects of "mildly motivational" instructions on what is learned from instructional films. During a course in introductory psychology, three groups of college students took a paper-and-pencil test measure of "chronic anxiety." Weeks later, they viewed either "Your Voice" or "Functions of the Nervous System." The introduction of the films for the three groups were designed either to lower anxiety about subsequent testing, to be neutral, or to heighten anxiety. Learning was tested by objective questions. Results are given on the relationships between these introductions and learning, and the scores on the Taylor anxiety scale and learning.
T.

1056
Mumlin, J.A., Mayer, M. & Harby, S.F. DAYLIGHT PROJECTION OF FILM LOOPS AS THE TEACHING MEDIUM IN PERCEPTUAL-MOTOR SKILL TRAINING. Contract NSCNR 269, SDC TR 269 7 26, May 1952, 8pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1056
This is an investigation of the use of film demonstrations in teaching a skill (tumbling), as compared with live instructor's demonstrations. Physical education college students were taught eight tumbling skills either by the eight two minute films, which were film loops projected by daylight, with a minimum of practice and no help from the instructor, or else by an experienced instructor, with no films. At the end of training, judges rated the students' performance of these skills. Results are given, with recommendations concerning the use of the training films, and daylight projection equipment.
T.

1057
Rohal, S.M., VanderWeer, A.W., Zuckerman, J.V., Brenner, H.R., et al. INSTRUCTIONAL FILM RESEARCH PROGRAM. PROGRESS REPORT. PERIOD 1 JANUARY TO 28 FEBRUARY 1949. Contract NSCNR 269, SDC Proj. 20 E 4, Prog. Rep. 10, Feb. 1949, 24pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1057
Although this is a progress report, it contains data from four research projects on factors influencing the effectiveness of training films. The projects concern 1) degree of realism in representing the learner in a film on knot-tying in terms of camera angle, continuous motion vs. static pictures, showing learner's hands in film, and audience participation; 2) comparing typical instructional methods with film alone and film plus guide for different kinds of subject matter; 3) relative effectiveness of different kinds of commentary, varying level of verbalization, personal reference, and commentary-picture phasing, and 4) effects of inserted questions and statements.
T.

1058
Carpenter, C.R. (Dir.). INSTRUCTIONAL FILM RESEARCH PROGRAM. PROGRESS REPORT. PERIOD: 1 MARCH TO 30 JUNE 1949. Contract NSCNR 269, SDC Proj. 20 E 4, Prog. Rep. 11 12, June 1949, 51pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1058
This progress report covers a four-month period of research on training films. A structured outline classifying areas for research is presented, and the current status of each project is described within the framework of the outline. Major headings of the outline are: Learning Principles, Film Characteristics, Development of New Research Equipment and Procedures, Utilization of Films in Instruction, and Reviews of Pertinent Literature.

1059

Carpenter, C.R. (Dir.). INSTRUCTIONAL FILM RESEARCH PROGRAM. PROGRESS REPORT. PERIOD: 1 JULY TO 31 NOVEMBER 1949. Contract N7CNR 269, Proj. NR 781 005, SDC Proj. 20 E 4, Prog. Rep. 13, Nov. 1949, 53pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1059

In addition to the customary status information this progress report contains preliminary reports on 4 research projects on the effectiveness of training films, including data. The projects concern: 1) the length of the film and the number of facts it contains; 2) effectiveness of film introductions; 3) effectiveness of repetitive film presentations; and 4) comparison of relative effectiveness of video and audio elements in films.

T. R 13

1060

Carpenter, C.R. (Dir.). INSTRUCTIONAL FILM RESEARCH PROGRAM. PROGRESS REPORT. PERIOD: 1 DECEMBER 1949 TO 31 MARCH 1950. Contract N7CNR 269, Proj. NR 781 005, SDC Proj. 20 E 4, Prog. Rep. 14 15 16, 47pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

1060

In addition to the customary status information, this progress report contains preliminary reports on 3 research projects on the effectiveness of training films, including data. The projects concern: 1) effects of varying number of words in narration, amount of "how-it-works" information, audience participation, and succinctness of treatment; 2) effectiveness of visual and auditory attention-gaining devices; and 3) effects of prestige and identification factors on attitude restructuring and learning from films. All the various experimental films produced for the program are listed and described.

T. G.

1061
Harris, J.D., Haines, H.L., & Myers, C.K. RECRUITMENT, PITCH TESTS, AND SPEECH-TONE HEARING DISCREPANCIES. A.M.A. Arch. Otolaryng., July 1955, 62: 66-70. (USN Medical Research Lab., New London, Conn.)

The problem of why some ears can hear pure tones at certain intensity but are relatively poor at hearing speech was investigated. There is a real discrepancy between hearing for speech and for pure tones for some persons. A group of 26 ears from 22 men and women, all partially deafened, were tested. Articulation curves were drawn for each patient, audiograms were taken and the experimental ear was examined as to presence of recruitment, pitch discrimination and complete background history on all factors likely to have affected the ears were also taken. On the basis of the above, the ear was labelled discrepant. All ears were defined as discrepant for speech and pure tones. The interrelations of loudness perception, pitch discrimination, and speech-tone discrepancies in hearing were examined. It was found that there is no evidence that pitch deafness itself contributes much to speech blurring. All the data point to the conclusion that, although there is no necessity for every case of recruitment to be accompanied by pitch blurring, some of recruitments unfortunately effects on speech reception are alleviated by concomitant pitch deterioration. (HEIAS)

R 12

1062

Richardson, Bellows, Henry & Co., Inc. EDUCATIONAL RESEARCH PROJECT. INTERIM REPORT. Contract N7CNR 383, Proj. 20 E 6, RBH Proj. 128, Rep. 1, Dec. 1947, 28pp. Richardson, Bellows, Henry & Co., Inc., New York, N.Y.

1062

This report summarizes the aims of a project established to evaluate and assist in improving the ground training activities of the Naval Air Training Command. The results of a survey of these activities by a 6-man team are reported, covering: Policy and Mission, Organization and Personnel, Student Training, Instructor Training, and Evaluation of Student Performance. Observed problems are discussed and future project plans are outlined.

T. I.

1063

Sparks, C.P. AMPLIFYING THE INSTRUCTOR TRAINING PROGRAM IN THE NAVAL AIR BASIC TRAINING COMMAND. INTERIM REPORT ON EDUCATIONAL RESEARCH PROJECT. Contract N7CNR 383, Proj. 20 E 6, Rep. 383 1 2, RBH Proj. 128, June 1948, 25pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

1063

This is a report of progress on a project to evaluate and assist in improving the ground training activities of the Naval Air Training Command. This report focuses on problems of the instructor training program, describing changes already effected and those being worked upon.

T. I. R 3

1065

Berkshire, J.R. STUDY SKILLS OF NAVAL AVIATION STUDENTS: ANALYSIS OF THE PROBLEM & RECOMMENDATIONS. INTERIM REPORT ON EDUCATIONAL RESEARCH PROJECT. Contract N7CNR 383, Proj. 20 E 6, Rep. 383 1 4, RBH Proj. 128, June 1948, 21pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

1065

This report describes the preparation of a manual, Successful Study Methods, designed to aid students in the Navy Air Training program in improving their study methods and habits. A copy of the manual is appended, together with suggestions for employing it effectively and a description of a study of the validity of the manual (in progress).

G. R 3

1068

Fryer, D.H. & Sparks, C.P. THE DEVELOPMENT OF AVIATION TRAINING SYLLABUS MATERIAL. Contract N7CNR 383, Proj. NR 782 002, SDC Proj. 20 E 6, SDC TR 383 1 7, RBH Proj. 128, Aug. 1948, 30pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

1068

This report describes the preparation of the Manual for Syllabus Construction, aimed at assisting in the improvement of syllabi, texts, and lesson plans in the ground schools of the Naval Air Training Command. The manual itself is appended with an enclosure entitled: Principles of Educational Psychology.

1069

Fryer, D.H. (Dir.). THE TRAINING SURVEY - A METHOD OF EVALUATING TRAINING WITH THE 1948 ANNUAL SURVEY AS AN EXAMPLE. INTERIM REPORT ON EDUCATIONAL RESEARCH PROJECT. Contract N7CNR 383, Proj. NR 782 002, SDC Proj. 20 E 6, SDC TR 383 18, RBH Proj. 128, Aug. 1948, 146pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

1069

This report describes in detail a technique for surveying training, involving the following steps: preparation of background material, orientation of survey personnel, collecting evidence, analysis of data, preparation of report, and recommending solutions for training problems. The technique is illustrated with a full report of its use in the 1948 survey of training in the Naval Air Training Command. Included are the reports of 6 survey teams on such subjects as classroom instruction, course technique, student evaluation, training development and research, instructor training and evaluation, and others.

T. I.

1070

Seeley, L.C. PRELIMINARY VALIDATION OF THE INSTRUCTORS EVALUATION REPORT. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract N7ONR 383, Proj. NR 782 002, SDC Proj. 20 E 6, SDC TR 383 1 9 & RSH Proj. 128, April 1949, 30pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

1070

This report describes a preliminary validation of the Naval Air Training Command's Instructor Evaluation Report (IER). The IER involves selection of descriptive phrases about rates, a graphic rating scale, and a section for rater's comments. Various superiors used the IER to rate 96 instructors. Rankings of the instructors by both superiors and students were used as criterion measures. Relationships between IER and criterion measures are discussed regarding IER validity; recommendations for future research are made. A copy of the IER is appended.
T. G.

1072

Berkshire, J.R. A STUDY OF INDIVIDUAL DIFFERENCES AMONG NAVAL AVIATION STUDENTS. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES.) Contract N7ONR 383, Proj. NR 782 002, SDC Proj. 20 E 6, SDC TR 383 1 12 & RSH Proj. 128, May 1949, 32pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

1072

To study the predictability of success in Naval aviation training, a battery of eight aptitude tests was administered to 560 entering students. Success criteria were daily and final course grades. The inter-correlations of test scores and course grades are analyzed and discussed regarding the early detection of potential failures and of apparent failures who may succeed with help.
T. G. I. R. few

1073

Richardson, Bellows, Henry & Co. A SUMMARY OF OPERATIONAL RESEARCH IN THE NAVAL AIR TRAINING COMMAND. FINAL REPORT. Contract N7ONR 383, T.O. 1, RSH Proj. 20 E 6, SDC TR 383 1 13, June 1949, 121pp. USN Special Devices Center, Port Washington, N.Y.

1073

This report summarizes a 2-year project for supplying technical assistance in the developmental aspects of the Naval Air Training Command's ground training program. Contents include: recommendations for research and development in operational research, training policy, instructor training, curriculum development, training surveys, billet development, and technical specialists; a statement of the project's purpose, and an historical sketch of the program. Abstracts of 9 technical reports, 2 survey reports, and 1 literature report are included. A table summarizes action taken by the Navy on project recommendations.
T.

1074

Hamburger, F., Jr., & King, E.J. A RECORDING PHOTOMETER AND ITS USE IN STUDIES OF CATHODE RAY SCREEN DISPLAYS. Contract N5 ori-166, T.O.1, Proj. 20-P-1, c. 1947, 19 pp. ONR, Special Devices Center, Port Washington, L.I., New York.

1074

A recording electronic photometer is described, suitable for measurements of light patterns generated by radar indicators, and also applicable to many photometric problems involving steady-state or transient illuminations at low brightness levels. Design and construction details with some photometric data, obtained from a radar plan position indicator, are presented and explained. Some additional design features for an improved version are suggested.
G. I. R 7

1075

Humphrey, C.E. AUDITORY DISPLAYS. I. SPATIAL ORIENTATION BY MEANS OF AUDITORY SIGNALS. AN EXPLORATORY STUDY. Rep. APL/STU TG 122, Jan. 1952, 11pp. Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.

1075

To discover whether auditory data might be used successfully to display spatial localization, ten subjects were given a series of auditory signals following explicit instructions on the manner in which such signals should be used to determine location in space. Twenty-four possible space locations were used. The results are presented and discussed in terms of the number of type of errors exhibited as a function of the number of signal presentations. Implications for radar and aircraft operation are presented.

1076

Garnor, W.R., & Hamburger, F. DETECTABILITY AND DISCRIMINABILITY OF TARGETS OF A REMOTE PROJECTION PLAN-POSITION INDICATOR. Proceedings of the Institute of Radio Engineers, Nov., 1947, 35, 1220-1225. Contract N5ori-166, T.O. 1, SDC, ONR, Port Washington, N.Y. (Johns Hopkins University)

1076

To determine the optimum operating conditions for the projection plan-position indication screen of the radar system, threshold measurements for six observers were obtained (minimum detectable signals and minimum separation between two signals) as the following factors were varied: video gain, CRT bias (screen brightness), signal-clipping, light source intensity, and type of diffraction screen. The data are analyzed in terms of target detection as a function of the different variables. Results from a standard PPI are compared with these data.
G.R.I.

1077

Harriman, K.W., & Williams, S.B. VISIBILITY ON CATHODE-RAY TUBE SCREENS: POSITIVE VS. NEGATIVE SIGNALS ON AN INTENSITY MODULATED SCOPE. J. opt. Soc. Amer., Feb. 1950, 40, 102-104. Contract N5ori-166, T.O.1, Proj. Desig. No. NR-784-001, ONR, (Johns Hopkins U.)

1077

To compare two methods of presenting signals on cathode-ray tube screens, three trained observers adjusted intensity of the signal (small, intermediate, and large sizes) until signal was just barely visible for (1) grid targets (positive signals) which appeared brighter than background, and (2) cathode targets (negative signals) which appeared darker than background. Threshold data (decibels of attenuation below initial 8-volt reference) are analyzed as a function of scope brightness (bias) for the two types of target.
G. R 2

1078

Woollen, C.E. & Hamburger, F., Jr. A PROJECTION TIMER FOR VISUAL RESEARCH. Contract N5 ORI 166, Task Order I, 166 I 4, Nov. 1946, 11pp. Electrical Engineering Lab., Johns Hopkins University.

1078

A device is described which provides visual images for research dealing with visual display methods. Specifically, the equipment was designed for basic study of visual images to determine an observer's ability to make optimum use of information presented as a series of light spots appearing on a coordinate system of concentric circles. The equipment which is described and diagrammed in detail will produce images variable from three inches to five feet in diameter which can be produced with any duration from 0.143 to 0.800 seconds.
I.

1079

Garner, W.R. AUDITORY THRESHOLDS OF SHORT TONES AS A FUNCTION OF REPETITION RATES. *J. Acoust. Soc. Amer.*, July 1947, 19(5), 600-608. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

1079

This research determined for short tones (sine-wave) the extent of threshold change with change in the repetition rate and the conditions under which the change is maximal or minimal. The change was studied as a function of type of threshold--absolute or masked, frequency of tone--250, 1,000, 4,000 cps. and duration of tone--1 to 50 msec. Six trained Ss were used; from each a minimum of five observations were obtained per condition. Repetition rates between 1/4 and 100 per sec. were tested. The threshold changes are considered in terms of total energy changes as afforded by change in repetition rate compared to change in duration. The conditions necessary for temporal integration of acoustic energy by the ear are discussed. G. I. R 4

1080

Witkin, H.A. & Asch, S.E. STUDIES IN SPACE ORIENTATION. IV. FURTHER EXPERIMENTS ON PERCEPTION OF THE UPRIGHT WITH DISPLACED VISUAL FIELDS. *J. exp. Psychol.*, Dec. 1948, 38(6), 762-762. (Brooklyn College & Swarthmore College).

1080

To determine how perception of the upright is affected by position of a simple luminous visual frame (28 degrees right, 28 degrees left, erect) and body position. (28 degrees left, erect), 53 adult subjects in a completely darkened room adjusted a luminous rod (set within the frame) to the horizontal and vertical for all above combinations. In supplementary experiments judgments were made for: 1) additional frame positions, 2) frame within a frame situations, 3) rod with and without a frame situations. All results are discussed in terms of amount and direction of errors as a function of articulation of the visual field. T. G. I. R 3

1081

Garner, W.R. ACCURACY OF BINAURAL LOUDNESS MATCHING WITH REPEATED SHORT TONES. *J. exp. Psychol.*, Aug. 1947, 32(4), 337-350. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

1081

These experiments were aimed at showing how the duration and repetition rate of tones affect the binaural intensity-disparity threshold; also the effects of frequency and intensity on differential sensitivity were examined. Six well-trained males observed; the task was to match the tones in the two ears in loudness when these tones differed only in intensity; each S made five loudness matches per condition. Conditions tested included tones of 40 to 100 db, 250 to 4,000 cps, 1 to 200 msec., and 1 to 100 times per sec. The standard deviation of these matched values was used as the measure of differential sensitivity. This technique provided data on loudness relations of the two ears and the magnitude of differences between Ss as compared with differences within Ss. T. G. I. R 7

1082

Garner, W.R. THE EFFECT OF FREQUENCY SPECTRUM ON TEMPORAL INTEGRATION OF ENERGY IN THE EAR. *J. Acoust. Soc. Amer.*, Sept. 1947, 19(5), 808-815. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

1082

The following hypothesis was tested: "The rate of temporal integration of energy in the ear is dependent on the width of the frequency band of the energy to be integrated. Duration is exactly equivalent to intensity only when all the energy to be integrated is in a narrow band of frequencies. When the energy is in a wider band of frequencies, integration will occur, but the change in threshold will be less than the change in duration." This change in threshold for very short durations of tone--1 to 100 msec.--was measured for a noise stimulus (50 to 5,000 cps) and sine-wave stimuli--250, 1,000, 4,000 cps--for six male observers using a modified method of limits, threshold being the hearing of two tones in succession. Ten observations were made per binaural condition, 25 per monaural condition. G. I. R 5

1083
Rough, R.G. & Neuharber, F., Jr. AN ELECTRONIC CHRONOGRAPH FOR MEASUREMENT OF VOICE REACTION TIME. *Am. J. Psychol.*, Oct. 1947, 60, 624-638. Contract NSORI-166, T.O.I. Rep. 166-I-27. ONR, SPECIAL DEVICES CENTER, Port Washington, L.I., New York. (Johns Hopkins University, Baltimore, Md.).

This report describes an electronic chronograph which permits a high-speed synchronous clock to be turned on by the video target voltage and turned off by the initiation of a verbal report. Variable errors associated with the circuit are the result of changes in line frequency and the type of initial syllable of verbal response. However, for a normal line frequency excursion of 1/4 cycle the clock error does not exceed 0.4%. Variable errors dependent upon the type of initial syllable of the verbal response are less than 2 msec. Initial experiments employing the chronograph have indicated that for the simplest voice reaction-time measurements, the shortest times involved are in the neighborhood of 200 msec. Compensation for the constant clock error will therefore permit the chronograph to be used in this application with an error not exceeding 1%. In addition to measurement of voice reaction-time, the system may be modified to fit the requirements of many other reaction-time experiments. R O

1084

Saltzman, I.J. & Garner, W.R. REACTION TIME AS A MEASURE OF SPAN OF ATTENTION. *J. Psychol.*, 1948, 25, 227-241. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

1084

To evaluate the concept of "span of attention" and to compare the effects of two different methods of studying span, five Ss were presented with concentric circle stimuli under two procedures--tachistoscopic presentation (TP) and reaction time method (RTM). With TP exposure duration was 0.5 sec. and Ss recorded the number of circles appearing on a data sheet. With RTM the stimuli remained in view until Ss made a verbal report. Percent of correct identifications and RTs were analyzed in terms of 1) the effect of exposure time, practice and knowledge of range of stimuli upon the size and immediacy of the span of attention; and 2) the relative efficiency of TP and RTM. G. R 3

1085

Hanes, R.M. & Williams, S.B. VISIBILITY ON CATHODE-RAY TUBE SCREENS: THE EFFECTS OF LIGHT ADAPTATION. *J. opt. Soc. Amer.*, April, 1948, 38, 363-377. Contract NSORI-166, T.O.I. Rep. No. 166-I-32, ONR, Special Devices Center, Port Washington, L.I., New York. (Johns Hopkins Univ.)

1085

To determine the effect of light- and dark-adaptation on contrast thresholds and time for detecting a supra-threshold signal appearing on a cathode-ray tube screen (P-7), a series of observations were made as these conditions were varied: pre-exposure brightness (0 to 2000 millilamberts), screen intensities (0.0001 to 0.22 millilamberts), length of exposure (1/4 to 5 minutes), contrast ratios of signal to background (0.13 to 2.50). Contrast thresholds and detection times are analyzed statistically and discussed in terms of optimal conditions for radar operation. T.G.I.R.9.

1086
Sleight, R.D. THE EFFECT OF INSTRUMENT DIAL SHAPE ON LEGIBILITY. *J. appl. Psychol.*, April, 1948, 32, 170-88. Cf. NS-ori-166, T.O.I., Rep. No 166-I-35, ONR, Special Devices Center, Fort Washington, L.I., N.Y. (Purdue Research Foundation and Johns Hopkins Univ.)

1086
To study the effect of instrument dial shape on accuracy of reading off information, 60 subjects viewed briefly each of five dial shapes (vertical, horizontal, round, semi-circular, open-window), equated for size and style of numerals, marks and pointers, contrast, size and brightness of background, and positioning of pointer, and reported the settings. Errors of extent and direction are analyzed for significant differences in legibility yielded by the five shapes. Implications for instrument design are discussed.
T,G,I,R30.

1087
Sweet, A.L., & Bartlett, M.R. VISIBILITY ON CATHODE-RAY TUBE SCREENS: SIGNALS ON A P7 SCREEN SEEN AT DIFFERENT INTERVALS AFTER EXCITATION. *J. Opt. Soc. Amer.*, April 1948, 38, 329-337. Contract NS-ori-166, T.O.I., Rep. 166-I-35, ONR, Special Devices Center, Fort Washington, L.I., N.Y. (Johns Hopkins Univ.)

1087
To measure visibility changes in signal images on the cathode-ray tube screen (P-7), visual thresholds for each of 5 observers were measured at varied intervals (fluorescence to 60 seconds delay), signal strengths (0 to 105 decibels from reference voltage), scope brightness or CRT bias (11,14,17,20 volts). Visibility data are given as attenuation of signal strength (in decibels) and are analyzed as functions of the three variables to determine conditions favoring optimum signal detection.
T,G,I,R4.

1088
Jeffries, R.J. & Hamburger, F., Jr. A LINEAR MOTION CHARACTERISTICS RECORDER. Contract NS-ori 166, Task Order 1, Rep. 166-I-36, Sept. 1947. ONR, Special Devices Center, Fort Washington, L.I., New York. (Johns Hopkins Univ., Electrical Engineering Lab., Baltimore, Md.)

The Linear Motion Characteristics Recorder described in this paper was designed to produce records of the parameters of motion encountered in the study of basic psychological motor problems. The equipment provides a free-moving stylus which may be directed by the S over a predetermined traverse. Simultaneous time-history records are produced of instantaneous displacement, velocity, and angular deviations of the stylus from the traverse. This paper reviews the design of the signal pick-ups and associated equipment. Engineering analyses and performance data are also included.
R 0

1089
Williams, S.B. & Bartlett, M.R. VISIBILITY ON CATHODE-RAY TUBE SCREENS: PROBLEMS AND METHODS. *J. Psychol.*, 1948, 22, 401-417. (Psychological Lab., Johns Hopkins University, Baltimore, Md.)

1089
The general features of equipment used in radar displays are described, with special features of interest to psychologists given in some detail. A general background is presented as a framework for practical research problems. Some brightness measurements of the cathode-ray tube screen and signal are given with comments on experimental methods used.
G,I,R6.

1080
Gleason, J.G. THE DESIGN OF NUMERALS FOR USE IN COUNTER-TYPE INSTRUMENTS: A REVIEW OF THE LITERATURE. Contract NS-ori-166, T.O. I, Proj. 20-F-1, Rep. 166-I-39, Dec., 1947, 24 pp. ONR, Special Devices Center, Fort Washington, L.I., New York. (Purdue Univ., Div. of Educ. and Appl. Psychol.)

1790
To review literature for data bearing on the design of numerals for counter-type instruments, some basic studies on the factors affecting visual acuity are studied. Factors summarized are size of critical detail, contrast between object and background, brightness level of illumination, color, and time of exposure. Two specific studies of numeral legibility are included. Discussion relates these data to the design of instrument numerals.
T,G,R67.

1091
Sweet, A.L., & Bartlett, M.R. AN ILLUSORY ROTATING SWEEP. *Amer. J. Psychol.*, July 1948, 61, 400-401. Contract NS-ori-166, T.O. I, Rep. 166-I-40, ONR, Special Devices Center, Fort Washington, L.I., N.Y. (Johns Hopkins Univ.)

1091
This report describes an illusory second sweep-line appearing on cathode-ray screens having a rotary sweep, when, combined with other conditions, the rotation of the sweep exceeds speeds of 15 to 20 rotations per minute. Evidence is presented to show that the illusion is Michell's ghost (sensations excited by a single non-stimulatory stimulation of the eye). Conditions under which it appears such as type of screen and operating conditions are given.
G,I,R2.

1092
Williams, S.B., Bartlett, M.R., & King, E. VISIBILITY ON CATHODE-RAY TUBE SCREENS: SCREEN BRIGHTNESS. *J. of Psychol.*, 1948, 22, 455-466. Contract NS-ori-166, T.O. I, Proj. 20-F-1, Rep. 166-I-42, ONR, Special Devices Center, Fort Washington, L.I. New York, (Johns Hopkins Univ.)

1092
To study the effect of screen brightness (grid bias) on the visibility of signals on the plan position indication screen of the cathode-ray tube (7EP7), discrimination thresholds were obtained for four observers at 12 bias (brightness) levels, with a noise-free screen and with noise (screen clutter). Threshold and grid bias measurements are given in voltage units and transformed into brightness units for comparison with classical data on sensitivity of the eye. Practical implications for research in radar displays and for the operating engineer are discussed.
T,G,R5.

1093
Garner, W.R. THE LOUDNESS OF REPEATED SHORT TONES. *J. Acoust. Soc. Amer.*, July 1948, 20(4), 513-527. (Psychology Dept., Johns Hopkins University, Baltimore, Md.)

1093
These experiments were aimed primarily at determining the relation between loudness and the repetition rate of tones and the effect of duration, frequency, and intensity on this relation. Six experienced males made ten observations per condition: for loudness, duration, and repetition effects the standard was 1,000 cps at 80 db for durations of 1 to 50 msec. and the comparison was repeated at rates of 5 to 100 per sec.; for frequency tones ranging from 125 to 8,000 cps, of 40 or 80 db, and of 20 msec. duration repeated 25 times per sec. were each compared to the same steady tone; for intensity a series of measurements similar to those for frequency were made using intensities ranging from 20 to 120 db. Five basic relations between loudness and the repetition rate of short tones are identified and discussed. T. G. I. R. 14

1094

Bartlett, M.R., Reed, J.D., & Davis, G. ESTIMATIONS OF DISTANCE ON POLAR COORDINATE PLOTS AS A FUNCTION OF THE SCALE USED. *J. gen. Psychol.*, 1949, 41, 47-65. Contract NS-ori-166, Proj. 20-F-1, Rep. 166-I-44, SDC, ONR, Fort Washington, E.Y. (Johns Hopkins University)

1094

To determine the accuracy of reading target range on polar coordinate plots, 48 subjects estimated the relative distances of targets from center in a series of ten displays having identical number of subdivisions but differing in number of units (five, ten, and twenty, respectively). Accuracy of reading is analyzed for different distances in terms of the constant error in judgments and variability of the judgments, and is interpreted as a function of scale numbering. Various number-effects are discussed. T.G.R.

1095

Boughty, J.M. & Garner, W.R. PITCH CHARACTERISTICS OF SHORT TONES. II. PITCH AS A FUNCTION OF TONAL DURATION. *J. exp. Psychol.*, Aug. 1948, 32(4), 478-484. (Psychology Dept., Johns Hopkins University, Baltimore, Md.)

1095

To determine the direction and magnitude of pitch changes as a function of duration over a wide range of durations, frequencies, and intensities, two psychophysical methods were employed--constant stimuli and average error; for both the standard was 250, 1,000, or 4,000 cps at 90 or 70 db and the comparison was 6, 12, 25, 50, 100, or 200 msec. Six Ss were used. In the first procedure one standard was paired with each comparison ten times; for each set of conditions the combined data of all Ss were fitted by a straight line using the method of least squares. In the second, S altered the frequency of the comparison over the entire audible range until it matched the standard in pitch; S made from two to five judgments per condition; variability for the combined data was expressed graphically by sigma. G. I. R 7

1096

Chapanis, A. THEORY AND METHODS FOR ANALYZING ERRORS IN MAN-MACHINE SYSTEMS. *Ann. N.Y. Acad. Sci.*, Jan., 1951, 51, 1179-1203. Contract NS-ori-166, T.O.I., Rep. No. 166-I-49, ONR, Special Devices Center, Fort Washington, L.I., New York. (Johns Hopkins Univ.)

1096

This paper develops systematically several important concepts and formulae for analyzing errors in complex man-machine systems (specifically, radar problems) and demonstrates by practical examples the applications of these equations to the analysis of errors in such systems. T.G.I.R.11.

1097

Hanes, R.M. A SCALE OF SUBJECTIVE BRIGHTNESS. *J. exp. Psychol.*, Aug., 1949, 39, 438-452. Contract NS-ori-166, T.O.I., Rep. No. 166-I-51, ONR, Special Devices Center, Fort Washington, L.I., New York. (Johns Hopkins Univ.)

1097

To determine how reliably individuals can make fractional estimates of the relation of subjective brightness (brilliance) to physical brightness, four trained subjects adjusted a variable flash to 1/2 and 3/4 the brightness of a standard (0.201 to 100 millilamberts). Other variables were: hue (white, red, green, blue) and duration (1300, 20, 970 milliseconds). The results are analyzed statistically. A subjective brightness or brilliance scale is constructed, the unit of which is called a "bril", and compared with a curve obtained by interstimulus difference limens. T.G.R.

1096

Leysorek, M. ACCURACY OF VISUAL INTERPOLATION BETWEEN CIRCULAR SCALE MARKERS AS A FUNCTION OF THE SEPARATION BETWEEN MARKERS. *J. exp. Psychol.*, Apr., 1949, 39, 270-279. Contract NS-ori-166, T.O.I., Rep. No. 166-I-52, ONR, Special Devices Center, Fort Washington, L.I., New York. (Johns Hopkins Univ.)

1096

To investigate the relation between accuracy of visual interpolation between scale markers and size of scale intervals, 7 subjects estimated the position of targets displayed on 10- or 20-inch polar coordinate plots, with sizes of intervals varied from 1/8 to 10 inches. Errors of interpolation (proportion of the intervals in which estimations were safe) and absolute errors of estimation are analyzed as a function of interval size. A critical value is suggested which will yield maximum accuracy of interpolation. Individual differences in performance are noted. T.G.I.R.

1099

Sleight, R.B. THE RELATIVE DISCRIMINABILITY OF SEVERAL GEOMETRIC FORMS. *J. exp. Psychol.*, Apr., 1952, 45, 324-328. Contract NS-ori-166, T.O. I., Rep. 166-I-55, SDC, ONR, Fort Washington, N.Y. (Johns Hopkins University)

1099

To study the relative discriminability of forms in a complex visual display, 21 subjects sorted a number of geometric forms (21, six of a kind) on the basis of (1) their attention-getting value, and (2) a predetermined order. Mean sorting times for both methods are studied for significant differences among forms. Rank orders for selection and speed of sorting are given. Suggestions are made as to the most discriminable forms to be selected for visual displays. T.I.R.11.

1100

Williams, S.B., & Hanes, R.M. VISIBILITY ON CATHODE-RAY TUBE SCREENS: INTENSITY AND COLOR OF AMBIENT ILLUMINATION. *J. Psychol.*, 1949, 27, 231-244. Contract NS-ori-166, T.O. I., Proj. NR-784-001, Rep. 166-I-56, ONR, Special Devices Center, Johns Hopkins U.

1100

To study visibility on cathode-ray tube screens as affected by ambient illumination, 2 observers made threshold judgments on the appearance of a small signal pip on a typical radar scope of modulated intensity. Room illumination was varied from 0.02 to 1 footcandle for 6 colors: blue, green, magenta, amber, red, and "daylight". Threshold data are analyzed as a function of intensity and hue of illumination and recommendations are made for illumination levels in the radar operating room. These results are compared with those in the visual literature. T.G.R.19.

1101

Kaufman, E.L., Reese, T.W., Volkman, J., & Rogers, S. ACCURACY, VARIABILITY AND SPEED OF ADJUSTING AN INDICATOR TO A REQUIRED BEARING. Contract NS-ori-166, T.O. I., Rep. 166-I-MHC 4. Sept. 1947. 37pp. ONR, Special Devices Center, Johns Hopkins U., Systems Research. (Mt. Holyoke College)

1101

To investigate some factors in the discrimination of angular orientation, 6 subjects observed a large circular display on which was a line of light and adjusted this line to a required bearing. In a second series, a single bearing marker at 300 was fixed on the display as a reference of "anchor". Errors of adjustment and times for adjustment are analyzed statistically to determine the accuracy, variability, and speed of performance with and without an "anchor". Individual differences are discussed. T.G.I.R.

1102

Kuffman, E.L., Lord, H.W., Reese, T.W., & Vollmann, J. THE DISCRIMINATION OF VISUAL NUMBER. *AMER. J. Psychol.*, 1949, 62, 400-405. Contract NS-ori-166, Rep. 166-I-MNC 8. Oct. 1949. ONR, Special Devices Center, Johns Hopkins Univ. (Mt. Holyoke College)

1102

To investigate factors in estimating visual number, 9 subjects received brief (1/5 second) visual presentations of randomly arranged fields of dots (from 1 to 210) and reported the number perceived; some subjects were instructed to report accurately and some for speed. Results are given as percentage error and variability of reported number, time for and confidence of reporting. Analysis and discussion is in terms of the effect of number and instructions on speed and accuracy, and the techniques used for estimating ("subitizing" versus "estimating"). Implications for application to practical problems are drawn.

T. G. I. R 9

1103

Jensen, E.H., Reese, E.P., & Reese, T.W. THE SUBITIZING AND COUNTING OF VISUALLY PRESENTED FIELDS OF DOTS. *AMER. J. Psychol.*, 1950, 50, 383-392. Contract NS-ori-166, Rep. 166-I-MNC 6. Oct. 1950. ONR, Special Devices Center, Mt. Holyoke College, Dept. of Psychol. and Educ.

1103

To investigate the manner in which visual number is discriminated, five subjects received visual presentation of fields of dots (from one to thirty) and reported the number observed. Time for observation was not limited. The data are analyzed statistically in terms of accuracy of report and time between stimulus presentation and reports. The shape of the function is discussed and explained in terms of discrimination techniques used. A discussion of the statistic of analysis by rectification is included.

T. G. I. R 9

1104

Minturn, A.L. & Reese, T.W. THE EFFECT OF DIFFERENTIAL REINFORCEMENT ON THE DISCRIMINATION OF VISUAL NUMBER. Contract NSORI 166, Rep. 131 I MNC 8, Sept. 1951, 30pp. Psychophysical Research Unit, Mount Holyoke College, South Hadley, Mass. (Reprinted from *J. Psychol.*, 1951, 31, 201-231).

1104

To investigate the effect of differential reinforcement on the discrimination of visual number, 10 subjects received one series of brief visual presentations of randomly arranged fields of dots (1 to 210) and reported the number perceived. For a second identical series, subjects were informed of the accuracy of report. Eight months later, the first procedure was repeated. Percentage errors, medians, and standard deviations for reported number are analyzed and discussed in terms of effects of reinforcement (knowledge of results), both immediate and lasting, and of individual trends toward over- or under-estimation.

G. I. R 10

1105

Humphrey, C.E. & Thompson, J.E. AUDITORY DISPLAYS. II. COMPARISON OF AUDITORY TRACKING WITH VISUAL TRACKING IN ONE DIMENSION. B. DISCONTINUOUS SIGNALS, COMPLEX COURSE. Rep. APL/JHU TG 147, Sept. 1952, 7pp. Applied Physics Lab., Johns Hopkins University, Baltimore, Md.

1105

The four Ss used in the simple course experiment (Accession no. 1106) also tracked the complex course. All other task conditions remained the same. Visual and auditory tracking scores were compared for each S separately, for all Ss on a daily basis, for the first and last day of trials, and for all Ss on all trials using t-tests. Tracking efficiency (accuracy) was determined and compared and the correlation between visual and auditory scores also was computed.

T. G. I. R 7

1106

Humphrey, C.E. & Thompson, J.E. AUDITORY DISPLAYS. II. COMPARISON OF AUDITORY AND VISUAL TRACKING IN ONE DIMENSION. A. DISCONTINUOUS SIGNALS, SIMPLE COURSE. Rep. APL/JHU TG 146, Sept. 1952, 7pp. Applied Physics Lab., Johns Hopkins University, Baltimore, Md.

1106

Four inexperienced Ss performed a simple compensatory tracking task (sine-wave course) under both auditory and visual presentation conditions. Each S was given 50 auditory and 50 visual trials. Tracking was done by joystick movement in the reverse direction from signal motion. Performance was measured by integrator scores obtained electronically from the area under the error curves. Auditory and visual performance data were compared statistically by t-test technique. Tracking efficiency was also determined for both signal conditions. The influence of discontinuous stimulus presentation and reaction time on performance was discussed briefly.

T. G. I. R 8

1107

Humphrey, C.E., Thompson, J.E. & Ensor, Helene L. THE MEASUREMENT OF TRACKING ERROR: TIME-ON-TARGET. Rep. APL/JHU TG 156, April 1953, 3pp. Applied Physics Lab., Johns Hopkins University, Baltimore, Md.

1107

This paper suggests time-on-target as a technique for measuring tracking error where error-curve analysis is not required. Its advantages in terms of simplicity, cost, time, and accuracy are considered. Summary error data collected from four tracking studies and one tracking personnel selection test are used to indicate the reliability of the technique.

T. R 4

1108

Chapanis, A. STUDIES OF MANUAL ROTARY POSITIONING MOVEMENTS: I. THE PRECISION OF SETTING AN INDICATOR KNOB TO VARIOUS ANGULAR POSITIONS. *J. Psychol.*, 1951, 31, 51-64. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

1108

This study tested the accuracy with which Ss could rotate an indicator knob to any angular position in the absence of visual cues. Four male and four female Ss each made 800 settings at each of 20 angular positions which ranged from 0 to 170 degrees. Half of these were made without a visual guide and half with (though S at no time could see his hands or the knob); both right and left hands were used. The main results, given as means and standard deviations, were evaluated by variance analyses; practice effects, differences between hands, sequence of hands, and sex differences also were examined by compounding the standard deviations of all of the settings.

T. G. I.

1109

Saltzman, D.C., & Garner, W.R. ACCURACY OF VISUAL ESTIMATION OF AZIMUTH POSITION. *J. Psychol.*, 1950, 29, 453-467. Contract NS-ori-166, T.O. 1, Rep. 166-I-70. Feb. 1950. ONR, Special Devices Center, Johns Hopkins Univ.

1109

To determine the accuracy with which angular positions can be estimated, eight subjects performed two tasks: 1) estimated size of an angle formed by two lights in the horizontal plane, and 2) adjusted a movable light so that it formed a given angle with a fixed light (a reference light at 30, 60, and 90 degrees was added for some adjustments). Constant and variable errors are analyzed in terms of effect of estimation or adjustment procedures, and for effects of the fixed reference point on performance accuracy.

G. R 2

1110

Saltzman, I.J., & Gerner, W.R. THE EFFECTS OF SIZE AND BRIGHTNESS ON THE SPEED OF IDENTIFYING NUMBER OF RANGE RINGS. Contract NS-ori-166, T.O. 1, SEC Human Eng. Proj. 20-P-1, Tech. Rep. SDC 166-I-79. Jan. 1949. 15pp. Special Devices Center, Johns Hopkins Univ., Institute for Cooperative Research.

1110

To investigate the effect of size and brightness on speed of identifying the number of range rings of a polar coordinate display, five subjects viewed a screen presentation of rings (from two to ten) at various visual angles (one degree-ten minutes to ninety degrees) and at varied brightnesses (0.005 to 55 apparent foot candles) and reported the number observed. Total time for identification for the various conditions are analyzed. Discussion is concerned with optimum size and brightness for range readings; number effects and individual differences are noted.

T. G. R 4

1111

Bartlett, M.R., & Sweet, A.L. VISIBILITY ON CATHODE-RAY TUBE SCREENS: SIGNALS ON A P-7 SCREEN EXPOSED FOR DIFFERENT INTERVALS. J. opt. Soc. Amer., 1949, 39, 470-473. Contract NS-ori-166, T.O. 1, Rep. No. 166-I-83. ONR, Special Devices Center, Johns Hopkins Univ., Psychol. Lab.

1111

To investigate some factors affecting signal detection on cathode-ray tube screens, the minimum detectable signal voltage rendering the target visible was determined (5 subjects) with varied exposure times (0.02 to 4.16 seconds), brightness levels of scope (dim and bright), turning rates of sweep (32 and 6 rotations per minute). Threshold data are analyzed in terms of the relations between target visibility and exposure time. Optimal conditions for grid bias (brightness) and sweep are discussed.

T. G. I. R 2

1112

Chapanis, A. THE STABILITY OF "IMPROVEMENT" IN COLOR VISION DUE TO TRAINING-A REPORT OF THREE CASES. Amer. J. Optom. and Arch. Amer. Acad. Optom., June 1949, 26(6), 251-259. (Johns Hopkins University, Baltimore, Md.).

1112

To add some data on the effects of training in color vision, three cases are presented. All were men who had been rejected for military service because of color deficiency, had then received training on color vision tests which enabled them to pass the tests. Several years later they were tested on a battery of color vision tests, two of which were new and two were familiar. Test scores are compared with those for 573 individuals and discussed in terms of the stability of "improvement" in color vision.

G,R14.

1113

Chapanis, A. SIMULTANEOUS CHROMATIC CONTRAST IN NORMAL AND ABNORMAL COLOR VISION. Amer. J. Psychol., 1949, 62, 526-539. Contract NS-ori-166, T.O. 1, Rep. 166-I-90. ONR, Special Devices Center, Johns Hopkins Univ.

1113

To add to the data on the phenomenon called "heightened color contrast", systematic observations obtained from the testing of 86 color-normal and 34 color-deficient individuals on the Royal Canadian Navy Colour-Vision Test Lantern are presented. Color names applied to pairs of red, green, and white lights (in all possible combinations) are tabulated and interpreted: the light of laboratory studies of differential chromatic sensitivity.

T,I,R24.

1114

Chapanis, A. HOW WE SEE: A SUMMARY OF BASIC PRINCIPLES. Human Factors in Undersea Warfare, 1949, 80pp. Contract NS-ori-166, T.O. 1, Rep. 166-I-85. National Research Council. (Johns Hopkins U.)

1114

This report presents a background of visual information with respect to certain general problems of visual research. Particular topics covered are: the nature and measurement of visual stimuli, dark adaptation and night vision, visual acuity, and visibility. An appendix contains a description and tabulation of measurements and nomenclature in visual science: concept of light and color, radiometry, photometry, and colorimetry.

T,G,I,R103.

1115

Gerner, W.R. THE LOUDNESS AND LOUDNESS MATCHING OF SHORT TONES. J. Acoust. Soc. Amer., July 1949, 21(4), 398-403. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

1115

The relation between zonal duration and differential sensitivity to intensity was investigated using a monaural loudness matching technique. Two basic conditions were employed: 1) the standard tone of 500-msec. duration was followed by the comparison tone of variable duration, 10 to 500 msec., the interval between them being either 50, 100, or 500 msec.; 2) everything was identical except the standard and comparison always had the same duration. A 1,000-cps tone was employed throughout. Six experienced Ss each made ten loudness matches for each condition. The probable error of the loudness matches was used as the measure of the difference limen, mean score in db was the loudness measure. The effects of the variables on these measures were considered in some detail.

G. I. R 12

1116

Williams, S.B. VISIBILITY ON CATHODE-RAY TUBE SCREENS: VIEWING ANGLE. J. opt. Soc. Amer., 1949, 39, 782-785. Contract NS-ori-166, T.O. 1, Rep. 166-I-92. ONR, Special Devices Center, Johns Hopkins Univ., Psychol. Lab.

1116

To determine the limits within which chance eccentricity of view can be a factor in radar detection, two trained observers made threshold (appearance) judgments of a signal on a modified TBP7 cathode-ray tube screen (four scope brightnesses, three signal sizes, viewing angle from zero to twenty degrees of eccentricity). Threshold measurements (units of signal voltage) are analyzed as a function of viewing angle, scope brightness, and signal size. Voltage data is translated to light values and discussed in terms of the approximate size of the differential threshold in brightness units.

G,T,R10.

1117

Steller, E. HUMAN FACTORS IN PANEL DESIGN. Report from: "Human Factors in Undersea Warfare." 1949, 153-175. US National Research Council, Washington, D.C. (Johns Hopkins University, Baltimore, Md.).

1117

The purpose of this chapter is to summarize and evaluate the results of investigations on the human perceptual and motor capacities directly relevant to panel layout problems, and to describe what the study of human factors in equipment design has to offer in the solution of such problems. The data and general principles derived therefrom are discussed for six major aspects of panel layout: practical limits of the working area, optimal location of controls and displays, importance and frequency of use of controls and displays, patterning of controls and displays, distribution of work over body parts, and confusion of controls and of displays. Problems of the practical application of this research knowledge also are considered.

T. G. I. R 36

1118
Doughty, J.M. THE EFFECT OF PSYCHOPHYSICAL METHOD AND CONTEXT ON PITCH AND LOUDNESS FUNCTIONS. *J. exp. Psychol.*, Oct. 1949, 32(5), 729-745. (Franklin and Marshall College, Lancaster, Penn.).

1118
This experiment tested the prediction that the experimenter can predetermine the Constant Errors (CE) for pitch and loudness by the selection of the comparison stimuli in the Method of Constant Stimuli; the same context effects were determined for the Average Error (AE) method. The specific experimental variables included: degree of asymmetry in the stimulus context, stimulus duration (50, 1,000 msec), and degree of spread of comparison stimuli. Three trained Ss made 50 judgments per point. For AE data, CE's were computed from the mean of the distribution of judgments; difference limens (DL) as the probable error of the distribution. The least squares solution for the phi-gamma function with unweighted values, was used to determine the CE's and DL's. Results from the two methods are compared. T. G. I. R 11

1119
Bair, J.T. & Ambler, Rosalie K. A COMPARISON OF ATTRITION RATES AMONG AVIATION OFFICER CANDIDATES, OTHER OFFICER STUDENTS, AND NAVCADES. Spec. Rep. 56 19, Attrition Rep. 20, June 1956, 4pp. USN School of Aviation Medicine, Naval Air Station, Fla.

1119
To compare current attrition rates for three different types of flight trainees, a study was made of 327 aviation officer candidates, 749 naval aviation cadets, and 459 officers under instruction. These three groups parallel each other in terms of entry and progress through the program with pre-flight school training complete. Attrition rates by type (flight failure, voluntary withdrawal, ground school failure, not physically qualified, not officer material, and other) were calculated and compared. The findings are discussed in relation to recruitment policies. T.

1120
Casperson, R.C. THE VISUAL DISCRIMINATION OF GEOMETRIC FORMS. *J. exp. Psychol.*, 1950, 40, 668-691. Contract NS-ori-166, T.O. I, Rep. 166-I-108. ONR, Special Devices Center, Johns Hopkins Univ.

1120
To investigate some factors affecting the discrimination of geometric forms (ellipse, rectangle, triangle, diamond, cross, and star each with five variations in area, maximum dimension, and perimeter), identification judgments were made by twenty subjects (one session always included forms all of equal area). Percent of correct reports was plotted as a function of the three variables; threshold values (50% correct reports) are further analyzed and discussed in terms of the effectiveness of each variable in predicting discriminability of different forms. T,G,I,R16.

1121
Hanes, R.M. SOME EFFECTS OF SHAPE ON APPARENT BRIGHTNESS. *J. exp. Psychol.*, 1950, 40, 650-654. Contract NS-ori-166, T.O. I, Tech. Rep. 166-I-109. ONR, Special Devices Center, Johns Hopkins Univ.

1121
To investigate the effect of form upon apparent brightness, 3 geometrical forms of equal area (square, circle, and triangle) were viewed in pairs, one standard and one comparison form, by 5 subjects. They adjusted the brightness of the comparison form to equal the brightness of the standard. Three sizes were compared. Mean value in millilamberts for apparent brightnesses are analyzed and interpreted as a function of form and size. T.P.I.

1122
Sleight, R.B., & Monbray, G.H. DISCRIMINABILITY BETWEEN GEOMETRIC FIGURES UNDER COMPLEX CONDITIONS. *J. Psychol.*, 1951, 31, 121-127. Contract NS-ori-166, T.O. I, Tech. Rep. 166-I-111. ONR, Special Devices Center, Johns Hopkins Univ.

1122
To determine tolerances required for discrimination between similar geometric forms under complex viewing situations, twenty subjects viewed a large polar-coordinate display board containing sixty geometric figures (squares and rectangles varied from square in one dimension in five steps, circles and ellipses varied in like manner), and read off range and bearing for a designated form. Number and percent of errors in naming the forms yielded a discrimination value of the amount of tolerable distortion. The effect of the horizontal-vertical position of figures is noted. T,R4.

1123
Chapanis, A. STUDIES OF MANUAL ROTARY POSITIONING MOVEMENTS: II. THE ACCURACY OF ESTIMATING THE POSITION OF AN INDICATOR KNOB. *J. Psychol.*, 1951, 31, 65-71. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

1123
This second study measured the precision with which Ss could estimate the setting of an indicator knob which they were not allowed to move. Ten Ss each made 180 estimates of the settings at each degree from 0 (the horizontal) through 90 degrees (the vertical). The statistical summary of the data include the mean, standard deviation, median, probabilities (10 and 90), and lowest and highest estimates made for each class of angular positions. The mean and standard deviation data were compared to those obtained in the first study when the settings were made by S. Number frequencies for the final digit of the estimates also were presented. T. R 1

1124
US Civil Service Commission. JOB ANALYSES FOR PHYSICAL FITNESS REQUIREMENTS. Handbook M 605, Sept. 1956, 39pp. Medical Div., Bureau of Departmental Operations, US Civil Service Commission, Washington, D.C.

1124
This manual was prepared for the medical officers of the United States Civil Service Commission to use in obtaining information concerning the physical demands of civil service positions. Such job surveys help in achieving the best utilization of manpower, particularly the physically handicapped and the older worker. The manual includes a general description of job analysis for physical fitness requirements, a job analysis form (3880, June 1954), format and examples of job descriptions and definitions of the functional factors that require rating. F 2

1125
de Groot, S.G., & Gebhard, J.W. PUPIL SIZE AS DETERMINED BY ADAPTING LUMINANCE. *J. opt. Soc. Amer.*, 1952, 42, 492-495. Contract NS-ori-166, T.O. I, Rep. 166-I-124. ONR, Special Devices Center, Johns Hopkins Univ.

1125
To make available present data on pupil size as determined by the adapting luminance, such measurements were collected from research studies and weighed for number of observers to make the data comparable. An equation for the curve which best fitted the combined data was determined as the best estimate that can be made of pupil size-luminance relation. Corrected for the Stiles-Crawford effect, an expression is presented whereby retinal illuminance, adjusted for average pupil size, may be obtained from direct knowledge of the luminance of the stimulus field. T,G,R11.

1126

Austin, T.R., & Sleight, R.B. FACTORS RELATED TO SPEED AND ACCURACY OF TACTUAL DISCRIMINATION. *J. exp. Psychol.*, 1952, 44, 283-297. Contract NS-ori-166, T.O. I, Rep. 166-I-155. ONR, Naval Research Lab., Systems Coordination Div., Johns Hopkins Univ.

1126

This experiment investigated the relationship between speed and accuracy of tactual discrimination of 23 figure and the following factors: sex differences; handedness; fingers employed in making the discriminations; learning; pressure exerted by the finger tips; and subjective confidence. The figures employed were geometric forms. Sixteen subjects equally divided according to sex and handedness were tested.
T. I. R 1

1127

Doughty, J.M. THE ROLE OF REPETITION RATE AND INTER-STIMULUS INTERVAL IN CONTEXT EFFECTS. *J. exp. Psychol.*, Feb. 1952, 43(2), 156-161. (Franklin and Marshall College, Lancaster, Penn.).

1127

The role of the temporal separation of stimuli on context effects was explored by varying repetition rate and interstimulus interval in the methods of constant stimuli and average error. Constant errors (CEs) and difference limens (DLs) for pitch were determined in a balanced and unbalanced context as well as by the method of single stimuli. Two comparison stimulus durations and prior or no knowledge of distribution of comparison stimuli also were tested. The standard tone was always 1,000 cps for 1,000 msec. Two trained Ss were used. For average error data CEs were computed from the mean of the distribution of judgments, DLs the probable error of the distribution. Constant stimuli data were determined by least squares. The effects of these variables on the CE and DL were compared and discussed. G, R 4

1128

Alexander, L.T., & Bricker, P.D. FIGURE-GROUND CONTRAST AND BINOCULAR RIVALRY. *J. exp. Psychol.*, 1952, 44, 452-454. Contract NS-ori-166, T.O. I, Rep. 166-I-158. ONR, Naval Research Lab., Systems Coordination Div., Johns Hopkins Univ.

1128

To investigate the rate of alternation in binocular rivalry as a function of degree of figure-ground contrast of stereoscopic fields, five stereograms, differing in degree of figure-ground contrast, were presented to five subjects. Rate of alternation for individuals and for combined scores is studied in terms of contrast, practice, and individual differences.
T.G.R2.

1129

Eriksen, C.W. LOCATION OF OBJECTS IN A VISUAL DISPLAY AS A FUNCTION OF THE NUMBER OF DIMENSIONS ON WHICH THE OBJECTS DIFFER. *J. exp. Psychol.*, 1952, 44, 56-60. (Johns Hopkins University, Baltimore, Md.). (ONR Rep. 166 I 149).

1129

To determine the manner in which the number of visual dimensions identifying a given object influences the speed of locating the object in a complex field, a total of sixty subjects viewed large visual displays (49 objects varied in form, hue, size, and brightness) and located the six forms exactly like a given sample. Two conditions were used: (1) the various classes of sample objects differed from one another on only one dimension, and (2) the classes differed on two or three dimensions. Location times are analyzed as a function of a single or compound dimensions used for discrimination.
T.R4.

1130

Garner, W.R. AN EQUAL DISCRIMINABILITY SCALE FOR LOUDNESS JUDGMENTS. *J. exp. Psychol.*, March 1952, 43(3), 232-238. (Psychology Dept., Johns Hopkins University, Baltimore, Md.).

1130

Three hypotheses were tested: the equal discriminability scale for loudness is linearly related to a scale of cumulative difference limens for intensity, the fact that a series has definite limits produces anchoring effects which make discriminability better near the limits, particular spacing of stimulus intensities has no effect on the discriminability scale per se. Accordingly four sets of experimental conditions were used: three spaced the presented stimuli five db apart—one used a range of 5 to 100 db, another 55 to 100 db, the third 5 to 50 db; the fourth used a 5 to 100 db range but spaced the stimuli according to loudness rather than log intensity. Each of ten Ss made 100 judgments of each intensity for each condition. Each S's data were handled separately to construct the equal discriminability scales. R 6

1131 Gebhard, J.W. THRESHOLDS OF THE HUMAN EYE FOR ELECTRIC STIMULATION BY DIFFERENT WAVE FORMS. *J. exp. Psychol.*, 1952, 44, 132-140. ONR, Special Devices Center, Johns Hopkins University, Institute for Cooperative Research, Baltimore, Md.

This study deals with a problem in electro-stimulation which resulted in some controversy due to discrepant findings. The problem is: Does the stimulus strength-frequency relation have one or several minima? Four Ss were tested under 4 wave forms in determining the flicker thresholds: a) a sine wave; b) a positive pulse with a duty cycle of .5; c) a negative pulse with a duty cycle of .5; and d) a "symmetrical" square wave made up of alternating positive and negative pulses of equal duration. Thresholds were obtained at 12 frequencies for each wave form except for the sine wave. These were at 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5, 25, 35, 45, and 60 cycles/sec. The cycles of 5 and 7.5 cycles/sec. gave lower thresholds than sine waves by an amount predictable from the total AC power; c) Rectangular pulses were most effective when the duty cycle was .5. These results indicate that the effective intermittent electric stimulation for the eye is alternating current and that the efficiency of any wave form is dependent upon the total power of the AC component; d) Thresholds for all wave forms were lowest at a frequency of about 20 cycles/sec. This frequency was the only one at which an unequivocal minimum was observed. The results of the study support some of the work in this area and contribute to the disagreement with other findings.
R 25

1132

Austin, T.R., & Sleight, R.B. ACCURACY OF TACTUAL DISCRIMINATION OF LETTERS, NUMERALS, AND GEOMETRIC FORMS. *J. exp. Psychol.*, 1952, 43, 239-247. Proj. Designation NR-784-001, Rep. 166-I-146. ONR, Special Devices Center, Johns Hopkins Univ.

1132

This experiment determined speed and accuracy of tactual discrimination of 45 letters, numerals, and geometric forms. Solid figures and figures outlined by spaced wire pins were discriminated with the index finger tip under conditions of no finger movement and where the subject was allowed to move his finger over the face of the figure. Criteria for selecting the most effective figures are presented.
F.T.R7.

1132
Halsey, R.M., & Chaponis, A. AN EXPERIMENTAL DETERMINATION OF SOME ISO-CHROMATICITY LINES IN COLOR-DEFICIENT VISION. J. opt. Soc. Amer., 1952, 42, 722-730. Contract NS-ori-166, Rep. 166-I-147. ONR, Naval Research Lab., Systems Coordination Div., Johns Hopkins Univ.

1133
To determine some iso-chromaticity lines in color-deficient vision, 47 color-deficient and 13 color-normal subjects selected from an assortment of red and red-purple Munsell papers matches for eight standard blue-green and neutral papers. The matches for each subject and of three chrom levels were plotted on the CIE diagram and a straight line fitted through the points. These data are analyzed in terms of differences due to the kind of color deficiency and for agreement with predicted values from the spectral data of Judd. Individual differences are examined.
T,G,I,R1.

1134
Hake, M.W., & Hyman, R. PERCEPTION OF THE STATISTICAL STRUCTURE OF A RANDOM SERIES OF BINARY SYMBOLS. J. exp. Psychol., 1953, 45, 64-74. Contract NS-ori-166, Rep. 166-I-160. ONR, Naval Research Lab., Systems Coordination Div., Johns Hopkins Univ., Baltimore, Md.

This study was designed to determine how human Ss perceive the statistical structure imposed on apparently random series of binary symbols. The Ss (40 male and female) were required to predict on each of 240 trials which symbol of 2 possible symbols, H or V, would appear on that trial. Each of 4 groups of Ss predicted a different series of symbols. The 4 symbol series differed from each other in terms of the proportion of trials on which a particular symbol appeared and in the degree of sequential dependency existing between successive symbols. The results indicated that: a) The Ss in all groups began predicting the 2 symbols about equally often and gradually adjusted their predictions to conform to the actual probability of occurrence of the symbols in the symbol series. The Ss tended to predict a symbol following a previous prediction of that symbol about as often as the symbol succeeded itself in the symbol series; b) The predictions of Ss were sequentially analyzed and it was found that the specific stimuli to which Ss responded on each trial were the sequences of events including the previous prediction of Ss and the correctness of these predictions, which had occurred in the previous 2 trials; c) The apparent ability of Ss to perceive and reproduce a sequential statistical structure was explained in terms of response to specific sequences of events occurring prior to each trial. The relevance of these results to the formulation of information transfer was discussed.
R 10

1135
Merryman, J.G., & Allen, H.E. AN IMPROVED ELECTRONIC TACHISTOSCOPE. Amer. J. Psychol., 1953, 66, 110-114. Contract NS-ori-166, T.O. I, Rep. 166-I-151. ONR, Naval Research Lab., Systems Coordination Div., Johns Hopkins Univ.

1135
This report describes a tachistoscope using an electronic method for controlling the duration of a light pulse to give a brief view of a stimulus object. Durations of two milliseconds have been obtained. Directions and working diagrams for construction are included.
I,R3.

1136
Follock, W.T., & Chaponis, A. THE APPARENT LENGTH OF A LINE AS A FUNCTION OF ITS INCLINATION. Contract NS-ori-166, T.O. I, Rep. 166-I-154, Aug. 1952, 12pp. ONR, Naval Research Lab., Systems Coordination Div., (Johns Hopkins Univ.)

1136
To study the apparent length of line as a function of its inclination, 80 subjects adjusted the length of a line, variable from a standard only in angular position (ten degree positions from 0° to 170°) to apparent equality with the standard line. Two lengths (three and six inches) and four positions (above, below, right, and left of variable) for standard line were used. Constant and variable errors of settings are analyzed and discussed in terms of the size of visual illusion (horizontal-vertical) at the various angular orientations.
T,G,I,R2.

1137
Eriksen, C.W. OBJECT LOCATION IN A COMPLEX PERCEPTUAL FIELD. J. Exp. Psychol., 1953, 45, 126-132, Contract NS-ori-166, T.O. I, Rep. 166-I-161. ONR, Naval Research Lab., (Johns Hopkins Univ.)

1137
To investigate perceptual factors which determine the speed of locating an object from among a large field of objects, both field objects and targets were varied in hue, shape, size, and/or brightness in various combinations. A field of objects (six targets and 36 non-targets) was displayed; the observer located the targets, specifically defined, as rapidly as possible. Speed of performance is analyzed as a function of field heterogeneity and target definition (number of distinguishing variables).
T,R4.

1138
Rogers, S., Volkman, J., Reese, T.W., & Kaufman, E.L. ACCURACY AND VARIABILITY OF DIRECT ESTIMATES OF BEARING FROM LARGE DISPLAY SCREENS. Contract NS-ori-166, T.O. I, Rep. 166-I-MHC1, May 1947, 41pp. ONR, Special Devices Center, Mt. Holyoke College, Psychophysical Research Unit, S. Hadley, Mass.

1138
To investigate some factors in estimating bearing (angular orientation) about the center of a circular display, 55 untrained subjects of both sexes judged the angular position of a line of light (bearing marker) projected on a round screen. The marker was varied in length, location of point of origin with reference to center, range (over 110 degrees), and presence of a reference line. Accuracy and variability of estimations were determined through an analysis of the error scores and their deviations. Length of bearing marker, "anchoring" effects of reference line, and individual differences are discussed.
T,G,I.

1139
Reese, T.W., Volkman, J., Rogers, S., & Kaufman, E.L. SPECIAL PROBLEMS IN THE ESTIMATION OF BEARING. Contract NS-ori-166, T.O. I, Memo Rep. 166-I-MHC 2, Jan. 1948, 41pp. ONR, Special Devices Center, Johns Hopkins Univ. (Mt. Holyoke, Psychophysical Research Unit)

1139
To investigate some factors in estimating bearing (angular orientation) about the center of a circular display (see also accession number 1138), 33 subjects were given four seconds to estimate the bearing of a line of light (bearing marker) projected on a circular screen for 1/2 second. The line was varied in length (56, 14, 4 centimeters) and range (over 110 degrees). Error scores are analyzed and interpreted with regard to effect of length of bearing marker and individual differences on accuracy and variability of estimations. Implications for display design are discussed.
T,G,I,R1.

1140
Chinnell, R.C. & Tolcott, M.A. THE USE OF HUMAN ENGINEERING DATA IN EQUIPMENT DESIGN PROBLEMS. Contract NS ORI 151, Proj. 20 F 2, May 1948, 31pp. Division of Bio-Mechanics, Psychological Corporation, New York, N.Y.

1140
This report discusses and illustrates typical problems encountered in applying human engineering principles to the design of equipment. The manner in which recommendations are derived by reconciling pertinent experimental data with the specific requirements of the equipment are discussed and cases are cited to illustrate the various degrees of confidence with which recommendations are made. Areas in which data are scarce or lacking and in which further research is needed are indicated. Major divisions of the report are devoted to design and location of controls and design of visual indicators.
I. R 31

1141
Irby, T.S., Ely, J.H. & Chinnell, R.C. COMPARISON OF PHYSICAL DIMENSIONS OF SUBMARINERS AND AVIATION CADETS. Contract NS ONR 641, T.O. 11, SDC Human Engng. Proj. 20 F 2, Memo 2, June 1952, 5pp. ONR, Special Devices Center, Dunlap & Associates, Inc.

The purpose of the present study was to determine whether anthropometric data of aviation cadets (specifically those reported in AAF Technical Report 5501) are comparable to those of submariners. Height and weight measurements were obtained for 350 candidates admitted to the submarine school at New London. Height measurements were obtained from 573 fleet submariners. These measurements were compared statistically with similar measurements on 2,901 aviation cadets. The 2 distributions of heights and weights were not significantly different. Therefore, when designing equipment for submariners in which such measurements are needed, it is safe to use the measurements obtained for aviation cadets. Correlations of other anthropometric data, which might be required in work-place design (ex., sitting height), with height are presented. Since in work-place design the concern is with the distribution of measurements, correlations as high as the ones presented (from .65 to .85) are useful. One limitation of this analysis is that most of the measurements involve vertical dimensions of a man standing upright. Little consideration has been given to horizontal dimensions, such as the width of a seat.
R 1

1142
Meyers, E., Katzman, J., Jr., Notterman, J.M. & Page, D. AUDIO AIDS TO BLIND FLYING AND A SCORING DEVICE FOR THE LINK TRAINER. (HUMAN ENGINEERING SYSTEM STUDIES). Contract N7ONR 370, Proj. NR 784 005, SDC Proj. 20 F 3, SDC TR 370 2 1, July 1949, 30pp. USN Special Devices Center, Port Washington, N.Y. (American Institute for Research, Pittsburgh, Penn.).

1142
As part of a study conducted to create methods for evaluating "flybar" in a Link trainer, two measures for scoring pilot performance in a Link trainer were developed: average angular deviation and maximum deviation from designated attitudes of turn, bank, and pitch, recorded respectively by a Watt-hour meter as the integral of angular deviation over the time of the test and by a Voltmeter as readings of angles of maximum deviations. A method for measuring reaction time to visual and auditory signals is described. Calibration data and descriptions of circuits are given.
T. G. I. R 2

1143
Nurdyke, H.W. FREQUENCY DISTORTION IN THE DEVICE 8-I PORTABLE INTERPHONE TRAINER. Contract NSORI 104, Proj. 20 K 1, Rep. 1, no date, 17pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1143
This report presents results of test of the frequency response of Device 8-I (Portable Interphone Trainer). Methods for correcting deficiencies are suggested. Included are descriptions of the apparatus tested, the equipment used in the tests, and the method of testing, as well as a discussion of the sources of possible error.
G. I.

1144
Steer, M.D. (Dir.). DIRECTIONS FOR INSTALLATION AND OPERATION OF VOICE COMMUNICATION TRAINING AND EQUIPMENT UTILIZING DEVICE 8-I. Contract NSORI 104, Proj. 20 K 1, Rep. 2, no date, 32pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1144
Instructions for the installation and operation of voice communication training equipment utilizing Device 8-I are presented. Topics covered includes room requirements, installation procedure, accessory equipment, procedure for operating the device, safety precautions, and technical information. Included in appendices are instructions for adjusting the amplification applied to the voice channel and for calibrating voice channel gain, as well as a description of a control panel to be used with the device.
T. I. R 3

1145
Kelly, J.C. AN EXPERIMENTAL COMPARISON OF 5 CONDITIONS FOR VOICE COMMUNICATION TRAINING. Contract NSORI 104, Proj. 20 K 1, Rep. 3, July 1947, 16pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1145
Five groups of subjects underwent training in voice communication, under different conditions of type or amount of interference: 1) standard training with Device 8-I; 2) noise output and speech channel gain attenuated 10 VU; 3) same as 2), but with garbled speech substituted for the noise; 4) light ambient noise, transmission through air rather than head phones; 5) same as 4), but with ear-muffs being worn. Pre- and post-training scores obtained by the groups on word-intelligibility tests and tests of connected speech are compared with each other and with those obtained by control (untrained) subjects.
T. G. I. R 22

1146
Kelly, J.C. & Mason, H.M. AN EXPERIMENTAL COMPARISON OF 5 CONDITIONS FOR VOICE COMMUNICATION TRAINING. Contract NSORI 104, Proj. 20 K 1, Rep. 4, Aug. 1947, 53pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1146
Five conditions for voice communication training with Device 8-I (Portable Interphone Trainer) are compared: 1) the usual high noise level; 2) lower noise level, less effective amplification of signal; 3) garbled speech background weaker than noise in (2), instead of airplane-type noise, and weak signal; 4) some "manufactured" noise, plus noise resulting from the simultaneous drilling of several trainees; 5) noise from drilling of trainees only. 55 were 259 male college students; effects of two hours of training were evaluated by word intelligibility tests and judgments of connected speech and high level noise.
T. I. R 23

1147

Kelly, J.C. & Hanley, T.D. VOICE COMMUNICATION: RETENTION OF IMPROVED INTELLIGIBILITY. Contract N6ORI 104, Proj. 20 K 1, Rep. 5, Jan. 1948, 16pp. NSN Special Services Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1150

Hanley, T.D. & Draegert, G.L. VOICE COMMUNICATION: INTELLIGIBILITY TRAINING WITH PURDUE SPEECH INTENSITY DEMONSTRATOR. Contract N6ORI 104, Proj. 20 K 1, Rep. 8, SOC TR 104 2 8, April 1948, 19pp. NSN Special Services Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1147

To test retention of improvement in speech intelligibility, 175 male college students who were studying speech (five experimental groups and a control group) were trained in intelligibility, each experimental group under one of five different types or amounts of noise. Intelligibility tests were administered before, immediately after, 65 days after, and 100 days after training. Gains in test scores are analyzed as a function of elapsed time after training and of noise conditions during training. The training effect of intelligibility testing alone is noted and discussed.

T. G. R 3

1148

Jordyke, H.W., & Draegert, G.L. PURDUE SPEECH INTENSITY DEMONSTRATOR: (TECHNICAL REPORT). Contract N6ORI 104, T.O. 2, Proj. 20-K-1, Rep. 104-2-5, Apr. 1948, 16pp. NSN, Special Services Center, Purdue Univ., Lafayette, Ind.

1150

To evaluate the Purdue Speech Intensity Demonstrator (a device giving the trainee a visual indication of his voice level and of signal-to-noise ratio), 170 male college students were tested. Fifty Ss were assigned to three experimental groups, each group being trained for one hour to speak loudly under one of three experimental conditions (achieving as high a degree of loudness as possible, or maintaining a constant degree). The 120 control subjects took no training. All subjects had pre- and post-tests of intelligibility. Test gains are discussed regarding the effectiveness of the trainer and of the one-hour training period.

T. G. R 6

1148

The Purdue Speech Intensity Demonstrator (SID) was designed to give the speech trainee a visual indication of his voice level and of the signal-to-noise ratio. This report describes the electrical characteristics and the calibration procedure of the SID.

I.

1151

Hanley, T.D., Draegert, G.L., Harris, J.S. & Kelly, J.C. VOICE COMMUNICATION: RETENTION OF IMPROVED INTELLIGIBILITY II. Contract N6ORI 104, Proj. 20 K 1, Rep. 104 2 9, Aug. 1948, 15pp. Purdue University, Lafayette, Ind.

1151

This study reports an experiment on retention of improvement in speech intelligibility. Sixty-two male college students (not studying speech) were divided into two groups (28 experimental, 34 control). The experimental group received training in speech intelligibility at a fixed noise level; controls received no training. All Ss were tested for speech intelligibility at a higher noise level both before and after the experimental training, and were retested after 12 weeks. Gains in test scores are discussed regarding the effectiveness of training. Results are compared with another study to evaluate the influence of concurrent enrollment in a speech course.

T. G. R 3

1152

Harris, J.S., Draegert, G.L., Hanley, T.D. & Kelly, J.C. VOICE COMMUNICATION: EFFECT OF STRESS CONDITIONS ON SPEAKER INTELLIGIBILITY. Contract N6ORI 104, Proj. 20 K 1, Rep. 10, 104 2 10, Sept. 1948, 18pp. Voice Science Lab., Purdue University, Lafayette, Ind.

1152

To investigate the effect of stress conditions on the intelligibility of voice communicators, fourteen subjects were given an intelligibility test following one hour of training on techniques for increasing loudness and one hour in precision of articulation under conditions of noise. The subjects were retested three weeks later under stress conditions. Both tests were recorded and analyzed by a group of listeners. The results are presented and discussed in terms of the differences in intelligibility under normal and stress conditions for the group as a whole and for particular subjects.

1149

Tyler, H.J. & Draegert, G.L. PURDUE SPEECH SOUND TIMER (TECHNICAL REPORT). Contract N6ORI 104, Proj. 20 K 1, Rep. 104 2 7, April 1948, 10pp. NSN, Special Services Center, Purdue University, Lafayette, Ind.

The purpose of the Purdue Speech Timer is to measure the accumulation of transient signals with respect to time. With regard to speech, this timer measures directly the amount of time during which a speaker expands more than a previously determined minimum amount of speech energy. This amount of time, grossly labeled phonation time, can then be compared to silent time within, or to the total time consumed by, a given speech sample, or it may be computed in terms of average phonation time per word or syllable through simple measurement and computation. A signal for operating the timer may be provided either through microphone or phonograph. The instrument has a flat response (2 db) from 80 to 4000 cps. A drop-off of 15 db per octave begins at 4000 cps. For a reliability test, 10 different messages were analyzed 10 times each. No measure deviated more than 2 standard deviations (SD) average 50%, 104 sec., from the mean time for the message involved.

R 2

1153

Harris, J.S. VOICE COMMUNICATION: EFFECT OF STRESS ON TALKERS - A PERSONALITY STUDY. Contract N6001 104, Proj. 20 K 1, Sep. 104 2 11, Oct. 1948, 9pp. USN Special Devices Center, Purdue Univ., Lafayette, Ind.

The purpose of the present study was to discover any aspects of personality as measured by the Rorschach Test and the Minnesota Multiphasic Personality Inventory (MMPI) which tend to be related to loss of intelligibility under stress conditions. The 14 Ss. trained in voice communication, were tested under standard conditions and under threat conditions consisting of threat of electric shock and the addition of an unrelated manual task. Individual Rorschach and MMPI tests were administered to each S within a few weeks after the measurement of intelligibility under stress. The following results were obtained: a) Rorschach form-quality was significantly related to increase in variability of intensity and loss in syllable duration from standard to stress conditions of testing; b) The 5 Ss showing a significant loss in intelligibility from standard to stress conditions had significantly lower mean "psychosis" score (MMPI) than Ss showing no significant change; c) Inter-correlations between the Rorschach and MMPI factors were low and not significant. The results obtained in this study indicate that further research in this area would be worthwhile in the hope of obtaining more conclusive results.

R 4

1154

Draegert, G.L., Buck, M.W., Kelly, J.C. & Hanley, T.J. TRAINING MANUAL FOR PORTABLE INTERPHONE TRAINER, DEVICE 8-1. (VOICE COMMUNICATION). Contract N6001 104, Proj. NR 782 003, SDC Proj. 20 K 1, SDC TR 104 2 12, Jan. 1949, 112pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1154

This is a training manual for a speech intelligibility training program using Training Device 8-1 (a device for producing and controlling both signals and background noise). Equipment and procedures are described in detail, together with background information on intelligibility. Appended are several intelligibility tests.

I. R 32

1155

Kelly, J.C. RETENTION OF VOICE COMMUNICATION TRAINING AFTER ONE YEAR. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract N6001 104, Proj. NR 782 003, SDC Proj. 20 K 1, SDC TR 104 2 13, March 1949, 11pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1155

This report describes a check made on the retention of skills in voice communication. Twenty-four male college students, who had received 2 hours of training in voice communication 1 year earlier, were re-tested on speech intelligibility. Twenty untrained subjects, who had been tested one year previously as controls, were also re-tested. The test scores of experimental and control groups are compared for implications for the effectiveness of the original training.

T. G. R 3

1156
Hanley, T.J. & Draegert, G.L. EFFECT OF LEVEL OF DISTRACTING NOISE UPON SPEECH RATE, DURATION, AND INTENSITY. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract N6001 104, Proj. NR 782 003, SDC Proj. 20 K 1, SDC TR 104 2 14, June 1949, 16pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

The purpose of the present experiment was to investigate the effect of 4 levels of distracting noise upon the following speech variables: a) words per minute; b) relation of speech time to total time; c) mean syllable duration; d) mean speech intensity level above an arbitrary reference level. 48 Ss read a 73-word standard passage 4 times; once under each level of distracting noise. The noise was fed into earphones worn by Ss. The following measures were obtained: a) total reading time; b) speech time; c) graphic speech intensity trace; d) S's rating of the loudness of the distracting noise. It was found that as distracting noise in the headphones became more intense: a) words per minute became fewer; b) percent speech time increased; c) mean syllable duration increased; d) mean speech intensity level increased; e) Ss judged distracting noise to be louder. When plotted graphically, the data for all variables showed curves of the same general shape. Further, logarithmic curves of the type $y = a \log x + b$ fit all the functions within the range of observations. It was concluded that, within the limits of this experiment, when Ss not trained in communication techniques nor instructed in specific adaptations are confronted with a communication problem in the presence of noise, they tend to recognize and correctly identify increasing amounts of distracting noise and to react in what has been assumed to be a desirable manner.

R 5

1157

Kelly, J.C., Draegert, G.L., Shaffer, G.L., Roberts, P., et al. SYLLABLE DURATION AND INTENSITY RELATED TO INTELLIGIBILITY. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract N6001 104, Proj. NR 782 003, SDC Proj. 20 K 1, SDC TR 104 2 15, July 1949, 18pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

1157

The relation of syllable duration and intensity to speech intelligibility was studied under three conditions: 1) Ss (40 undergraduates) talking in R/T circuits in quiet prior to instruction in voice communication; 2) Ss talking over R/T circuits with aircraft noise in headset prior to instruction; 3) Ss talking over R/T circuits with noise after two hours of instruction in voice communication. Correlations between speech intensity and syllable duration, intensity level and intelligibility, and syllable duration and intelligibility under the three test conditions are presented.

T. G. R 4

1158

Kelly, J.C. & Steer, M.D. INTELLIGIBILITY TESTING IN THREE CONDITIONS INVOLVING MASKING NOISE. J. Speech Hearing Disorders, 1949, 14, 369-372. Contract N6ori 104, T.O. 11, Proj. 20 K 1, Tech. Rep. SDC 104 2 17, Dec. 1949. ONR, Special Devices Center, Purdue University, Lafayette, Ind.

The experiment was designed to test the hypothesis that if signal-to-noise ratio is held essentially constant, scores of intelligibility tests obtained under 3 different sound levels will not be significantly different. 40 Ss were given 3 forms of the VCL 24-Word Multiple-Choice Intelligibility Test under: a) The standard setting of Device B-1 (a portable interphone trainer) with 107 db masking noise level; b) speech and noise attenuated 10 db; and c) speech and noise attenuated 20 db. An ANOVA based upon intelligibility scores found no significant differences among conditions. No loss in test reliability (test-retest corrected for attenuation) was found with the reduction in noise level and speech channel gain. Coefficients of correlation ranging from .61 to .77 for arrays of data obtained under similar signal-to-noise ratios but progressively attenuated sound levels provide further evidence that reduced noise and speech level intelligibility testing may produce substantially the same results as testing in high level noise.

R 3

1159

Depsey, M.E., Draegert, G.L., Siskind, R.P. & Steer, M.D. THE PURDUE PITCH METER--A DIRECT READING FUNDAMENTAL FREQUENCY ANALYZER. J. Speech Hearing Disorders, June 1950, 135-141. Contract N6ori 104, Proj. 20 K 1, Tech. Rep. SDC 104 2 18, ONR, Special Devices Center, Purdue University, Lafayette, Ind.

The Purdue Pitch Meter is an instrument designed and built to indicate in cycles per sec. the fundamental frequency of speech sounds between 50 and 1000 cps. This operation is accomplished by equalizer circuits designed to amplify the lowest frequency component present and attenuate the higher harmonics. Cycles of the amplified fundamental component are counted and indicated on a meter calibrated in cycles per sec. The applied signal may be from either a microphone or a phonograph. Indicated fundamental frequency in cycles per sec may be read from the built-in meter or recorded on a suitable re-ordering millimeter. Fundamental frequency may also be demonstrated as an audible tone without intelligibility.

R 5

1160

Hanley, T.D. ITEM ANALYSIS, VCL INTELLIGIBILITY SERIES. Contract N6ori 104, Proj. 20 K 1, Rep. SDC 104 2 19, April 1950, 29pp. ONR, Special Devices Center, Purdue University, Lafayette, Ind.

The Voice Communication Laboratory (VCL) Twenty-Four Word Multiple Choice Intelligibility Tests were administered to Ss under 2 controlled conditions. Form A was given to naive S and Form B was given to control Ss who had previously undergone intelligibility training in addition to having been tested with Form A. The test results of the two groups were subjected to item analysis to determine the intelligibility of these words and the central tendency and variability of listener scores of Ss who have identified the words in an intelligibility test. It was found that: a) VCL test items range in intelligibility from 13% to 83% on a scale where 100% = no failures and 00% = no passes; b) 92% of the VCL test items fall within the 25%-75% intelligibility range; c) success in passing a given item is almost always unrelated to total listening score. It is believed that, by judicious selection of items, it will be possible to construct intelligibility tests of predictable levels of difficulty, with predictable ranges of dispersion. This hypothesis requires support in practical testing situations before the VCL test series can be used with confidence for selection of personnel for intelligibility training or communication billets, or as a diagnostic tool to define the intelligibility level of a given population. (HEIAS)

R 6

1161

Wilson, D.K. THE MANUAL-VERBAL RESPONSE TACHISTOSCOPE: DISTRACTING DEVICE FOR INTELLIGIBILITY TESTING. Contract N6ori 104, Proj. 20 K 1, Tech. Rep. SDC 104 2 20, June 1950, 17pp. Special Devices Center, ONR, Purdue University, Lafayette, Ind.

This report describes the Purdue Manual-Verbal Response Tachistoscope, which is an instrument designed to measure intelligibility under conditions of distracting psychomotor activity. The intelligibility testing involves the use of a standardized intelligibility test and the psychomotor tasks consist of eye-hand coordination manipulations. The Purdue Manual-Verbal Response Tachistoscope has been designed primarily for research and training in intelligibility under conditions involving high-level noise. Use of the instrument in combination with Navy Device B-1, Portable Interphone Trainer makes possible the determination of the effect on voice communication of psychomotor tasks more or less complex in nature requiring greater or less precision and rapidity of voluntary hand movements. Research involving these communication and manipulation variables have been instituted at the Purdue Voice Science Laboratory and will be reported in the near future.

R 2

1162

Hanley, T.D. & Williamson, R.J. THE EFFECT OF VARIOUS NOISE LEVELS ON PERFORMANCE OF THREE MENTAL TASKS. Contract N6ori 104, Proj. NR 782 003, SDC Proj. 20 K 1, SDC TR 104 2 21, Dec. 1950, 20pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Purdue University, Lafayette Ind.).

1162

To study the effect of various levels of constant and variable noise on mental performance, 25 Ss were tested on three clerical-type mental tasks. Six conditions were used--ordinary office noise levels; constant noise levels of 65, 75, 85, or 95 db, and a variable condition consisting of random presentations of all five noise levels. Errors on the three tests were analyzed and discussed in relation to the effect of noise level on performance.

T. G. R 3

1163

Doyle, M.P. & Steer, M.D. STUDIES IN SPEECH RECEPTION TESTING. J. Speech Hearing Disorders, 1951, 16, 132-139. Contract N6ori 104, Proj. NR 782 003, Tech. Rep. SDC 104 2 23. ONR, Special Devices Center, Voice Lab., Purdue Univ., Lafayette, Ind.

The purpose of these studies was to investigate the application of the Voice Communications Laboratory (VCL) 24-word Test as a speech reception test of hearing ability, and to compare the results with those obtained under the same conditions for two established intelligibility tests, Auditory Test No. Nine (Spondaic Words) and the PB-50 (Phonetically Balanced) lists. Twenty-five normal hearing subjects and 22 hard of hearing subjects were administered modified forms of the three tests, recorded by the experimenters at Purdue University, and the PB test recorded at Central Institute for the Deaf. The tests were administered in five db steps, through the Purdue Speech Reception Test Equipment. The reliability coefficients for the four tests, computed by the odd-even method, all were above .93. The mean percentage scores and standard deviations of the normal-hearing subjects were computed for the tests at each intensity level. Results of the tests for both the normal hearing and hard of hearing groups were subjected to statistical analysis. Within the limits of this investigation--the samples, tests, apparatus, and procedures used--the following conclusions may be drawn: a) The mean threshold for the VCL test lies at approximately 26 db above reference, with a mean score of 0% at 10 db and 90% at 50 db; b) A high inter-relationship exists among the VCL, No. Nine and PB tests; c) Differences among the test means are statistically significant; d) Although the VCL data (intensity level vs. percentage of correct responses) closely resemble those obtained for the No. Nine test, the VCL is considerably more difficult than the No. Nine, but not as difficult as the PB tests; e) The VCL test appears to differentiate between persons of normal hearing and defective hearing.

R 22

1164

Black, J.W. NATURAL FREQUENCY, DURATION, AND INTENSITY OF VOWELS IN READING. J. Speech Hearing Disorders, 1949, 14, 3-8. Contract N7onr 411, Proj. 20 K 2, Rep. 411 1 11. ONR, Special Devices Center, Kenyon College, Ohio.

The present study attempts to determine intensity duration and frequency of a sample of vowels. 42 male Ss read 11 words into a microphone. Each S: a) practiced the words under direction; b) spoke from a standing position in a sound-treated room with a constant distance between his lips and the microphone; c) read the words at 5 sec intervals; and d) inhaled between each pair of words. Measurements of peak intensity, duration and frequency were made from a tape of Ss' speeches. 3 independent ANOVAs and t-tests of the difference between means were used to analyze the data. Significant differences were found among some vowels in their natural frequency, duration and intensity. Frequency appeared to vary with the openness of the vowel, and the more open, the lower the frequency. In general, duration varied directly with the openness of the vowel. Significant differences were found among the overall intensity values of the vowels.

R 5

1165

Black, J.W. INFLECTION OF REPEATED MESSAGES. Speech Monogr., 1949, XVI(2), 3-5. Contract N7onr 411, Proj. Designation 782 004, Rep. 411 1 12. ONR, Special Devices Center, Kenyon College, Ohio.

The purpose of this study was to determine whether pitch of voice is copied when repeating messages. Of special interest was whether the final pitch inflection of a phrase is carried over when the phrase is repeated. Two recordings of 60 short phrases were made in which each phrase was spoken with an upward or downward final inflection in one recording and with the opposite inflects in the second recording. The recordings were played to 24 listener-speakers individually who repeated each phrase as soon as he heard it. The phonographic recordings obtained were then played back to panels of 24 judges who had to determine whether each phrase ended with an upward or downward inflection. A chi-square technique was used to detect significant variations from chance performance. The hypothesis that the inflection of the repetition was unaffected by the inflection of the stimulus could be rejected for 2/3 of the phrases at 10 percent level of confidence, and for 1/2 the phrases at the 2 percent level. Thus, the tendency among speakers was to copy the direction of the final inflection of the phrase that was heard. (HEIAS)

R 2

1166

Black, J.W. THE RELATION BETWEEN MESSAGE TYPE AND VOCAL RATE AND INTENSITY. Speech Monogr., 1949, 16(2), 3-6. Contract N7onr 411, Proj. Des. 782 004, Rep. 411 1 13. ONR, Special Devices Center, Kenyon College, Ohio.

The purpose of this study was to determine whether vocal rate and intensity varied among 6 types of speaking assignments: a) reading actual phrases; b) repeating factual phrases; c) continuing a familiar statement; d) locating a familiar site; e) reading responsively; and f) describing a picture. 48 male Ss were tested individually and were required to speak into a microphone which recorded his speech under the above 6 conditions. The measures used were the mean duration of the syllables and the relative intensity of the phrases in each type of speaking. One or both of these varied from task to task. This data was submitted on analyses of variance. Each pair of speaking tasks was significantly dissimilar in mean syllabic rate or intensity or both. The differences in responses, duration, and intensity are apparently attributable to differences among tasks, and in a manner that emphasizes the specific nature of the task. (HEIAS)

R 5

1167

Black, J.W. THE PRECISION OF ARTICULATION IN REPEATED PHRASES. Central States Speech J., Nov. 1949, App. Contract N7onr 411, Proj. Designation 782 004, Proj. 20 K 2, Rep. 411 1 14. ONR, Special Devices Center, Kenyon College, Ohio.

This paper reports a study of the relationships between the precision of articulation of the stimulus phrase and the repetition--this is a circumstance in which attention of the listener-speaker was focused upon the right message, not an aesthetic characteristic of speech. 5 Ss read lists of 12 5-syllable phrases, the phrases spaced 5 sec. apart. 24 Ss individually heard and repeated the 60 phrases, 3 speech students then selected with unanimous agreement 2 phrases from each list of 12, representing respectively good and poor articulation. The responses to these 10 selected phrases (from the 24 Ss) were re-recorded in pairs with the order of responses to good and poor phrases randomized. These recordings were then played twice to 53 judges. It was found using a binomial test of proportions that Ss tended to repeat the phrases in keeping with the degree of articulation that they heard. Also, when he was judged to be articulating 'better' he was speaking more slowly. However, it could not be established that greater duration and better articulation were necessary concomitants. It was concluded that the speakers changed their articulatory pattern--presumably unconsciously--with the span of successive short speaking performances; and their momentary patterns of articulation were set in part by the ones they heard.

1168

Black, J.W. LOUDNESS OF SPEAKING: THE EFFECT OF HEARD STIMULI ON SPOKEN RESPONSES. Contract N7onr 411, Proj. 20 K 2, Designation NR 782 004, Rep. 411 1 2, June 1948, 39pp. Acoustic Lab., School of Aviation Medicine & Research, ONR, Special Devices Center, NAS, Pensacola, Fla. (Kenyon College, Gambier, Ohio).

A series of experiments is in process to determine characteristics of voice that affect the vocal patterns of responding listener-speakers. Summaries of 5 experiments are given in this report. They treat factors that alter intensity of voice. The data show that in repeating messages that are heard over headsets--except in the instance of very weak signals--the listener responds with greater intensity as he hears more intense signals. It was also found that vocal loudness is similarly affected when the speaker is answering questions instead of repeating words. Moreover, Ss in the experiments were unable to maintain a constant intensity when "saying back" words that were heard at different levels of amplification. 2 amounts of noise background introduced into the headsets of the listeners did not significantly differentiate 2 levels of vocal response. Messages spoken by males and females elicited different intensities, the female being responded to the louder. This observation may be misleading and arise from non-identical intensity levels in the stimulus materials. Room illumination did not affect the intensity with which the listeners repeated words.

R 1

1169

Lightfoot, C. & Black, J.W. RATE OF SPEAKING: REPORTS II-III. (RESPONSES TO HEARD STIMULI). Contract N7onr 411, Proj. 20 K 2, Designation NR 782 004, Rep. 411 1 3, June 1948, 15pp. Acoustic Lab., School of Aviation Medicine & Research, ONR, Special Devices Center, NAS Pensacola, Fla. (Kenyon College, Gambier, Ohio).

2 experiments, part of a series, concerned with speech rate are reported. Exp. I evaluated the effect of interrupted phrases on the rate at which those phrases are repeated. Measurements were made of the duration of repeated, 5-syllable phrases the originals of which included equal numbers of: a) phrases containing 1-sec pauses which did not seem to disturb the meaning; b) phrases containing 1-sec pauses which seemed to interrupt the flow of thought; c) phrases containing no pauses. Analysis of the obtained data indicated that: a) the mean duration of repetitions of phrases which had originally been uttered with pauses was significantly greater than that of repetitions of phrases which had originally been uninterrupted; b) the mean duration of phrases originally uttered with seemingly logical pauses was significantly greater than that elicited by phrases containing a distracting interruption. Exp. II evaluated the effect of normal speech rate on the relationship between the rate of repeated phrases and the rate of the original phrases. 25 Ss were divided into 5 equal groups on the basis of time taken to read a list of meaningful phrases and sentences. 5 lists of phrases, comparable in all respects save rate, were presented to each S who was instructed to repeat each phrase in a natural manner. Analysis of the durations of the repeated phrases indicated that: a) original phrase rate influenced the response rates of Ss in the 3 faster speaking groups in a more uniform way than it influenced the less fluent Ss; b) there was a definite relationship between rates of original and repeated phrases for the fast-speaking groups and for the slow-speaking groups.

R 3

1170

Lightfoot, C. & Morrill, S.N. LOUDNESS OF SPEAKING: THE EFFECT OF THE INTENSITY OF SIDETONE UPON THE INTENSITY OF THE SPEAKER. Contract N7onr 411, Proj. 20 K 2, Designation NR 782 004, Rep. 411 1 4, June 1948, 12pp. Acoustic Lab., School of Aviation Medicine & Research, ONR, Special Devices Center, NAS, Pensacola, Fla. (Kenyon College, Gambier, Ohio).

This study investigated whether the level of amplification or intensity of the side-tone of an aircraft radio or interphone affect the intensity with which the speaker talks and his intelligibility. 16 naval officers served as Ss and were required to read 4 lists from 2 forms of the Voice Communication Laboratory Multiple-Choice Intelligibility Test while wearing headphones. Each list was accompanied by one of 4 conditions of side-tone in circuit noise. The recordings of the readings were played back to panels of 12 listeners who were composed of the original 16 Ss. The different combinations of Ss formed 4 panels. The listeners heard the recording through earphones at one level of amplification with simulated airplane noise (110-114 db) filling the room. An analysis of variance indicated that intelligibility scores were affected differentially by side-tone level. The speakers were progressively both more intense and more intelligible as their side-tone was diminished in intensity.

R 0

1171
Black, J.W. EVALUATION OF THE PRIMARY FLIGHT HELMET, DEVICE 12-EM - 6 (IMPACT - AUDIBLE SIGNAL SYSTEM FOR FLIGHT TRAINING). Contract N70R 411, Proj. NR 001 058.03.01, SDC TR 411 1 18, Dec. 1949, 22pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

1171
This study evaluated the Primary Flight Helmet (PFH) Device 12-EM-6 (Impact-Audible signal system for flight training). The following factors and conditions were investigated: natural responses to the four spatially different PFH signals; recognizability of PFH signals; effect of pre-occupation on reaction accuracy; auditory masking characteristics; comparison of voice and PFH for communication speed, student preference, reliability, and response to false cues; reduction of voice communication in Link trainer flights; and construction and maintenance. Four hundred midshipmen (NR07C) and 64 cadets served as subjects. Data for each test is presented, and tests of significance performed where applicable. Implications for auditory tactile communication are mentioned. R

1172
Lightfoot, C. SOME EFFECTS OF THE COMMON COLD UPON SPEECH. Contract N70R 411, Proj. 20 K 2, Proj. Designation NR 782 004, Tech. Rep. SDC 411 1 8, Aug. 1949, 27pp. Acoustic Lab., School of Aviation Medicine & Research, ONR, Special Devices Center, NAS, Pensacola, Fla. (Kenyon College, Gambier, Ohio).

A study is presented which evaluated the effects of the common cold on a speaker's intelligibility or vocal quality. It was found that whether their words were transmitted to listeners through earphones in a very noisy room or through a loudspeaker in a quieter place, a group of men with coryza will vary considerably with respect to direction and amount of change that administration of a vasoconstricting spray will produce in the intelligibility of their speech. Their average intelligibility, however, after such treatment, will probably be lower than a comparable average representing their normal speech, provided that no more than a third of their words contain sounds ordinarily requiring nasal emission. Also, coryzal utterances of most men can be distinguished from their normal utterances by a majority of untrained listeners; however, the coryzal speech of some men is rather misleading. Although a man's coryzal utterances might be recognized by a large proportion of listeners comparing it with his normal speech, it might be recognized by relatively few listeners comparing it with something he said shortly after his nose had been sprayed. Thus, there might be some relationship between distinctiveness of coryzal vocal quality and extent of nasopharyngeal inflammation. R 3

1173
Lightfoot, C. EFFECTS OF THE MODE AND RATE OF TRANSMITTING MESSAGES UPON THE RELATIONSHIPS BETWEEN THEIR INTENSITY AND THE INTENSITY OF REPETITIONS OF THEM. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract N70R 411, T.O. 1, Proj. NR 782 004, SDC Human Engng. Proj. 20 K 2, Tech. Rep. SDC 411 1 10, Aug. 1949, 13pp. USN Special Devices Center, Port Washington, N.Y.

1173
To determine the extent to which the relationship between intensities of original and repeated messages might be affected by (1) the mode of transmitting the originals and (2) syllabic rate of their transmission, equally readable phrases at three speed rates were given to each of 54 subjects. The task was to repeat each message in a normal tone. Messages were transmitted through loudspeaker, through headphones, or directly. Intensity levels were low, but distinctly audible, moderate (ten decibels above the first), and loud (another ten-decibel increase). Average syllabic intensities of the repetitions of messages were determined and studied for differences due to experimental variables. T. G. R 7

1174
Lightfoot, C. RATE OF SPEAKING: IV. EFFECTS OF THE MODE AND LEVEL OF TRANSMITTING MESSAGES UPON THE RELATIONSHIP BETWEEN THEIR DURATION AND THE DURATION OF THEIR REPETITION. Contract N70R 411, Proj. 20 K 2, Proj. Designation NR 782 004, Tech. Rep. 411 1 9, Aug. 1949, 16pp. ONR, Special Devices Center, School of Aviation Medicine & Research, NAS Pensacola, Fla.

This study was concerned with the effect that the duration and intensity level of a spoken utterance has on the spoken response. 18 commands or 5-syllable phrases were recorded phonographically at several rates (rapidly, intermediate rate, and slowly). These were presented to 54 Ss who were instructed to repeat each message in his usual manner of speaking; messages were recorded, and the recorded versions were played through a loudspeaker or through headphones; some emanated directly from the lips of the reader. The intensity level of the messages was low for some Ss, moderate for others, and high for others. The duration of the average of the repetitions of messages presented at one rate and over one transmission system was determined for each S. From these individual measures group means were computed and the differences among the experimental conditions they represented were evaluated. The main findings of the study are: a) Increases in the time taken by the original utterances--whether presented through a loudspeaker, through headphones, or by the reader directly--were accompanied by significant increases in the time devoted to the average repetition; b) such increases in repetition--duration were found whether the original messages were presented at a low, moderate, or high level of intensity; c) for any one of the 3 intensity conditions, the trend of such increases did not vary significantly from one transmission system to another; d) but for any one of the three original rates, average syllabic rates of the repetitions of low- and moderate-level messages were significantly different for the 3 transmission systems; such a difference was not found in the case of high messages; e) differences in mean repetition rate which accompanied changes in transmission system did not appear to be related to the intensity of the repetitions. R 5

1175
Lightfoot, C. RELATIONSHIP BETWEEN ORIGINAL AND REPEATED PHRASES. Contract N70R 411, Proj. 20 K 2, Rep. 411 1 1, May 1948, 23pp. ONR, Special Devices Center, School of Aviation Medicine & Research, Acoustic Lab., NAS, Pensacola, Fla. (Kenyon College, Gambier, Ohio).

3 experiments were conducted to determine the relationship between the rate of saying and phrase and rate of repeating that phrase under 3 conditions: a) When several groups of phrases are originated by a single speaker uses a different rate for each group; b) When a number of phrases are originated by a single speaker who varied his rate from phrase to phrase; c) When each of several groups of phrases is originated by a different speaker who speaks at his usual rate. 25 student pilots served as Ss in all 3 experiments in which they listened to 5 lists of phrases through headphones and repeated the phrases back into a microphone. The repetitions were carried to a graphic power level recorder which furnished an accurate means of measuring the duration of each response. Mean response duration for each stimulus rate and for each condition was determined. On the basis of the analysis it was concluded that: a) There is a positive relationship between duration of original and repeated phrases under all 3 conditions; b) The relationship is not rectilinear when stimuli include phrases presented at a very slow rate; c) The same sort of relationship does not prevail for all 3 conditions whether stimulus rates are within the range commonly found among speakers or whether extremely slow rates are used; d) Response rate is also influenced by factors other than stimulus rate. R 4

1176
Black, J.W. TIMED PHRASES. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract N70R 411, Proj. NR 782 004, SDC Proj. 20 K 2, SDC TR 411 15, no date, 9pp. USN Special Devices Center, Port Washington, N.Y. (Kenyon College, Gambier, Ohio).

1175
This report studies the duration of five syllable phrases with the purpose of standardizing phrase duration for work where this factor is important. Eighteen males about to start pilot training read 490 five-syllable phrases selected from Navy Flight Pattern. Duration value of each phrase was determined by a graphic level recorder. The mean duration and standard deviation of the mean duration for each phrase is listed. Also, the differences in duration of phrases in isolation and continuous reading are compared and tested for significance.
T, 3 1

1177
Reed, J.B. THE SPEED AND ACCURACY OF DISCRIMINATING DIFFERENCES IN HUE, BRILLIANCE, AREA, AND SHAPE. Contract N0R 131(01), Proj. NR 784 001, SDC Proj. 20 L 2, Tech. Rep. 131 1 2, Sept. 1951, 28pp. USN Special Devices Center, Port Washington, N.Y. (Mount Holyoke College, South Hadley, Mass.).

1177
To determine the relative discriminative value of four common aspects of vision (hue, shape, area, and brilliance), 100 subjects sorted cards carrying symbols varying in each of these aspects on the basis of a given variable. In addition, the size of the stimulus difference for hue and area were varied and sorted. Speed and accuracy of performance (average sorting time, percentage error) are analyzed and interpreted in practical terms for use in coding practices.
T,G,I,R9.

1178
Williams, A. ANALYSIS OF INFORMATION REQUIRED FOR INSTRUMENT FLIGHT. Contract N6CRI 199, Proj. 20 L 1, 15pp. USN Special Devices Center, ORR, Port Washington, N.Y. (University of Illinois).

1178
This paper presents a descriptive analysis of the information required by a pilot in order to fly. Definitions of goals and related action sequences are given; the necessary discriminations and manipulations are detailed and reduced to four sub-goals which represent action for the pilot to follow (directional, attitude, temporal, and mechanical). The manner of presentation of these sub-goals, instrumentation, is then explored.

1179
Williams, A.C. EVALUATION AND DEVELOPMENT OF AIRCRAFT INSTRUMENT DESIGNS. Contract N6CRI 71, Proj. 20 L 1, Prog. Rep. 3, May 1947, 8pp. Institute of Aeronautics, University of Illinois, Urbana, Ill.

1179
This paper contains an informal report of tests of perception of motion in a rotating chair in which the axis of rotation may be situated behind the subject, in front of him, or to either side. It is argued that the results of these tests cannot be accounted for in terms of contemporary inertia - momentum theories of vestibular function. A hypothesis of vestibular function in terms of the gyroscopic properties of a vibrating cupola is outlined.

1180
Williams, A.C. EVALUATION AND DEVELOPMENT OF AIRCRAFT INSTRUMENT DESIGNS. Contract N6CRI-71, Proj. 20-L-1, T.O. Prog. Rep. 6, March 1948, 9pp. University of Illinois.

1180
This report on aircraft instrument design is primarily concerned with problems of altitude and direction control manipulation. Various types of controls are analyzed with a general reference to pertinent experimental findings. Requirements for optimal control-indicator relationships are specified and two general design requirements for conventional controls are formulated. A number of aircraft controls are evaluated in terms of the degree to which they meet each design requirement.

1181
Williams, A.C., Jr. PRELIMINARY ANALYSIS OF INFORMATION REQUIRED BY PILOTS FOR INSTRUMENT FLIGHT. Contract N6CRI 71, Proj. NR 784 003, SDC Proj. 20 L 1, Task 16, SDC TR 71 16 1, ca. 1949, 13pp. USN Special Devices Center, GNR, Port Washington, N.Y. (Psychology Dept., University of Illinois, Urbana, Ill.).

1181
This paper employs the following scheme for the analysis of information required for successful instrument flight behavior: "(first) in order to achieve a goal the behaving person (the pilot) must make a series of discriminations between courses of action which are open to him, selecting those which will lead him to the goal, and (second) he must translate these courses of action into a motor performance." Given the goal and necessary subgoals, a summary of the information thus required includes: earth-topography, geography; air-movement, weather; plane-flight characteristics; pilot-limitations; traffic. This information is reduced such that four courses of action: directional, altitude, temporal, and mechanical are represented.
T, I, R 1

1182
Johnson, B.E., & Williams, A.C. OBEDIENCE TO ROTATION-INDICATING VISUAL DISPLAYS AS A FUNCTION OF CONFIDENCE IN THE DISPLAYS. Contract N6CRI-71, T.O. 16, Proj. 20-L-1, Proj. Designation NR-784-003, Tech. Rep. SDC 71-16-2. June 1949. 18pp. ONR, Special Devices Center, Univ. of Ill., Dept. of Psychol.

1182
To determine the effects of confidence in visually presented information upon response to rotation cues of the display, twenty subjects were placed in a cubicle (on a rotation table) from which could be seen a direct view of the room, its mirror image, a positive panoramic display, and its negative; the task was to move a stick in the direction of acceleration or deceleration during rotation. After inspection of the equipment, further trials were made in which response was to direction of movement. Data from the two confidence levels and the positive and negative cues are compared for their relative effects on accuracy of response.

1183
Williams, A.C., & Roscoe, S.W. PILOT PERFORMANCE IN INSTRUMENT FLIGHT AS A FUNCTION OF THE EXTENT AND DISTRIBUTION OF VISIBLE HORIZON. Contract N6CRI-71, T.O. 16, Proj. 20-L-1, Tech. Rep. SDC 71-16-3. June 1949. 21pp. ONR, Special Devices Center, Univ. of Ill., Dept. of Psychol.

1183
To determine the effect of extent and distribution of visible horizon upon instrument flight performance, nine experienced pilots flew a standardized pattern in a plane modified so that variations in extent (subtending visual angles of 16 degrees, ten degrees forty minutes, and five degrees twenty minutes) and position (on longitudinal axis, and forty degrees to left and right, singly and in combinations) could be made. Nine experimental conditions were given in counter-balanced order. Average error scores for direction and altitude are analyzed for effects of the experimental variables. Further experimentation is outlined.
T,G,I,R1.

1184
Williams, A.C. & Fleymann, R.E. AN EVALUATION OF THE LINK SNJ OPERATIONAL TRAINER AS AN AID IN CONTACT FLIGHT TRAINING. Contract N6CRI 71, SDC Proj. 20 L 1, SDC TR 71 16 5, July 1949, 8pp. USN Special Devices Center, Port Washington, N.Y. (Dept. of Psychology, University of Illinois, Urbana, Ill.).

1184
To evaluate the Link SNJ Operational Trainer as an aid in contact flight training, an experiment was performed with 2 groups of 6 college students each. One group learned a series of maneuvers in the Trainer, then rehearsed in an aircraft; the control group learned the same maneuvers directly in the aircraft. Results (number of hours required for criterion performance) are discussed regarding potential savings in flight training time through preflight training in the Link Trainer.
T.

1185

Payne, T.A. A STUDY OF THE MOVING FIGURE AND ORIENTATION OF SYMBOLS ON PICTORIAL AIR-CRAFT INSTRUMENT DISPLAYS FOR NAVIGATION. Contract NSORI-71, T.O. 16, Proj. 20-L-1, Proj. Designation NK-784-003, Tech. Rep. 71-16-8. July 1950. 25pp. ONR, Special Devices Center, Univ. of Ill., Dept. of Psychol.

1185

To investigate some features of a pictorial display of air navigation information (azimuth position in relation to radio station, VOR) two groups of private pilots (18 each) drew solutions to navigation problems using printed drawings in which (1) the moving figure represented the station or the aircraft with the other in a fixed position, and (2) the moving figure represented the aircraft with station location and orientation of compass rose varied. Performance (time and error scores) is analyzed in terms of what the moving part of the display should represent and what position and orientation of symbols should be used. T.I.R.7.

1186

Bell, J.M. A LANDING DISPLAY FOR USE WITH A CONTACT FLIGHT SIMULATOR. Contract NSORI 71, Proj. NR 784 003, SDC Proj. 20 L 1, SDC TR 71 16 8, March 1951. USN Special Devices Center, Port Washington, N.Y. (University of Illinois, Urbana, Ill.).

1186

To determine the geometry of a visual display which might be used in teaching contact landings in a synthetic flight trainer, a mathematical analysis of the visual perspective cues that occur during an approach to landing is made. Application of the equations developed by this procedure is made to the actual design of such a training device. Diagrams are included. I.R.I.

1187

Kaufman, E.L. THE EFFECT OF A SIMPLE TRAINING PROCEDURE ON THE JUDGMENT OF VISUAL NUMBER. Contract NSOR 131(01), Proj. NR 784 001, SDC Proj. 20 L 2, SDC TR 131 1 1, Sept. 1951, 12pp. USN Special Devices Center, Port Washington, N.Y. (Mount Holyoke College, South Hadley, Mass.).

1187

To determine the effectiveness of training on estimation of number, ten subjects viewed fields of black dots (from one to 210) and made rapid estimates (within 1/5 second) of the number perceived; procedure repeated with the correct number of dots given after each report was made; eight months later the first procedure was repeated. Errors are analyzed for group and for individual accuracy as a function of the training (knowledge of results). Discussion concerns trends toward overestimation and underestimation and the lasting effects of training. T.G.

1188

Slater-Hammel, A.T. & Brown, J.S. DISCRETE MOVEMENTS IN THE HORIZONTAL PLANE AS A FUNCTION OF THEIR LENGTH AND DIRECTION. Contract NSORI 57, SDC Proj. 20 M 1, Rep. 2, Oct. 1947. 24pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., State University of Iowa, Iowa City, Iowa).

1188

The speed and accuracy with which individuals can execute simple discrete movements of the hand and arm were investigated. Twelve right-handed males were required to move the limb as rapidly and accurately as possible from one fixed position in space to another, the movements confined to the horizontal plane parallel to the frontal plane of the body. Two directions of movement: right-to-left and left-to-right, and three lengths of movement: 2.5, 10, and 40 cm were studied. From detailed graphic records several aspects of movement were obtained and analyzed: RT (variance analyses); primary-movement time, total-movement time, secondary-movement times, and speed of movement (t and F analyses); and correlations between movement times for the three distances. T. G. I. R 6

1189

Lewis, D. & Shephard, A.H. DEVICES FOR STUDYING ASSOCIATIVE INTERFERENCE IN PSYCHOMOTOR PERFORMANCE. IV. THE TURRET PURSUIT APPARATUS. J. Psychol., 1950, 23, 173-182. (Dept. of Psychology, State University of Iowa, Iowa City, Iowa).

1189

This is a report on the development of a new apparatus for research on associative interference in a tracking task--the Turret Pursuit Apparatus. The apparatus is described in detail, and results given for a sample experiment. Forty students had 10 trials a day for 7 days, with the first 3 days' practice on standard (normal) control-display arrangement, next 3 days on reversed arrangement, and final day on re-learning the standard task. The photocell target moved through the same path each day. Results of practice with respect to both interference by reversed task, and individual differences in interference are reported. T. I. R 2

1190

Adams, J.A. THE EVALUATION OF DIFFICULTY OF TASK UNDER SEVERAL DIFFERENT CONDITIONS OF PERFORMANCE ON THE MODIFIED MASHBURN APPARATUS. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract NSORI 57, Proj. NR 783 002, SDC Proj. 20 M 1, SDC TR 57 2 8, 1949. 27pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1190

This is a methodological study to develop a reliable index of the relative difficulty of 6 different tasks on the Modified Mashburn Apparatus. Six groups of 15-18 male college students each practiced for 20 trials on 1 of 6 combinations of display movement to control movement. Number of matches and errors are plotted; ratios of errors to matches are plotted, and 6 possible indices of difficulty (ranging from mean matches and errors to slopes of performance curves) are computed and compared. A combination of certain of these indices is recommended as a general index of difficulty. T. G.

1191

Adams, J.A. THE PROBLEM OF CONTROLLING LEVEL OF LEARNING IN STUDIES OF ASSOCIATIVE INTERFERENCE IN PSYCHOMOTOR PERFORMANCE. Contract NSORI 57, Proj. NR 783 002, SDC Proj. 20 M 1, SDC TR 57 2 9, April 1949. 8pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1191

This is a discussion of the relatively greater difficulty in controlling level of learning in experiments on psychomotor learning than in experiments on verbal learning. The problems are illustrated with learning curves obtained on three Ss with the Mashburn Apparatus. A possible satisfactory solution is proposed and plans for using this method in a forthcoming program of research are discussed. G. R 5

1193

Lewis, D., Shephard, A.H. & Adams, J.A. EVIDENCES OF ASSOCIATIVE INTERFERENCE IN PSYCHOMOTOR PERFORMANCE. Science, Sept. 1949, 110(2855), 271-273. (Department of Psychology, State University of Iowa, Iowa City, Iowa). (SDC TR 57 2 11).

1193

This is a general presentation of some results from a number of studies of associative interference utilizing the Modified Mashburn Apparatus. The apparatus and procedure (original learning, interpolated learning with reversed controls, and relearning) are discussed, and samples are presented of plotted results giving evidence of associative interference. G. R 7

1194

Lewis, D. DEVICES FOR STUDYING INTERFERENCE IN PSYCHO-MOTOR PERFORMANCE. III. THE DOUBLE-DISK PURSUIT APPARATUS. *J. Gen. Psychol.*, 1951, 45, 123-132. (Department of Psychology, State University of Iowa, Iowa City, Iowa). (SDC TR 57 2 13).

1194

This is a report of some unsuccessful attempts to develop a simple pursuit apparatus as a source of interfering reversible tasks. The development of the Double Disk Pursuit Apparatus (2 Koerth-type rotors mounted side by side, almost touching, with which the subject is required to alternate his pursuit action between the 2 disks) is described in some detail, and learning curves are given for pilot experiments using mirror vision with the simple Koerth rotor, and using 2 prototypes of the Double Disk apparatus.

I. G. R 6

1195

Gagne, R.M., Baker, Katherine E. & Foster, Harriet. TRANSFER OF DISCRIMINATION TO A MOTOR TASK. (MOTOR SKILLS AND JOB EFFICIENCY). Contract N7ONR 316, Proj. NR 783 003, SDC Proj. 20 M 1A, SDC TR 316 1 6, July 1949, 30pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.).

1195

In an investigation of transfer of training in stimulus discrimination, 140 Navy enlisted men had 60 learning trials on a task requiring discrimination of both color (red or green) and position (top or bottom) of signal lights as stimuli for the selection of one of 4 switches to press. Two groups (56 each) had 30 trials of preliminary practice on color discrimination only or on position discrimination only, and a control group (28) had no preliminary practice. Response times and errors are analyzed and interpreted regarding relative difficulty of color and position discrimination, transfer effects, and implications for choice of components for training.

T. G. R 3

1196

Gagne, R.M. & Baker, Katherine E. STIMULUS PRE-DIFFERENTIATION AS A FACTOR IN TRANSFER OF TRAINING. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract N7ONR 316, Proj. NR 783 003, SDC Proj. 20 M 1A, SDC TR 316 1 7, Aug. 1949, 20pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.).

1196

To study the effects of practice on differentiating stimuli prior to learning motor reactions to the stimuli, 4 matched groups of 32 college men each had 0, 8, 16 or 32 trials of learning a response letter for each of 4 signal lights. Then all subjects had 60 trials of learning to select one of 4 switches in response to each signal light. Response times and errors are analyzed to evaluate the effectiveness of stimulus pre-differentiation in transfer of training, and implications for training methods are discussed.

T. G. R 8

1197

Gagne, R.M. & Baker, Katherine E. TRANSFER OF TRAINING TO A MOTOR TASK IN RELATION TO STIMULUS SIMILARITY. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract N7ONR 316, Proj. NR 783 003, SDC Proj. 20 M 1A, SDC TR 316 1 8, Aug. 1949, 33pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.).

1197

To study transfer of training as a function of stimulus similarity, 5 matched experimental groups of 25 Navy men learned to press one switch in response to one color, a second switch to any of 6 other colors. All transferred to final tasks, differing from the training task in that a different color was the stimulus for the one-color switch, and differing among groups in the similarity of the second one-color stimulus to the first. Response time and errors are discussed regarding the relative amount of transfer and interference as a function of stimulus similarity.

T. G. R 7

1198

Gagne, R.M., Baker, Katherine E. & Wylie, Ruth C. THE EFFECTS OF AN INTERFERING TASK ON THE LEARNING OF A COMPLEX MOTOR SKILL. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract N7ONR 316, Proj. NR 783 003, SDC Proj. 20 M 1A, SDC TR 316 1 9, Aug. 1949, 25pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.).

1198

To study the effects of performing an interfering task at different stages of learning a complex motor skill, 6 matched groups of 22 college men each practiced for 6 stages (26 trials each) making matches with the Complex Coordination Test. An interfering task, involving lever settings in response to light stimuli, was introduced at a different stage for each of the 6 groups. Results (mean time at each stage) are analyzed for the effects of the interfering task, and implications for training on components of tasks are discussed.

T. G. R 3

1199

Gagne, R.M., Baker, Katherine E. & Wylie, Ruth C. TRANSFER OF TRAINING TO A MOTOR SKILL AS A FUNCTION OF VARIATION IN RATE OF RESPONSE. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract N7ONR 316, Proj. NR 783 003, SDC Proj. 20 M 1A, SDC TR 316 1 10, Aug. 1949, 23pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.).

1199

To study transfer of training as a function of response rate, 5 groups of 31 male college students practiced a tracking task requiring maintenance of a null setting of a moving pointer by turning a crank at an appropriate rate. After 8 trials at one rate, each group transferred to a task requiring a different rate, combinations of 4 different rates being varied among the 5 groups. Results (time on the null setting) are discussed regarding the effects of relative rates on transfer between tasks, and the implications for training methods and devices are pointed out.

T. G. I. R 7

1200

Gagne, R.M., Foster, Harriet, & Crowley, Miriam E. THE MEASUREMENT OF TRANSFER OF TRAINING. Contract N7ONR-316, Rep. 316-1-1, Sept. 1947, 59pp. CNR, SDC, U.S. Naval Medical Research Laboratory, New London, Conn. (Connecticut College)

1200

To assess training devices and training, in for instance, the gaining of proficiency in a motor skill, it is necessary to employ transfer of training measures, in the operational situation. This article is a review of such measures of transfer, a discussion of the variations in such measures (as dependent upon experimental conditions), and a statement of the requirements for good measures. The six different types of measures found in the literature are evaluated with respect to these criteria.

R 136

1201

Gagne, R.M. & Foster, Harriet. TRANSFER OF TRAINING FROM PRACTICE ON COMPONENTS IN A MOTOR SKILL. Contract N7ONR 316, Proj. 20 M 1A, Rep. 2, Dec. 1947, 60pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.).

1201

This report concerns the value of varying amounts of practice on a component of a psychomotor skill, in the learning of the task itself. Navy enlisted men learned differential manual responses to four lights. Part training, on discrimination of reactions to the position of the lights, was given 3 groups, for 10, 30 or 50 trials; part training, in discrimination of responses to the color of the lights, was given one group, for 30 trials. These groups, and a control, practiced for 60 trials the total skill, up-down and red-green discriminations. Time for each correct reaction and errors are reported.

T. G. R 26

1202

Gagne, R.M. & Foster, Harriet. TRANSFER TO A MOTOR SKILL FROM PRACTICE ON A PICTURED REPRESENTATION. Contract N6ONR 316, Proj. NR 783 003, Rep. 316 1 4, June 1948, 30pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.).

1202

To study the transfer of training on a paper-and-pencil representation of a motor task to the performance of the task itself, 5 matched groups of 30 Navy enlisted men each were given 60 trials on a task requiring the pressing of one of 4 switches in response to one of 4 lights. Prior to learning the task, the groups had 0, 8, 16, 24, or 48 trials on marking the appropriate switch on a paper-and-pencil representation of the apparatus. Response times and errors are analyzed for the effects of the various amounts of practice on transfer, and an hypothesis is advanced relating the pre-training to a reduction in tendency to generalize.

T. G. I. R 14

1203

Hollander, E.P. VARIABLES UNDERLYING SOCIOMETRIC STATUS. I. A THEORETICAL MODEL OF IDIOSYNCRATIC BEHAVIOR AND STATUS. Contract N6ONR 1849(00), Tech. Rep. 4 56, July 1956, 19pp. Psychological Labs., Carnegie Institute of Technology, Pittsburgh, Penn.

1203

This paper presents a theory of behavior which centers about idiosyncratic behavior (non-conformity) and yields a status variable in the form of group-awarded "idiosyncratic credits". Background considerations, determinants of idiosyncratic behavior, idiosyncratic credits and their determinants, and group variables are discussed along with a symbolic representation of the mechanisms of the model. The implications of the model for the study of status, or leadership, are discussed.

I. R 27

1204

Schulman, J., Barmack, J.E., & Coakley, J.D. HUMAN PROBLEMS IN THE OPERATION OF HIGH SPEED AIRCRAFT: I. ATMOSPHERIC OZONE. Contract N6ONR-151, T.O. 1, Proj. 20-M-1b, Memorandum No. 1, Aug. 1947, 13pp. ONR, Special Devices Center, (Division of Bio-Mechanics, The Psychological Corporation, New York)

1204

This paper reviews the available information on ozone (O_3) concentration in the atmosphere as a function of altitude in relation to its effects on man and animals, to evaluate the hazard of ozone toxicity from breathing air compressed at very high altitudes. The symptoms produced by breathing air containing ozone are summarized as a function of concentration and duration of exposure. Since nitrous oxide (NO_2) is a common contaminant in prepared ozone and also occurs in free atmosphere, its toxic effects, alone and in mixture with ozone, are also reviewed.

T,G,R26.

1205

Barmack, J.E. & Coakley, J.D. A METHOD OF INCREASING THE MANEUVERABILITY OF HIGH SPEED AIRCRAFT WITHIN THE LIMITS OF HUMAN TOLERANCE TO G FORCES. Contract N6-onr-151, T.O. I, Desig. NR-783-004, Proj. No. 20-M-1b, Rep. 151-1-11, Feb. 1948, 67pp. ONR, Special Devices Center. (Division of Bio-Mechanics, The Psychological Corporation, New York)

1205

Theoretical calculations of the magnitude and direction of the g forces acting on the pilot of an aircraft during a high speed turn are presented. Comparisons are made among comparable turns on a constant radius at a constant speed, turns preceded by deceleration and succeeded by equal acceleration, and turns with deceleration going into the turn and equal acceleration coming out. The efficiency of these classes of turns with respect to lapsed time and distance traversed is also compared.

T,G,R1.

1206

Coakley, J.D. (Dir.). THE EFFECT OF AMBIENT AND BODY TEMPERATURES UPON REACTION TIME. Contract N6ONR 151, Proj. NR 783 004, SDC Proj. 20 M 1b, Task 1, SDC TR 151 1 13, March 1948, 34pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Bio-Mechanics Div., Psychological Corporation, New York, N.Y.).

1206

This review of the literature on the effect of ambient and body temperatures upon RT is organized in terms of three topics: 1) effects of low ambient temperatures on RT, 2) effects of high ambient temperatures on RT, and 3) relationship between body temperature and RT. A critical survey and evaluation of the literature is followed by a brief summary of conclusions applicable to the performance of the pilot in high-speed aircraft.

T. G. R 16

1207

Vestinger, L., Kelley, H., Orlansky, J. & Coakley, J.D. ESTIMATES OF VISIBILITY FROM HIGH ALTITUDE AIRCRAFT. Contract No. N6-onr-151, T.O. 1, Desig. NR-783-004, Proj. 20-M-1b, Rep. No. 151-1-14, April 1948, 59pp. ONR, Special Devices Center. (Division of Bio-Mechanics, The Psychological Corporation, New York)

1207

To present estimates of visibility (detection of the presence of an object) at high altitudes, data from specific laboratory research is combined with relevant data from the literature. Section I presents data about vision (brightness contrast, visual angle, adaptation level) and the properties of the atmosphere which influence vision; Section II shows how the distance at which an object becomes visible may be computed by taking into account the influence of atmospheric attenuation; and Section III presents estimates of visibility for a specific target at altitudes up to 300,000 feet when the observer is at various altitudes up to 200,000 feet.

T,G,R41.

1208

Orlansky, J. & Dunlap, J.W. THE HUMAN FACTOR IN THE DESIGN OF STICK AND RUDDER CONTROLS FOR AIRCRAFT. Contract N6ONR 151, SDC Proj. 20 M 1b, Task 1, Feb. 1948, 77pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Bio-Mechanics Div., Psychological Corporation, New York, N.Y.).

1208

"This study is an attempt to determine how airplane control systems may be designed to provide the pilot with optimal sensory information by means of pressure cues obtained from operating the stick and rudder. The present approach to the problem consists of an examination and evaluation of literature pertaining to a) the maximum forces that may be exerted by a human pilot; b) human reaction time insofar as it may be expected to cause delays in the pilot's response; c) the optimal design, placement, and manner of movement of controls, and d) the optimal gradients of control forces. Current specifications for stability and control characteristics of military and civil airplanes are examined."

T. G. I. R 75

1209

Spragg, S.D.S., Devoe, D.B. & Davidson, A.L. STUDIES IN THE ACCURACY OF MOVEMENT. I: THE BISECTION AND DUPLICATION OF LINEAR EXTENTS IN THE HORIZONTAL SAGITTAL PLANE. Contract N6ONR 241, Proj. NR 783 006, SDC Proj. 20 M 1b, Task 6, SDC TR 241 6 1, Oct. 1949, 20pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., University of Rochester, Rochester, N.Y.).

1209

This study attempts to determine the accuracy with which Ss 1) can duplicate and 2) can bisect a sampled extent of linear movement in the horizontal plane parallel to the sagittal plane. Each of several Ss made 32 judgments for both the duplicating and bisecting instructions at each of four linear extents which varied from 4 to 24 cm, by moving a rider back and forth on a track. The basic results have been expressed as Mean Average Error, Mean Constant Error, and standard deviation; differences have been analyzed by t tests.

T. G. I. R 2

1210

Spragg, S.D.S., Devoe, D.B. & Davidson, A.L. STUDIES IN THE ACCURACY OF MOVEMENT. II. THE BISECTION AND DUPLICATION OF LINEAR EXTENTS AT VARIOUS ANGLES IN THE HORIZONTAL PLANE, AND AT INCLINATIONS ABOVE THE HORIZONTAL. Contract N6ONR 241, Proj. NR 783 006, SDC Proj. 20 M 10, Task 6, SDC TR 241 6 2, Oct. 1949, 21pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., University of Rochester, Rochester, N.Y.).

1210

As in accession no. 1209, Ss were instructed to duplicate and to bisect a sampled extent of linear movement; however, here the movement was at -90, -45, +45, +90 degrees in the horizontal plane and at inclinations of 0, 45, 90 degrees above the horizontal. The distances to be judged again ranged from 4 to 24 cm; Ss made 16 forward and 16 backward judgments at each angle at each distance. (The gravitational component for the above horizontal inclinations were counterbalanced by a weight). The results were expressed both as average error and constant error, and differences were examined by t-test analyses. Recommendations for control setting situations were made.
T. G. I. R 2

1211

Norris, Eugenia B. & Spragg, S.D.S. STUDIES IN COMPLEX COORDINATION. I. PERFORMANCE ON THE TWO-HAND COORDINATOR AS A FUNCTION OF THE PLANES OF OPERATION OF THE CONTROLS. Contract N6ONR 241, Proj. NR 783 006, & SDC Human Engng. Proj. 20 M 10, SDC TR 241 6 3, Aug. 1950, 16pp. USN Special Devices Center, Port Washington, N.Y. (Dept. of Psychology, University of Rochester, Rochester, N.Y.).

1211

To investigate performance of a two-hand coordination task as a function of the planes of rotation of the controls, the SAM Two-Hand Coordinator was modified so that each crank control could be placed in any one of a variety of planes. Three planes were investigated: horizontal, vertical and parallel to the frontal body plane, and vertical and perpendicular to the frontal body plane. Each of ten groups of subjects was given preliminary trials on one plane of rotation; each of nine groups was then assigned to one of a combination of planes; the tenth group continued practice on the preliminary combination. The results were analyzed in terms of mean time on target and for differences between groups which could be attributed to plane of rotation.
T. G. I. R 12

1212

Spragg, S.D.S. & Devoe, D.B. STUDIES IN THE ACCURACY OF MOVEMENT. III: THE BISECTION AND DUPLICATION OF ANGULAR EXTENTS AS A FUNCTION OF SIZE OF ANGLE AND OF TYPE OF ENDPOINT CUE. Contract N6ONR 241, Proj. NR 783 006, SDC Proj. 20 M 10, Task 6, SDC TR 241 6 4, Oct. 1950, 26pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., University of Rochester, Rochester, N.Y.).

1212

This study tested the accuracy of making knob settings as a function of the size of angle to be duplicated or bisected, and of the type of end-point cue provided. The angular extent of knob movement ranged from 20 to 160 degrees and the cues were tactual-kinesthetic, visual, and auditory. Ss (12) were given considerable practice in the knob turning procedures; each S made 20 bisection and duplication judgments with each type of cue for each of four angles. Again the results have been expressed by means of average error, constant error, and standard deviations. Differences were examined by variance analyses and t-tests.
T. G. I. R 4

1213

Morris, E.B. & Spragg, S.D.S. STUDIES IN COMPLEX COORDINATION. II: PERFORMANCE OF THE TWO-HAND COORDINATOR AS A FUNCTION OF THE RELATIONS BETWEEN DIRECTION OF ROTATION OF CONTROLS AND DIRECTION OF MOVEMENT OF DISPLAY. Contract N6ONR 241, Proj. NR 783 006, SDC Proj. 20 M 10, Task 6, SDC TR 241 6 5, Nov. 1950, 17pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., University of Rochester, Rochester, N.Y.).

1213

The accuracy of performance of a complex two-hand coordination task was examined as a function of the direction of rotation of the controls relative to the movement of the display, and the effect of the plane of rotation on the direction of rotation. A modified SAM Two-Hand Coordinator was employed. Two groups of 48 Ss each were used: for one the two cranks were in the vertical plane parallel to the frontal body plane, for the other the left crank was the same and the right was vertical but perpendicular. Four combinations of direction of rotation and two combinations of planes of rotation were tested. Results were analyzed in terms of mean time on target per condition; differences were examined by variance and t-test analyses.
T. G. R 12

1214

Brown, J.S. & Slater-Hammel, A.T. THE EFFECT OF SPEED-UP INSTRUCTIONS UPON THE PERFORMANCE OF DISCRETE MOVEMENTS IN THE HORIZONTAL PLANE. Contract N5ONR 57, SDC Proj. 20 M 1. Rep. 3, Jan. 1948, 19pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., State University of Iowa, Iowa City, Iowa).

1214

The ability to move the right arm and hand along a horizontal line parallel to the frontal plane of the body as quickly and accurately as possible was investigated using special speed-up instructions. The specific task required S to move a pointer in a left-to-right or right-to-left direction from one fixed reference line to another located 2.5, 10, or 40 cm. away. The 12 Ss each made 20 movements over each length. Performance was measured in terms of: reaction time, primary-movement, secondary-movement, and total-movement time, and accuracy. Means and standard deviations of these data were compared by t and F-ratios respectively, to those obtained in a previous study under normal instructions. The functional relation between speed and distance is described.
T. G. R 5

1215

Brown, J.S. & Knauff, E.B. POSITIONING REACTIONS OF UNIFORM LENGTH EXECUTED AT VARIOUS DISTANCES FROM THE BODY. Contract N5ONR 57, SDC Proj. 20 M 1, Rep. 4, July 1948, 9pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., State University of Iowa, Iowa City, Iowa).

1215

This study investigated the ability to perform positioning reactions involving movements of a constant length (ten cm), executed at various distances from the front of the body. Movements were confined to a line lying in the horizontal plane and perpendicular to the frontal plane of the body; starting positions were 10, 20, 30, 40 cm from the body, direction of movement was toward or away from the body. The 24 Ss each made ten responses at each position using a lightweight sliding pointer; all responses were made in the dark. Mean constant errors for the various positions and two directions of movement were compared statistically by a t-analysis.
T. G. R 1

1216

Brown, J.S., Slater-Hammel, A.T. & Bilodeau, E.A. CHARACTERISTICS OF DISCRETE MOVEMENTS IN THE HORIZONTAL PLANE WHEN EXECUTED WITH ONE AND WITH TWO HANDS. Contract NS ORI 57, SDC Proj. 20 M 1, 4ep. 5. Aug. 1948, 14pp. USN Special Devices Center, ONR, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1216

The ability to move both right and left arms in unison along a horizontal line parallel to the frontal plane of the body was studied for two directions of movement, left to right and right to left, and three lengths, 2.5, 10, 40 cm. Movements were made using a sliding pointer which could be grasped by both hands. The 12 Ss each made 20 responses over each length. Performance measures included: reaction, primary-movement, secondary-movement, and total-movement times, average and maximum speeds; and accuracy. All of these data were compared to those obtained with the same Ss using one-hand. The movement-time differences were evaluated by analyses of variance; speeds by t-tests, and accuracy by a statistical analysis, also.

T. G. R 4

1217

Brown, J.S., Wieben, E.W. & Morris, Eugenia B. DISCRETE MOVEMENTS TOWARD AND AWAY FROM THE BODY IN THE HORIZONTAL PLANE. Contract NSORI 57, SDC Proj. 20 M 1, Rep. 6, Sept. 1948, 13pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychology Dept., State University of Iowa, Iowa City, Iowa).

1217

The ability to move the right hand along a line lying in the horizontal plane perpendicular to the frontal plane of the body was studied for two directions of movement, inward and outward, and three lengths, 2.5, 10, 40 cm. The 24 Ss each made 20 responses at each of the lengths with the lightweight sliding pointer. As in the previous studies, the following performance measures were obtained: reaction, primary-movement, secondary-movement, total-movement time; average and maximum speed; and mean constant error. Means of the movement-time scores were compared for the various lengths by t-tests. Relationships among the three basic movement-time measures were examined by correlations. Other comparisons were made with earlier left-right direction data.

T. G. R 5

1218

Barch, A.M. A DEMONSTRATION OF RETROACTIVE INTERFERENCE IN PURSUIT ROTOR LEARNING. Contract NSOR 166(00), Proj. NR 783 002, SDC Proj. 20 M 1E, SDC TR 166 00 1, Dec. 1951, 16pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1219

This experiment is an attempt to demonstrate interference effects of learning a similar (not reversed) task upon the relearning of the original task, with a rotary pursuit tracking skill. The Epicyclic Pursuit Rotor was used by 43 college students. The conditions provided well-distributed practice, opportunities to warm-up, and medium to high levels of original and interpolated learning, with a short interval before relearning. Results are analyzed with respect to occurrence of interference, and the possibility of warm-up decrement in the relearning.

T. G. I. R 13

1219

Lewis, D., Smith, P.N. & McAllister, Dorothy E. RETROACTIVE FACILITATION AND INTERFERENCE IN PERFORMANCE ON THE MODIFIED TWO-HAND COORDINATOR. J. exp. Psychol., July 1952, 44(1), 44-50. (State University of Iowa, Iowa City, Iowa).

1219

In the training of psychomotor skills, the possible interference effects of learning similar or opposite tasks to those already learned are of interest. This report concerns an experiment on the Two-Hand Coordinator, keeping a button on top of a moving target, with a standard control arrangement ("normal"), and a reversed arrangement for second-task learning. The primary aim was to investigate the effects of different levels of learning the second, interpolated task, on the relearning of the standard task. Results (with college student subjects) are in terms of time-on-target scores, principally, and errors.

T. I. R 6

1220

Morgan, G.T. THEORY AND PROBLEMS OF RADAR VISIBILITY: INTENSITY-MODULATED SCOPES. Contract NSOR 16601, NRL Rep. 3046, JRU Rep. 166-I-148, Apr. 1952, 20pp. Naval Research Lab., Johns Hopkins Univ.

1220

To provide a general framework in which to consider problems of radar visibility, an analysis is made of the major phenomena of target detectability, as observed on the 7MF intensity-modulated radar screen, in terms of the capacity of the eye to make brightness discriminations and of the voltage regulation of light-emission from the screen. Topics covered: visual factors, brightness and size, fluorescence and phosphorescence, positive versus negative pipe, optimum CRT bias, pulse-repetition and antenna-rotation rate, beam width and pulse length, range, time of detection, search time, light adaptation and ambient illumination, color and noise.

T.G.R.15

1221

Lewis, D., McAllister, Dorothy E. & Adams, J.A. FACILITATION AND INTERFERENCE IN PERFORMANCE ON THE MODIFIED MASHBURN APPARATUS: I. THE EFFECTS OF VARYING THE AMOUNT OF ORIGINAL LEARNING. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract NSOR 93801, Proj. NR 783 007, SDC Proj. 20 M 1E, SDC TR 938 1 1, ca. 1947, 23pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1221

This report concerns the effects of different amounts of training on a psychomotor task (positioning levers in response to lights) on subsequent reversed learning, and relearning. The original task consisted of a standard (normal) control-display relationship, with the nine experimental groups receiving 10 to 50 trials, (1-5 days) followed by 10 to 50 trials of an interpolated, reversed task. Relearning occupied two days (20 trials). Three control groups had no interpolated training. Results are reported for correct matches, and errors. Discussion includes the reciprocal influences of original and second learning, especially with respect to the varying amounts of original learning.

T. G. R 10

1222

Lewis, D. & McAllister, Dorothy E. FACILITATION AND INTERFERENCE IN PERFORMANCE ON THE MODIFIED MASHBURN APPARATUS: II. THE EFFECTS OF VARYING THE AMOUNT OF INTERPOLATED LEARNING. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract NSOR 93801, Proj. NR 783 007, SDC Proj. 20 M 1E, SDC TR 938 1 2, ca. 1950, 14pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1222

Part of a study of training on the Modified Mashburn Apparatus, this experiment was concerned with the effects of varied amounts of second-task learning on the relearning of an original task. Twelve experimental groups of undergraduates had different amounts of practice on the original task (which was lever-positioning in response to lights), and for each level of original learning, different amounts of training on a reversed task. Correct matches and errors on relearning trials constitute the results, the implications of which are discussed.

T. G. R 7

1223

Hedlund, J.L. & Lewis, D. FURTHER ATTEMPTS TO DEMONSTRATE INTERFERENCE IN THE PERFORMANCE OF ROTARY PURSUIT TASKS. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract NSOR 93801, Proj. NR 783 007, SDC Proj. 20 M 1E, SDC TR 938 1 3, July 1950, 11pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1223

This report concerns the problem of interference between reversed-task learning, and original learning, which seems to occur with certain psychomotor tasks, and not others. Here experiments are reported on more complex types of pursuit rotor--the Double-Disk Pursuit Apparatus, and the Epicyclic Pursuit Rotor--developed in an attempt to demonstrate interference on a rotary pursuit task similar to what is found with positioning tasks. Students practiced an original task, a second one with control action reversed, and then relearned the first. Scores are reported for time-on-target, in beat, and in synchronization.

T. G. I. R 14

1224
Shepherd, A.R. & Lewis, D. PIECE LEARNING AS A FACTOR IN SHAPING PERFORMANCE CURVES. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract W392 93801, Proj. NR 783 007, SDC Proj. 20 X 15, July 1950, 8pp. USN Special Design Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1224
This is a study on the importance of "mutual" control-display relationships, in the Turret Pursuit Apparatus tracking task. There were two groups of subjects—students—one of which practiced first the standard version of the task (keeping a spot of light on a moving target with hand controls) and second, the reversed task. The other group practiced the reversed, less natural task first, then the standard. Time-on-target scores are plotted for results of these periods, and the relearning of the original task by both groups. G. I. R 2

1225
Adams, J.A. A STUDY OF WORK DEFICIENCY IN PURSUIT TRACKING PERFORMANCE. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract W392 93801, Proj. NR 783 007, SDC Proj. 20 X 15, SDC TR 938 1 5, July 1950, 17pp. USN Special Design Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1225
This study begins with a statement of the problem of work-up decrement in psychomotor tasks, and a discussion of various explanations of it—in terms of set, interference, or inhibition. To test these explanations, an experiment was run with two conditions of practice. In-decrements in one group had massed practice on the Epicyclic Pursuit Motor for six minutes a day, for 11 days. The distributed practice group worked for 30 min. a day, with thirty-six trials of ten sec. each separated by 40 sec. rests. Scores were always recorded after 10 sec. practice. Time-on-target scores are reported, and their meaning for the problem discussed. T. G. R 15

1226
Spleth, M. & Lewis, D. THE EFFECTS OF ALTERNATING PRACTICE ON THE PERFORMANCE OF TWO ANTAGONISTIC MOTOR TASKS. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract W392 93801, Proj. NR 783 007, SDC Proj. 20 X 15, SDC TR 938 1 6, July 1950, 8pp. USN Special Design Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1226
In connection with research on mutual interference in learning standard and reversed-control-tracking tasks, this experiment was performed with the Turret Pursuit Apparatus. The purpose was to find out whether the task—keeping a spot of light on a moving target—could be learned, if practice were alternated between the standard and expected control-display relationships, and the reversed. In the main experiment three reverse trials to one standard were run, with undergraduate Ss, who practiced an hour a day for five days. Trials were 30 sec. separated by 30-sec. rests. Results are reported for groups and for individual differences. T. G. R 2

1227
McAllister, Dorothy E. & Lewis, D. SINGLE-TRIAL PER TASK VERSUS MULTIPLE TRIALS PER TASK IN THE ACQUISITION OF SKILL IN PERFORMING SEVERAL SIMILAR TASKS. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract W392 93801, Proj. NR 783 007, SDC Proj. 20 X 15, SDC TR 938 1 7, Aug. 1950, 18pp. USN Special Design Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1227
To investigate the effects of frequently shifting from task to task while learning, 2 experiments (22 and 24 subjects) were run, one with the Washburn complex coordination apparatus, one with the Epicyclic Pursuit Motor. In each, 2 matched groups practiced 8 different tasks over a period of 8 days, one concentrating on 1 task each day, the other on all tasks every day. Then all practiced for 2 days on 2 test tasks. Learning curves and performance on test tasks are analyzed and discussed regarding single-trial and multiple-trial spacing of practice and implications for theories of transfer and interference. G. I. R 11

1228
McAllister, Dorothy E. THE EFFECTS OF LEVEL OF LEARNING AND OF OVERLEARNING ON PROACTIVE AND RETROACTIVE FACILITATION AND INTERFERENCE. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract W392 93801, Proj. NR 783 007, SDC Proj. 20 X 15, Aug. 1950, 24pp. USN Special Design Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1228
To investigate facilitation and interference in motor learning as a function of amount of original learning, an experiment was run using a Two-Hand Coordinator modified to permit reversal of display-control movement relationships. Four experimental groups practiced with standard controls 1, 4 different performance criteria (including overlearning). Interpolated practice with reversed controls was followed by a fixed amount of relearning. For each group there was a control group, a 2nd control group practiced the reversed task only. Time on target, number of errors, and persistence of errors are discussed regarding proactive and retroactive facilitation and interference. T. G. R 5

1229
Shepherd, A.R. LOSSES OF SKILL IN PERFORMING THE STANDARD WASHBURN TASK ARISING FROM DIFFERENT LEVELS OF LEARNING ON THE REVERSED TASK. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). Contract W392 93801, Proj. NR 783 007, SDC Proj. 20 X 15, SDC TR 938 1 9, Aug. 1950, 24pp. USN Special Design Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1229
This study concerns the effects of different degrees of interpolated learning. After reaching a criterion of 25 matches per trial on the Modified Washburn Apparatus, five groups of 9-11 male college students practiced to different criteria (25-39 matches) with reversed controls. Relearning was tested immediately and after 24 and 48 hours (two control groups did not have immediate relearning). Number of matches, number of errors, and error-match ratios are discussed regarding implications for theories of retroactive inhibition. T. G. R 15

1230
Lewis, D., McAllister, Dorothy E., Adams, J.A., Shepherd, A.R. et al. AN INVESTIGATION OF INDIVIDUAL SUSCEPTIBILITY TO INTERFERENCE. (HUMAN ENGINEERING SYNTHESIS OF BASIC INFORMATION). FINAL REPORT. Contract W392 93801, Proj. NR 783 007, SDC Proj. 20 X 15, SDC TR 938 1 10, Aug. 1950, 8pp. USN Special Design Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

1230
This is a review of studies investigating the possible existence of a general trait "susceptibility to interference." Thirty-six to 109 college students took part in studies involving learning a motor or verbal task, interpolated learning of a reversed task, then relearning the original task. Performance is studied in detail, and intertask correlations are examined for evidence of consistent susceptibility to interference. Details of a preliminary study and of apparatus construction (modifications of Washburn and Two-Hand Coordinator, the Turret Pursuit Test, rotor tests, and a paired-associates verbal test) are included. T. G. I. R 33

1231
Mackie, M.R. GENERAL TREATMENTS OF INTER-GROUP DIFFERENCES AND THEIR EFFECT ON THE RELIABILITY AND PREDICTABILITY OF PERFORMANCE RATINGS. Contract W392 1113 (00), Proj. NR 151-141, Balladburg, Proj. 002-013, Tech. Rep. 3, ca. 1954, 17pp. Management and Marketing Research Corporation, Los Angeles, Calif.

1231
The question of how rating scores obtained from different small subgroups of personnel can be combined to obtain the most reliable and predictable criterion was investigated. The men comprising the sample were scattered in small groups among 16 submarines in the Pacific Fleet and represented a wide variety of rates and pay grades. Each were rated by a different rater on a rating scale of 20 traits using a 10-to-man format. Several treatments of the scores were investigated from the standpoint of their effect on 1) inter-rater agreement and 2) predictability of the ratings by several logically related variables. T. P 7

1232:

Donlap, J.W. & Chancell, R.C. ANALYSIS OF PILOT'S PERFORMANCES IN MULTI-ENGINE AIRCRAFT (R58). Contract NSORI 151, Bureau Proj. X 651. April 1947. 45pp. ONR, Special Devices Center, Psychological Corp., Division of Bio-Mechanics.

In this study the principles of job analysis and of time and motion study are applied to the task of flying a multi-engine aircraft, the R5D. The cockpit of the R5D is divided into 7 general work areas as a basis for analyzing action pathways. Each control is described, with detailed consideration given to its location and to the extent of pilots' arm and body movement required for operation. Photographic records were subjected to frame by frame study and process charts are presented for the pilots' and co-pilots' performance, with the time required for each operation indicated. An analysis was made of the voice recordings and charts are presented showing the frequency of use of controls by pilot and co-pilot during take-off, cruise, and landing. The investigations were not designed to accumulate any considerable amount of quantitative data, but rather to test the applicability of this method of study. However, some conclusions are drawn from the data. Recommendations are made for extending the investigation, and improvement of the recording equipment are suggested. The implications of such an extended investigation for design of cockpits and training of pilots are discussed.

R 13

1233

Adiletta, J.G. PRELIMINARY INVESTIGATION WITH RESPECT TO LEG BRACES. Contract NSORI-11, T.O. 1, Rep. 90-04. Oct. 1946. 45pp. Navy Dept., Special Devices Center, Office of Research and Inventions, New York Univ.

1233

This is a preliminary report on leg braces including: a review of existing leg braces and work done by others; comparison of relative merits of materials now being used or intended for future use; measurement and fitting procedures; and detail design. Suggestions and recommendations are made to leg brace users and producers.

I. R 9

1234

Reese, E.P., Reese, T.W., Volkman, J., & Corbin, E.H. PSYCHOPHYSICAL RESEARCH SUMMARY REPORT 1946-1952. Contract NS-ori-166 and NSOR-151-(01), NAVJCS F-1104, Tech. Rep. SDC-151-1-5. Jan. 1953. 194pp. ONR, Special Devices Center, Mt. Holyoke College, Psychophysical Research Unit.

1234

This is a compilation of over seventy psychophysical experiments concerned with visual discrimination (1946-1952). Main categories are: discrimination of visual inclination, length, area, and number; discriminable aspects for coding; subjective geometry; general problems in judgment; and subjective statistics. All the experiments are summarized and main results presented; apparatus common to several experiments is described in an appendix. Some findings have immediate military application, some are general, and others have basic research application.

T.G.I.839.

1235

Stevens Institute of Technology, Hoboken, N.J. PHOTOGRAPHIC TRIANGULATION FOR ASSESSING ANTI-AIRCRAFT GUNNERY. Contract NSORI 54, July 1947, 6pp. ONR, Special Devices Center, Fort Washington, N.Y.

1235

A method for assessing anti-aircraft gunnery by means of photographic triangulation is described. The apparatus is also described and includes the various devices designed to eliminate tedious computations and measurements which enable one unskilled man to do the equivalent of three technicians in assessing anti-aircraft gunnery problems.

R 2

1236

Hoffman, A.C. & Gray, Florence E. RESEARCH & DEVELOPMENT OF READING ASSESSOR. INTERIM PROGRESS REPORT. Contract NSORI 58, SDC TR 58 C 1, ca. 1947, 11pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

1236

To test the relation between comprehension level and reading eye-movements, 37 Ss were given standardized reading materials and comprehension checks. Eye-movements were recorded by the electroculogram technique. Comprehension scores are analyzed in relation to total reading time, number of eye-movements, and number of saccadic movements in left-right and right-left directions. The measures best predicting comprehension under the conditions of this experiment are discussed.

T. R 1

1237

Castro, G. A MECHANICAL TARGET GENERATOR. Contract NSORI 80, Rep. 39 (NS 16), June 1948, 27pp. General Precision Laboratory, Incorporated, Birmingham, N.Y.

1237

This report describes the design and performance testing of a model of a mechanical device for simulating a single moving radar target. Several can be combined to simulate a group of targets for the purpose of training radar operators. Solution of design problems and the construction and testing of the model are described in detail.

G. I.

1238

Hayek, A. PLOTTING DEVICE FOR AUTOMATIC MECHANICAL PLOTTER. Contract NS-ORI-80, Rep. 51 (NS-14), June 1948. 8pp. ONR, Special Devices Center, General Precision Lab., Inc.

1238

This report describes a plotting device which, when placed on either a map or oscilloscope tube, enables an operator to select points from either source to be plotted on the plotting board (see 1239). The principle of operation, mechanical construction, and operating instructions are included with the necessary working diagram for the device.

I.

1239

Hayek, A., & Gilbert, C.W. AUTOMATIC PROJECTION PLOTTING BOARD. Contract NS-ORI-80, Rep. 50 (NS-13), June 1948. 39pp. ONR, Special Devices Center, General Precision Lab., Inc.

1239

An automatic projection plotting board is described by which the plotted area is projected onto a screen for presentation to a large audience. The report gives the principle of operation of the board and instructions for operation and maintenance. Working diagrams are included.

1240

Beche-Comer, J.G. & Mead, L.C. APPARATUS FOR THE OUTDOOR MEASUREMENT OF DEPTH PERCEPTION. Rep. 1, no date, 14pp. Tufts University, Medford, Mass.

1240

This report describes an outdoor apparatus for the study of depth-discrimination under field conditions. A cockpit mock-up is so devised that observations may be made under conditions of natural illumination (both day and night) or of simulated night conditions with the use of proper filters and goggles. The observer in the cockpit is able to set a mobile stimulus to be equal in apparent distance to a stationary stimulus for varying testing distances. Photographs are included.

I.

1241
Beebe-Center, J.G., & Mead, L.C. CHARGE OF ILLUMINATION FROM DAYLIGHT TO DARKNESS. Tufts Biblio. 24, Commonwealth Fund Rep. 2. 1942. pp. 18-22. ONR, Special Devices Center, Tufts College, Medford, Mass.

1242
This report gives quantitative measurements of the daytime and night time brightness of a white test patch oriented toward the sun, taken at intervals (1 hour to 3 minutes) throughout the day and twilight on different days (July to October, latitude, 42.50) under many atmospheric conditions. The records for clear days are plotted as a function of time of day and also of angular elevation of sun above and below horizon. The latter relationship is discussed as a viable measure for various latitudes and seasons.
G.

1242
Beebe-Center, J.G. & Mead, L.C. THE REPRODUCTION OF NIGHT VISION DURING THE DAY. PROGRESS REPORT. Rep. 3, 1942, pp. Tufts University, Medford, Mass.

1242
To study the relation between depth perception and illumination, two subjects made twenty settings of a mobile stimulus to apparent equality in depth with a fixed stimulus at 100 feet under conditions of (1) full daylight, (2) dusk (one and one-half hours before darkness until full night), and (3) with red and green filters during full daylight (simulated night). Standard deviations and constant errors are analyzed to determine the variability and accuracy of judgments as affected by illumination. The effectiveness of the filter combination for simulating night conditions is discussed.
G.

1243
Beebe-Center, J.G., & Mead, L.C. THE RELATION OF VISUAL ACUITY TO ILLUMINATION. Tufts Biblio. 26, Commonwealth Fund Rep. 4. 1942. pp. 28-30. ONR, Special Devices Center, Tufts College, Medford, Mass.

1243
To examine the relation of illumination to depth perception and to visual acuity, the classical data relating visual acuity to brightness (Koenig) was plotted as the minimum visible angular separation against the logarithm of the illumination in micro-footcandles. This curve permits a comparison of acuity data with the depth perception data (see accession 1242) obtained experimentally.
G, R1.

1244
Beebe-Center, J.G., & Mead, L.C. RELATION OF DECREASE OF BRIGHTNESS AT NIGHTFALL TO DECREASE OF THRESHOLD BRIGHTNESS DUE TO ADAPTATION. Tufts Biblio. 27, Commonwealth Fund Rep. 5. 1942. pp. 31-33. ONR, Special Devices Center, Tufts College, Medford, Mass.

1244
To determine whether the human eye dark adapts fast enough to keep up with the fall of natural environmental illumination, a standard curve for dark adaptation (laboratory data) was compared with a curve of brightness as a function of time of day (see accession number 1241). The relative rates of the course of dark adaptation and the fall of darkness are discussed.
G, P2.

1245
Beebe-Center, J.G., & Mead, L.C. DEPTH PERCEPTION UNDER NATURAL CONDITIONS OF OBSERVATION DURING THE TRANSITION FROM DAYLIGHT TO DARKNESS. Tufts Biblio. 28, Rep. 6. 1942. pp. 34-39. ONR, Special Devices Center, Tufts College, Medford, Mass.

1245
To investigate the effect of transition from daylight to darkness on the consistency of depth perception judgments, data were gathered for 3 subjects for both full daylight and twilight to darkness. Distance of observation was 100 feet. The standard deviations of judgments are related to levels of illumination and to the angular elevation of the sun. (see accession number 1241). The practical implications for pilots are discussed.
G. & I

1246
Beebe-Center, J.G., & Mead, L.C. THE EFFECT OF THE RED-GREEN FILTER COMBINATION ON DEPTH PERCEPTION AT 100 FEET OBSERVATION DISTANCE. Tufts Biblio. 29, Commonwealth Fund Rep. 7. 1942. pp. 40-44. ONR, Special Devices Center, Tufts College, Medford, Mass.

1246
To determine the effect of a red-green filter combination on depth perception, 6 observers made depth settings at 100 feet under full daylight (see accession number 1245), with and without filter combinations, and full night light, without the filter. The standard deviations of the scores are compared for the 3 conditions and evaluated in terms of the usefulness of the filter combination for simulating night conditions for seeing.
G.

1247
Beebe-Center, J.G., & Mead, L.C. DEPTH PERCEPTION AT 200 FEET OBSERVATION DISTANCE UNDER TWILIGHT CONDITIONS AND WITH A RED-GREEN FILTER COMBINATION. Tufts Biblio. 30, Commonwealth Fund Rep. 7a. 1942. pp. 45-48. ONR, Special Devices Center, Tufts College, Medford, Mass.

1247
To determine the effect of increased distance upon depth perception judgments (see accession number 1246) under twilight conditions and with a red-green filter combination, 4 observers made depth settings at 200 feet. Consistency (standard deviations) of the settings is plotted as a function of brightness and compared with results from the preceding study to evaluate distance effects.
G.

1248
Beebe-Center, J.G., & Mead, L.C. DARK ADAPTATION WITH A COMBINATION OF KR-12 RED AND GREEN ACETATE FILTERS. Tufts Biblio. 31, Commonwealth Fund Rep. 8. 1942. pp. 49-54. ONR, Special Devices Center, Tufts College, Medford, Mass.

1248
To observe the course of dark adaptation when outdoor vision is obscured by the combination of red and green acetate filters, four observers were required to give the orientation of the open end of capital Z (a series of 34, graduated in size from 3.75 to .25 inches) at a distance of 40 feet. Judgments began as soon as the subject donned a pair of goggles fitted with both red and green filters and continued until all sizes had been correctly judged. The time of correct response was recorded for each stimulus size and plotted against the size of the stimulus.
T, G.

1243
Beebe-Center, J.G., & Nead, L.C. VARIATION OF TRANSMISSION IN A COMBINATION OF RED AND GREEN ACETATE FILTERS. Tufts Biblio. 32, Commonwealth Fund Rep. 9. 1942. pp. 56-67. ONR, Special Devices Center, Tufts College, Medford, Mass.

1249
To evaluate the transmission qualities in red and green acetate filters being used to simulate night vision, visual acuity judgments were made by two subjects wearing successively twenty pairs of goggles fitted with the combination filters. In addition, a photometric determination was made of the overall transmission of each goggle. A comparison is made of the results for both tests by the correlational technique. The range of transmission is presented and discussed.
T.C.R.

1250
Beebe-Center, J.G., & Nead, L.C. A FURTHER REPORT ON VARIATION IN TRANSMISSION WITH A COMBINATION OF RED AND GREEN ACETATE FILTERS. Tufts Biblio. 33, Commonwealth Fund Rep. 9a. 1942. pp. 68-72. ONR, Special Devices Center, Tufts College, Medford, Mass.

1259
To evaluate the transmission qualities of red and green acetate filters being used to simulate night vision, spectrophotometric curves were taken of the acetate for both new and old samples. Further tests were made by exposing photographic film through both filters and then noting variations in density.
G.

1251
Beebe-Center, J.G., & Nead, L.C. INDIVIDUAL DIFFERENCES IN VISION WITH A COMBINATION OF RED AND GREEN ACETATE FILTERS. Tufts Biblio. 34, Commonwealth Fund Rep. 10, 1942, pp. 73-91. SDC, ONR, Fort Washington, N.Y. (Tufts College)

1251
To study individual differences in acuity of vision with a combination of red and green acetate filters, determinations were made for 32 subjects. Test stimuli were 9 rows (varied in size from .65 to .25 inch) of four white E's presented on a black background at a distance of forty feet; the task was to identify the orientation of the open end of the E's in each row. A retest was given to 22 of the subjects and the two sets of scores correlated to check reliability of judgments. The scores are analyzed for variability due to individual differences; these are compared to variability due to filters. Recommendations are made for procedures in selecting the acetates.
T.C.R.

1252
Beebe-Center, J.G., & Nead, L.C. PROPOSAL FOR A GROUP TEST OF VISUAL ACUITY AFTER DARK ADAPTATION. Tufts Biblio. 35, Commonwealth Fund Rep. 11. c1942, pp. 92-106. ONR, Special Devices Center, Tufts College, Medford, Mass.

1252
To study the relative importance of variations in acuity due to different filters and variation due to different individuals, two groups of ten and twelve subjects were tested for acuity at forty feet (see 1251) wearing successively eleven or twelve different goggles. The variables are evaluated by an analysis of variance technique. The group procedure is described fully.
T.

1253
Carmichael, L., Beebe-Center, J.G., Nead, L.C., Wellman, S., et al. SUMMARY REPORT TO THE COMING HEALTH BOD. Dec. 1942. 12pp. Psychology Dept., Tufts University, Medford, Mass.

1253
This summary presents Reports One through Eleven of an investigation of discriminative vision under various conditions of day and night. The major problem was the reproduction of night conditions so that aviation pilots might be safely trained during daylight hours to make night landings. The studies include determination of changes in outdoor illumination from daylight to darkness, establishment of norms of visual performance in "real night" which were to be simulated in "artificial night", construction of apparatus for outdoor testing, and testing the filter combinations for simulating night conditions.
T.C.R.

1254
Beebe-Center, J.G., & Nead, L.C. DESCRIPTION OF DENSITOMETER DEVELOPED BY MR. BENTLEY WELLMAN. Tufts Biblio. 39, Commonwealth Fund Rep. 13. Mar. 1943. 4pp. ONR, Special Devices Center, Tufts College Research Lab. of Sensory Psychology and Physiology, Medford, Mass.

1254
This report describes an instrument for the measurement of low photometric transmissions of high density filters. Extensive use indicates that speedy and reliable measurements are obtained. Some data on validity are included. Details of the construction of the densitometer are given and a photograph is included.
I.B.I.

1255
Beebe-Center, J.G., & Nead, L.C. TRANSMISSION OF NAVY RED LENSES. Tufts Biblio. 40, Commonwealth Fund Rep. 14. Mar. 1943. 2pp. ONR, Special Devices Center, Tufts College Research Lab. of Sensory Psychology and Physiology, Medford, Mass.

1255
This report presents the results of an examination of 66 red lenses - 25 Polaroid All Purpose Goggles and 40 Polaroid All Purpose Navy Red Lenses. Transmissions for both sides of each filter were measured by passing light through the lens and a green acetate filter. Readings taken by the Wellman Densitometer. Results are examined in terms of acceptability for use with the green acetate in simulating night vision.

1256
Beebe-Center, J.G., & Nead, L.C. FURTHER OBSERVATIONS ON THE CHANGE OF ILLUMINATION FROM DAYLIGHT TO DARKNESS. Tufts Biblio. 41, Commonwealth Fund Rep. 16. Apr. 1943. 3pp. ONR, Special Devices Center, Tufts College Research Lab. of Sensory Psychology and Physiology, Medford, Mass.

1256
To determine whether the relation between brightness of a white patch oriented toward the sun and angular elevation of the sun (daylight and twilight) found to hold during summer months (see 1241) also obtains at other seasons, observations were made on March 12 at various intervals throughout the day and twilight to darkness. Measurements are related to calculations of the sun's elevation above and below horizon, and compared with the data obtained previously for summer months. The practical implications are discussed.
G.

1257
Beebe-Center, J.G., & Mead, L.C. SPECIFICATIONS OF RED AND GREEN FILTERS FOR SIMULATING NIGHT FLYING CONDITIONS. Tufts Biblio. 43, Commonwealth Fund Rep. 17. May 1943. 4pp. ONR, Special Devices Center, Tufts College Lab. of Sensory Psychology and Physiology, Medford, Mass.

1257
The transmission requirements for the red and green acetates to be used in reproducing night conditions so that aviation pilots might be safely trained during daylight hours to make night landings are analyzed. Definite specifications and tolerances for both types of filters are given.
T.

1258
Beebe-Center, J.G., & Mead, L.C. TOLERANCES IN REGARD TO GREEN LUMINANCE. Tufts Biblio. 45, Commonwealth Fund Rep. 18. July 1943. 3pp. ONR, Special Devices Center, Tufts College Research Lab. of Sensory Psychology and Physiology, Medford, Mass.

1258
This paper is a further study (see 1257) of the allowable tolerance in the specifications for green acetate filter (luminance 0.4403) transmission. This acetate was supplied to the Navy for use in simulating night conditions in the training of pilots. Specifications are given.
C.

1259
Beebe-Center, J.G., & Mead, L.C. TESTS OF RED IR-12 LENSES. Tufts Biblio. 47, Commonwealth Fund Rep. 19. Aug. 1943. 11pp. ONR, Special Devices Center, Tufts College Research Lab. of Sensory Psychology and Physiology, Medford, Mass.

1259
To select red filters which had joint transmission, with green luminance, appropriate for training pilots in night flying, 5721 red lenses (Polaroid IR-12) were tested with the Wellman Densitometer. In addition, procedures used in testing the green acetate (luminance 0.4403) are described.
T.

1260
Beebe-Center, J.G., & Mead, L.C. FURTHER TESTS OF RED IR-12 LENSES. Tufts Biblio. 49, Commonwealth Fund Rep. 20. Sept. 1943. 15pp. ONR, Special Devices Center, Tufts College Research Lab. of Sensory Psychology and Physiology, Medford, Mass.

1260
To select red lenses (Polaroid IR-12) for joint transmissions, with green acetate (luminance 0.4403), appropriate for use in training pilots in night flying, 375 lenses were tested (see 1259) with the Wellman Densitometer.

1261
Beebe-Center, J.G., & Mead, L.C. OPINION ON PROPOSED EXTENSION OF TOLERANCE FOR GREEN ACETATE. Tufts Biblio. 51, Commonwealth Fund Rep. 21. Oct. 1943. 6pp. ONR, Special Devices Center, Tufts College Research Lab. of Sensory Psychology and Physiology, Medford, Mass.

1261
This paper presents a further study (see 1257, 1258) of the allowable tolerance in transmission specifications for green acetate filters (luminance 0.4403) supplied to the Navy for use in simulating night conditions in the training of pilots. Possible ways of extending the range are proposed; recommendations are included.
T.G.

1262
Clark, Ruth E. VISUAL ACUITY THROUGH COLORED LENSES. Rep. No. 22. 40pp. 1943. Tufts College M.A. Thesis. SOC, Commonwealth Fund.

1262
In the present experiment the subjects were required to report the orientation of an experimenter at 200 and at 400 feet without lenses and with an amber lens under different conditions of late afternoon brightness (3.5 log microfootlamberts to 4.6 log microfootlamberts) and with varied conditions of fog and overcast. Similarly, blue-green lenses were tested on days of high brightness (9.7 log microfootlamberts) and haze. The results are visual acuity scores under these different conditions.
T.T.C.

1263
Beebe-Center, J.G. & Mead, L.C. REPORT ON CELANESE SAMPLES OF ORANGE AND BLUE FILTERS. Rep. No. 24. Oct. 1944. 7pp. Special Devices Center, Commonwealth Fund, Tufts College. (Laboratory of Sensory Psychology and Physiology)

1263
This report presents a comparison, with respect to suitability for training pilots in blind flying, of samples of Celanese Orange and Blue filters of various thicknesses to standard samples of Monsanto 25 mil Amber and Fibertex 25 mil Blue. Measurements included spectrophotometric, photometric, and experimental acuity tests of transmissions for each filter singly, and in combination. Recommendations are included.
T.P.

1264
Beebe-Center, J.G. & Mead, L.C. MEMORANDUM ON "BLUE-ORANGE INSTRUMENT FLYING SPECIFICATIONS" ISSUED BY POLAROID CORPORATION. Rep. No. 25. Oct. 1944. 5pp. Special Devices Center, Commonwealth Fund, Tufts College. (Laboratory of Sensory Psychology and Physiology)

1264
This report presents a critical evaluation of a document entitled "Blue-Orange Instrument Flying Specifications," prepared by Polaroid Corporation, Cambridge, Massachusetts. Laboratory measurements made previously (see 1263) are brought to bear on the problem. Recommendations are made concerning the way specifications for filters to be used in training pilots for blind flying should be written.
C.

1265
Beebe-Center, J.G. & Mead, L.C. COMPARISON OF NEW MONSANTO BLUE WITH PREVIOUS MONSANTO BLUES. Rep. No. 26. May 1945. 5pp. Special Devices Center, Commonwealth Fund, Tufts College. (Laboratory of Sensory Psychology and Physiology)

1265
This report presents a laboratory comparison with respect to suitability for training pilots for blind flying, of a new Monsanto blue filter with the standard Monsanto blue. The major difference was in thickness. A determination was made of optical density, visual acuity, and eye strain of the new blue in combination with the standard amber.
T.

1266

Beebe-Center, J.G. & Mead, L.C. **RECOMMENDATIONS CONCERNING THE MONSANTO BLUE AND GENERAL USE OF THE BLUE-AMBER COMBINATION.** Rep. No. 27. July 1945. 3pp. Special Devices Center, Commonwealth Fund, Tufts College. (Laboratory of Sensory Psychology and Physiology.)

1267

This report reviews a laboratory comparison (see 1266) of two blue Monsanto filters for use in training pilots in blind flying. Recommendations are presented with accompanying data. The need for supplementary lighting in the cockpit is examined and further recommendations are incorporated.

1267

Beebe-Center, J.G. & Mead, L.C. **COMMENT ON SPECIFICATIONS OF SIMULATED BLIND FLYING SHEETS.** Rep. No. 29. July 1945. 3pp. Special Devices Center, Commonwealth Fund, Tufts College. (Laboratory of Sensory Psychology and Physiology.)

1267

This report is a brief comment on specifications for amber-blue filters for training pilots in blind flying. Of particular concern here is the joint optical density of the two sheets. An auxiliary source of white light for illuminating instruments in the cockpit is discussed.

1268

Beebe-Center, J.G. & Mead, L.C. **COMPARISON OF NEW SAMPLES OF MONSANTO BLUE 23027 WITH PREVIOUS MONSANTO BLUE.** Rep. No. 28. July 1945. 3pp. Special Devices Center, Commonwealth Fund, Tufts College. (Laboratory of Sensory Psychology and Physiology.)

1268

This report presents a laboratory comparison, with respect to suitability for training pilots in blind flying, of Monsanto Blue 2 727 TWA with the approved standard Monsanto Blue A9183. Measurements included spectrophotometric transmittance, optical density, and effects on visual acuity. Recommendations are included.

1269

Duerfeldt, C.H. **ATTITUDE INDICATORS FOR HELICOPTERS, EVALUATION OF, REPORT #1, FINAL REPORT.** Proj. PTR AE-7362.8, 5733-62, Feb. 1956, 4pp. Service Test Division, Naval Air Test Center, Patuxent River, Md.

1269

To evaluate, in a helicopter, the Lear type MM-1 remote horizon indicator with roll and pitch adjustments, 61 flights were made (34.8 hours under simulated instrument conditions). Comparisons were made with the standard type gyro horizon for accuracy and reliability and also checked for accuracy against the visual horizon. The results are discussed with particular reference to hovering operations. Recommendations are included.

1270

USN Special Devices Center. **CHECK-LIST OF GOOD TRAINING PRACTICES.** Contract 16CR1 195, Jan. 1949, 7pp. USN Special Devices Center, Port Washington, N.Y.

1270

This document is a check list of good training practices to be used by designers of training programs and training aids in evaluating their products. It consists of five to ten self-examining questions in each of the following categories: the student, the instructor, the method of instruction, and the trainer.

1271

Seals, L.S., Jr. **THE HUMAN IN CLOSED LOOP CONTROL CIRCUITS.** Dec. 1951, 17pp. USN Special Devices Center, ONR, Port Washington, N.Y.

1271

This paper points out that "engineering is now making greater demands on the biosciences for human design criteria--particularly in control systems--than can possibly be met as long as research clings to a molecular methodology. In order to determine: 1) how man structures his discriminations, and 2) what his response capacities and limitations are, a molar approach such as has been proposed must be generally adopted in the study of biological control elements." This approach considers the problem of control of machines as a regulator process in which man forms part of the regulation cycle.

R 4

1272

Edgerton, H.A. & Fryer, D.H. **THE DEVELOPMENT OF AN EVALUATION PROCEDURE FOR TRAINING AIDS AND DEVICES.** Contract N70mr-38302, Proj. Desig. W-783-008, SDC Human Engineering Proj. 23-M-2, RSH Proj. 181, SDC Tech. Rep. 383-2-1. ONR, Special Devices Center, Richardson, Belkows, Henry & Co., Inc.

1272

This report describes the contents and the use of the SDC-NSR Evaluation Procedure for Training Aids and Devices. This procedure, embodied in a form (included in the report), is a series of questions about the device under evaluation, to be answered by the evaluator. It is composed of the following parts: I. Description of the Training Purpose and Situation. II. Description of the Training Devices. III. The Use of the Training Device. IV. Summary Evaluation of Training Device.

1273

USN Special Devices Center. **THE PRINCIPLES OF LEARNING.** Contract 16CR1 199, Feb. 1949, 7pp. USN Special Devices Center, Port Washington, N.Y.

1273

This article discusses the learning process, its measurement and evaluation, aids and hindrances to the process, and some phenomena associated with learning. Illustrations of learning curves and types of learning such as trial and error, associations, and insight are included. The factors of motivation, knowledge of results, part and spaced learning, meaningfulness, and individual differences, transfer of training, use of time, overlearning, verbalization, role of instructor, and instructing procedures are discussed in terms of facilitating learning.

G.

1281

Miller, G.A., Heise, G.A. & Lichten, W. **THE INTELLIGIBILITY OF SPEECH AS A FUNCTION OF THE CONTEXT OF THE TEST MATERIALS.** J. exp. Psychol., May 1951, 41(5), 329-335. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.)

1281

This study examined the effects of limiting the number of alternative test items on the threshold of intelligibility for speech in noise; these limits were achieved by providing three kinds of context: restricting the size of the test vocabulary (2, 4, 8, 16, 32, 256 monosyllables); using the words in sentences (which contained five key words); repeating the test words (monosyllables and words in sentences). The tests were carried out at several signal-to-noise ratios over the range from -21 to +18. Two Ss participated. The intelligibility differences are related to the amount of information present.

T. G. R 5

1282

Votaw, D.F., Jr. REVIEW AND SUMMARY OF RE-SEARCH ON PERSONNEL CLASSIFICATION PROBLEMS. Contract AF 18(603)-369, Proj. 7702, Task 77037, AFTRC-TN-56-106, Aug. 1956, 12pp. Personnel Research Laboratory, AFTRC, Lackland AFB, Tex.

1282

Methods of making the most efficient assignment of men to jobs are reviewed in this report. In the first section two main problems are defined: (1) given a number of job categories with personnel quotas, and given a group of persons for each of whom an amount of production in each job is known, the problem is to allocate persons to jobs so that production per person is a maximum; (2) given a number of job categories with quotas and a group of persons, where each person is regarded as qualified or not in each job category, the problem is to find some allocation that will place each person in a job for which he is qualified. Ten methods of solution are listed, with references, and discussed briefly in section 2. Section 3 summarizes present knowledge and suggests further research. T. R 19

1283

Galer, E.L., McQuitty, L.L., & Cherry, C.W. A PROCEDURE FOR DEVELOPING JOB-KNOWLEDGE TESTS. Contract AF 33(038)-25726, Task A, Proj. 7700, Task 77015, AFTRC-TN-56-113, Sept. 1956, 20pp. Personnel Research Laboratory, AFTRC, Lackland AFB, Tex.

1283

To develop and illustrate a procedure for building job-knowledge tests, particularly for the situation where nearly all personnel possess prerequisite job knowledge and consequently little relation exists to job proficiency, three 100-item job knowledge tests were prepared from a pool of 12,668 mechanical test items. Tests I and II were the result of random sampling; Test III was stratified so that each of 13 phases of a basic aircraft and engine course was proportionally represented. All tests were administered to 645 Air Force Aircraft and Engine Mechanics at different levels of formal training and experience. Item responses were studied with respect to the power of the items to differentiate between levels of training and experience. T. R 8

1284

Andreas, B.G., Gerall, A.A., Green, R.P., Murphy, D.P., & Spragg, S.D.S. PERFORMANCE ON A TRACKING TASK SIMULATING FIXED GUNFIRE AS A FUNCTION OF INSTRUCTIONS AND DIFFICULTY LEVEL OF INITIAL TRAINING. Contract Monr-668(09), NavTraDevCen-Proj. 20-F-11, Tech. Rep. 668-9-2, Sept. 1956, 11pp. Training Device Center, University of Rochester.

1284

To determine the proficiency level attained in a tracking task simulating fixed gunnery after varying verbal instructions and varying difficulty levels of initial practice, four groups of subjects (ten each) were given performance trials on the Rochester Generalized Tracking Apparatus. Two groups performed after minimum verbal instructions and two after extensive instructions on how to perform the task. Within each group, one half was given an easy task before a final more difficult task; the other half was given initial training equivalent in difficulty to the final task. Time on target scores (milliseconds) were analyzed as functions of instruction and task difficulty. Implications for use of tracking trainers are discussed. G. R 1

1285

Thomas, G.J. VOLUME AND LOUDNESS OF NOISE. *Acad. J. Psychol.*, Oct. 1952, 65(4), 588-593. (University of Illinois, Urbana, Ill.).

1285

This study determined whether S could equate various bandwidths of white noise with respect to volume and whether such equations would be different from those of loudness. Two Ss determined equal-volume and equal-loudness contours with the standard band of noise (250 mels between 1,900 and 2,450 cps) at 22, 42, 62, and 82 db; S made five equal-volume matches and five equal-loudness settings for each of five bandwidths for any one contour; S also made five loudness and five volume judgments at each intensity of the standard. The differences between the equal-volume and equal-loudness judgments of the same noise stimuli were described. The results of equal-volume and equal-loudness matches between a 1,000-cps tone and the standard band of noise were compared. T. G. I. 2 5

1286

Webster, F.A. THE INFLUENCE OF INTERAURAL PHASE ON MASKED THRESHOLDS. I. THE ROLE OF INTERAURAL TIME-DEVIATION. *J. Acoust. Soc. Amer.*, July 1951, 23(4), 452-462. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

1286

This investigation was concerned with "an analysis of the action produced by a given frequency-component of the signal on a corresponding component of the masker." Three experiments were conducted: I--the masking of tones by wide band noise; II--the masking of narrow bands of noise by wide band noise; and III--the masking of narrow bands of noise by narrow bands of noise. The signal level was 60 db SPL in all cases. In I and II an automatic attenuator was used and in III a manual one. Three Ss had to stop following as soon as the masker stopped increasing or the pattern became inaudible; three or four such thresholds were obtained. From the results, the relation of "masking level difference" to frequency was defined. An hypothesis to explain these findings was examined. G. I. R 9

1287

Heise, G.A. & Miller, G.A. AN EXPERIMENTAL STUDY OF AUDITORY PATTERNS. *Acad. J. Psychol.*, Jan. 1951, 62, 63-77. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

1287

"The threshold frequency for the perceptual integration of a variable tone into a temporal sequence of tones was measured as a function of the shape of the sequence and the ratio of the frequencies of successive tones. Six different frequency ratios between successive tones in the sequence were investigated for each of four pattern types: inverted V, upright V, ascending straight line, and descending straight line. For each combination of pattern and frequency ratio between successive tones, four Ss made 'upper' settings of the variable tone, for which increasing the frequency of the variable tone caused it to separate from the remainder of the sequence, and 'lower' settings... of the same type. The results are related to the principles of visual perceptual organization. T. G. R 4

1288

Heise, G.A. & Miller, G.A. PROBLEM SOLVING BY SMALL GROUPS USING VARIOUS COMMUNICATION NETS. *J. Abnorm. & Exp. Psychol.*, July 1951, 45(3), 327-335. (Harvard University).

1288

Problem solving performance of a three-man group was studied for five different communication nets, three signal-to-noise ratios and three kinds of tasks. The tasks were (1) the reassembling of a list of standard words with each member having only part of the information, (2) constructing a sentence, the words of which had been distributed among group members, and (3) forming anagrams by the group. Group efficiency was measured in terms of time or number of words spoken to complete the task and analyzed for effects of communication net, type of task, and stress, provided in this case by noise. Problems of control in small group research are discussed. T. G. I. R 7

1290

Rosenberg, S., & Roby, T.B. EXPERIMENTAL ASSEMBLY OF B-29 CREWS BY SELF-SELECTION PROCEDURES: A DESCRIPTION AND VALIDATION OF THE METHOD. Proj. 7713, Task 77231, AFTRC-TN-56-104, Aug. 1956, 38pp. Crew Research Laboratory, AFTRC, Randolph AFB, Tex.

1290

To assess an assembly technique whereby potential team members "select" each other on the basis of behavior samples from other potential team members, three successive classes of nine B-29 crews were assembled by this procedure. Choices of crew members for each other were based on 1) individual self-descriptions of background information and general attitudes, and 2) specific attitudes toward problems of crew functioning. About half the crews were assembled by using the choices and the other half assembled randomly. Sociometric ratings were obtained in both early and late phases of training together with instructor ratings of crew coordination to serve as validation criteria. Two sets of analyses were performed: 1) to ascertain suitability of choice scores for assembly and 2) to determine the validity of selection scores. T. R 11

1291

Cock, R.P. AIRCRAFT INTERNAL NOISE-ENVIRONMENT. Proj. 1370, NADC-TT-56-411, Sept. 1956, 6pp. Aircraft Laboratory, NADC, Wright-Patterson AFB, Ohio.

1291

Noise level envelopes for military aircraft under all operating conditions are presented. The data, available sound level measurements, are separated into three basic types pertaining to propeller driven, jet propelled aircraft, and helicopters. These data may be used as a guide for communication equipment design.

G

1292

Miller, G.A. LANGUAGE ENGINEERING. J. Acoust. Soc. Amer., Nov. 1950, 22(6), 720-725. (Harvard University).

1292

Although such a field of study as "language engineering" does not exist, this paper points the way by which different disciplines might cooperate in the problems of this field. Some problems for the language engineer are posed, with a specific one - development of air international language of the air - discussed in detail. Six steps in such a development are outlined and the contributions needed from various fields of knowledge are pointed out. In still more detail, some contributions that psychology can make toward solving this problem are discussed under: (1) reception of information, (2) information storage, and (3) group problem solving.

G. I. E 3

1293

Hackworth, N.E. VIGILANCE. Nature, 1956, 178, 1375-1377.

1293

This paper is a summary of a symposium on "Vigilance - the nature of alertness and the problem of its maintenance during long spells of work". A definition of vigilance, the problem it posed and the main environmental and motivational factors were discussed by the first speaker. Other speakers gave reports of their studies and experiments which included (1) the change of effective threshold during the day, (2) failures in perception on active and passive jobs, (3) vigilance in industry in relation to machine-aiding and inspection tasks, (4) factors counteracting loss of vigilance, and (5) conditions needed in a vigilance task.

R 19

1294

Bowen, J.M., & Woodhead, Muriel W. THE RELATIVE ACCURACY OF TRACK PREDICTION ON FOUR RADAR DISPLAYS. FPRC 699, Memo 39, Oct. 1954, 11pp. Applied Psychology Research Unit, NRC, Cambridge, England.

1294

To determine how accurately the future course of tracks on four types of radar displays (Cartesian and polar coordinate with linear and exponential range scales) could be predicted, 12 subjects observed a display with a complete track for five seconds then estimate termination of the track on a second display which showed only 1/3 of the original. Three types of tracks were used in all four quadrants of all four displays. Errors (difference in "miles" between actual and estimated termination) and their deviations in inches were analyzed for type of coordinate and type of range scale used. The effect of track length was studied.

G. I.

1295

Vince, M.A. DIRECTION OF MOVEMENT OF MACHINE CONTROLS. FPRC 637, Aug. 1944, 9pp. Cambridge Psychological Lab., FPRC, Cambridge, England.

1295

To study relationship between directional movements of the control and the display, preliminary experiments were conducted with simple directional controls involving upward and downward movements with corresponding upward and downward effects. In the first test, a pointer was moved by upward or downward movements of a knob in response to stimuli (short lines) which appeared above or below a horizontal line. An "expected" connection between knob and pointer (both upward or downward) and the reverse or "unexpected" were studied. A second test of the same relationships involved a continuous tracking with a positional control. Errors were analyzed for differences due to the "expected" and "unexpected" directional movements.

T. G. I.

1296

Gibbs, C.B. THE ADVANTAGES OF A PRESSURE OPERATED CONTROL LEVER IN A VELOCITY CONTROL SYSTEM. J.E.S. 208, A.P.U. 161/51, Jan. 1952, 24pp. Applied Psychology Research Unit, Royal Naval Personnel Research Committee, NRC, Cambridge, England.

1296

To find optimal relationships between the operator and a servo-mechanism which moves a display element in two directions, two types of joysticks were used to control the output of a velocity control servo-mechanism - a free moving and a pressure control. A range of sensitivities (gear ratios) were tested to determine optimum conditions for each control and performance (errors and graphic records) compared under these conditions. Further comparisons involved finger vs. arm operation and time to correct a given amount of error. The general problems of control sensitivity, control lever loading and control/display relations are discussed along with the problem of the functions of the proprioceptors in such skills.

T. G. R 15

1297

Pavlik, W.B. MOTIVATIONAL FACTORS IN INDIVIDUAL AND GROUP PRODUCTIVITY: IV. THE EFFECTS OF PERSONAL AND SITUATIONAL MOTIVATION UPON INDIVIDUAL PERFORMANCE IN A SMALL-GROUP SETTING. Contract M601-17, T.O. III NR 171-123, 1956, 75pp. ONR, Ohio State University Research Foundation.

1297

To investigate the role of motivation upon individual performance in a small group setting, sixty subjects were divided into three classes (high, moderate, and low) of inferred individual drive level on the basis of scores on the Taylor Scale of Manifest Anxiety. Three subjects, one from each class, were assigned to each of twenty groups and performed a simple assembly task in a situation designed to control effects of face-to-face interaction. Motivating conditions were: (1) special incentives (reward, group competition) and frequent time signals, and (2) no special incentives and one time signal (control). Performance scores (number of operations completed during each of two twenty-minute work periods) were studied by analysis of variance techniques for differences due to both personal and situational motivation.

T. I. R 50

1298

O'Neill, R.R. AN ENGINEERING ANALYSIS OF CARGO HANDLING: V. SIMULATION OF CARGO HANDLING SYSTEMS. Rep. 56-37, Sept. 1956, 153pp. Department of Engineering, University of California, Los Angeles.

1298

This investigation treats a method for the prediction of average rate of flow of discrete entities which are moved by a sequence of independently controlled movements and handlings. The technique is applied to present day cargo-handling system, between place of rest of pre-assembled cargo on dock and secured position in hold. The system is idealized as a set of links (round trip path of transporting agents) and nodes (region where the particle is transferred from one agent to the next). Productivity, a measure of the time rate of transport, is studied as it is affected by number and arrangement of links, number of transporting agents, number of storage units at node, size of unit of commodity, and distributions of element working times.

T. G. I. R 15

1299

Miller, G.A. RELATION BETWEEN AUTOCORRELATION FUNCTION AND TRANSITIONAL PROBABILITIES FOR BINARY DATA. Contract NSori 76, Proj. NR-142-201, Rep. PNR 105, Nov. 1950, 16pp. Office of Naval Research, Washington, D.C. & Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

It is the purpose of this report to summarize in a readily available form several of the well known properties and relations of autocorrelation functions and transitional probabilities for the special case of binary sequences. We shall assume that we begin with the transitional probability matrix and that we wish to calculate the absolute probabilities and the autocorrelation function. We shall consider the Markovian case, and shall show some of the difficulties encountered in the non-Markovian case.

1300

Pearson, R.G. THE EFFECTS OF BENADRYL AND DRAMAMINE ON PERCEPTUAL-MOTOR SKILL. Rep. 57-50, Jan. 1957, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

1300

To evaluate the effects of motion sickness preventives upon perceptual-motor components of pilot skill, two preparations, diphenhydramine hydrochloride (benadryl) 50 mg. and dimenhydrinate (dramamine), 100 mg. were used with a third treatment, lactose placebo, as control. Forty-eight subjects received preliminary training on the USAF SAM Multidimensional Pursuit Test, and were assigned equally and randomly to one of the three drug treatment groups, and then continued the task for a period of four hours. The performance data were analyzed for differences due to drugs as compared to the placebo group. Previous findings with other preparations are compared and discussed.

T. G. R 13

1301

Newman, E.S. THE PATTERN OF VOWELS AND CONSONANTS IN VARIOUS LANGUAGES. *Amer. J. Psychol.* 1951, 64, 365-379. (Rep. PNR 109, Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

Reported is a study of vowel-consonant sequences in a number of languages including Basic-English, English, French, German, Hebrew, Icelandic, Italian, Latin, Lifu, Polish, and Samoan. Comparisons of comparable material in each language were made by taking passages from the New and Old Testaments in each of the above languages. Autocorrelations, certainty measures, and the proportions of vowels and consonants were determined. The autocorrelation shows that there is a strong alternation of vowels and consonants. There is a systematic difference represented by the difference between Latin and Italian on the one hand and German on the other, in terms of syllable length. Latin and Italian consist largely of open syllables, i.e., C-V or V-C combinations, while German has closed syllables generally of C-V-C form. The measures used suggest that there is little structure to be found beyond the fifth or sixth letter, so long as we restrict ourselves to vowels and consonants. It is probably not just a matter of chance that the most primitive languages studied showed the greatest restrictions in terms of patterning, while English showed the least. From the statistical point of view, English is "noisy", i.e., unpredictable.

1302

Hells, J.G., Balke, B., & Van Fossan, D.D. LACTIC ACID ACCUMULATION AS A FACTOR IN DETERMINING WORK CAPACITY. Rep. 56-121, Nov. 1956, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

1302

To establish a classification of physical work, six subjects performed on an established work capacity task. Measurements were made of pulse rate, blood pressure, oxygen consumption, ventilation, and lactic acid. Blood lactate production during the various stages of work intensity were correlated with respiratory and circulatory data. Work classifications are derived from the analysis.

T. G. R 28

1305

Creelman, J.A., & Miller, E.E. EVALUATION OF A "MOVING AIRPLANE" ATTITUDE INDICATOR. Res. Proj. NX 001 109 107, Rep. 3, Sept. 1956, 9pp. US Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

1305

To evaluate the "moving airplane" attitude indicator under controlled field conditions, the rates of student learning on the standard gyro (moving horizon) and the Flight Attitude Indicator (moving airplane) were compared. Eight students, four experimental and four control, were selected and paired on the basis of previous flight grades. Each pair was assigned the same instructor but received initial instrument training using different attitude indicators. After completion of the D12 check, students switched instruments and received instruction until successful completion of another D12 check. Criteria were regular flight grades, time to complete instrument stage, and control reversals. The data were analyzed for differences due to type of attitude indicator used. The findings are discussed in relation to laboratory results. T. R 2

1306

Doehring, D.G., Ward, W.D., & Hixson, W.C. THE DEVELOPMENT AND STANDARDIZATION OF A GROUP TEST FOR CRITICAL FLICKER FREQUENCY. Contract Nour-1151 (02), Proj. NR(146-092), BuMed & Surgery Proj. NX 001 102 502, Rep. 4, Dec. 1956, 11pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

1306

The development and standardization of a group test for critical flicker frequency are described. The test can be administered to ten subjects at a time in a total of eight minutes. The results of testing 100 naval aviation cadets and 174 enlisted men are presented. Distributions of median thresholds, analyses of inter- and intra-trial variability and of intra-subject variability are discussed.

T. G. R 5

1307

Coakley, J.D., Abbott, W.C., & Bishop, E.W. HUMAN ENGINEERING EVALUATION OF A SEMI-AUTOMATIC MANUAL SWITCHBOARD. Contract DA-36-039-SC-64647, DA Proj. 3-99-01-022, SC Proj. 2004A, March 1957, 17pp. Dunlap and Associates, Inc., Stamford, Conn.

1307

To evaluate a projected design of the Semi-Automatic Manual Switchboard, a comparison was made with the functionally equivalent Two-Cord Manual Switchboard in terms of human engineering principles. The two switchboards were described; the facilities that each would provide and the procedures for using them were indicated. Operating procedures were compared and the differences evaluated. Recommendations for specific design features to improve operation of the Semi-Automatic Manual Switchboard are presented.

R 1

1308

Zwislocki, J. NEW TYPES OF EAR PROTECTORS. *J. Acoust. Soc. Amer.* Nov. 1952, 24(6), 762-764. (Syracuse University, Syracuse, N.Y.).

1308

An ear protector is described which provides both attenuation of all audible frequencies and attenuation of only the more dangerous high frequencies, with only minor adaptation. The advantages of the device are indicated and the results from a series of experiments in several factories are described briefly.

G. I. R 9

1309

Flottorp, G. EFFECT OF DIFFERENT TYPES OF ELECTRODES IN ELECTROPHONIC HEARING. *J. acoust. Soc. Amer.*, March 1952, 25(2), 236-245. (Psycho-Acoustic Lab., Harvard University, Cambridge Mass.).

Depending upon the kind of electrode system employed, a sinusoidal electric current gives rise to at least 5 phenomena. a) With a moving electrode on the skin or on the roof of the mouth (fricative effect), the S receives the strongest sensation of hearing. He may hear either the first harmonic or the first and second harmonics, or the second harmonic alone, depending upon the applied voltage and upon the placement and properties of the electrode. b) With a large-area electrode any place on the skin of the head, if the skin is dry the S hears the second harmonic; if it is wet, he hears nothing. c) When the electrode is immersed in salt solution in the ear (the most common method), the S hears a complex tone containing mostly second harmonic, suggesting the action of a square-law transducer. d) When the electrode is on the mucous tissue inside the middle ear (with eardrum removed), the S hears the first harmonic and/or a noise. e) When the electrode is in contact with the epidermis of the ear, the S hears the first harmonic, and at low frequencies he may also hear a noise. The experimental results seem to indicate that the hearing of a tone under any of these 5 conditions is probably due to vibrations set up outside the cochlea, although there appear to be at least 4 different transducing mechanisms. Contrary to earlier hypotheses, the tympanic membrane is apparently not involved in the conversion of the electrical energy into mechanical vibration.

R 34

1310

Newman, E.B. COMPUTATIONAL METHODS USEFUL IN ANALYZING SERIES OF BINARY DATA. *Amer. J. Psychol.*, 1951, 64, 252-262. Contract N5ori 76, Proj. Nr 142 201, Rep. PNR 94. (CNR, Harvard University, Psycho-Acoustic Lab., Cambridge, Mass.).

This paper presents certain mechanical and computational aids that materially reduce the time and effort involved in applying the mathematical theory of time-dependent random processes. The particular procedures developed here have one important limitation: they are applicable only to sequences of binary data, i.e. to data that may be expressed in terms of 2-valued series. Further, it is assumed that such data occur in discrete steps with respect to time. Described are: a) computation of the uncertainty function; b) construction of a relay-operated tabulator; and c) construction of an autocorrelator.

R 6

1320

Verplanck, W.S., Ratliff, F., Stough, D.S., Day, W.C., et al. RESPONSE MECHANISMS AT THE VISUAL THRESHOLD: A METHODOLOGICAL STUDY. STATUS REPORT II. Contract N5041 07639, Proj. NR 140 015, Oct. 1952, 16pp. Psychological Labs., Harvard University, Cambridge, Mass.

1320

This report 1) surveys both the experimental and statistical literature on psychophysical methodology as it relates to thresholds; 2) presents the conceptual framework of the program under study, i.e., examining the effects of complex "psychological" or "cortical" or "central" factors on threshold functions; 3) summarizes the progress of the experimental work to date; and 4) reviews the problems which have been dealt with and the tentative generalizations reached.

T. G. R 9

1321

Payne, R.B., & Hauty, G.T. SKILL FATIGUE AS A FUNCTION OF WORK-REST DISTRIBUTION. Proj. 57-14C, July 1957, 5pp. USAF School of Aviation Medicine, Randolph AFB, TX.

1321

To test the explanatory relevance of certain aspects of Hull's reactive inhibition theory to skill fatigue, three groups of subjects (48 in all) were trained to substantial levels of skill on a multichannel tracking task. Groups A, B, and C then performed the task following work-rest distribution ratios of four to one, 0.67 to one, and 0.25 to one, respectively, for four hours of elapsed time. The analysis of data involved comparisons of proficiency among the groups with (1) work (number of trials) held constant, and (2) task confinement held constant. Proficiency changes were analyzed as functions of work and rest variables. The practical and theoretic implications of the results for tracking and watchkeeping tasks are discussed.

T. G. R 5

1322

Wilson, R.C., Green, G.A., Bryan, G.L., Willmorth, N.E., & Warren, N.D. AN INVESTIGATION OF CERTAIN AFTEREFFECTS OF INTERMITTENT RADIAL ACCELERATION - PSYCHOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE. Contract N6ori 77, T.O. 3, Rep. 8, Oct. 1950, 19pp. ONR, U. Southern Calif., Psychol. Lab.

1322

To determine the effects of intermittent exposure to acceleration (g) forces upon subsequent mental and psychomotor efficiency, 26 male college students performed on a battery of especially constructed psychological tests before and after a series of 7 one-minute rides in a human centrifuge separated by 8 minute rest periods. One group was exposed to 3g and the other to 1 1/2g. The pre- and post-exposure test scores are compared for indications of behavior decrement as a consequence of g exposure.

T,RL5.

1323

Bryan, G.L., Wilson, R.C., Willmorth, N.E., Svenson, D.W., Green, G.A., & Warren, N.D. THE EFFECTS OF INCREASED POSITIVE RADIAL ACCELERATION ON REACHING AND MANIPULATING TOGGLE SWITCHES. PSYCHOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE. Contract N6ori 77, T.O. 3, No. V. June 1951, 20pp. ONR, U. Southern Calif., Psychol. Lab.

1323

To evaluate the effects of g forces on the ability to reach and manipulate switches near the body, 30 male college students were subjected to positive accelerations of 1.0, 2.5 and 4.0 g in a human centrifuge. The subjects reached for and manipulated one of several toggle switches located around them as rapidly as possible when the signal light coupled with that switch appeared. The reaction time (lapsed time from the appearance of the signal to the initiation of the movement) and the time to complete the movement were measured as a function of switch position, direction of switch manipulation, hand used and the magnitude of the g force acting on the subject.

T,RL5.

1329
Erikson, C.W. EFFECTS OF PRACTICE WITH AND WITHOUT CORRECTION UPON DISCRIMINATION LEARNING UNDER ABSOLUTE CONDITIONS. Contract AF 33(616)-2918; Proj. 7192-71598, WADC-TR-57-71, Feb. 1957, 16pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

1329
To investigate discrimination learning as a function of discriminability of the stimulus series and as a function of knowledge of errors, two groups of six subjects each made absolute judgments (using the numbers 1-20 to identify which stimulus had occurred) of six series of stimuli varied as to size, brightness-hue. Each stimulus in a series was judged 100 times. Subjects in one group only were informed of the correct response after each judgment. Error data were plotted as a function of practice and analyzed in terms of effect of knowledge of results and degree of discriminability. Further analysis of the effect of practice was made in terms of information transmitted at different stages of learning. T. G. R 11

1332
USA Environmental Protection Research Branch. CLOTHING ALMANAC NO. 10. CHINA AND KOREA. April 1951, 57pp. USA Environmental Protection Research Branch, QM Research & Engineering Center, Natick, Mass.

1332
This is a clothing almanac for China and Korea put out by the Environmental Protection Section of the Office of the Quartermaster General. Various clothing requirements are given for the area with regard to seasonal climate, terrain, ground conditions, and insects and pests. I, T, G.

1333
USA Environmental Protection Research Branch. CLOTHING ALMANAC NO. 21. UNITED STATES. Dec. 1951, 68pp. USA Environmental Protection Research Branch, QM Research & Engineering Center, Natick, Mass.

1333
This is a clothing almanac prepared by the Environmental Protection Branch of the Office of the Quartermaster General and giving various clothing requirements for the continental United States. Clothing recommendations pertain to terrain, seasonal climate, ground conditions, and insects and pests. I, T, G.

1334
Siple, P.A. (Chm.). CONFERENCE ON THE PRINCIPLES OF ENVIRONMENTAL STRESS ON SOLDIERS. 25 AUGUST 1944. Reissued Feb. 1947, 51pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

1334
The papers presented at a symposium (Climatology and Environmental Protection Section, Quartermaster Research and Development Branch, 1944) convened for the purpose of developing a climatic index suitable for mapping purposes for the protection of troops operating in all climates are reproduced together with minutes of the discussion. The papers concern heat exchange between man and his environment and cover convection, conduction, evaporation and radiation and treat both theoretical considerations and empirical results. T, G, R many.

1336
Blaisdell, R.K. PAIN AND COLD SENSATIONS DURING COLD-INDUCED VASODILATATION. Rep. 182. Dec. 1951. 18pp. Office of the Quartermaster General, Research and Development Div., Environmental Protection Branch, Quartermaster Climatic Research Lab.

1336
A series of experiments were undertaken to obtain quantitative data on the phasic alterations in the sensations of cold, pain and rewarming accompanying cold-induced cyclic vasodilation in fingers. Measurements recorded for six subjects were: (a) sensation intensity of cold, pain and rewarming (b) cold sensitivity (c) skin temperature (d) finger blood flow. T. F. R 6

1337
Carre, Lieut. HISTORICAL REVIEW OF THE LOAD OF THE FOOT-SOLDIER. Tentage and Equipage Series Rep. 8. 48pp. Office of the Quartermaster General, Research and Development Branch, Textile, Clothing and Footwear Div.

1337
This is a historical review, translated from the French, on the problem of the difficulties encountered in determining what clothing, equipment, and materials individual foot soldiers shall transport. Part of the discussion relates to types and designs of carriers such as the knapsack. The review covers the period from the time of the Roman Legion up to the Japanese Army in the Manchurian Campaign.

1341
Johnson, R.E., & Mark, R.M. RESEARCH REPORTS - FEEDING PROBLEMS IN MAN AS RELATED TO ENVIRONMENT. AN ANALYSIS OF UNITED STATES AND CANADIAN ARMY RATION TRIALS AND SURVEYS, 1941-1946. Apr. 1947. 94pp. Office of the Quartermaster General, Research & Development Branch, Quartermaster Food & Container Institute for the Armed Forces. (Harvard Fatigue Lab.)

1341
The results of a number of United States and Canadian Army ration trials and surveys are analyzed. The nature and quantity of diet is considered in relation to the activities performed by the troops and the thermal environment. Tests and surveys conducted in temperate, subarctic, arctic, mountain, desert and jungle areas are reported. Clinical, biochemical, physiological and behavioral observations are summarized. An attempt is made to draw general conclusions concerning the principles of adequate nutrition in relation to the soldier's activities and environment. T, G, R 22.

1343
Mann, C.W. & Zacharias, V.B. APPLICATION OF FOOT MEASUREMENTS IN THE DEVELOPMENT OF LAST SYSTEMS. RESEARCH AND DEVELOPMENT REPORT. FOOTWEAR AND LEATHER SERIES. Rep. 7. 1952. 45pp. USA Office of the Quartermaster General, Research and Development Div., Washington, D.C.

The present report describes a study of the foot dimensions of soldiers, obtained in 2 large scale anthropometric surveys, and their application in the improvement of the Munson last system, used for the manufacture of Army service shoes. The basic dimensions of the feet are compared with the corresponding model last dimensions and the foot gradients for size and width are compared with corresponding last gradients. The results show that many of the standard last grades differ from the corresponding foot grades by more than 30%. The deviations are discussed in detail and their importance is demonstrated. An example is presented which shows that the deviations lead to combinations of shoe dimensions that cannot afford optimum fit for the average foot in certain sizes. The report presents some of the basic principles that are essential in the development of a last system from scientific foot measurements. The evaluation of the fitting qualities of shoes and last systems is also discussed and a new method based upon the analysis of dimensions is described which overcomes many of the disadvantages of conventional methods. The application of the methods described above to research and development problems is demonstrated in the analysis of the Munson last system and in defining some of the important characteristics of a last system. R 8

1344
Nelson, R.R., Clark, J.D.A. & Couch, R.deS. SUBSISTENCE PACKAGING AND PACKING. VOLUME V. Operation Studies 1, Jan. 1947, 161pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

1344
This study covers the operations of the Packaging and Packing Branch of the Subsistence Research and Development Laboratory (now designated The Quartermaster Food and Container Institute) during World War II. The purpose and organization of the Branch are discussed along with a general introduction to the work in the development of adequate food packaging materials and packing procedures during the war period. Following chapters deal with test methods, flexible packaging materials, glass and plastic containers, cans, wax dipped cartons, waterproof bag case liners, packing, flexible unit packages, and ration assembly.
T. I.

1345
Randall, F.E. & Munroe, Ella H. ANTHROPOMETRIC MONOGRAPH OF ARMY WOMEN. Rep. 148, Feb. 1949, 13pp. Office of the Quartermaster General, Military Planning Div., Research and Development Branch, Lawrence, Mass.

The objective of this project was to provide a simple source of reference of anthropometric data for use by designers of women's clothing and other personal equipment for Army women. An analysis of an Army (female) population, 18-29 years of age, has been made in order to present the interrelationships which exist between 8 bodily dimensions and 2 independent bodily dimensions, Cervical Height and Hip Circumference. Resulting from this analysis is a nomograph from which can be easily read the average values of the 8 dependent dimensions which will be associated with any selected pair of Cervical Height and Hip Circumference values. This nomograph will be of aid to the designers and developers of clothing, personal equipment, and other equipment used by Army women.

1346
Randall, F.E., Munroe, Ella H. & White, R.M. ANTHROPOMETRY OF THE FOOT (U.S. ARMY WHITE MALE). Rep. 172, Jan. 1951, 23pp. Office of the Quartermaster General, Climatic Research Lab., Lawrence, Mass.
Data obtained during an anthropometric survey of the feet of 5575 Army white men are available in a report published in 1946 by the Armed Medical Research Laboratory, Fort Knox, Kentucky. Although the original report contains many useful data, the interpretations thereof do not permit direct application by designers of lasts and shoes for the Army. In order to provide greater detail and also more directly applicable information, an intensive analysis of the original Fort Knox data has been carried out. The general conclusion reached is that the dimensions of the foot which are closely related to the 2 basic dimensions, Ball Length and Ball Girth, are easily accommodated, whereas those poorly related cannot be accommodated by adjustment and, therefore, must be provided for in the design of the shoe. Dimensions which probably are critical in the proper fit of shoes, and which show low correlations with Ball Length and Ball Girth, namely, the Dorsal and Plantar Arch Heights, Foot Flare, and Angular Orientation of the Heads of Metatarsals, may be expected to occur with almost as much variation for any one size as they occur in all feet. Thus, in order to obtain shoes which will fit properly, it will be necessary to construct them in such a manner as to provide for a considerable amount of independent variation in most of the dimensions studied.
R. I.

1348
Saul, E.V., & Jaffe, J. THE MEASUREMENT OF DECREMENTES IN GROSS MOTOR PERFORMANCE DUE TO CLOTHING. Contract DA44-109-qm-1124. Sept. 1953. 63pp. Office of the Quartermaster General, Tufts College, Institute for Applied Experimental Psychology.

1348
This pre-publication draft describes a study which was designed to investigate the effect of clothing on the efficiency of motor performance. College men performed 28 motor tasks involving gross motor coordination, steadiness, and/or flexibility, under 3 (minimum, medium, and maximum) clothing conditions. The results relate performance scores to each clothing condition.
T.R23.

1351
Prast, J.W., & Noell, W.K. ANOXIA WARNING DEVICE: THE SLOW-WAVE ACTIVITY OF THE BRAIN DURING EARLY STAGES OF OXYGEN LACK. Proj. 21-02-050, Rep. 1. Mar. 1949. 8pp. USAF School of Aviation Medicine, Randolph Field, Texas.

1351
To evaluate the efficacy of an automatic anoxia warning device based upon the incidence of electroencephalographic waves of 4 to 7 cps, 109 subjects aged between 17 and 37 years breathed nitrogen-oxygen mixtures of 6.4 to 8.8 percent oxygen while writing numbers in reverse sequence starting with 1000. The results are presented in terms of the lapsed time from beginning to breathe low oxygen, to warning signal, to first mistake in writing.
T.G.R21.

1352
Campbell, P.A. AIRCRAFT OBSCURATION BY SUN GLARE. Proj. 34, Rep. 1. June 1942. 4pp. AAF School of Aviation Medicine, 27th AAF Base Unit, Randolph Field, Texas.

1352
To determine certain of the characteristics of sun glare in relation to aircraft obscuration, experimental measurements were made of (1) the area in which objects are obscured by sun glare, and (2) of sun brightness for different atmospheric conditions and times of day. From these data estimates of the area of obscuration at different altitudes are made and a principle for a sight mechanism is developed whereby this glare area might be utilized by a pilot to fly in the sun's path.
T. I.

1353
Rowland, Louise S. INTENSITY AS A FACTOR IN RECOGNITION OF COLORED LIGHT SIGNALS. Proj. 37, Rep. 1. Aug. 1942. 4pp. School of Aviation Medicine, AAF, Randolph Field, Texas.

1353
To explore the possibilities of constructing a quantitative test for color signal identification based on measurements of chromatic intensity thresholds, 24 color normal and 11 color deficient subjects made judgments of the minimum intensity at which blue, green, and red test lights could be named. In addition, identification tests were made at higher intensities (range of five log units above threshold). The results are analyzed and discussed in terms of consistency of measurements and differentiation between groups. Further study is recommended.
T.G.

1354
Rowland, W.M. COMPARISON OF HOWARD-DOLMAN DEPTH PERCEPTION TEST, WULFECK GROUP TEST OF STEREO ACUITY, AND KEYSTONE DEPTH PERCEPTION APPARATUS. Proj. 59, Rep. 1. July 1942. 4pp. The School of Aviation Medicine, Randolph Field, Texas.

1354
To determine the value of the Wulfeck Group Test of Stereo Acuity as a method of testing binocular depth perception, 539 aviation cadets were given three tests of depth perception (Howard-Dolman, Keystone, and Wulfeck). The scores are compared and analyzed by means of scatter diagrams. Observed relationships are discussed. Recommendations are made concerning the modification of the Wulfeck test.
G. I.

1365
Rowland, Louise S. AN INVESTIGATION OF THE PERFORMANCE OF POLAROID WIND-FOIL, GLASS-FOIL, AND DARK ADAPTION COCKPITS. Proj. 63, Rep. 1, July 1942. 3pp. The School of Aviation Medicine, Randolph Field, Texas.

1366
To study the efficacy of three types of Polaroid goggles (Wind-Foil, Glass-Foil, Dark Adapter) in providing eye protection for air crew personnel, service tests were made of the Wind-Foil and Glass-Foil types for protection provided from wind, dust, flash-burn, and glare; for fit with oxygen masks, radio headsets, and for comfort. The field of binocular vision and the light transmitting qualities of the goggles were measured. The Dark-Adapter goggle was tested under laboratory conditions for efficiency in pre-conditioning the eyes for seeing in the dark. Recommendations are included.

1367
Bell, P.C. THE EFFECT OF AIRCRAFT COCKPIT FLUORESCENT LIGHTING ON VISUAL ACUITY AND DARK ADAPTATION. Proj. 64, Rep. 1, July 1942. 3pp. School of Aviation Medicine, Randolph Field, Texas.

1368
To determine the effect of ultraviolet fluorescent lighting on visual acuity and dark adaptation, determinations were made of (1) the threshold for the dark adapted eye prior to, and after five minutes exposure to ultraviolet light (distance of 15 inches), and (2) the minimum intensity required to detect a plane silhouette with white light, and with ultraviolet light directed to the eye (distance of 15 inches). Both measures are analyzed for changes due to type of light. The implications of the findings for use of ultraviolet fluorescent in aircraft cockpits are discussed; recommendations are made.

1369
Bell, P.C. SULFA DRUGS AND DARK ADAPTATION. Proj. 91, Rep. 1, Nov. 1942. 2pp. School of Aviation Medicine, Randolph Field, Texas.

1370
To study effects of sulfathiazole and sulfadiazine on dark adaptation, the Wecht adaptometer was used to obtain dark adaptation curves on four subjects, before and four hours after oral administration of either of the drugs. Six additional subjects receiving sulfathiazole in treatment of gonorrheal urethritis were tested. Variations in blood level analyses are presented and the results of administration of either drug are discussed in terms of effect on dark adaptation.

1371
Rowland, Louise S. SULFA DRUGS AND DARK ADAPTATION. Proj. 91, Rep. 2, Dec. 1942. 3pp. School of Aviation Medicine, Randolph Field, Texas.

1372
To study the effect of sulfathiazole and/or sulfadiazine on night visual efficiency as reflected in light thresholds and the ability to locate the position and distinguish the form of an object, two groups of seven subjects each were tested under controlled pre- and post-medication conditions. Results are presented and conclusions drawn as to the effects of sulfa drugs on dark adaptation.

1373
Bell, P.C. A RETRACTABLE SUN GLASS SHIELD. Proj. 107, Rep. 1, Jan. 1943. School of Aviation Medicine, Randolph Field, Texas.

1374
This report describes a sun glass shield which may be snapped on or off type B-7 aviator goggles to provide a means for detecting an aircraft in the sun or glare area of the sun. The device does not restrict the field of vision when not in use and when in use still permits unobstructed vision over the entire visual field by movement of the head. Instructions for use, photographs and diagrams illustrating the device are included.

1375
Rowland, Louise S. "CHES" FOR COLOR BLINDNESS. Proj. 122, Rep. 1, Feb. 1943. 3pp. School of Aviation Medicine, Randolph Field, Texas.

1376
To investigate reported improvement in color vision following treatment with red and green light, seven color deficient men who had received such treatment and had shown day-to-day improvement in reading the American Optical Company charts were examined. Tests used were (1) a measurement of the Rayleigh equation, (2) Berlin-Polydromatic Plates, (3) Dethmers, 7th edition, (4) Dilling, 2nd edition, and (5) American Optical Company Plates, complete and abridged forms. The results are analyzed for valid evidence that improvement in color perception had occurred.

1377
Rowland, Louise S. DAYLIGHT FLUORESCENT LAMPS AS A SOURCE OF ILLUMINATION IN TERMS OF COLOR PERCEPTION WITH PSEUDO-ISOTHERMATIC PLATES. Proj. 130, Rep. 1, Apr., 1943. 3 pp. USAP School of Aviation Medicine, Randolph Field, Tex.

1378
To determine the effect of "Daylight" fluorescent lighting on results of color perception tests, two groups (30, 25) of color deficient subjects were examined with an abridged form of the American Optical Company Test in natural daylight (twenty footcandles or more) and in fluorescent light (sixty to seventy footcandles). Tests were given in reverse order to the two groups. The number of errors for each subject are compared for the two types of illumination. Recommendations are made.

1379
Rowland, W.Z., & Rowland, Louise S. A COMPARISON OF THREE TESTS OF DEPTH PERCEPTION. Proj. 238, Rep. 1, Feb. 1944. 8pp. School of Aviation Medicine, Randolph Field, Texas.

1380
This report presents an experimental comparison of three depth perception tests: Howard-Dolan, Verhoeff, and Dustran (modified Wulfeck test) -- the latter two are small and more portable than the first. One hundred and sixty-four individuals were tested (156 aviation cadets, 8 men disqualified on the basis of previous visual tests). Individual scores are compared by categories for superior, average, and failing for each test. Retests were given and correlations are given to show test reliabilities. Recommendations are included.

1363

Rowland, W.M., & Rowland, Lucine S. STUDIES OF A NUMBER OF MEN REPORTING DIFFICULTY IN NIGHT OPERATIONS. Proj. 251, Rep. 1. May 1944. 6pp. School of Aviation Medicine, AAF, Randolph Field, Texas.

1363

This is a report of a research study which utilized vitamin therapy with a group of nine military men complaining of difficulty in night vision. To determine the cause of the difficulty each individual was evaluated on various visual tests and a course of vitamin therapy was employed where indicated. Results are discussed in terms of each individual and his case history. Results of visual testing of other night blind men's referrals are presented as well as the effects of night blindness and possible non-vitamin factors producing the condition. Various vitamins, such as A, B, C, etc., were used. T, 21

1364

Rowland, Lucine S. NIGHT VISUAL EFFICIENCY IN ILLUMINATIONS ABOVE THE LEVEL OF THE COKE FURNACE. Proj. 248, Rep. 1. May 1944. 12pp. School of Aviation Medicine, Randolph Field, Texas.

1364

To investigate the need for tests of foveal acuity at low intensities as a part of testing for night visual efficiency, measurements were made of the minimum illumination required to read test letters of varied sizes; further measurements of acuity at three brightness levels (100, 0.04, and 0.003 millilamberts) were made. The results are analyzed for procedures to use in measuring foveal acuity at low illumination, and for the relationship between acuity at low illumination and at ordinary levels. Recommendations are included. T.G.E.

1365

Scobee, R.C. TESTS OF THE GRADED DENSITY SUN GLASS, TYPE "A" AND "B" IN CONNECTION WITH AAF BOARD PROJECT J-4035. Proj. 356, Rep. 1. Jan. 1945. 5pp. AAF School of Aviation Medicine, 27th AAF Base Unit, Randolph Field, Texas.

1365

To evaluate the Graded Density Sun Glass, Type "A" (lenses coated at top with a thin, absorbing layer of chrome nickel alloy) and Type "B" (coated lens at both top and bottom), spectrophotometric measurements of the graded density portion were made and field test given by three flying officers. On the basis of the transmission data and the opinions of the subject, favorable and unfavorable points are listed and recommendations are made for use and for modifications. 1.

1366

Rowland, W.M. NIGHT VISION: A REVIEW OF INVESTIGATIONS AT THE AAF SCHOOL OF AVIATION MEDICINE. Proj. 399, Rep. 1, July 1945; 6pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

1366

This report summarized investigations of night vision made at the AAF School of Aviation Medicine between January 1942 and June 1943. Topics of concern are: 1) development of tests for rating night visual efficiency, 2) training in the use of eyes at night, and 3) miscellaneous studies including pupillary size, effect of carbon monoxide and drugs, mapping of visual fields, and acuity at various low levels of illumination. The need for further investigation is indicated. R 17.

1367

Frade, G.E., Green, E.L., & Hoagson, F.V. COMPARISON OF RESULTS OF SIGHT-SCREENER AND CLINICAL TESTS. Proj. 480, Rep. 1. Sept. 1943. 16pp. AAF School of Aviation Medicine, 27th AAF Base Unit, Randolph Field, Texas.

1367

To compare clinical tests routinely used by ophthalmologists with the A-3 Sight-Screener Test for visual acuity, presence of binocular single vision, depth perception, and muscle balance, 31 subjects were examined. Clinical tests used were: A-3 Projector Chart, Clincon Visual Acuity meter, Waller test with the photometer, the Screen and Familiar test, Howard-Dolman test, phoria and red line test. The results are presented in tabular form with a brief statement concerning the reception of a statistical analysis of the data. T.G.E.

1368

Jennings, A.L., Haber, E., & Gerathwohl, S. A STUDY OF SUMMAY MARKINGS. Proj. 512, Rep. 1. Nov. 1947. 14pp. School of Aviation Medicine, Randolph Field, Texas.

1368

To determine the aircraft runway markings which are most effective as aids to landing under conditions of poor visibility, 10 subjects judged the visibility of nine test patterns of equal area black on white arranged in a moving cell, as viewed through a ground glass that simulated fog. Visibility scores are expressed in terms of visual acuity required to recognize the different markings; also as "detected recognition distances" through fog. Recommendations are made and illustrated with a discussion of advantages and disadvantages of each. T.G.E.

1369

Kell, P.C. IMPROVED AVIATION GOGGLES. Proj. 145, Rep. 1. May 1943. 2pp. School of Aviation Medicine, Randolph Field, Texas.

1369

An aviation goggle is described which was designed to increase the available visual field beyond that provided by the B-7 and Polaroid goggles and to fit with the A-14 oxygen mask. A non-shatterable plexiglass lens and sponge rubber frame are provided for increased comfort and wearability. A photograph of the prototype is included. 1.

1372

Gibbs, P.A. RETINAL ADAPTATION IN NIGHT FLYING. Proj. 21-31-014. May 1952. 6pp. USAF School of Aviation Medicine, Randolph Field, Texas.

1372

To study some possible causes for temporary loss of ability to see the horizon during night flying, nine dark-adapted subjects, under simulated night flying conditions, scanned the horizon and reported time and duration of any loss of vision. Variables were: amount of oxygen, body posture, method of scanning, and intermittent light. Time factors in loss of vision are discussed as a function of retinal adaptation and oxygen deficiency. Comments are made concerning restoration of vision by inverting body position and suggestions are made as to best method of scanning. T.G.I.R.

1373
Cibis, P.A., Gerathwohl, S.J., & Rubinstein, D. **DEPTH PERCEPTION IN MONOCULAR AND BINOCULAR VISION.** Special Report. Jan. 1953. 12pp. USAF School of Aviation Medicine, Randolph Field, Texas.

1373
To study the effectiveness of various cues in depth perception, 21 subjects viewed white squares (plate, with vertical black stripes, with horizontal black stripes) displayed at 15- and 70-degree angles, either in motion or in various fixed positions. Judgments were made of the degree of apparent slant. The same proportion of errors for all conditions are analyzed and discussed in terms of perspective cues, stereoscopic cues, motion cues and their combined effects on accuracy of depth perception. A tabular summary of potential factors in space perception is included. T.I.R.

1374
Gerathwohl, S.J. **PERCEPTIBILITY OF FLASHING AND STEADY LIGHT SIGNALS. II. HIGH-CONTRASTS.** Proj. 21-24-014, Rep. 2. Feb. 1952. 8pp. USAF School of Aviation Medicine, Randolph Field, Texas.

1374
To study the relative visibility of steady and intermittent light signals at contrast ratios higher than 1.00, a multiple complex reaction experiment was conducted with contrast ratios of 1031.5, 133.4, 19.1, 13.3, and 6.6 for both steady and flashing light signals. Subjects were used in groups of 25, 21, and 22. Total response time, response time for first presentation of each light, and correct responses are analyzed for the two signal lights as affected by the contrast ratio, complexity of the task, and practice. T.I.R.

1375
Gerathwohl, S.J., & Rubinstein, D. **INVESTIGATION OF PERCEPTUAL FACTORS INVOLVED IN THE INTERPRETATION OF PFI-SCOPE PRESENTATIONS. II. A PILOT STUDY ON POOR DISCRIMINATION.** Proj. 21-24-009, Rep. 2. Aug. 1952. 12pp. USAF School of Aviation Medicine, Randolph Field, Texas.

1375
To investigate the relative discriminability of simple planimetric figures, 12 targets (pairs of triangles, circles, ellipses, squares, rectangles, and trapezoids arranged in a circle around a center) were presented on a radar scope at three ranges (ten, twenty, and fifty miles) and a simulated altitude of 26,000 feet. Targets were identified by 24 untrained observers. The number of correct identifications is given as an index of relative discriminability and analyzed for significant differences among shapes, positions, sizes, and observers. T.G.I.R.10.

1376
Soley, P.J. **A SUMMARY OF EXPERIMENTS TO DATE ON THE APPLICATION OF NON-LINEAR SCALES OF THE LOGARITHMIC TYPE TO ALTIMETER DESIGN.** DAME 160 1/0 164, POC D77 94 20 27, March 1954. 14pp. Reference Research Medical Labs., Toronto, Ontario, Canada.

1376
As a result of experiments carried out on the interpretation of non-linear scales of the logarithmic type, a single pointer, single revolution altimeter display was designed. A range from ten feet to 60,000 feet was used. This display was evaluated, in terms of interpretation error with controlled exposure time and with uncontrolled exposure time. T. G. I. R. 2

1377
Burt, G.E. **PSYCHOLOGICAL ADAPTABILITY. STANDARDIZATION OF A PSYCHOLOGICAL TEST AND CONSIDERATION OF TRANSFER EFFECTS.** Proj. 21 0222 0003, Rep. 2, Jan. 1953. 14pp. USAF School of Aviation Medicine, Randolph Field, Texas.

1377
To evaluate the procedure for further study and to obtain preliminary data on transfer effects, an experiment was conducted with 118 basic trainees involving learning the task in succession. Tasks were various combinations of response patterns on the SIX Self-Testing Discrimination Reaction Time Test. The second task involved a reversal or a change of axis in the interpretation of the direction signalled on the display. Amount of information to the task varied. Correct and incorrect responses are interpreted in terms of transfer as a function of directed attention and task similarity. T. G. I. R. 3

1379
Holzman, W.H., & Bitterman, M.E. **PSYCHIATRIC SCREENING OF FLYING PERSONNEL. VI. ANXIETY AND REACTIONS TO STRESS.** Contract AF 33(036) 13807, Proj. 21 37 002, Rep. 6, Dec. 1953. 24pp. USAF School of Aviation Medicine, Randolph Field, Texas.

The survey of the literature was summarized under the following major topics: anxiety reactions in military personnel; psychometric studies, stress tests, physiological correlates of emotional disturbances, and anxiety and learning. The bibliography of 263 references was selected from several thousand reviewed. Published reports indicate that while nearly all flyers experience some anxiety before and during combat, the intensity of this experience varies greatly. Furthermore, under strong emotional tension some individuals are capable of more effective control of behavior than are others who soon become badly incapacitated. These observations point to the importance of 2 fundamental factors in anxiety-proneness: a) lability of susceptibility to emotional arousal, and b) control or ability to function adequately in the face of emotional arousal. Both factors are in all likelihood intimately related to a motivational variable which may be called ego-involvement. An individual who is highly motivated to meet certain standards of performance will be more quickly and strongly aroused by the threat of failure and will, at the same time, try harder to maintain control. Unfortunately, there is at the present time little in the way of well-designed prognostic research directly applicable to the practical problems of psychiatric screening. The diffuse literature surveyed does, however, suggest a number of promising approaches which require considerable development and preliminary field work before their validity in screening situations can be assessed. k.263

1380
Barter, J.T., & Alexander, M. **A SIZING SYSTEM FOR HIGH ALTITUDE GLOVES.** Contract AF 18(600)-30, Proj. 7214, WADC-TR-56-599, Dec. 1956. 21pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

1380
This report presents the rationale for and procedures followed in the development of a sizing program for high altitude gloves. A selected sample of 100 hands was measured in 31 dimensions. Both x-ray and caliper measurements were used. Summary statistics, regression equations, design dimensions, and a procurement tariff are presented for twelve sizes (chosen arbitrarily to conform with the number of suit sizes issued). The results of a fit-test of two differing styles of gloves sized according to this program are discussed. Detailed instructions for determining the indicated size of gloves are included. T. I. R. 3

1381

Farley, F.M. INDIVIDUAL DIFFERENCES IN CRITICAL AIRCRAFT ELEMENTS. I. THE REGENERATION OF CRITICAL PROFICIENCY REQUIREMENTS FOR B-29 (BOMB CREW). Contract AF 33(616) 10476, Proj. 21 23 014, Rep. 1, April 1952, 17pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Data on aircraft performance were obtained by analysis of already existing evaluation forms, from study of technical aircraft literature, through individual and group interviews with flying personnel, by analysis of bombardment wing gross error board reports, and through reference to critical incidents obtained in a previous study. These data were integrated and utilized to develop tentative lists of proficiency evaluation items for each of B-29 aircraft positions. Subsequently arrangements were made to obtain, through judgments by qualified experts, information regarding the relative importance of the various items. The evidence indicates that the procedures discussed in this report have provided the basis necessary for the development of fully adequate proficiency evaluation techniques of the type required.

R-3

1382

Edgar, H.M. & Fleck, E. NIGHT VISION TRAINER AND TRAINING TECHNIQUES. I. A PROJECTOR FOR BASIC NIGHT VISION TRAINING OF PILOTS. Proj. 21 38 020, Rep. 1, June 1950, 8pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

1382

A device for basic training of pilots in night vision is described. The device is a projector for wide-angle projection of five low levels of illumination and is accompanied by six fixed slides of a landscape and a moving slide of an airplane silhouette which may be projected simultaneously with the fixed landscape. The specific uses for the device in a demonstration and training program are discussed.

I.R.

1383

Schmidt, Ingeborg. COMPARATIVE EVALUATION OF THE HARDY-BARD-RITTNER POLYCHROMATIC PLATES FOR TESTING COLOR VISION. Proj. 21-31-013, June 1952, 10pp. USAF School of Aviation Medicine, Randolph Field, Texas.

1383

To evaluate the Hardy-Bard-Rittner polychromatic plates (simple geometric forms used in place of numbers) for screening and classifying personnel with respect to color vision, 319 subjects (mean visual acuity 20/30 or better) were examined with the H-B-R charts, American Optical Company 19-plate Test, SAM Color Threshold Test and the Nagel anomaloscope. A comparative analysis of test results was made in terms of their screening, quantitative and qualitative classification abilities. Recommendations for development and suggestions for changes in the H-B-R test are made.

T.B.

1384

Gochman, N. A STUDY OF METHODS OF EVALUATING INFORMATION PROCESSING SYSTEMS OF WEAPONS SYSTEMS. Contract DA-36-039 ac-63143, Rep. WE-56-U-M-3, Proj. 1380, July 1956, 38pp. Institute for Cooperative Research, University of Pennsylvania.

1384

This report deals with methods of operational analysis and evaluation of communications (or information-processing) systems. It is concerned with examining how in principle and practice one can proceed from raw data of system performance to both an over-all and analytic evaluation that will explain and pinpoint reasons for the over-all result. Basic general theoretical questions such as nature of the standards to be applied and the major factors involved are discussed. Specific and detailed forms which have been developed for actual practical application in the analytic evaluation of weapons systems are presented and discussed in detail.

T. I.

1385

Ulett, G.A., Gleser, G., Starr, P., Haddock, J., et al. PSYCHIATRIC SCREENING OF FLYING PERSONNEL: FURTHER STUDIES TOWARD THE DEVELOPMENT OF AN ELECTROENCEPHALOGRAPHIC SCREENING TECHNIQUE. Proj. 21 0202 0007, Rep. 5, Aug. 1953, 25pp. USAF School of Aviation Medicine, Randolph Field, Tex. (School of Medicine, Washington University, St. Louis, Mo.).

This report describes the validation of previously developed scales for the detection of anxiety-prone individuals based upon the basic EEG and the EEG changes and subjective responses induced by intermittent photic stimulation. A sample of 110 Ss was used. The individual's proneness to develop anxiety under stress was rated by means of psychological tests and 2 psychiatric interviews. 2 provisional scales for scoring the basic EEG and the scale for subjective response to intermittent photic stimulation were found valid for the prediction of the criterion of anxiety-proneness in the new sample.

R 18

1386
Ulett, G.A., Gleser, G., Lwiner, Ann & Vinokur, U. PSYCHIATRIC SCREENING OF FLYING PERSONNEL. IV. AN EXPERIMENTAL INVESTIGATION OF DEVELOPMENT OF AN EEG INDEX OF ANXIETY-TOLERANCE BY MEANS OF PHOTIC STIMULATION--ITS VALIDATION BY PSYCHOLOGICAL AND PSYCHIATRIC CRITERIA. Contract AF 33(616) 1380, Proj. 21 37 003, Rep. 4, Aug. 1952, 39pp. USAF School of Aviation Medicine, Randolph Field, Tex.

221 Ss were utilized in an attempt to devise an EEG measure for selecting anxiety-prone individuals. These Ss were studied under conditions of intermittent photic stimulation both with and without the added feature of an environmental stress-producing situation. Ss were carefully screened by psychological tests and psychiatric interviews and rated for anxiety-proneness on an 8-point scale. There was a significant correlation between the criteria of anxiety-proneness and the following: a) the amount of subjective dysphoria produced by intermittent photic stimulation; b) the amount of abnormal EEG response in the 20-30 cps range to stimulation with flicker frequencies one-half or one-fourth this rate; c) the displacement of the centroid of driving from the normal range; and d) the percentage of abnormal and low alpha records as detected by the electronic analyzer and by clinical inspection of the electroencephalogram. There was no relationship found between the criteria for anxiety-proneness and the amount of change in response to photic stimulation at 14 cps during the experimental stress situation. A check list of anxiety-indicators derived from the basic and photically driven EEG and including evaluation of induced subjective sensations correlated 0.48 with the validating criterion on anxiety-proneness. For an independent sample the check list was again shown to have predictive value. The ability of photic stimulation to produce a disturbance of consciousness in certain susceptible individuals may indicate another possible value of this procedure as a screening device. It is felt that the results of this investigation are sufficiently promising to warrant further refinement and simplification with the ultimate goal of developing an EEG measure useful for the screening of applicants for military service.

R-38

1387

Bowen, H.M. SIGNAL VISIBILITY ON A B-SCAN RADAR DISPLAY: A STUDY OF NOISE BRIGHTNESS AND NOISE PATTERN. FTRC 782, Feb., 1952; 4 pp. FTRC, RAF Radar Research Unit, Psychological Laboratory, Cambridge, England.

1387

To investigate the effect of video noise on signal detection on radar displays, three factors which control brightness and distribution of noise were varied: cathode-ray tube bias (from -34 to -44 volts), video limiter values (from just visible to non-limited display); I.F. Gain (to cover operating range on B-scan radar set). Signal detection thresholds (in decibels) for one trained observer were obtained for each viewing condition and analyzed as function of video noise and screen brightness. Theoretical interpretations are given.

G.R.C.

1388
Graham, Mervin E. NATURAL TRACKING ON A HORIZONTAL SCALE AND IN THE FOUR QUADRANTS OF A CIRCULAR SCALE. Brit. J. Psychol., 1952, 43, 70-77. Pp. 783. Flying Personnel Research Committee, Univ. of Durham, Staffs. Dept. of Industrial Health.

1388

To determine the effect of target location on manual tracking, a comparison, is made of a horizontal scale with target at midpoint and a circular scale with target in the upper and lower quadrants. Twenty subjects kept a moving pointer on target by a control knob, directly below the displays. A further comparison was made with targets in all four quadrants of the circular display. Tracking errors and frequencies of touching the control the wrong way are analyzed. The best display-control relation for this particular situation is discussed.
T,G,R2.

1389

Mockworth, N.E. SOME HUMAN-LEGIBILITY TESTS IN A MOCK-UP CONTROL ROOM. Pp. 785. Mar. 1952. 2pp. Flying Personnel Research Committee, Medical Research Council, Applied Psychology Research Unit, Univ. of Cambridge, England.

1389

To test suggested arrangements for a proposed Control Room, tests were made of the legibility of two raid block displays (three-figure index number and an identification letter) on the plotting table. Readings were made by six tellers from five different parts of the room. Error scores are analyzed as a function of the telling position (viewing distance and viewing angle). Recommendations for placement of tellers in the Control Room are made.
T,R1.

1391

Betts, E.A. DATA ON VISUAL SENSATION AND PERCEPTION TESTS. PART II. VISUAL EFFICIENCY. Meadville, Pa.:Keystone View Co., 1940. 66pp. (Penn. State College, Director of Reading Clinic.)

1391

This report presents data on the reliability and validity of readings taken on the three visual efficiency slides (visual acuity) of the Visual Sensation and Perception Tests of the Betts Ready to Read Inventory for screening or detecting cases of questionable visual acuity. The Snellen Letter Test Chart is used as the criterion. Data are 42,329 readings taken on 13,213 cases from kindergarten age to adult level. Correlations are analyzed and tables of expected distribution for adult and school age populations are given.
T,R187.

1392

Betts, E.A., & Ayers, A.W. DATA ON VISUAL SENSATION AND PERCEPTION TESTS. PART III. STEREOPSIS. Meadville, Pa.:Keystone View Co., 1940. 37pp. (Penn. State College, Reading Clinic.)

1392

To establish the reliability of readings taken on the eye coordination (stereopsis) slides of the Visual Sensation and Perception Tests of the Betts Ready to Read Battery, 14,490 readings were taken on 1,650 cases covering an age range from kindergarten through adult levels, with three distance settings: equivalent of 16 inches, 40 inches, and 20 feet. The data are analyzed for relationships among the three slides of the test, reliability of readings taken by different examiners of varying background of experience, and for effect of distance settings. Tables of expected distributions through the various age populations are presented.
T,R31.

1393

Betts, E.A., & Ayers, A.W. DATA ON VISUAL SENSATION AND PERCEPTION TESTS. PART IV. ANISOTROPIA. Meadville, Pa.:Keystone View Co., 1940. 69pp. (Penn. State College, Reading Clinic.)

1393

To establish reliability of the anisotropy slides of the Visual Sensation and Perception Tests of the Betts Ready to Read Battery for detecting cases needing referral, 19,235 readings were obtained on 10,231 cases. The data are analyzed for consistency of test results and of readings taken by different examiners. The interrelationships of the three slides used are studied. Tables of expected distribution for various age populations are given. There is an extensive discussion of anisotropy and of its mechanical functional explanation.
T,R47.

1394
Hick, W.E. & Bates, J.A.V. THE HUMAN OPERATOR OF CONTROL MECHANISMS. Monogr. 17 204, AFU/79, May 1950. 64pp. Ministry of Supply, Permanent Records of Research & Development, Strand, London, England.

This report considers the physiological and psychological attributes of man in tracking behavior and tasks. The tracking task and the physiological characteristics of the operator are discussed in the introduction along with the types of manual control system and the performance and stability criteria involved. The report is broken down into 4 chapters covering: general features of the human operator in action; performance of the operator in a control system; practical considerations in control design; and learning and the acquisition of skill in tracking. This report appears to be the product of an extensive examination of the man-machine relationship in control mechanisms. (HEIAS)
R 73

1395

King, B.G., Vollmer, E.P., Henson, Margaret, Margolis, S.I., et al. MEASUREMENTS OF AIRCREWMEN AND AIRCREW SPACES IN NAVAL AIRCRAFT. Proj. X-651, Rep. 1, Dec. 1945, 12pp. USN Medical Research Institute, Bethesda, Md.; & USN Air Test Center, Patuxent River Air Station, Md.

1395

This study was conducted to determine the adequacy of entranceways and intra-aircraft spaces in relation to heights and weights of aircrewmembers, the clothing worn, and activities performed. Results are presented in terms of time required for entrance and exit and also in terms of "theoretical exclusion" limits for various aircraft.
T,G,R2.

1397

Birren, J.E. & Fisher, M.B. STANDARDIZATION OF TWO TESTS OF HAND-EYE COORDINATION: A TWO-HAND COMPLEX TAPPING TEST AND A ROTARY PURSUIT TEST. Res. Proj. X 233, Rep. 6, Sept. 1945, 11pp. USN Naval Medical Research Institute, Bethesda, Md.

A 2-hand tapping test was devised which required dissimilar simultaneous movements of the 2 hands and which produced frequent "blocking" or interruption of smooth performance. The split-half reliability coefficient (r) for the first practice session (8 1-min. trials) was 0.98 (N=52), retest coefficients were 0.86 (N=46) between sessions 1 & 2, and 0.91 (N=40) between sessions 11 & 12. Ss appeared to improve regularly with practice and most Ss were approaching their maximum performance by the 14th test session. Improvement from trial session 1 to 14 was about 200% of the initial score, that is, the mean rose from 55 to 165 taps per min. The Koehn Pursuit-Rotor test of hand-eye coordination was standardized. The procedure employed 5 30-sec. trials per practice session, and 30-sec. rests between trials. Session 1 had a split-half reliability of 0.96 (N=81). The correlation between sessions 1 and session 2 was 0.74 (N=81), and between session 17 and 18, 0.87 (N=46). Improvement in performance on the pursuit rotor was rapid, the greater part of the improvement occurring in the first 12 practice sessions. Performance on the 2 tests was not significantly correlated. Both mechanical and test performance criteria indicate that these tests are satisfactory in evaluating motor skills. Their long and rather smooth learning curves suggest their usefulness in assaying the influence of prolonged exposure to physiological stress.

R 10

1396

King, S.G., Morrow, Dorothy J. & Vollmer, F.P. COCKPIT STUDIES--THE BOUNDARIES OF THE MAXIMUM AREA FOR THE OPERATION OF MANUAL CONTROLS. Proj. X 651, Rep. 3, July 1947, 13pp. USN Medical Research Institute, National Naval Medical Center, Bethesda, Md.

The boundaries of the maximum working area for operation of manual controls may be represented by a segment of the shell of an ellipse; the shell is about 5 in. thick. The maximum dimension to the periphery of this shell is found at approximately shoulder height at 105° to the right or left; dimension diminishes as the arm is brought to the zero position and as the arm is raised or lowered. Average reaches for 139 Ss varied between 36.8 in. and 13.1 at various points on the elliptical segments; dimensions within 0° and 75° satisfactory for 93% of the sample varied from 11.6 to 11.0 in. when seat back was 13° from vertical. Anthropometric measurements are given for a large number of Ss. The problem of representative samples of the military population is discussed. A simple rapid method for further testing of dimensions, selection of pilots, and studying placement of controls is described.

R 8

1403

Blackwell, H.R. PSYCHOPHYSICAL THRESHOLDS EXPERIMENTAL STUDIES OF METHODS OF MEASUREMENT. Contract NSORI 116, T.O.-5, Proj. NR 142 106, Engineering Res. Bull. 36, Jan. 1953, 227pp. Office of Naval Research, Washington, D.C. (University of Michigan, Ann Arbor, Mich.)

4. Trials of experiments are reported which are concerned primarily with establishing optimum experimental conditions to be used in psychophysical measurement of sensory thresholds. In all cases, measurements were made by methods of constant stimuli. Primary criteria were the reliability and inferred validity of the measurements made with various procedures. By inferred validity is meant the extent to which threshold data are influenced by variables which are generally agreed to be irrelevant to purely sensory functions. A secondary criterion was the absolute magnitude of the thresholds obtained, the smallest thresholds being preferred as most sensory-determinant. In the first series, 4 Ss made more than 60,000 observations under constant stimulus conditions. Psychophysical procedures were varied systematically. In the second series, 4 subjects made more than 34,000 observations under 8 stimulus conditions, employing each of 2 psychophysical procedures. In the third and fourth series, 10 groups of Ss employed selected psychophysical procedures. 77 subjects made more than 193,000 observations. It was concluded that optimum psychophysical procedures include the following: a) the use of forced choice rather than phenomenal report to indicate discrimination; b) stimulus variation in time rather than in space to provide the basis for a forced choice; c) stimulus magnitudes to be blocked rather than randomized in forced choice; d) the use of Ss with reasonably extensive experience; and e) provision for immediate knowledge of the correctness of responses to be given the Ss. Other topics considered are: a) systematic differences in threshold data related to data collection procedures; b) the neural quantum theory of sensory discrimination and other theories which predict the form of threshold data; and c) the time order of threshold variability.

R 34

1410

Duntley, S.O. (Res. Dir.). THE VISIBILITY OF SUBMERGED OBJECTS. FINAL REPORT. Contracts NSORI 07831, NSGNI 07864 & NOBS 50378, Projs. DIC 6621, DIC 6757 & DIC 6918, Aug. 1952, 74pp. Visibility Lab., Massachusetts Institute of Technology, Cambridge, Mass.

1410

The primary concern of this Handbook is with the physical and visual factors which limit the visual detectability of objects submerged in the ocean. The following major problems have been studied experimentally and solutions are offered in form of mathematical equations, nomographs, and measuring devices: (1) apparent contrast of submerged objects; (2) principles of hydrological optics; (3) inherent contrast of submerged objects; (4) visibility from aircraft; and (5) contrast reduction by the atmosphere.

T.O.I.R12.

1400

USAF Operational Test Center. OPERATIONAL SATISFACTION TEST OF APPRENTICE AIRCRAFT PROPELLER REPAIRMAN. DETAILED TEST OF TIAF COURSE NUMBER AM2131. FINAL REPORT. Proj. AGC/CSC/1005-A, June 1946, 47pp. USAF Operational Test Center, Eglin AFB, Fla.

1400

To determine the ability of the apprentice aircraft propeller repairman to perform the duties of his Air Force specialty, four apprentices, who represented a cross-section of a graduating class of the Aircraft Propeller Repairman Course, were tested in a 90-day on-the-job situation. The work performed each day was rated by the immediate supervisor. The nature and extent of any additional instruction needed to complete any job was recorded. These data were analyzed and recommendations for improvement of the training course were made.

R 1

1413
Graham, C.H. (Chas.). A SYMPOSIUM: THE PRESENT STATUS OF FUNDAMENTAL RESEARCH IN VISION. ABSTRACTS OF PAPERS PRESENTED AT A MEETING OF THE NAVAL RESEARCH ADVISORY PANEL IN PSYCHOLOGY. COLUMBIA UNIVERSITY, 30-31 JANUARY 1953. 17pp. Naval Physiological Psychology Branch, ONR, Washington, D.C.

1413
This report presents abstracts of papers given at a symposium coordinating the latest results of all investigators conducting basic work in vision under contract with the Office of Naval Research. The abstracts are grouped under the following divisions: psychophysiology and ophthalmology, psychology and psychophysiology, color vision, psychology, methodology, and applications of methods.

1414
Meyer, G.L. EXPERIMENTAL TEST OF A GENERAL MODEL OF DECISION BEHAVIOR. Contract DA 36 039 SC 63143, Proj. WESCOM, DA Proj. 3-99 12 023 & SC Proj. 132C, Serial 46, WE 56 U M 4, Aug. 1956, 16pp. The Institute for Cooperative Research, University of Pennsylvania.

1414
This paper is concerned with an experimental determination of the question "Can the models of decision which incorporate the concept of expectation be used to describe adequately how decisions are made?" A game was devised which involved three square arrays of numbers; the numbers in each row represented the amount of money in cents that could be won or lost by the selection of that row. The result that would apply was determined by a random device manipulated by the experimenter. Thirty-four subjects were given 48 trials each. Analysis consisted in counting the number of behaviors that could be considered as consistent with the model of expectation in question.

G. R 1

1416
Hohn, F.E. & Cronbach, L.J. SOME METHODS OF COMPARING SOCIOMETRIC MATRICES. Contract N6001 07135, Tech. Rep. 5, Jan. 1953, 24pp. Bureau of Research and Service, University of Illinois.

1416
This paper develops two measures, the hierarchy index (h) and coefficient of agreement (a), for comparing sociometric matrices. The hierarchy index is a function of ranks, ranging from the value zero, when members of a group are "equal" with respect to the characteristic in question, to the value one for extreme inequality. Differences between bi-values obtained from two sets of observations may be tested for significance. The coefficient of agreement (ranging from minus to plus one) also compares group structures. The assumptions and definitions of each measure are presented. A discussion of the usefulness of h and a sociometric research is presented.

T. R 7

1417
USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE AIRCRAFT CONTROL AND WARNING OPERATOR GRADUATES OF TTAI COURSE NO. AB27330. FINAL REPORT. Proj. APG/ADC/976 A, July 1956, 27pp. USAF Operational Test Center, Eglin AFB, Fla.

1417
This report is concerned with graduates of Technical Training Air Force Course Number AB27330, Aircraft Control and Warning Operator, who were tested in an on-the-job situation to determine their abilities to perform the duties of their specialty. Assignments in an aircraft warning and control situation and in an airborne early warning and control situation were followed. Recommendations are offered for improvement of the training.

T.

1418
USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE AIRCRAFT MECHANIC (REPAIRING, OVER TWO ENGINES) GRADUATES OF TTAI COURSE NUMBER AB431312-1. FINAL REPORT. Proj. APG/ADC/975-A, July 1956, 41pp. USAF Operational Test Center, Eglin AFB, Fla.

1418
To determine the ability of the apprentice aircraft mechanic to perform the duties of his Air Force specialty, eight apprentices, representing a cross section of a graduating class of the course, were tested in a 90-day on-the-job situation. The work performed each day was rated by the immediate supervisor. The nature and extent of any additional instruction needed to complete a job was recorded. These data were studied and recommendations for improvement of the training course were made.

T.

1424
Low, F.M. PERIPHERAL VISUAL ACUITY: A REVIEW. Contract W5000-243, T.O. III, Proj. NR 141-262, June, 1950, 24 pp. ONR. (Johns Hopkins Univ., School of Medicine, Dept. of Anatomy)

1424
This report reviews pertinent literature on peripheral visual acuity. A brief historical sketch is followed by graphical comparison of quantitative results of different investigations. The many factors known to affect peripheral acuity (angular eccentricity, meridional differences, test object differences, brightness of test object, adaptive processes, refractive conditions, color, viewing time, movement, individual differences, spontaneous fluctuation, practice, psychological and others) are discussed with reference to published data and probable reasons for prior agreement among investigators. Theories explaining decreased acuity in the periphery are evaluated.

G.R100.

1425
Courtney, D., Greer, F.L., Masling, J.M. & Orlans, H. NAVAL, NEIGHBORHOOD, AND NATIONAL LEADERSHIP (THREE REPORTS). ANNUAL TECHNICAL REPORT. Contract N6001 694C1, Series 1953 - Inst. Rep. 1, Feb. 1953, 68pp. Institute for Research in Human Relations, Philadelphia, Penn.

1425
The work in the field of leadership that is being carried on by the Institute for Research in Human Relations emphasizes 1) real life situations, 2) the follower in the leader-follower relations, 3) relationships between personality syndromes in both leader and followers and their social behavior, and 4) group or social memberships of followers and social roles of leaders as they interact in social behavior. Three facets of this work are presented here: 1) a study of leadership in a real military situation at the U.S. Naval Training Center, Bainbridge, Maryland, by Joseph Masling; 2) a study of neighborhood leaders in certain areas of Philadelphia, by F. Loyal Greer; and 3) leadership attitudes and ideology as reflected in national polls, by Harold Orlans.

T.

1428 Davis, H. REPORT OF THE CONFERENCE ON HEARING AND VOICE COMMUNICATION. NATIONAL ACADEMY OF SCIENCES, WASHINGTON, D.C., 28 OCTOBER 1950. 24pp. USN Physiological Psychology Branch, ONR, Washington, D.C.

The Conference on Hearing and Voice Communication of which this report constitutes a summary, was one of a series of technical symposia sponsored during 1950 by the Naval Research Advisory Panel for Psychophysiology. The purpose of the conference was to review the research in this area currently being conducted under cognizance of the Psychophysiology Branch, Office of Naval Research, and the formulation of plans for future research activities. Many of the projects to be reported fall clearly in the biophysical or anatomical and physiological classification. These projects include part of the work at the Psycho-Acoustic Laboratory, Laboratory under Meyer, the biophysical and neurophysiological studies of the Princeton for the deaf, the neurophysiological studies of Kemp, Thurlow, et al. at the Central Institute of Rochester, and those of Tunturi at the University of Oregon. Hearing studies, at the University of Chicago, relating conditions reflexes to particular parts of the nervous system also lie in this area. In the area of psychophysics lie many of the projects of the Psycho-Acoustic Laboratory, the work by Harris at the U.S. Naval Submarine Base, New London, on psychophysical functions, and similar work at the U.S. Naval Electronics Laboratory and several other institutions not directly represented at the conference.

1429 Wendt, G.R. & Berry, M. REPORT OF CONFERENCE ON MOTION SICKNESS. NATIONAL ACADEMY OF SCIENCES, WASHINGTON, D.C. 9 SEPTEMBER 1950. 15pp. USN Physiological Psychology Branch, ONR, Washington, D.C.

1429 The presentations and discussion at a symposium on motion sickness sponsored by the Office of Naval Research in 1950 are summarized. Current research is reviewed, covering the use of drugs, effects of forces on orientation, neurophysiological mechanisms, importance of head movements and practical incidence of motion sickness in military operations. The present status of preventative and therapeutic techniques is discussed together with the areas in which the participants considered further research most necessary. R4.

1430 Voss, H.A. SPECIFICATIONS FOR CONTROLS AND DISPLAYS. May 1946; 4pp. ONR, Special Devices Center, Port Washington, L.I., New York.

1430 This paper is a preliminary draft of specifications for controls and displays. General specifications, panel arrangements, knob and handle design, and displays are included.

1431 Meyer, G.L., & Hoban, C.P. INQUIRY INTO THE DECISION PROCESS. Contract DA-36-039 ac-63143, Rep. WE-56-U-M-5, Proj. 132C, Aug. 1956, 15pp. Institute for Cooperative Research, University of Pennsylvania.

1431 This non-technical report is concerned with the nature of the decision process. The problem of information required for decision and the criteria for decision, given the required information, is discussed. A distinction is made between prescriptive and descriptive models of decision and the concept of expectation is identified as common to available prescriptive models. The results of an experimental test of prescriptive models of decision behavior are described. Finally, some areas of research are indicated which might lead to increased understanding and control of decision-making in communications systems. I. R 7

1432 Sloan, Louise L., & Altmann, Adelaide. EVALUATION OF H.R.R. PLATES FOR MEASURING DEGREE OF RED-GREEN COLOR DEFICIENCY. Tech. Rep.--Proj. N6onr 243-07, 3 pp. ONR. (Wilmer Ophthalmological Inst.)

1432 To evaluate the Harri-Rand-Rittler (HRR) Plates for measuring degree of red-green color deficiency, 65 subjects, with such deficiencies, were tested by (1) HRR plates, (2) Color Threshold Test, (3) Nagel Anomaloscope, (4) a filter anomaloscope, and (5) the Navy Lantern Test (given to a selected few); 17 subjects were tested twice on the HRR plates to check on test reliability. The data are analyzed as to relative difficulty of each HRR plate for testing red-green deficiency, the accuracy of the test for classifying degree of deficiency, and for relationships among all tests. Comments are made on the usefulness of the HRR plates. T,G,R5.

1433 Sloan, Louise L., & Rowland, W.M. COMPARISON OF ORTHO-RATER AND SIGHT-SCREENER TESTS OF HETEROPHORIA WITH STANDARD CLINICAL TESTS. Amer. J. Ophthal., Oct., 1951, 34, 1363-1375. Contract N6onr 243-7, Proj. NR141-526, ONR (Johns Hopkins Univ., Wilmer Ophthalmological Inst.)

1433 To determine the degree of agreement between measures of heterophoria by machine tests (Ortho-Rater, Sight-Screener) and clinical tests (Maddox rod and scale, Maddox rod and phorometer, Grid and polaroid tests), subjects were given the five tests (half took the Ortho-Rater first, half the Sight-Screener, with clinical tests following). Some modifications were made in the machine tests. All scores were converted to prism diopters; correlations among the test scores are given. Further analysis is made on the basis of selected pass-fail criteria. The usefulness of the machine tests for screening purposes is discussed. T,G,R7.

1434 Stauffer, A.J. & Thordike, R.L. RESEARCH AND DEVELOPMENT OF NEW ELECTRONIC TECHNICIAN SELECTION TESTS. FINAL REPORT. Contract N6onr 326(00), Aug. 1952; 27pp. USN Classification Survey Research Branch, Bureau of Naval Personnel, Washington, D.C. (Teachers College, Columbia University; New York, N.Y.).

1434 This is a final report of research and development of new Electronic Technician Selection Tests (ETST). The first phase consisted of the preparation of two new forms of the test, built to the same content specifications as the current form but somewhat easier. Approved techniques of item preparation, editing, and analysis were used, and norms developed for the resulting tests. Some data were obtained on the validity of the ETST for the first ten weeks of the electronics course. In the second phase, two electronic technician schools were visited, examinations analyzed, and evaluation procedures discussed with school officials. Operational and research recommendations are included. T. R 3

1436
Canfield, A.A., Conrey, A.L., Wilson, R.C. & Zimmerman, W.S. THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION UPON DISCRIMINATION REACTION TIME. *J. exp. Psychol.*, Dec. 1950, 40(6), 733-737. (University of Southern California, Los Angeles, Calif.).

1436
This experiment was designed to evaluate the effects of acceleration (g) forces, such as act on the pilot of an aircraft during high speed turns, on the speed of discriminatory responses. Twenty-three college students performed a reaction time test requiring them to throw a toggle switch in the direction in which a signal light appeared, while subjected to 1, 3, and 5 g's in a human centrifuge. The effects of the g forces and of test practice on the reaction time are analyzed separately and with respect to their interaction.
T, R 1

1437
Conrey, A.L., Canfield, A.A., Wilson, R.C. & Zimmerman, W.S. THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION UPON PERCEPTUAL SPEED ABILITY. *J. Aviat. Med.*, Feb. 1951, 22(1), 60-65. (University of Southern California, Los Angeles, Calif.).

1437
To investigate the effects of acceleration (g) forces, such as act on the pilot of an aircraft in high speed turns, on the speed of visual perception, 14 subjects performed on a test measuring the speed of recognition of the details of test patterns, while subjected to 1, 2, 5 and 4g in a human centrifuge. The effects of the g forces and practice on the test are analyzed separately and with respect to their interaction.
T, R 2

1438
Bryan, G.L., Wilson, R.C., Willmorth, N.E., Svenson, D.W., et al. PSYCHOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE. FINAL REPORT. Contract NSOR1 77 III, June 1951, 18pp. Department of Psychology, University of Southern California, Los Angeles, Calif.

This report is composed of abstracts of various experiments conducted on the human centrifuge located at the University of California. Following the listing of the abstraction is a section called "General Conclusions" which lists and discusses some of the findings of these studies. Recommendations for further research and a list of publications stemming from this research is appended. The abstracts listed were: Stick Force Estimation; Maximum Pull; Maximum Forces upon Elevator and Aileron Controls; Perceptual Speed; Temporal Estimation; Simple Reaction Time; Discrimination Reaction Time Pupillary Reflex; Speed and Accuracy of Target Striking; Aftereffects of Radial Acceleration; Toggle Switch Manipulation; Adjustive Reactions.
R 22

1439
Kryter, K.D. THE EFFECTS OF NOISE ON MAN. *J. of Speech and Hearing Disorders*, 1950, Monograph Suppl. 1, 95pp. Contract N6onr-272, ONR. (Central Inst. for the Deaf, St. Louis, Mo.).

A review, summary, synthesis, evaluation, and interpretation of the experimental literature on noise as an aspect of man's environment is presented. The first section is concerned with effects upon behavior, particularly in regard to work output and efficiency. The record part brings together material on auditory damage as the result of noise, and defenses against such damage. The third part considers noise as a disruptive factor in speech communication. An attempt was made to dig as deeply as necessary into basic psychological and physiological experiments to support and elucidate the results of the 'applied' and technical research. Each part of the report is followed by its own bibliography, and, in addition, there is attached a bibliography concerned with 'Measurement and Reduction of Noise'.
R 629

1440
USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE PERSONNEL SPECIALIST GRADUATES OF ITAF COURSE NUMBER AB73231. FINAL REPORT. Proj. APG/CSC/1006-A, June 1956, 12pp. USAF Operational Test Center, Eglin AFB, Fla.

1440
To determine the ability of the apprentice personnel specialist to perform the duties of his specialty upon graduation from the preparatory course, seven apprentices, representing a cross section of a graduating class, were tested in a 90-day on-the-job situation. The apprentices were assigned to the normal routine duties of personnel specialists and worked with or for other specialists who rated them daily on job performance. The ratings and observations were analyzed and recommendations made relating to training and reorganization of duties within the specialty.
T.

1441
Lowry, N.K. (Ed.) OSRD REPORTS. BIBLIOGRAPHY AND INDEX OF DECLASSIFIED REPORTS HAVING OSRD NUMBERS. June 1947, 105pp. US Office of Technical Services, Department of Commerce, Washington, D.C.

This is an unannotated bibliography which includes all of the Office of Scientific Research and Development reports which have had OSRD numbers assigned to them and which have been forwarded to the Office of Technical Services. The publications are arranged in 3 parts: Part I is arranged by OSRD number with the PB numbers. Immediately following the PB number is the volume and page reference in the 'Bibliography of Scientific and Industrial Research' where an abstract of the report may be found; Part II is a cross reference list arranged in PB number order and giving the corresponding OSRD number; Part III is an author and subject index to the OSRD reports listed in Part I. The entries refer to OSRD numbers.
R Many

1443
USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE RECIPROCATING ENGINE MECHANIC GRADUATES OF ITAF COURSE NUMBER AB43231. FINAL REPORT. Proj. APG/CSC/947 A, April 1956, 26pp. USAF Operational Test Center, Eglin AFB, Fla.

1443
To determine the ability of apprentice aircraft reciprocating engine mechanics to perform the duties of their Air Force specialty upon graduation from the preparatory course, six apprentices, representing a cross-section of their specialty, were tested in a 90-day on-the-job situation. The apprentices were utilized in the normal tasks of the specialty and were rated daily by supervisors who were responsible for the proper performance of the job. If assistance were required to complete a job, the nature and extent of such assistance was noted. These data were analyzed and recommendations made for the improvement of training.
T.

1444
USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF THE B-52B FLIGHT SIMULATOR, TYPE S-9. FINAL REPORT. Proj. AFG/SAS/165 A 2, June 1956, 36pp. USAF Operational Test Center, Eglin AFB, Fla.

1444
An operational suitability test of the type S-9 B-52B Flight Simulator (a device to provide realistic transition, instrument, and emergency training for B-52 pilots) was conducted. The following specific areas were investigated: 1) installation and initial checkout including configuration for problem-free installation, facility requirements, and man-hour requirements; 2) sustained daily operation including training requirements, man-hour requirements, logistics, and maintenance requirements; and 3) suitability as a training device, including physical and performance similarity and ability to produce an acceptable training environment. The evaluation was based on an eight-month use period.

1445
USAF Operational Test Center. EMPLOYMENT AND SUITABILITY TEST OF APPRENTICE AIRCRAFT MECHANIC (JET, OVER TWO ENGINES) GRADUATES OF ITAF COURSE NUMBER AB43131E-1. FINAL REPORT. Proj. AFG/CSC/1030-A, Aug. 1956, 23pp. USAF Operational Test Center, Eglin AFB, Fla.

1445
To determine the ability of the apprentice aircraft mechanic to perform the duties of his Air Force specialty, eight apprentices, representing a cross-section of a graduating class of the 14-week Mechanic Course were tested in a 90-day, on-the-job situation. They worked in the flight line organizational maintenance section and were rated each day by supervisory personnel. Additional instruction required to accomplish the work was recorded. Analysis of the data was made and recommendations offered for improvement of training.

1447
Hudson, B.B., & Searle, L.V. THE EFFECTS OF SOUND ON ACCURACY OF AZIMUTH TRACKING. Contract OEM sr 581, Rep. 1, Sept. 1942, 19pp. National Defense Research Committee, (Tufts College Laboratory, Medford, Mass.)

This experiment was undertaken to determine the effect of sounds of high amplitude upon accuracy of performance in azimuth tracking on a Naval trainer. These sounds were introduced at intervals during tests of 4 hours duration. It was concluded that: a) decrement in performance over a period of 4 hours of continuous tracking is rapid; b) sound, introduced at intensities of either 120 or 130 db. produces marked improvement in performance for the duration of the sound. Return to the presound level of performance is rapid; c) marked individual differences exist in ability or willingness to maintain a high level of good performance of 4 hour tests. Marked differences are also apparent for a given S from trial to trial; the performance level variations are not primarily a function of the S's ability; d) learning is rapid. There is only a slight improvement from Test I to Test III; e) average stereo performance was better after the 4 hour test than before the test on all trials. The interpretation may be made that performance decrement was due to arm and hand fatigue, and to boredom or lack of motivation.

1448
Hudson, B.B., & Searle, L.V. CONTINUOUS 13 1/2 HOURS TRACKING FATIGUE TEST. Contract OEM sr 581, Rep. 2, Sept. 1942, 5pp. National Defense Research Committee, (Tufts University, Medford, Mass.)

The nature of tracking performance decrement during continuous work over a long period of time (13 1/2 hrs.) was examined. The task was to continuously track in azimuth an airplane target as it moved in an irregular pattern across the field. In the preliminary 4 hr. test, the observer, not informed about the duration of the experiment, was instructed to keep the reticle as close as possible to the centre of the target. In test number II, a schedule for the introduction of motivation was drawn up and applied during the test. The accuracy of tracking was recorded continuously. It was found that: a) marked performance decrement in azimuth tracking is produced by local muscular fatigue; b) this decrement may be reduced by adequate motivation, but not to initial performance levels; and c) the effect of motivation is short-lived under these conditions of local muscular fatigue.

1449
Hudson, B.B., & Searle, L.V. THREE DAY TEST OF FATIGUE EFFECTS UNDER CONDITIONS OF LONG HOURS ON DUTY, LIMITED SLEEP. Contract OEM sr 581, Rep. 3, Oct. 1942, 11pp. NDRC, (Tufts College Laboratory, Medford, Mass.)

An experiment lasting 74 hours was conducted on a group of 4 observers. Of this time 42 hours were spent on duty, 8 hours eating, 16 hours sleeping, 8 hours at liberty. Hours on duty, times for sleeping and eating, were irregularly scheduled. During the period on duty, Ss were on the alert and were required to spot and report signal lights appearing in the area allotted to them for observation. At intervals Ss reported for duty on a stereoscopic training instrument. Measurements were made of tracking and stereo performance. During the 3 day period, no decrement in this performance was found. During the night periods on the alert, Ss maintained a high standard of performance in spotting and recording signals. During the day periods on the alert, S differences appeared which were relatively constant throughout the test. These differences may be due to variation among Ss in sensitivity to slight changes in contrast (all Ss had at least 20/20 visual acuity). It is evident that in order to produce performance decrement on short stereo or tracking tests due to general physiological fatigue, a schedule similar to the one reported here would have to be maintained over a longer period of time. Ss can muster, for a brief test, sufficient energy to maintain a standard of performance. A by-product of this protracted test was the temporary development of friction between members of the groups of Ss.

1450
Beebe-Center, J.G. MOTIVATION IN THE PERFORMANCE OF ROUTINE MILITARY TASKS. Contract OEM sr 581, Rep. 5, Dec. 1942, 18pp. NDRC, (Tufts College Laboratory, Medford, Mass.)

The effect of motivation on routine tasks is reviewed and 3 principles concerning the role of motivation are given: a) potential output of the organism at any given moment is largely distinct from actual output at that moment; b) potential output of the organism is remarkably constant especially for tasks not involving great physical effort; c) actual output is remarkably variable in contrast with the relative constancy of potential output. These 3 principles lead to an important consequence; namely output can, to a large extent, be controlled by psychological means -- by means of situations, attitudes, training. The 12 principal means of control are presented in the form of rules for the maximization of performance in routine tasks.

R 28

1451
Radwin, R.B., & Scerbo, L.V. THE EFFECT OF
SOUND-FIELD DIMENSION ON STEREO-RANGING.
Contract OCMR-572, Rep. 7, Feb. 1943, Typ.
ROM, (Tufts College Laboratory, Medford,
Mass.)

1451
To determine the effect of strenuous physical activity upon stereo ranging accuracy, nine trained subjects were given two preliminary tests of stereo ranging on the Mark II Navy Trainer. Following a period of rapid cardiovascular work with a heavy load, the stereo test was given again. Statistical analysis of the scores in terms of consistency and precision of performance before and after exercise is made. The practical implications for stereo ranging during field conditions are discussed.
C.M.

1452
Egan, J.P., & Clarke, P.M. SOURCE AND
RECEIVER BEHAVIOR IN THE USE OF A CRITERION.
J. Acoust. Soc. Amer., Nov. 1956, 28, 1257-
1260. (Indiana University).

1452
In an articulation test the listener is sure of some responses and dubious of others. In order to extract some information about this behavior six listeners heard, at a signal-to-noise ratio of -12 db, a list of 200 spondee words from a set of 50 previously memorized. In one experiment the listeners wrote down their responses and then judged them correct or incorrect. In another experiment they marked a given set of spondee words, half of which were actually correct. The listeners were asked to adopt different criteria of certainty in repetitions of the experiment. The results are analyzed in terms of a pair of derived parameters describing the probability of a correct transmission and confirmation--the source operating characteristic and the receiver operating characteristic. C.M.

1453
Hoffman, A.C. & Reed, L.C. THE PERFORMANCE OF TRAINED
SUBJECTS ON A COMPLEX TASK OF FOUR HOURS DURATION.
Contract OCMR 581, Prof. Memo. 1, OSD Rep. 1701,
July 1943, 11pp. Tufts University, Medford, Mass.

1453
To test the hypothesis that individuals would show signs of fatigue (decrement in efficiency of performance) when continuously engaged for relatively long periods of time in a task of psychological complexity, five subjects worked four hours at a complex task that required the continuous matching of dials as well as periodic adjustment of peripheral apparatus. Performance scores were analyzed as a function of time.
T. G. I.

1454
Tufts University. THE EFFECT OF DIOPTRIC SETTINGS ON
STEREO PERFORMANCE. Contract OCMR 581, Rep. 8, 19pp.
Department of Psychology, Tufts University, Medford,
Mass.

1454
To explore the effect of diopter settings (assumed to be related to visual acuity) of the eye-pieces to stereo ranging in the Mark II Navy Trainer, 19 men were measured for accuracy of stereo settings on a stationary target under two conditions of diopter settings: zero (no adjustment), and variable (adjustment by each subject). Mean scores and sigma scores are analyzed and interpreted with relation to the use of diopter settings as a means for predicting stereo ranging performance.

1455
Tufts University. EFFECT OF A TWENTY-MILE WALK ON
STEREO-RANGING, TRACKING, AND OTHER TASKS. Contract
OCMR 581, Rep. 6, Feb. 1943, 11pp. Department of
Psychology, Tufts University, Medford, Mass.

1455
To measure the effect of prolonged physical exercise and accompanying loss of sleep upon performance, 13 subjects were tested before, after, and twice during a 30-mile hike. The functions measured were stereoscopic acuity, tracking accuracy, brightness discrimination, reaction time, and persistence. Special memory instructions were used to keep effort at a high level. The overall scores are analyzed and discussed in terms of fatigue effects upon stereo-ranging and tracking in particular. Individual differences and motivation effects are noted.
C.

1456
Tufts University. REPORT ON MOTIVATION IN RELATION TO FATIGUE. Contract OCMR 581, Rep. 9,
April 1943, 19pp. Department of Psychology, Tufts University, Medford, Mass.

The purpose of the present report is to point out various instances in which motivational factors served to influence the results in studies of efficiency during relatively long periods of work. The primary task studied included stereoscopic range findings, aiming in tracking and protracted alertness. Specifically, the following situations where motivational influences were found are considered: a) effect of knowledge results; b) effect of intermittent sittings vs. continuous ones; c) effect of long-continued performance of sleep; d) effect of long-continued alertness; e) effect of fatigue; f) effect of deprivation of sleep; g) effect of prolonged strenuous exercise; h) effect of short period exercise.

1458
Hoffman, A.C. THE RELATIONSHIP BETWEEN
EYEPICCE DIOPTRIC SETTINGS AND STEREO
RANGE SETTINGS. Contract No. OCMR-581,
Rep. No. 10, OSD Rep. No. 1729, Aug.,
1943, 11 pp. OSD, National Defense Res.,
Committee, Washington, D.C. (Tufts College,
Medford, Mass.)

1458
To determine the relationship of diopter settings of the eye-pieces to subsequent scores of stereo ranging on a stationary target in the Mark II Navy Trainer, 19 men in a preliminary, and 12 men in a major experiment were measured for accuracy of stereo settings under conditions of (1) zero diopter setting (no adjustment), and (2) variable diopter setting (each subject adjusted his own eye-piece). Mean scores and sigma scores are evaluated by analysis of variance technique; relevant correlations are given. The use of diopter settings as a means for predicting stereo ranging performance is discussed.
T.

1465
 Ward, L.C. RESEARCH ON FACTORS IN SERVICE JARS. SUMMARY
 REPORT OF RESEARCH AND DEVELOPMENT WORK FROM AUGUST 1,
 1942 TO JULY 1, 1943. Contract ODSR 543, OSD Rep.
 1392, June 1943, 15pp. Psychology Department, Tufts
 University, Medford, Mass.

1469
 This report presents a summary of the research on
 fatigue in service jobs conducted by the Tufts College
 Project during the period August 1942 to July 1943.
 The experiments primarily evaluate the effect of such
 factors as the following upon the performance of visual
 tasks such as tracking, depth perception, etc.: moti-
 vation, sleep deprivation, fatigue, and so forth. In-
 cluded are details of the equipment used in the experi-
 ments (e.g. Tufts Director Tracking Trainer, Mark II
 Ray Stereoscopic Trainer, etc.)

1471
 Dudley, H.W. FUNDAMENTALS OF SPEECH SYNTHESIS. J. Audio, Engng. Soc., Oct. 1955, 3, 170-
 185. (Bell Telephone Laboratories, Incorporated, Murray Hill, N.J.) (Monogr. 2646; Bell
 Telephone System).
 From the communications engineer's point of view, there are 2 fundamental principles of
 human speech synthesis. The first is that speech is a message, which, in its initial
 expression from the body, is represented by a group of muscular vibrations - a multiplicity
 of telegraph signals functionally similar to the muscular vibrations of the finger in holding
 the simplest type of telegraph on-off signals. The second principle is that these multiple
 telegraph signals are made audible to the ear by modulating a set of carrier-frequency
 components in the audible part of the spectrum. Such components range from an inflected,
 buzz-like tone for voiced sounds to a hiss-like noise for unvoiced sounds, including whispers.
 The Vocoder was an early development of apparatus exploiting both of these basic character-
 istics of speech - the telegraph nature in the analyzer and the carrier nature in the
 synthesizer. If advantage is taken of the telegraph nature of speech, a large reduction
 can be effected in the frequency band required for transmission. Where long expensive
 lines are concerned, economic benefit to the telephone user may accrue from such a reduction
 in bandwidth. The ultimate in this telegraphizing speech for transmission would be obtained
 in a system able to recognize phonetic elements and then transmit them by narrow-band tele-
 graph methods. Rudimentary experiments along these lines have been performed, using "Vudrey",
 the automatic digit recognizer, to recognize the individual phonetic units at the sending
 end, and using a Vocoder at the receiving end for the purpose of synthesizing somewhat
 standardized speech from the telegraph-like currents transmitted from the sending end.
 On a basic speech analyzer-synthesizer devices experimented with at the Bell Telephone
 Laboratories over the years are briefly reviewed; these devices include the Voder, the sound
 spectrograph, the visible-speech translator and synthesizer, the electrical vocal tract, and
 the improved Vocoder. R. 18

1478
 Ades, H.W., Graybiel, A., Merrill, S.M., Tolhurst,
 G.L., et al. NON-MILITARY EFFECTS OF HIGH INTENSITY
 SOUND STIMULATION ON DEAF PONY SUBJECTS. ONR Proj.
 NMR-1353 & USN School of Aviation Medicine Proj.
 NA 13 02 99, Subtask 2, Rep. 5, Sept. 1958, 22pp.
 USN School of Aviation Medicine, Naval Air Station,
 Fla.

1478
 To study the effects of high-intensity sound on sen-
 sory systems other than the auditory, deaf subjects were
 exposed to pure tone and wide-band noise up to 170 deci-
 bels. Thresholds for vibration, tickle, warmth, pain,
 and dizziness were determined at several test frequen-
 cies.
 T.G. I. R 7

1481
 Colby, Helen J. & Garn, S.M. A BIBLIOGRAPHY ON MILITARY AND INDUSTRIAL APPLICATIONS OF
 ANTHROPOMETRY AND APPLIED PHYSICAL ANTHROPOLOGY. Contract DA 18 108 cml 2029, Suppl. Rep.
 11, Feb. 1952, 17pp. Forsyth Dental Infirmary for Children, Boston 15, Mass.

This is a classified bibliography on applied anthropometry and includes all major titles
 on human body size and its application to military and industrial problems. This biblio-
 graphy includes industrial reports of limited circulation, relatively inaccessible research
 reports, reports published in the anthropological literature and reports circulated by vari-
 ous government agencies. The titles are classified as follows: General; General Body Size;
 Models; Manikins and Headforms; Face and Head Size; Limb and Hand Size; Kinematical and
 Calorimetry. A total of 123 references are given.
 R 123

1473
 Batchelor, J.H. OPERATIONS RESEARCH - A PRELIMINARY ANNOTATED BIBLIOGRAPHY. 1952, 95pp.
 Case Institute of Technology, Cleveland, Ohio.

This annotated bibliography on non-military applications of Operations Research, covers
 a period since the war through 1951. The criterion for inclusion has been that the refer-
 ence has been considered relevant to OR. The list is arranged in single alphabetical order
 by author, and is indexed by periodical and institution. A total of 309 references are list-
 ed.
 R-309

1474
 USN Special Devices Center. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS (INCLUDING SUPPLEMENTS
 1, 2, AND 3). NAVEXOS P 530 18, Rev., Jan. 1955, 16pp. USN Special Devices Center, Port
 Washington, N.Y.

This is a bibliography of human engineering documents issued by or under the sponsorship
 of the Office of Naval Research. The reports are arranged by subject, and by report number
 within subject classification.
 R 373

1482

Cozzi, Florence M. MEASUREMENTS OF THE HUMAN FOOT - A LITERATURE SURVEY. Biblio. Series 24, July 1952, 12pp. Quartermaster Research & Development Lab., Technical Library, Philadelphia, Penn.

This bibliography is on foot measurements, especially as applicable to military personnel in the United States and in foreign countries. References cover the years 1900 - July 1952. All information refers to male and female individuals in the age group covering the time at which they may enter military service until expected retirement age. All races and nationalities have been considered. Abstracts are of material gathered from Philadelphia and Washington, D.C. libraries. There are 70 references listed.
R 70

1483

Vaccaro, J., Jr. & Hudson, E.M. REPORT ON FABRICATION OF INTEGRAL LIGHTING BEZELS. Proj. TED ADC AE 7051 1, Rep. NADC AL 5644, Aug. 1956, 22pp. USN Aeronautical Instruments Lab., Naval Base Station, Penn.

1483

To improve on instruments prepared under a previous project, and to provide two sets of integrally lighted instruments suitable for flight testing, six instruments comprising the flight-instrument group for the TV-2 and F3H-2M airplanes were equipped with a composite wedge and light guide and light values measured across the face of the instrument. These values were compared with requirements as set forth in Bureau of Aeronautics Specification XAE508; these comparisons are stated in the results. Figures are given illustrating lighting with wedge and with standard Bezel. Certain specific recommendations are made for further experimentation and development.
T. G. I. R 7

1488

Mirsh, Shirley K. A BIBLIOGRAPHY IN AUDITION. VOL. I, A-M, VOL. II, N-Z. Contract NSORI 76, Proj. NRI42 201, Rep. PNR 88, 1950, 408pp. Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

This is a 2 volume unannotated bibliography of about 5000 references on audition. The aim was completeness for the period 1938-1948, and reasonably complete coverage for the pre-1938 literature. A supplement tries mainly to improve the coverage for 1948, but references to important (or readily available) entries published during 1949 are included. The articles are listed alphabetically by the author's surname. Co-authors are cross-referenced. A subject index is given in which the articles are classified by the name of the senior author.
(NEIAS)
R About 5000

1490

Superintendent of Documents. HEALTH: DISEASES, DRUGS, AND SANITATION. Price List 51, 36th Ed. June 1946. 118pp. Supt. of Documents, Washington 25, D.C.

1490

This is an extensive bibliography of government publications as of June 1946 (36th edition) in the general areas of health, diseases, drugs, sanitation, etc.

1491

Superintendent of Documents. HEALTH: DISEASES, DRUGS, AND SANITATION. Price List 51, 37th Ed. June 1947. 84pp. Supt. of Documents, Washington 25, D.C.

1491

This is an extensive bibliography of government publications as of June 1947 (37th edition) in the general areas of health, diseases, drugs, sanitation, etc.

1492

Goldsmith, C.T. THE ANALYSIS OF HUMAN FACTORS IN WEAPON SYSTEMS. Human Engineering Tech. Memo. 10, Nov. 1955, 18pp. Engineering Research Section, Samuel Peltman Ammunition Lab., Picatinny Arsenal, Dover, N.J.

1492

This Technical Memorandum presents the text of an address to the scientific and professional personnel at Picatinny Arsenal on the role of human engineering in operations research. The subject is presented in a non-technical manner covering definition of the terms, why human factors are important in a system, illustrative examples of man-machine system analysis, and some operations research or systems analysis techniques.
T.G. I. R 7

1495
Cornell University. HUMAN ENGINEERING - SELECTED BOOKS AND REPORTS. ca. 1953, 2pp. Daniel and Florence Guggenheim Aviation Safety Center, Cornell University, New York, N.Y.

A list of 25 books and reports on human engineering principles and practices comprises this bibliography. The first 8 items are books which are readily available through most familiar sources such as technical libraries and the publishers. The other items are reports which can be secured from the addresses listed with the reports. The publication dates of these references cover the years between 1943 and 1953.
R 25

1497
Morgan, P.D. HUMIDITY STUDIES - A LITERATURE SURVEY. Biblio. Series 19. Nov. 1961. 34pp. Quartermaster Research and Development Lab., Technical Library, Phila., Pa.

1497
Studies of the measurement, control and effects of ambient humidity are listed in an annotated bibliography, which includes investigations related to instrumentation, foods, pest control, metals, packaging, physical chemistry, physiology, plastics, leather and textiles.

1499

1499
Morgan, P.D. & Sage, C.R. SOME PHASES OF PERSPIRATION - A LITERATURE SURVEY. Biblio. Series 17. Jan. 1961. 37pp. Quartermaster Research and Development Lab., Technical Library, Philadelphia, Penn.

This paper presents a 130 item annotated bibliography on perspiration. The survey covers the period of 1919-1949, with an occasional article falling outside this delineation. The arrangement of abstracts is by subject. Inasmuch as there is considerable overlapping in the subject break down, numerous cross references are to be found at the end of each subject division. A "name index" of authors is included.

R 130

1501
USN Medical Research Lab. VISUAL ENGINEERING SECTION REPORTS. Sept. 1953, 5pp. USN Medical Research Lab., New London Submarine Base, Conn.

1501
This listing of reports gives the title and M.R.L. number of available reprints of unclassified papers on color vision, illumination, eye protection, and human engineering, prepared by the Medical Research Laboratory, U.S. Naval Submarine Base, New London, Connecticut (1943-1953). R60.

1506
Polaroid. REFERENCES ON THE USES OF MODERN LIGHT POLARIZERS. Jan. 1952. Polaroid.

1506
This list of references on the uses of modern light polarizers includes optical research papers categorized by (1) subject (mechanics, astronomical, meteorological, physiological, physical optics, and photochemistry) and (2) apparatus and instruments (color filters, microscopes, photometers, densitometers, spectrophotometers, etc.) R97.

1507
Prosser, S.L. PAPERS THROUGH MAY 1953 BEARING ON AGING, UNDER THE DIRECTION OF S. L. PROSSER. Ohio State University.

1507
This is a brief bibliography of all publications dealing with aging prepared under the direction of Dr. S.L. Prosser at Ohio State University.

1510
Swain, A.D. BIBLIOGRAPHY ON ARTIFICIAL FEEDBACK (KNOWLEDGE OF RESULTS). Proj. A 41, Oct. 1952, 19pp. American Institute for Research, Pittsburgh, Penn.

1510
This is a list of citations of reports on "knowledge of results" as related to motor learning and military training devices. As used here, "artificial feedback" is feedback in the training situation which is not present in the operational situation. The citations are in a 3" x 5" format, which can be cut apart to form a card catalogue. R 74.

1511
USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE INSTRUMENT REPAIRMAN GRADUATES OF TIAF COURSE NUMBER AB42230. FINAL REPORT. Proj. APG/CSC/884 A, Jan. 1956, 44pp. USAF Operational Test Center, Eglin AFB, Fla.

1511
To determine the ability of the apprentice instrument repairman graduate of Technical Training Air Force Course Number AB42230 to perform the duties of his Air Force specialty, four representative graduates were studied in a 90-day on-the-job situation. Daily ratings were made by supervisors (immediately responsible for the performance of the job) on performance, time to complete the job, and initiative or effort. The results were analyzed in terms of the capabilities and limitations as observed compared to job description and job training standards. Changes in both these areas are recommended.

1517
USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE AIRFRAME REPAIRMAN GRADUATES OF TIAF COURSE NUMBER AB53430. FINAL REPORT. Proj. APG/CSC/895 A, Feb. 1956, 19pp. USAF Operational Test Center, Eglin AFB, Fla.

1517
To determine the ability of apprentice airframe repairman graduates of Technical Training Air Force Course Number AB53430 to perform the duties of their Air Force specialty, six representative graduates were studied during a 90-day on-the-job situation. Rating procedures included assignment to regular work of section without explanation or demonstration, close observation of job performance, and daily ratings on jobs performed. Ratings were made by supervisors immediately responsible for proper performance of the job. The capabilities and limitations of the apprentice were summarized and a critique given in terms of job description, job training standard and the training program. Recommendations are included.

1518
USAF Operational Test Center. EMPLOYMENT AND SUITABILITY TEST OF APPRENTICE ORGANIZATIONAL SUPPLY SPECIALIST GRADUATES OF TIAF COURSE NUMBER AB64131. FINAL REPORT. Proj. APG/CSC/1113 A, July 1956, 13pp. USAF Operational Test Center, Eglin AFB, Fla.

1518
To determine the ability of apprentice organizational supply specialist graduates of Technical Training Air Force Course Number AB64131 to perform the duties of their Air Force specialty, ten representative graduates were studied during a 90-day on-the-job situation. Assignments were made to regular work of the section without explanation or demonstration of specific tasks until capability to perform was established. Supervisors observed and made daily ratings of job performance. The results were analyzed in terms of the capabilities and limitations of the apprentices as compared to the job training standard, and a critique of the training was given. Recommendations are included.

1522

Reed, J.D. SPEED AND ACCURACY OF TARGET DESIGNATION WITH SMALL JOYSTICK CONTROLS. Contract AF 30(602)-373, Final Rep., 22pp. Human Factors Office, RADC, Griffiss AFB, Rome, N.Y.

1523

To investigate the speed and accuracy of target designation with very small joystick controls, a series of experiments were performed by ten highly trained subjects. Measurements were taken of the time required to position a tiny beam of light over simulated targets of 1/8, 1/4, and 1/2 inch diameter under various ratios of hand-to-pointer movement: one to five, 11, 23 and 33. The indicator beam was controlled by a joystick lever of pencil size (two cases). In some experiments force was provided for hand or arm; in others, a locking device provided frictional forces (two to four cases). Mean designation time and number of errors were related to accuracy for the various movement ratios and equipment variables. Implications for equipment design are discussed. T. G. I. R 7.

1523

Reed, B.N., Gaier, E.L., & Paresse, P.J. METACOSMETRY: THE STUDY OF CHANGING BEHAVIOR IN GROUPS. Contract N7 ONR 35609, Tech. Rep. 6, Feb. 1956, 47pp. ONR, Navy Dept., Washington, D.C.

1523

This report describes a method of "metacosmetry" -- the study of changing behavior in groups. Each member of a group makes a set of items in private and then participates in group discussion to arrive at a joint ranking. Each member of the group then ranks the items again in private. Three specific techniques are described for gathering such data: paper and pencil, mark-sense cards, and direct input to an analog computer. The results are analyzed by obtaining rank order correlations among the rankings made by individuals, and between the rankings of the group and each individual. T. G. I. R 22

1524

Katchmar, L.T., Jelinek, R.E., & Hodge, D.C. VISUAL EFFICIENCY UNDER DESERT CONDITIONS. TBI-1000-9, Tech. Memo. 20, 1956, 33pp. Human Engineering Laboratory, Aberdeen Proving Ground, Md.

1524

To determine the effects of certain environmental conditions characteristic of hot deserts on specific visual functions, 36 subjects were tested over a 26-day period (July) in the desert near Yuma, Arizona. Conditions of testing: (1) time of day, (2) observations, from shelter and in direct sunlight, (3) viewing ranges, and (4) type of terrain. Visual functions tested: (1) retinal sensitivity (critical flicker frequency measures at beginning and end of period), (2) visual acuity (Landolt Ring display), and (3) depth perception (tombstone shaped and truck targets) for four distances (500, 1000, 2000, and 3000 feet). The data were studied by analysis of variance techniques for differences in the visual functions attributable to differential exposure to desert conditions and to the other experimental variables; T.G.I.R.32

1526

Whittingham, P.D.G.V. THE INGESTION OF SEA WATER. Rep. 1, June 1955, 7pp. North Atlantic Treaty Organization, AGARD, Paris, France.

1526

This paper restates and interprets the principles which are involved in making recommendations concerning the ingestion of sea water for prolonged or brief periods of survival at sea, namely, the composition of the sea water and the concentrating power of the human kidney. Methods of reducing the loss of body water are stressed for their importance in survival. T. R 18

1529

Macworth, F.E. SOME RECENT STUDIES OF HUMAN STRESS FROM A MARINE AND NAVAL VIEW-POINT. Inst. of Marine Engineering Transactions, 1948, Vol. 64, No. 6. Medical Research Council, Appl. Psychology Research Unit, The Psychological Laboratory, Downing Place, Cambridge, England.

1529

This paper reviews some laboratory research on the working ability of human subjects as affected by (1) general surroundings--temperature extremes and noise, (2) various local arrangements of the working task--visual display (cycloster compared with dial on jig and bore) and manual controls (loading on joystick in tracking task), and (3) stress of time and/or load of information on decision taking. Gaps in our knowledge in each of these areas is pointed out. T.G.I.R.23.

1530

Hick, W.E. REACTION TIME FOR THE AMENDMENT OF A RESPONSE. A.P.U. 93/49, Jan. 1949, 5pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1530

This is a repetition of an earlier experiment on kinesthetic reaction time in slightly modified form to test the findings which seemed to be an exception to usual findings on refractory phase. Three subjects were required to move a recording pen as quickly as possible to a marked position on receipt of an auditory stimulus. Three different methods of operating the control were used. The load, ordinarily light, was occasionally unexpectedly heavy. Results under the various conditions are compared, and discussed in terms of other data concerning refractory phase. T. I. R 6

1531

Nixon, S.R. SOME EXPERIMENTS ON IMMEDIATE MEMORY. I. FOR SPATIAL POSITIONS. II. FOR SERIAL MATERIAL. APU 39, April 1946, 31pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1531

To explore some factors affecting immediate memory for position, a series of experiments were performed: (1) recall of spatial positions in various arrangements of black dots within a circle (from one to five) after intervals of from three to ten minutes; recall in reverse order of playing cards which had been dealt out singly, or recognition of repetitions of sets of numbers. The results are analyzed in terms of the effects of spatial position and serial order position on recall. T.G.I.R.3.

1533

Carpenter, A. SOME EFFECTS OF LIFE IN SINGAPORE. A.P.U. 103/49, June, 1949, 14pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

1533

To determine areas in which experimental studies of the cumulative effects of residence in the tropics might profitably be undertaken, sixty civilian and military residents of Singapore completed a questionnaire covering commonly asserted deleterious effects of the climate. The answers and comments are analyzed and discussed with respect to climatological, sociological and economic factors, and their effects on physical and mental health. T.

1535

Kays, H. S. Poulton, E.C. ANTICIPATION IN MEMORIZING. *British Journal of Psychology*, March-May 1962, 21:112(2), 34-41. (Psychological Lab., University of Cambridge, Cambridge, England). (APJ 1962/49).

1536

To study the effect of anticipation of how and when material must be recalled on the accuracy of recall, 32 X-ray fittings were tested. Subjects were required to learn series of compass directions from a projected display. Recall was tested by having the Ss move controls through the memorized series of directions. Learning-recall sequence and Ss' knowledge of the forthcoming recall sequence were varied. Results (percent recalled correctly) are discussed regarding effects of anticipation, the nature of the retention process, and factors underlying the loss of primary and fidelity in learning.
T. G. 2-7

1537

Poulton, E.C. PERCEPTUAL ANTICIPATION IN TRACKING. A.P.U. 119/50, Aug. 1950, 21pp. Psychological Lab., MRC, Cambridge, England.

1537

To investigate the part played by perceptual anticipation in tracking under different conditions, two experimental arrangements were used. In one the subject had to trace regular or irregular courses under conditions of restricted vision, with or without a preview. In the other, the subject either had to keep a pointer in line with a second pointer moving in a harmonic course by using a positional control (following or pursuit tracking) or had to keep a single pointer moving in this way stationary on a fixed line (compensatory tracking). A detailed analysis of errors in performance under the various experimental conditions was made and related to the perceptual anticipation component.
T. G. 2-17

1536

Poulton, E.C. PERCEPTUAL ANTICIPATION AND REACTION TIME. A.P.U. 199/50, May 1950, 14pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

To determine the effect of perceptual anticipation upon reaction time (RT), 2 experiments were done. In the first, a skilled response (S) had occasionally to be altered at a given point after a variable warning period. In the second, S had to react to 2 auditory signals separated by a short time interval which was systematically varied, the second signal being expected or unexpected. It was found that lack of readiness to respond to a signal, as revealed by a lengthened RT, may be due to S not having prepared himself, as he was not expecting the signal; or to S not being able to prepare himself in time. Preparation for reacting to the second of 2 signals, when both are expected and have to be reacted to, never appears to take more than between 0.2 and 0.4 sec. as judged by Ss. On the majority of occasions it appears to be complete in 0.2 sec. These times are shorter than those usually given, because the extra delay due to incorrect anticipation has been excluded. With intervals of 0.1 sec. or less, delay in the second reaction may be due to the mechanical difficulty of responding quickly enough, especially when the 2 reactions have to be made in opposite directions. These results suggest that so-called psychological refractoriness is due to lack of foreperiod in which to prepare for the R, rather than to "psychological refractory phase" comparable to the refractory phase of nerves. These results also lead to the conclusion that a skilled performance is not merely a series of discrete Rs. It is a single whole, in that performance throughout is dominated by S's anticipatory mental set or aim.
R 11

1537

Mitchell, M.J.H. DIRECTION OF MOVEMENT OF MACHINE CONTROLS. V. A TWO-HANDED PERFORMANCE IN A CONTINUOUS TASK. A.P.U. 110/49, May 1949, 23pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

This investigation was designed to examine the problem of 2-handed continuous tasks. In the 2 experiments conducted, the effect on the right-hand performance of introducing a similar task for the left hand was observed under 6 different control-display conditions. The control-display relationship for the left-hand task remained the same, while that for the right-hand task varied to include each of the 6 control display relationships. Each pair of Ss carried out the task with the condition for the right hand task, in a different order, with each condition appearing in a different position in that order and occupying each possible place in that order. Exp. 2 repeated the above procedure but with a different fixed control-display for the left-hand task. The results indicated that when a continuous task is performed with both hands simultaneously, the relation between the direction of movement of the control and the display does on some instances significantly affect the accuracy with which the right hand performs the task. Whereas, in a continuous task performed by the right hand alone, accuracy is unaffected by changes in the direction of movement relationships. The most consistently accurate condition is the natural or "expected" one, i.e., where an upward movement of the control produces an upward movement in the display and vice versa.
R 12

1538

Conrad, R. THE EFFECTS OF VERY FAST SPEEDS ON MULTIPLE DIAL WATCHING. APU Rep. 115, Oct. 1949, 12pp. Psychology Lab., Applied Psychology Research Unit, MRC, Cambridge, England.

An experiment was carried out to examine the effect on performance of speed increases on a very fast skilled task. The task required S to respond to a continuously changing display consisting of 4 independent elements. Increasing the speed of the task had no effect on the number of correct responses (R), Ss apparently being fully extended at the slowest speed. An average time of 1.5 sec. was required to make Rs. The total R-rate, however, continued to rise with speed increases, though it lagged behind that necessary for perfect adaptation. At the fastest speed, an average time of 0.72 sec. was taken to make Rs of any kind. The majority of errors fell into 2 classes. Errors of timing (an R at the wrong time) were common, but became less important as the speed increased. Errors of omission (failure to respond to a signal) increased steeply out of all proportion to the number of signals presented. Though the fastest speed was less than twice the slowest, the errors of omission increased fivefold. Evidence for the hypothesis that speed stress would affect the distribution of Rs among the 4 elements of the display was inconclusive. The distribution of correct Rs was unchanged, but errors both of timing and omission increased least on the part of the display that presented most signals. A number of observations were made on the way Ss organized both the perceptual and R side of the task.
R 8

1541
Vince, M.A. SOME EXCEPTIONS TO THE PSYCHOLOGICAL REFRACTORY PERIOD IN UNSKILLED MANUAL RESPONSES. APU 124/50, Feb. 1950, 14pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

The present paper presents 3 experiments concerned with the psychological refractory period. The main findings were: a) if the interval between 2 responses (R) requiring discrete Rs is 0.5 sec. or less the RT to the second stimulus is likely to be lengthened; b) where the inter-stimulus interval is less than 0.5 sec., second Rs with a slightly lengthened RT do occur in a minority of cases; c) in some Rs at intervals of 0.2 and 0.3 sec. this implies a complete overlap between the execution of the first R and the formulation of the second R; d) a few Rs also occur where the course of the first R appears to be shortened by the second R beginning in the opposite direction; e) the RT for such first Rs tends to be shorter than that of normal completed Rs; f) when a second stimulus occurs after an inter-stimulus interval of 0.5 or 0.1 sec., it can be made to inhibit the first response in about 1/3 of the cases; g) the RT for such an R is slightly longer than for simple Rs; h) the RT for a double R is only slightly longer than for a single one, the difference being statistically significant only when the double R consists of 2 dissimilar movements. The conclusion drawn from these results is that the psychological refractory phase is not absolute.

1540
Poulton, E.C. SPEED ANTICIPATION AND COURSE ANTICIPATION IN TRACKING. A.P.U. 123/50, Sept. 1950, 12pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

In order to study separately the two kinds of perceptual anticipation in tracking, speed anticipation and course anticipation, two different experimental arrangements were used. In one the subject had to predict the position of a pointer moving in harmonic motion, at a given time ahead. In the other the subject had to keep a pointer in line with a second pointer moving in harmonic motion, when he only received intermittent glimpses of the display. It was found that it was not the length of time ahead, but what happened during that time, which determined the accuracy of perceptual anticipation at different distances in the future. The importance of speed anticipation in "blackout" tracking was demonstrated experimentally by reducing the length of the glimpses of the display, so that the subject could see only the successive positions of the "stimulus" pointer at fixed intervals of time, not its speed in these positions. His performance deteriorated accordingly.

R 6

1542
Vince, M.A. LEARNING AND RETENTION OF AN "UNEXPECTED" CONTROL-DISPLAY RELATIONSHIP UNDER STRESS CONDITIONS. APU 125/50, Aug. 1950, 17pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1542
This experiment compares the relative rates of learning for expected and reversed directions of control movement, and also the relative ability to retain the habits under stress conditions. Two matched groups of ten subjects consisting of pilots, seamen, and mechanics performed a simple control-display task with the control movement reversed for one group. After training sessions of 70 stimuli presentations, ten test series were given. The task was repeated with introduction of distractions. The results compare the expected and reversed control groups in terms of: learning curves, correlation of errors and intelligence scores, response time, and effect of distractions.

T. G. I. R 2

1543
Gibbs, C.B. TRANSFER OF TRAINING AND SKILL ASSUMPTIONS IN TRACKING TASKS. APU 127/50, Sept. 1950, 18pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1543
Two series of experiments on transfer of training in tracking tasks are reported. One task involved turning a handwheel at a constant rate to keep a pointer steady on a fixed mark. Seventy Naval ratings participated in five experiments, transferring from one to another combination of handwheel diameter, pointer size, handwheel direction, and display-control movement relationships. The second task was pursuit tracking with a handwheel on two tracks of different difficulty, the order of transfer being counterbalanced among Ss (10 business women and 10 Naval ratings). Results are discussed regarding their implications for transfer as a function of task difficulty.

T. G. I. R 16

1544
Broadbent, D.E. THE TWENTY DIALS TEST UNDER QUIET CONDITIONS. APU 130/50, Aug. 1950, 22pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1544
To determine whether a task involving vigilance gives a reliable measure of performance, a test was devised consisting of twenty dials, each provided with marked danger point above which the pointer should not be allowed to rise. Forty Ss watched the dials, arranged in rows on three sides of the room, for two 1-1/2 hour periods and made adjustments when necessary. Time between responses and signals and number of signals observed moving are analyzed in terms of the consistency of the task in measuring differences between individuals. Practice effects and dial position as it affects speed of detection are noted.

T. G. I. R 3

1547 Mitchell, M.J.H., & Vince, M.A. THE DIRECTION OF MOVEMENT OF MACHINE CONTROLS. A.P.U. 137/50, Feb. 1951, 13pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

Experiments are described in which the relation between the direction of movement of a control and display was varied in order to determine what relationships are likely to cause least confusion to the operator of a machine. Two different types of task were used: a task consisting of intermittent stimuli whose rate of presentation could be varied, and a continuous pursuit task. It is found that accuracy of performance varies with the degree of remoteness of the directional relationship from those met in everyday life, with the complexity of the task, with the ability of the subject, and there is some indication that under certain conditions it may vary with the breadth of his attention. Awareness of the response aspect of the situation in these simple sensori-motor tasks, it is suggested, although necessary in the early stages of learning, may be associated in the later stages with confusion and error.

R 14

1546 Conrad, R. SPEED AND LOAD STRESS IN A SENSORI-MOTOR SKILL. A.P.U. 134/50, Autumn 1950, 12pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

In this paper, previous work on the distribution and division of attention is critically reviewed from the point of view of its relevance to the study of skill. It is felt that fundamental methodological weaknesses minimize its value to this field of research. In particular, the presence of time as an environmental factor in skilled behaviour has been consistently underrated. Time is effective in skill in the form of speed. This in the simplest terms can be described as the rate of which critical display changes occur. Speed, however, needs to be qualified by another factor--load--which describes the number of independent streams of signals which comprise the changing display. An experiment was carried out to study the effects on skilled performance of increases of speed and load beyond the point at which deterioration occurs. Twenty subjects did the same task, which demanded adaptation to a continuously changing situation, under three different conditions of load, and at five different speeds for each load. The results can be summarized as follows: a) The number of signals not responded to at all bears a logarithmic relationship to the rate at which they are presented; b) At any one speed, the incidence of this type of error depends markedly on the load content of the display; c) Statistical interaction between speed and load effects is demonstrated; d) Of the responses made, the size of errors of timing is not affected by the speed of the task, but doubling the load approximately doubles the timing error.

R 17

1549 Poulton, E.C. TWO POINTER AND ONE POINTER DISPLAYS IN TRACKING. APU 142/50, Dec. 1950, 19pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1549.

These experiments concern the effects of practice and of nature of displayed information on tracking performance. Tracking involved moving a control handle so that a moving pointer was kept on a fixed reference line (one pointer display) or in alignment with a moving stimulus pointer (two pointer display). Learning curves were obtained on 12 Naval ratings for one and two pointer displays. In another experiment, a third pointer (error information) was added; 12 Naval ratings performed with variations in display-control relationships; 12 with or without error information. Results are analyzed for implications for training in tracking.

G. I. R 3

1550 Bartlett, F.C. PRINCIPLES OF SYNTHETIC EQUIPMENT AND TRAINING. APU 143/50, Dec. 1950, 5pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1550

This paper discusses the principles of synthetic training equipment that have evolved from past research at the Cambridge Psychological Laboratory. It covers general requirements and technical requirements (based on physiological and psychological research), and lists 16 principles of synthetic training, with special emphasis on principles of transfer of training.

1548 Poulton, E.C. ANTICIPATION IN OPEN AND CLOSED SENSORI-MOTOR SKILLS. APU 138/50, Sept. 1950, 15pp. Psychology Lab., Applied Psychology Research Unit, MRC, Cambridge, England.

Two characteristics of compensating voluntarily for an error in responding appear to be of importance in sensori-motor skills. Firstly there is the relatively long latency of voluntary compensation, which allows the initial response deviation to increase before it can be corrected. And secondly in a performance requiring voluntary compensation, maximal accuracy and smoothness are not both possible. The two kinds of anticipation shown in sensori-motor skills, receptor anticipation and perceptual anticipation, are discussed in relation to their function of compensating for reaction time delays. By anticipating the nature and time of occurrence of a signal, the subject can make the appropriate response synchronously with the signal. A further consequence of perceptual anticipation is that smooth yet complex sensori-motor skills are possible. A classification of sensori-motor skills into open and closed types is suggested, the position of any particular skill on this continuum depending upon the degree of predictability of the environmental signals. One advantage of closed skills is the reduced attention which environmental signals require. A second advantage, shared by open skills allowing receptor anticipation, is that voluntary compensation is seldom required. Two experiments are described. One is an example of a closed skill in the early stages of learning. The second demonstrates the relatively small importance of voluntary compensation in a two pointer tracking task with slow harmonic courses, once the subject becomes fairly practiced.

R 5

1552

Conrad, R. STUDY OF SKILL BY MOTION AND TIME STUDY AND BY PSYCHOLOGICAL EXPERIMENT. Research, 1951, 5, 353-358. APU 145/51. Psychological Lab., Cambridge, England.

Reviewed are the basic principles underlying the study of skill by motion and time study and how they relate to psychological principles. It is pointed out that the time and motion methods take into consideration only the element of movement and the breakdown of the number of movements in a given operation. There has been a lack of a fundamental research in time and motion work. The importance of examining the unity of skilled behavior and the application of sound psychological principles is emphasized. (HEIAS)
R 19

1553

Broadbent, D.E. SPEAKING AND LISTENING SIMULTANEOUSLY. A.P.U. 146/51. Jan. 1951. Epp. Medical Research Council, Applied Psychology Research Unit, The Psychological Lab., Cambridge, Eng.

1553

This investigation of performance in a distraction situation required 27 subjects to give verbal answers to simple questions coming from a loud speaker. Intervals between questions were varied so that at times a question was presented while the subject was still answering a previous one. There were two message sources; S had to make his replies only to the correct one. Performance was analyzed in terms of impairment with overlap of speaking and listening and as a function of rate of presentation of questions.
P, T, RT.

1554

Gibbs, J.B. & Baker, J.C. FREE-MOVING VERSUS FIXED CONTROL LEVERS IN A MANUAL TRACKING TASK. Automatic and Manual Control. London: Butterworths Scientific Publications, 1951, 467-472pp. A.P.U. 161/51, Applied Psychology Research Unit, Psychology Lab., Cambridge, England.

A series of experiments using a manual tracking task, with 2 alternative methods of operating the control lever are reported. In 1 case, a normal free-moving joystick was used, and in the other the joystick was secured, but could be deflected slightly by the application of pressure. The pressure control was found to be more accurate in tracking tests. Further tests showed that single corrections could be made more quickly, to a given level of accuracy, when the pressure control was used. (HEIAS)
R 1

1555

Hick, W.E. ON THE RATE OF GAIN OF INFORMATION. A.P.U. 162/51, Oct. 1951, 18pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1555

To test the hypothesis that the rate of gain of information is, on the average, constant with respect to time within the duration of one perception, the analytical methods of information theory were applied to data obtained in choice-reaction-time experiments. Two types of experiments were performed: (1) a conventional one with various numbers of alternatives up to ten and with negligible proportion of errors, and (2) a ten-choice experiment in which subjects reduced their reaction-times by allowing various proportions of errors. Some possible conceptual models of the process are considered.
T. G. R 7

1556

Broadbent, D.E. NOISE, PACED PERFORMANCE AND VIGILANCE TASKS. APU 165/51, Dec. 1951, 8pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

2 vigilance experiments using a 5-choice reaction task are reported. In the first, one group of 9 Ss was "unpaced"--a fresh stimulus was presented each time a reaction was made--and a second group of 6 Ss was "paced"--a fresh stimulus was presented automatically every sec. The 2 rates were about equal. In the paced condition the output of correct responses fell off after 10 min. work, while in the unpaced condition there was no decrement until nearly an hour had gone by. The unpaced Ss, however, showed a marked decrease in the number of short pauses in responding, "short", being here 2 sec. or more. In the second (main) experiment, 18 Ss worked at the task unpaced, for 1/2 hr. on each of 2 successive days. One day the room was quiet, while on the other it contained a steady noise of high intensity. The previous results were confirmed for the first day under either condition but pauses ceased to show a decrement in performance with time on the second day: wrong reactions, however, continued to show one. Such errors were far more frequent in noise than in quiet, the average increase being more than 1/2 of the number occurring in quiet. A further group of 14 Ss showed a similar effect of noise despite a preceding suggestion that contrary results were to be expected. It is suggested that these results allow us to give an adequate interpretation of the peculiarities of vigilance tasks, of differences found between them in the effects of noise and continued exercise, and of the reasons for the apparent failure of other laboratory tasks to show such effects. (HEIAS)
R 17

1557

Broodent, D.E. FAILURES OF ATTENTION IN SELECTIVE LISTENING. APJ 168/51, Feb. 1952, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

This present paper contains a series of experiments on the selection out of a mass of speech of parts which are relevant. It is shown, firstly, that a group of 20 Ss found it easier to listen steadily to 1 voice in a mixture rather than change from voice to voice in obedience to a visual cue. This applied only when the voices were familiar, so that one may suspect that an unfamiliar voice has to be reidentified every time it speaks. Secondly, a group of 14 Ss were required to listen to 2 questions and then answer them both before the cycle was repeated. In one case the questions followed one another in time, while in another alternate words were heard from each voice. The latter condition was far harder, showing that the difficulty of listening to 2 messages at once is not purely a matter of difficulty in hearing (masking). A third group of Ss was required to answer only 1 of the 2 questions. The alternate word condition was still the harder, so that neglect even of irrelevant information is not perfect in this case. 2 groups of 10 and 12 Ss respectively underwent the conditions of the third group with variations in the vocal cues available for discarding the irrelevant information. It appeared that if the same voice read relevant and irrelevant words it was harder to answer the relevant ones than if different voices read the 2 types of information. On the other hand, when the voice using the call-sign to be answered varied randomly from question to question, performance was as good as when the same voice used the call-sign throughout the session. This also seems to indicate that reidentification occurs in every message with an unfamiliar voice. (MEIAS)

2-9

1558

Gibbs, C. B., Davidson, A., & Shackel, B. CAR TURNING SIGNALS AND DELAYS IN RESPONDING TO VISUAL INFORMATION. A.P.U. 176/52. Sept. 1952, 15pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

1558

To compare the relative efficiencies of two systems of car-turning indications (British: afficator, an illuminated mobile arm, and U.S. flashing lights on appropriate side of car), all possible variations and combinations of turn and stop signals were studied under both day and night field conditions by 23 subjects having a wide range in age, occupation, and previous driving experience. The number of signals seen in limited exposure times, number of correct responses, and total response times are discussed in terms of the two systems.

1561

Lewis, R. E. F., & Cunningham, W. R. HAND SIGNALS VERSUS A TURNING INDICATOR FOR MOTOR CYCLISTS. A.P.U. 183/53. June 1953, 6pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

1561

To evaluate illuminated signalling displays for motor cycles, twenty-five experienced drivers determined the "range of clear identity" for two signalling devices and for orthodox hand signals by day and by night under reasonably realistic conditions. Recognition distances are analyzed and compared for the three types of signalling. Suggestions are made concerning improved design for a signalling device. C.I.R.I.

1562

Chambers, C.C. MEASUREMENT SCALES: THE PREREQUISITES OF BIOLOGICAL STATISTICS. APJ 148/51, 1951, 5pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1562

The concept of measurement is discussed and the following definition accepted for purposes of this paper: "Measurement in its widest sense may be defined as the assignment of numerals to things so as to represent facts or conventions about them." Four types of measurement scales falling under this definition are described: nominal scale, ordinal scale, interval scale, and ratio scale. Finally, the statistical methods allowable for each type of scale are discussed.

1559

Conrad, R. MISSED SIGNALS IN A SENSORI-MOTOR SKILL. A.P.U. 187/53, Feb. 1953, 15pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

To explain why speed increases in the demanded rate of work in a sensori-motor skill, led to a disproportionate deterioration in performance, specific association was sought between signals omitted and definable temporal relationships occurring as a result of continuous display changes. The distribution of the time intervals between the signals presented was such that some relationships occurred many times more often than others, the frequency being determined by the mean signal speed. A detailed examination of performance in these terms revealed that omissions occurred close to the nearest response more often than would be expected by chance, and they were as likely to occur just before the response as just after. Furthermore, the probability that a signal would be omitted when it occurred a constant time interval from a response increased linearly with mean speed. The effect of increasing the signal speed was twofold. Firstly, it increased the chances that a signal would occur close to a response, thus subjecting it to a hazardous temporal situation. Secondly, if a signal did occur close to a response it increased the chances that it would be omitted. This latter effect was not due to the crowding in of other specific events as the speed increased, but to the general effect of a shortage of time in the situation as a whole. R 11

1563 Poulton, E.C. & Gregory, A.L. BLINKING DURING VISUAL TRACKING. A.P.O. 152/51, June 1951, 15pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

In order to determine the incidence of blinks during visual tracking, their effect, and the nature of this effect, 2 experimental arrangements were used. In the first the subject had to keep a pen upon a moving line, his blinks being recorded without his explicit knowledge both electronically and by 2 observers. In the second he had to keep 2 pointers in line using a positional control, the display being occluded intermittently in 1 part by a wheel tachistoscope. In another by his own voluntary blinks. It was found that the blink rate was raised when the S expected the tracking to start, and again after tracking. During tracking it was reduced, particularly initially. The blinks that did occur tended to be concentrated in the easy periods of the course. It was not possible to predict the individual's blink rate while tracking from a knowledge of his "resting" blink rate. Blinks were most detrimental when the course was difficult, especially when anticipation was not possible. This effect was due at least partly to interference with vision. But temporary inattention had to be postulated to account for the delayed deterioration following blinking. It was suggested that the blink rate might serve as an index of attention. Blinking cannot be excluded as a cause of accidents. Inattention, of which blinking may be the earliest sign, is probably far more important in this respect.

1565 Moore, R.C., & Tate, G.F. ENGINE INSTRUMENT SIMPLIFICATION PROGRAM "SINGLE" VS "DUAL" INSTRUMENTS. TSEAA 655 1478. Nov. 1946, 47pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

1565 This report reviews progress and objectives of the Engine Simplification Program and discusses the relative merits of "single" versus "dual" instrument methods for presenting engine instrument data. A study to determine the best possible instrument design and arrangement with respect to pilot readability, panel space saving, and ease of maintenance with the subsequent development project is reported. The establishment of an entirely new instrument standard is discussed with plans for an interim program suggested. Specific recommendations are included for continuance of this research.

1566 Reither, H., & Meiator, F.J. THE SENSITIVENESS OF THE HUMAN BODY TO VIBRATIONS. F-TS-616-RE. Sept. 1946. WADC, Aero Medical Laboratory, Dayton, Ohio.

1566 Human responses to sinusoidal vibrations was investigated for the frequency range of 3 to 70 cps. Ten subjects were tested in the standing and lying position with vertical and horizontal vibrations of amplitudes from 0.0001 to 1 cm. applied both along the body axis and transverse to it. After 5 minutes of exposure, the subject classified his reaction in one of the following categories: not perceptible; weakly perceptible; easily perceptible; strongly perceptible; unpleasant, believed dangerous for long periods; very unpleasant, believed dangerous for short periods.

1567 Hollifield, R. G. FINAL DEVELOPMENT STATUS OF KIT CONTAINER, FIGHTER PILOT, SEAT TYPE, SURVIVAL. NCREXD-670-208. July 1948, 9pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

1567 This is a report on the Survival Kit container, Fighter Pilot, Seat Type. One bail-out test was conducted and reported. The kit's size and design, method of donning, compatibility or fit with other equipment are described.

1568 Hollifield, R. G. FINAL DEVELOPMENT STATUS OF KIT CONTAINER, FIGHTER PILOT, BACK TYPE, SURVIVAL. NCREXD-670-208. July 1948, 13pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

1568 This is a report on the Survival Kit Container, Fighter Pilot, Back Type. The design, method of donning, contents, etc. of the kit are described. The results of a single bail-out test are also reported.

1570 Carter, L.F. THE RELATIVE EFFECTIVENESS OF PRESENTING NUMERICAL DATA BY THE USE OF TABLES AND GRAPHS. TSEAA 694 1. Apr. 1946, 9pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

1570 To determine the relative merits of tables and graphs for presenting numerical data, 27 subjects solved a large number of problems using four tables and four graphs presenting linear and curvilinear data, one set of data, and a family of data, under a time limit the same for all problems. Two types of solutions were required: (1) no interpolation, and (2) interpolation. Speed (number of problems completed) and accuracy (frequency and magnitude of errors) are analyzed as functions of the type of solution required. Recommendations are included.

1571 Young, Katherine, D. LEGIBILITY OF PRINTED MATERIALS. Memo. TSEAA 8 694 1A, June 1946, 28pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1571 This report is a summary of selected experimental studies concerned with the legibility of printed materials (1946). Of particular concern are the conditions under which printed material is best suited to the capacities and habit patterns of the average person: type faces, type sizes, length of line, leading, capital versus lower case, italics versus lower case, white on black or the reverse, color, spatial factors, illumination, modern versus old style numerals. Recommendations are included.

1572 Carter, L.F. A STUDY OF THE BEST DESIGN OF TABLES AND GRAPHS USED FOR PRESENTING NUMERICAL DATA. TSEAA 694 1C. Sept. 1946, 16pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

1572 To study some design factors in tables and graphs used for presenting numerical data, tables were constructed and varied in completeness (number of pages and number of points tabulated); graphs were constructed and varied in frequency of coordinate rulings and the axis on which entered. Seventy subjects solved problems using both types of presentation. Speed and accuracy scores are analyzed for the efficiency of type of presentation. Recommendations are included.

1573

Christensen, J.M. PSYCHOLOGICAL FACTORS INVOLVED IN THE DESIGN OF AIR NAVIGATION PLOTTERS. TSEAA 694 1 D, Dec. 1946, 26pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio.

The present experiment was designed to test variations in 4 basic components of air navigation plotters: a) single-edge vs. double edge; b) protractor scale with numbered degree markings increasing from left to right vs. right to left; c) protractor scale with 10 gradations vs. 5 gradations; and d) double vs. single protractor elements. 6 models were constructed and tried out on 348 high school advanced mathematics students. It was found that a double-edged plotter is superior to a single-edged plotter, a left-right scale is slightly superior to a right-left scale, a 5° scale is superior to a 10° scale, and 1 protractor element is better than 2. A possible design for a new air navigation plotter was drafted on the basis of findings from the study. (MEIAS)

R 1

1574

Grether, W.F. SPEED AND ACCURACY OF DIAL READING AS A FUNCTION OF DIAL DIAMETER AND SPACING OF SCALE DIVISIONS. TSEAA-694-12. Mar. 1947, 22pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

1578

Crocker, Mary L. & Kennedy, J.L. STUDY OF PREFERENCES FOR ABBREVIATIONS OF COMMON WORDS USED IN AVIATION. Contract W33 038 AC 14559, Rep. 3, July 1947, 78pp. Tufts University, Medford, Mass.

1574

To determine the manner in which speed and accuracy of dial reading vary with dial size and spacing of scale divisions, eighty subjects read off settings on simulated instrument dials with fluorescent markings, four sizes (one to four inch diameters), four graduation intervals (five to forty degrees of angular separation) under simulated daylight and night conditions (ultraviolet illumination). Reading time and errors are analyzed as functions of the variables used. The usefulness of the data in estimating reading precision possible with common types of aircraft dials is discussed. T.G.I.B.I.

1578

To investigate optimal abbreviations for common words used in aviation, 175 college students (25 AAF veterans, 150 unselected) indicated their preferences for one of several abbreviations listed for each of 451 words taken from the AMA Bulletin No. 261, under forced speed conditions. Three abbreviations for each word that was chosen most frequently are presented in rank order with their frequencies. A list of 60 abbreviations which were selected very infrequently is given together with the more frequently chosen ones. Some suggestions are made as to the applicability of these data for use.

T.

1575

Crook, M.N., Hoffman, A.C., Wessell, N.Y., Wulfeck, J.S., & Kennedy, J.L. EFFECT OF VIBRATION ON LEGIBILITY OF TABULAR NUMERICAL MATERIAL EXPERIMENTS 1 to 4. Contract W33 038 AC 14559, TSEAA 694 1F, June 1947, 20pp. WADC, Aero Medical Laboratory, Dayton, Ohio. (Tufts University).

1579

Kappauf, W.E. THE USE OF THE ANGULAR TRANSFORMATION IN THE STATISTICAL TREATMENT OF ERROR FREQUENCIES. Contract W33 038 AC 14480, Memo, Rep. TSEAA 694 1J, Rep. 2, July 1947, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Princeton University, Princeton, N.J.).

1575

To explore the effects of vibration, illumination, and type size upon the speed and accuracy with which numerals can be differentiated, a series of experiments are described which used a reading task calling for a two digit same-different judgment. Conditions varied: linear vibration, from 0.079 to 0.0079 double inches of amplitude; brightness, 12.4 to 0.96 foot lamberts; type size, six to eleven point (inverted for some trials). Twelve subjects were used. The effects of the experimental values are statistically evaluated by analysis of variance. Discussion treats effect of type inversion in terms of task complexity and familiarity.

T.

1579

This report contains a discussion of the application of the angular transformation in handling error data in certain kinds of psychological experiments where performance on unit tasks is scored on a right or wrong basis (reading of dials, tables, graphs, or printed materials) and in which frequency of error is low and where the likelihood of error from trial to trial remains about the same for tasks which fall in a single category. The angular transformation puts such error data in a form which permits profitable use of analysis of variance. Examples are included. G.B.10.

1576

Smith, W.M. & Kappauf, W.E. STUDIES PERTAINING TO THE DESIGN AND USE OF VISUAL DISPLAYS FOR AIRCRAFT INSTRUMENTS, COMPUTERS, MAPS, CHARTS, AND TABLES: A BIBLIOGRAPHY. Contract W33 038 AC 14480, Memo, Rep. TSEAA 694 1G, June 1947, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Princeton University, Princeton, N.J.).

1576

This report presents a bibliography of scientific reports concerned with the design of aircraft instruments, tables and charts, computers, maps, or to the particular conditions under which these devices were used. A list of sources used in preparing the bibliography is given. R264.

1577

Fitts, P.M. STUDIES OF VISUAL DISCRIMINATION TIME: THE TIME REQUIRED TO RECOGNIZE SIMPLE PATTERNS AT EQUAL DISTANCES FROM THE EYE, AND PATTERNS AT ALTERNATELY FAR AND NEAR DISTANCES. Serial TSEAA 694 1H, TSEAA 8/PMF/jc, July 1947, 2pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1577

The purpose of the present studies was to determine the time required for successive fixation and recognition of test objects located at equal distances from the eyes and the time required for changing from far to near fixation. 50 college students, serving as Ss, judged the positions of Landolt Rings at distances of 1.) 22 in., 2.) 43 ft., 3.) alternating near and far distances. The author notes that these data are useful in connection with studies of instrument interpretation time.

1580

To explore the effects of vibration on legibility of numerals, three experiments were conducted: (1) vibration frequencies varied (480, 930, 1930 per minute) with favorable and unfavorable conditions of amplitude, brightness, and numeral size, (2) vibration pattern varied (linear, rotary, elliptical) with two conditions of amplitude, and other factors held constant, and (3) stimulus contrast varied (black on white or the reverse) with an unfavorable and with a mixed condition of other factors. The data were evaluated statistically by analysis of variance. Problems for further research are outlined. (See accession number 1575.) T.

1581

Kappas, M.E. DESIGN OF INSTRUMENT DIALS FOR MAXIMUM LEGIBILITY: I. DEVELOPMENT OF METHODOLOGY AND SOME PRELIMINARY RESULTS. MEMORANDUM REPORT. Contract #33 CSM AC 14480, Serial TSEAA 694 11, Oct. 1947, 2pp. Aero Medical Lab., Wright-Patterson AFB, Ohio. (Princeton University, Princeton, N.J.).

1582

This report describes a procedure for the study of precision of dial reading. It consists of presenting 12 dials simultaneously to a single subject and scoring his performance in reading: dials in terms of errors and average time. In a preliminary study, dial size (three), dial design (differing in number of subdivisions), and reading attitude (accuracy or speed), subject differences, and practice effects were explored using the procedure. Analysis of the data is presented and some considerations concerning the methodology are discussed.
T. G. I. R 8

1583

Connell, Shirley C. THE RELATIVE EFFECTIVENESS OF PRESENTING NUMERICAL DATA BY THE USE OF SCALES AND GRAPHS. TSEAA-694-1M. Dec. 1947. 17pp. Aero Medical Lab., Headquarters, Air Materiel Command, Engineering Div., Wright Field, Dayton, Ohio.

1584

To determine the relative merits of scales and graphs for presenting numerical data, 32 subjects solved a large number of problems with the aid of four scales and graphs (one each representing linear data, one each representing curvilinear data) with a time limit the same for both. Problems were of three types requiring (1) no interpolation, (2) single interpolation, and (3) double interpolation. Frequency and magnitude of errors were analyzed with respect to the efficiency of scales and graphs for such problem solving.
T.G.I.R2.

1585

Christensen, J.M. THE EFFECT OF THE STAIRCASE SCALE ON DIAL READING ACCURACY. MEMO-694-1-P. Oct. 1948. 17pp. Aero Medical Lab., Headquarters, Air Materiel Command, Engineering Div., Wright Field, Dayton, Ohio.

1586

To evaluate the effectiveness of a staircase dial in reducing reversal errors in dial reading, 55 subjects read dials varied as follows: staircase and conventional scales, clockwise and counter-clockwise increase, zero at top and at bottom of scale. Identical problems were presented on each dial and administered by the "card rotation method". Reading times and errors are analyzed for each dial. Special note is taken of the differences yielded by each reversal error. Practice effects are shown.
T.G.I.R2.

1587

Hill, H. A REVIEW OF MUSCLE ACTIVITY AND ACTION POTENTIALS AS THEY ARE RELATED TO MOVEMENT. Contract W33 032 ac 13968, TSEAA 694 2E, Rep. 5; May 1947, 14pp. USAF Aero Medical Lab., Engineering Div., Air Materiel Command, Wright Field. (Indiana University; Bloomington, Ind.).

In the interest of studying movements, their initiation, maintenance, and modification, the nature of the contractile properties and processes of skeletal muscle are briefly surveyed. Differentiation of muscle action and forms of contraction, including reciprocity and co-contraction are considered and evidence presented for and against the occurrence of ballistic movements. Recording apparatus and techniques for the study of muscle action are then shortly reviewed. Stetson's classification, used to order the experimental work on movement and muscle action during loading, is briefly reviewed. The electrical occurrences connected with muscle contraction are discussed from the points of potential origin, and speed, form, frequency, and amplitude of propagated waves under various conditions. Evidence on the origin of muscle rhythms is presented, and recording techniques, together with possible interpretations of recorded electrical activities are briefly discussed. Action potentials during movement under various conditions are reviewed. While no attempt is made to trace the development of any specific coordinated movement in a particular individual's lifetime, biologically similar bases of reflex movement (between individuals) are pointed out. The contention is then put forth that structure-function activities (the inheritable reactions, e.g., reflexes) gradually, or in some instances suddenly, come under the control of other than the originally adequate stimulus through the operation of conditioning.
R 124

1588

Kappas, W.R., & Smith, W.M. DESIGN OF INSTRUMENT DIALS FOR MAXIMUM LEGIBILITY: II. A PRELIMINARY EXPERIMENT ON DIAL SIZE AND GRADUATION. Contract W33-038 ac 14480, MEMO-694-1-N, Rep. 4, May 1948. 17pp. Aero Medical Lab., Engineering Div., Air Materiel Command, Wright Field. (Princeton U.).

1589

To explore the effect of dial size and graduation on the speed and accuracy of dial reading, six subjects read panels of twelve similar instruments under instructions to be as accurate as possible. Dial sizes used: 1.4 and 2.5 inch diameters; scale ranges: from zero to 100, 200, 400, and 600 units; graduation markings: every five or ten units. Reading times and errors are analyzed for conditions permitting the greatest accuracy for obtaining quantitative information.
T.G.I.R2.

1590

Crook, R. K., Harker, G. S., Hoffman, A. C., Wolfek, J. M., & Kennedy, J. L. PLITUDE THRESHOLDS FOR VISUAL PERCEPTION OF VIBRATION. Contract W33-038 ac-14553, Memo Rep. MEMO-694-1R, Rep. 6, Dec. 1948. 17pp. WADD, Aero Medical Laboratory, Dayton, Ohio. (Tufts University)

1591

To determine the least amplitude of vibration just visually perceptible at reading distance (14 inches) under adequately good lighting conditions (13.0 and 23.5 foot lambert), threshold judgments were made using a page of printed digits (6, 8, 10 point type) with vibration frequencies of 1160, 1450, and 1800 per minute. Threshold measurements (inches of double amplitude) are analyzed as functions of vibration frequency, brightness level, and type size. The results are discussed in relation to legibility at further distances, to bodily sensitivity, and to visual acuity.
T.R6.

1592

Krueger, G. K., Podell, J. E., & Ronco, P. G. EFFECT OF NUMBER OF ALTERNATIVES AND SET ON THE VISUAL DISCRIMINATION OF NUMERALS. J. exp. Psychol., 1954, 48, 75-90. (Tufts University)

1593

To investigate some relationships between amount of information presented and accuracy of discrimination, subjects discriminated accurately a number displayed under conditions of from two to 1000 alternative categories; procedure repeated with an "expectancy" established for a large number of categories when there were only four; a further repetition after subjects had been informed of the actual number of categories to expect. The maximum distance at which discriminations could be made accurately was defined as a threshold. The data are analyzed and interpreted as a function of amount of information presented and of perceptual set.
T. R 7

1598

Farnsworth, D. AN INTRODUCTION TO THE PRINCIPLES OF COLOR DEFICIENCY. Project NM 003 041.60.01, NRL Rep. 254, Sept. 1954, 15 pp. Medical Research Laboratory, U. S. Naval Submarine Base, Bureau of Medicine and Surgery, New London, Conn.

1598

A simplified introduction to the principles of color defectiveness is presented, with diagrams showing color confusions. Explanation is given of the characteristics of color defective vision, their systematic basis, and the classification of types. The construction and operation of color vision tests are explained and application is made of the same principles to selection of colors for coding purposes. G.I.R.10.

1591

Happoport, M. THE ROLE OF REDUNDANCY IN THE DISCRIMINATION OF VISUAL FORMS. J. GEN. Psychol., 1957, 53 (1), 3-10. Contract Nonr-495(02), OHS, Ohio State University.

1591

To investigate the role of redundancy in visual perception, stimulus material (constructed metric figures) were prepared of two types (congruent and incongruent) and five amounts (71, 81, 86, 91, 97 percent) of visual redundancy. Subjects were required to sort out a specified pattern from among eight similar patterns (six discriminations for each of eight patterns) under noise-free and 17 percent background noise (perturbation of the stimulus pattern). Average recognition times were analyzed (analysis of variance) in terms of type and amount of redundancy with and without visual noise. Implications of this experimental approach for an interpretation of Gestalt figure concepts are mentioned. T. G. I. R 11

1592

Reedy, J.D. EVALUATION OF THE EFFECTIVENESS OF THE PHYSICAL TRAINING PROGRAM DURING THE BASIC INFANTRY TRAINING CYCLE. Proj. 6 95 20 001, Subtask AMRL 8.5, Rep. 137, Feb. 1954, 10pp. USA Medical Research Lab., Fort Knox, Ky.

1592

This study investigated the effectiveness of the physical training program during the basic infantry training cycle. A total of 1132 basic trainees was divided into companies having the customary 24 periods of calisthenics during the 8-week basic infantry cycle and companies having no physical training. The results of 4 tests of physical condition are compared for the 2 groups, and recommendations are made for further research and for modification of the physical training program. T. R 5

1593
Reedy, J.D. & Saiger, G.L. EVALUATION OF THE HARVARD STEP TEST WITH RESPECT TO FACTORS OF HEIGHT AND WEIGHT. Proj. 6 95 20 001, Rep. 140, Feb. 1954, 6pp. USA Medical Research Lab., Fort Knox, Ky.

This report is concerned with the relationship between height and weight factors and scoring on the Harvard Step Test. Results of studies on Army trainees would seem to indicate that test scores are not appreciably affected by a combined height weight factor or the height factor alone, but may be affected by the weight factor. Low scores in relatively heavy men may be due in part to the weight factor. R 3

1589

Godwin, A.C. & Wallis, D. SOME HUMAN FACTORS IN THE DESIGN OF CONTROLS: AN EVALUATION OF THE LITERATURE. Rep. 51, Oct. 1954, 37pp. Office of Naval Research, American Embassy, USN Mission Study Unit, London, England.

Many summaries have been prepared of the vast accumulation of literature on human factors which should influence control design. Many of them are unutilized to the needs of service designers and those that are useful are frequently inaccessible. This report attempts first to bring up-to-date and expand the summary issued in 1948 by K.F.H. Murrell (N.M.S.U. Report 36). It also tries to evaluate some of the research data and recommendations which appear in the literature, pointing out also where some of the gaps in our knowledge lie. No attempt is made to discuss the intricacies of control mechanisms themselves. The object has been to give an account of the more relevant human factors which have been shown to influence performance through the design of controls, joysticks and other control handles commonly found in association with "closed" or "open" loop systems. R 47

1590

Fairbanks, D.H., & Moore, B. DOUGLAS A4D SEAT-EJECTION TESTS. NOTS 1068, TPR-119, Feb. 1956, 25pp. Naval Ordnance Test Station, China Lake, Calif.

1590

To make a functional checkout of the seat ejection system of the Douglas A4D airplane, a series of tests was conducted under dynamic conditions closely simulating flight. Runs were made using an A40 cockpit section, complete with ejection seat and dummy, mounted on a rocket-propelled sled riding on a track. Sled-borne and ground-placed metric and documentary cameras were used to gather data. Analysis of data was made to determine whether the canopy jettisoned cleanly without danger of striking pilot and whether the pilot was released properly from the seat. Recommendations were included. T. I

1594

Gerall, A.A., Sampson, P.B. & Spragg, S.B.S. METHOD FOR STUDYING PERFORMANCE ON A SIMPLE TRACKING TASK AS A FUNCTION OF RADIUS AND LOADING OF CONTROL CRANKS. Proj. 6 95 20 001, Rep. 144, April 1954, 18pp. USA Medical Research Lab., Fort Knox, Ky.

4 trained Ss. were tested on a simple tracking task in which the operator was required, by using 2 hand cranks, to align a follower on a stationary target suddenly appearing on the face of a cathode ray oscilloscope. 3 crank radii (2, 4 and 6 in.), and 5 frictional forces (3, 6, 9, 12, and 15 lbs.) were used. The results of this preliminary experiment showed that reactions varied with friction but not with crank radius; that travel times and total times were significantly related to crank radius and friction. Adjustment times were not analyzed.

R.2

1595

Loeb, M., Barron, T., & Burde, E. A PRELIMINARY INVESTIGATION OF THE EFFECTS OF WHOLE-BODY VIBRATION AND NOISE. Proj. 6 95-20 001, Rep. 145, Apr. 1954, 17pp. Army Medical Research Lab., Fort Knox, Ky.

1595

To investigate the effects of noise and vibration on psychomotor efficiency, 16 young men performed a variety of tasks while seated on a platform vibrating at 20 cps with a peak to peak amplitude of 0.012 or 0.034 inches, and making a noise of 94 or 102 decibels. Measures of mirror tracing, simple and complex reaction time, manual steadiness, tapping speed, strength of grip, visual acuity, blood pressure, pulse rate, and urinary sodium, potassium, and albumin were made before, during and after exposure to each level of vibration and noise. The results are analyzed for statistically significant differences among the experimental conditions.

T. G. R. 34

1596

Gogel, W. C., Tammaro, J. P., & Inaba, Kay. THE TENDENCY TO SEE OBJECTS AS EQUIDISTANT AND ITS INVERSE RELATION TO LATERAL SEPARATION. Proj. 6-95-20-001, Rep. 146, Apr. 1954, 22pp. Army Medical Research Laboratory, Fort Knox, Ky.

1596

To study monocular and binocular factors determining judgments of distance, a series of experiments were devised wherein monocular and binocular objects were viewed simultaneously (stereopsis was assumed to be effectively absent between objects) under conditions providing no depth cues and conditions where depth aspects of parts of the field were fairly well determined (number of objects, lateral displacement, size). The data are analyzed as a function of lateral line-of-sight separation of objects.

T, I, R4.

1597

Gogel, W. C., Tammaro, J. P., & Inaba, Kay. RELATIVE VISUAL DIRECTION AS A FACTOR IN DEPTH PERCEPTIONS IN COMPLEX SITUATIONS. Proj. 6-95-20-001, Rep. 149, July 1954, 30pp. Army Medical Research Laboratory, Fort Knox, Ky.

1597

To explore some relationships between depth perception and visual direction, twelve subjects viewed monocularly and binocularly two playing cards, (one twice the size of the other) and a small disc (varied in lateral position between the cards), all objects at equal distances. Estimates of apparent difference in depth of disc to cards were made. The data are analyzed as a function of lateral displacement of disc and its form relation to nearest card. Prediction is made and tested of the apparent path of an object attached to an Ames rotating trapezoidal window; further application is made to stereoscopic range-finding.

T, I, R5.

1598

Hartmar, B.O. THE ACCURACY OF THROWING HAND GRENADES AS A FUNCTION OF THEIR WEIGHT, SHAPE, AND DISTANCE. Proj. 6 95 20 001, Subtask AMRL S 1, MEDA, Rep. 153, Aug. 1954, 19pp. USA Medical Research Lab., Fort Knox, Ky.

1598

To determine the influence of shape, weight and distance on the accuracy with which grenades are thrown, 12 subjects were required to throw at a horizontal, bull's eye type of target. Four shapes (sphere, standard, tear drop, and cylinder), five steps of weight (12, 15, 18, 21, and 24 ounces), and four distances (20, 25, 30, and 35 yards) were the variables. Both accuracy, radial distance from center of target, and consistency, dispersion of throws, of performance were analyzed for effects of these variables. An effort curve was plotted using error scores for each combination of weight and distance. Recommendations concerning grenade design are made.

T. G. I. R 1

1599

Gogel, W. C., Tammaro, J. P., & Inaba, Kay. A MODIFICATION OF A STEREOPSIS ADJUSTMENT BY THE EQUIDISTANCE TENDENCY. Proj. 6-95-20-001, Rep. 157, Aug. 1954, 11pp. Army Medical Research Laboratory, Fort Knox, Ky.

1599

To determine whether an adjustment for apparent equal distance made with the stereopsis one can be modified by the tendency to see two objects as equidistant, two experimental situations were devised where the equidistant tendency was present but opposite in direction. In two control situations it was absent. Results are analyzed for differences between the conditions. Application is made to two field situations involving stereoscopic ranging.

T, I, R9.

1600

Ashenurst, F.F. SYSTEMS ANALYSIS LITERATURE. Contract Monr 494(03), Proj. NR 145,088, Rep. 1954 494 03 17, April 1954, 235pp. ONR, Tufts College, Medford, Mass.

This report summarizes work upon the problem, "Systems Analysis Literature," under Office of Naval Research Project Number NR 145,088, Contract Number Monr 494(03). It reviews the methodologies developed by a service section charged with the collation and maintenance of a body of complex and classified material. It surveys the areas of systems analysis and coordination and documents the bulk of significant and relevant research. It is dated from the February 25, 1954, de facto disestablishment of the Collations Section, Department of Systems Analysis, Tufts College.

R 1328 (about)

1601

Adams, C.S., Fitts, P.M., Rapoport, M. & Weinstein, M. RELATIONS AMONG SOME MEASURES OF PATTERN DISCRIMINABILITY. *J. exp. Psychol.*, 1954, 48, 81-88. (Ohio State University, Columbus, Ohio).

1601

To determine the relations among different measures of the discriminability of visual forms, two determinations of size threshold, four measures of identification time under constant and one under increasing illumination, two measures of sorting performance, and two learning measures were applied to 16 arbitrarily chosen forms (half of which were symmetrical and half asymmetrical; half were filled and half outlined). Sixteen Ss performed all tests. Scores are analyzed statistically for differences among measures and for factors accounting for differences.

T. I. R 9

1603

Crook, M.H., Marker, G.S., Hoffman, A.C. & Kennedy, J.L. THE EFFECT OF VIBRATION ON LEGIBILITY OF TABULAR NUMERICAL MATERIAL: EXPERIMENTS 8 & 9. Contract W33-038-ac-14569, WCHRD-694-1Q, Dec. 1948, 18pp. Wright-Patterson AFB, Aero Medical Lab., Eng. Div. (Tufts College)

1603

To study the relations between vibration amplitude and both spacing and page density (number of digits per unit area), two tasks (1. same-different judgment of two digits, 2. recognition of correct answer to a three-digit addition problem) were performed under a variety of conditions of type size, brightness, and vibration frequencies. Spacing between digits were varied from .005 to .061 inches; double amplitudes from .005 to .030 inches; densities from one to 2.2 units. Legibility data are analyzed and interpreted in terms of spacing of numerals in actual situations where vibration is present.

T.

1604

Johnson, A.P. EXPERIMENTAL COMPARISON OF SIGHTING AND TRIGGERING PERFORMANCE WITH HAND GRIPS AS COMPARED TO HAND WHEELS CONTROLS ON THE B-29 PEDESTAL SIGHT. Memo. Rep. TSEAA 8-694-2, May 1946, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1604

To determine the principle of control action best adapted to the capacities of the user, a study was made of the accuracy of sighting and triggering when using a new type handgrip control as compared to a handwheel control on the B-29 Pedestal Sight. Each subject was required to operate both types of controls for similar time periods but on different days. For each series a time score was obtained for tracking and ranging correctly and for triggering while tracking and ranging correctly. Recommendations for design changes in controls are made on the basis of the results.

1605
Milton, J.L. AN EXPERIMENTAL COMPARISON OF THE ACCURACY OF TRACKING, RANGING AND TRIGGERING WITH TWO NEW TYPE GUN-SIGHT HAND CONTROLS. TSEAA 694-2, Oct. 1946, 12pp. USAF Air Materiel Command, Aero Medical Lab., Wright-Patterson AFB, Dayton, Ohio.

This experiment was designed to determine the accuracy with which gunners could use the B-29 Pedestal Sight when equipped with 2 new type hand controls. The 2 new hand controls, designated B and C, were designed to eliminate most of the faults of the original hand controls on the B-29 Pedestal Sight. Hand control B is a squeeze grip type control utilizing a spring-loaded extension of the right hand control for ranging and a trigger which is incorporated in the left-hand control. Hand control C is a knoblike ranging control used with the right hand in this experiment. The same left hand control was used in both cases. The S.A.M. Pedestal Sight Manipulation Test was used. In order to simulate as closely as possible the complete task of the gunner, the test was arranged to provide data on tracking, ranging and triggering. Hand control B was found to be superior to hand control C in all respects. The ranging score with control B was superior at the 2% level of statistical confidence. Combined tracking and ranging scores, and combined tracking, ranging, and triggering scores were approximately 8% higher. There is less than 1 chance in 100 that this superiority of control B could have occurred by chance. It was concluded that variations in the shapes and modes of action of gun-sight controls make marked differences in tracking, ranging and triggering performance.

R 5

1605
Gray, Florence E., Livingston, W.A. & Ellison, D.G. MODIFICATIONS OF THE IAAF S.A.M. PEDESTAL SIGHT MANIPULATION TEST. Contract W33-038-ac-13968, TSEAA 694-2, Nov. 1946, 9pp. WADC, Aero Medical Laboratory, Dayton, Ohio. (Indiana University, Bloomington, Ind.)

This report describes modifications of the Pedestal Sight Manipulation Test (PSMT) which were made to provide: a) simultaneous and independent measures of tracking error in 2 or 3 dimensions, and b) flexibility of sight controls permitting variation of position, form, and mode of action of controls. The modifications which were made include: a) Provision for 1 and 2 dimensional tracking in addition to the 3-dimensional task incorporated in the original PSMT; b) Provision for independent scoring of each tracking dimension and triggering in addition to combination scores; c) Provision for increased sensitivity of the scoring system; d) Provision for increased accuracy of scoring.

R 0

1607

Hill, H., Gray, Florence & Ellison, D.G. WAVE LENGTH AND AMPLITUDE CHARACTERISTICS OF TRACKING ERROR CURVES. Contract W33 038 ac 13968, TSEAA 694 20, Rep. 4, April 1947, 23pp. USAF Air Materiel Command, Wright Field, Dayton, Ohio. (Indiana University, Psychology Dept., Bloomington, Ind.).

Tracking error curves were obtained for 10 subjects on the 15th and 16th days of practice in a single dimension tracking situation using constant target rates from 5° to 25° per sec. 2 types of tracking were identified: a) "rate tracking," which produced error curve waves with low initial error, zero or very small wave amplitude, and extremely variable wave length and b) "position correction tracking," which produced waves of high and variable initial error, high and variable wave amplitude, and a relatively small range of wave lengths. Waves of the second type were isolated for separate analysis by segregating waves with amplitudes of 0.5° or more. Changes in mean tracking error and mean wave amplitude are approximately proportional to target speed. For low amplitude waves, including all examples of rate tracking, wave length decreases as target speed increases, but for the high amplitude waves produced in position correction tracking, wave length does not change significantly with target speed. This is especially important since it is the high amplitude waves which account for a major part of the tracking error and the variability in tracking error curves. Wave length is also relatively stable at different amplitudes, increasing approximately 50% with a 10 to 1 increase in amplitude.

R 0

1608

Gray, Florence E. & Ellison, D.G. EFFECTS OF FRICTION AND MODE OF OPERATION UPON ACCURACY OF TRACKING WITH THE G.E. PEDESTAL SIGHT. TSEAA 694 21, Rep. 2, March 1947, 10pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio. (Dept. of Psychology, Indiana University, Bloomington, Ind.).

1608

This study is concerned with the effects of friction and mode of operation upon accuracy of tracking with the G.E. Pedestal Sight. Twenty-four subjects were required to track under two different conditions of operation (i.e., the normal manner vs. looking over or around the sight) and with various degrees of azimuth and elevation friction settings. The results are presented and discussed in terms of the relative effect of the friction settings and mode of operation upon tracking accuracy. The implications for tracking training are also discussed.

1610

Ellison, D.G. & Hill, H. ACTION POTENTIALS DURING TRACKING. Contract W33 038 AC 13968, TSEAA 694 21, Rep. 9, Dec. 1947, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Psychology, Indiana University, Bloomington, Ind.).

1610

To determine the relationship between type of tracking (position or rate) and the type of muscular movement involved, action potentials from the biceps and triceps muscles were recorded during performance of a tracking task that involved primarily the activity of these two muscles. Tracking error and the two sets of action potential figures were compared graphically and by correlational methods in an effort to identify the type of movement--ballistic or moving fixation.

R :

1609

Gray, Florence E. & Ellison, D.G. THE VALIDITY OF TIME-ON-TARGET (CLOCK) SCORES AS AN ESTIMATE OF TRACKING ERROR-MAGNITUDE. TSEAA 694 2F, Rep. 6, June 1947, 14pp. USAF Aero Medical Laboratory, Dayton, Ohio. (Indiana University, Bloomington, Ind.).

Reported is an investigation comparing 2 methods of scoring based on tracking data obtained in an experiment in which both types of scores were obtained simultaneously. 10 Ss tracked a pointer moving horizontally at constant rates of about 5°, 10°, 15°, 20°, and 25° per sec. Separation of the target pointer and the pointer controlled by the S was recorded graphically. The 2 scores used were time-in-target and mean error scores. The data analyzed included all the data obtained on the 16th day of practice, for each S, a mean error score and 6 time-on-target scores were obtained for 2 right and 2 left runs at each of 5 target speeds. The mean error was correlated separately with each of the 6 time-on-target scores. It was found that the 2 scores are acceptably equivalent under certain conditions. However, the 2 scores varied with target speed and sensitivity of the time-on-target system. Changing the limits of the time-on-target scoring produces marked changes in the degree to which the highest correlation becomes progressively greater as these limits (the size producing the highest correlation) increase. No single sensitivity setting can provide optimal representation of error magnitude for all parts of a variable rate target course.

R 0

1611

Ellison, D.G. THE INDEPENDENCE OF TRACKING IN TWO AND THREE DIMENSIONS WITH THE B-29 PEDESTAL SIGHT. Contract W33 038 ac 13968, TSEAA 694 2G, Aug. 1947, 16pp. USAF Aero Medical Laboratory, Dayton, Ohio. (Indiana University, Bloomington, Ind.).

It is desirable that servo-mechanism systems be devised which will compensate for human error in the operating of air-borne gun sights. This report is based on data from experiments designed to find out whether or not human operators tend to make error corrections simultaneously or independently in 2 or 3 tracking dimensions (azimuth, elevation, range). It was concluded that: a) For both trained and untrained operators using the G.E. Pedestal Sight, tracking errors in azimuth and elevation are essentially independent as to time of occurrence. b) For untrained operators, using the G.E. Pedestal Sight, tracking errors (azimuth and elevation combined) and ranging errors are essentially independent as to time of occurrence. These findings point to the conclusion that tracking in azimuth and tracking in elevation may not be integrated by the human operator and that the "tracking problem" might be more correctly considered as the "tracking problems". Experimental comparisons of the accuracy of independent azimuth-tracking and independent elevation-tracking with the accuracy of tracking of each of these dimensions in a combined tracking situation seems to be indicated.

1612
Ellson, D.G. & Hill, H. WAVE LENGTH AND AMPLITUDE CHARACTERISTICS OF TRACKING ERROR CURVES. II. INDIVIDUAL DIFFERENCES AND LEARNING EFFECTS. Contract W33-038 AC 13968, TSEAA 694 2H, Rep. 8, Oct. 1947, 21pp. Department of Psychology, Indiana University, Bloomington, Ind.

1612
This study investigated the effects of practice and individual differences on tracking error. Ten Ss tracked a horizontally moving pointer with a tracking pointer controlled by extension and flexion of the forearm. Practice continued for 16 days. Pointer difference (error) was recorded graphically. Mean error and wave length of error curve were analyzed for practice effects. Errors and wave lengths for selected days are intercorrelated to check stability of performance.
T. G. I. R 2

1613
Spragg, S.D.S. & Rock, M.L. DIAL READING PERFORMANCE AS RELATED TO ILLUMINATION VARIABLES: I. INTENSITY. MCRED-694-21, Rep. 1, Oct. 1948, 32pp. USAF Air Materiel Command, Aero Medical Lab., Wright-Patterson AFB, Dayton, Ohio. (Univ. of Rochester, Dept. of Psychol., Rochester, N.Y.)

1613
To investigate the relation between level of illumination and dial reading performance under night viewing conditions, twenty subjects read dial settings (photographic reproductions of a 2.8-inch dial, graduated from 0 to 100 in ten unit steps) under five illumination levels (.005, .018, .022, .296, and 6.0 foot-lamberts). Performance scores (errors and speed) are analyzed as a function of illumination level and compared with the usual relation between visual acuity and brightness. Suggestions for further studies are made.
T.R10.

1614
Ellson, D.G. THE APPLICATION OF OPERATIONAL ANALYSIS TO HUMAN MOTOR BEHAVIOR. Psych. Rev., Jan., 1949, 55(1), 9-17. (Mathematics Dept., Indiana University, Bloomington, Ind.)

Recent development in military, aviation, and industrial equipment design has produced a need for specific information concerning characteristics of the motor behavior of the human operators of these machines. A considerable amount of research has been performed recently on the form of motor responses as a function of those characteristics of the task which are determined by design of machines. To date, no conceptual scheme has been presented which integrates the many isolated facts which permits the prediction of the response to complex inputs on the basis of a limited number of determinations of the response to simple input components is potentially applicable to certain aspects of human motor behavior. From a psychological point of view, the operational analysis method provides a ready-made, limited psychological theory which may be verified experimentally. The method is a direct parallel of the stimulus-response approach in psychology, which is concerned with the relationships between stimuli and responses rather than with intervening physiological mechanisms. Essentially it assumes that the motor response to complex changes in a stimulus input may be predicted from the addition or integration of responses of simpler components of this input. If this assumption is verified, aside from its value in application, it will provide a means for examining the nature of learning and individual differences in motor behavior.
R 2

1619
USAF Aero-Medical Lab. REPORTS OF RESEARCH IN FIELD OF ENGINEERING PSYCHOLOGY. Dec. 1948, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

An annotated bibliography of 71 reports in the field of engineering psychology is given. The reports are grouped under the following headings: a) Design and arrangement of displays for ease of interpretation (4); b) Orientation, attitude, and position in space (4); c) Legibility, visibility, and lighting (17); d) Emergency indications (3); e) Human factors in communication (1); f) Displays-general (2); g) Design of controls (17); h) Servo analysis of human-control systems (7); i) Crew requirements and work-place layout for new aircraft (4); j) Unusual environmental and psychophysiological factors (3); k) Controls and systems-general (1); l) Pilot reactions in flight (2); m) Engineering psychology consultation service (1); n) Apparatus, methodology, and statistics (5). The reports are arranged under each heading by date of issue.
R 71

1616
Craig, D.R. & Ellson, D.G. A COMPARISON OF VARIOUS MANIPULATIVE TECHNIQUES IN A TRACKING TASK: A COMPARISON OF A TWO-HANDED AND SEVERAL ONE-HANDED CONTROL TECHNIQUES IN A TRACKING TASK. Contract W33-038 AC 13968, MCRED 694-21, Rep. 11, July 1948, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Psychology Dept., Indiana University, Bloomington, Ind.)

The purpose of this report is to present the results of an experiment concerning various manipulative techniques in tracking with the pedestal Sight Manipulative Test (PSMT). The sight of the PSMT was fitted with a set of 3 extended handgrips. Operators tracked 3 trials daily for 8 days: a) both hands on the offset grip; b) the preferred hand on the centered handgrip; c) the preferred hand on the corresponding offset handgrip; d) the non-preferred hand on the corresponding offset handgrip; e) the non-preferred hand on the centered handgrip. No ranging and triggering were used in this experiment. Use of the preferred hand resulted in significantly superior performance to that achieved with the non-preferred hand. Use of the offset handgrip, whether with the preferred or non-preferred hand, was significantly superior in azimuth and in combined azimuth and elevation, but not in elevation alone. Comparisons of techniques in which both hand and handgrip differ showed that these two variables interacted to influence the tracking performance in a predictable manner. Comparisons of the performance with 1- and 2-hands equivalent. An operator's relative proficiency with 1 technique was highly predictive of his relative proficiency with other techniques. Initial performance was highly predictive of final performance for each of the manipulative techniques.
R 2

1620
USAF Aero Medical Lab. SYNOPSIS OF THE AERO MEDICAL ASPECTS OF JET PROPELLED AIRCRAFT. Jan. 1949, 46pp.
USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1620

The aeromedical and human engineering problems introduced by the use of jet-propelled aircraft are discussed. High altitude flight makes the requirements for oxygen supply, cabin pressurization and protection against decompression sickness more critical. Long term acceleration (g) force toleration, cockpit design, flight instruments, and cockpit temperatures are reviewed in relation to higher flight speeds. Problems of emergency escape at high altitude and velocity are also treated.
T.M2.

1621

Hammond, P.H. A DESCRIPTION OF APPARATUS FOR TRANSIENT RESPONSE OBSERVATIONS ON HUMAN MUSCULAR CONTROL. R.R.E. Tech. Note 576, Jan. 1956, 8pp. Radar Research Establishment, Ministry of Supply, London, England.

1621

Apparatus developed for the study of muscular control in man is described. Mechanisms have been devised to elicit and to measure involuntary activity in the nervous system. The experiments are made automatic by a four-channel "programmer" improvised from a four pen recorder. Limb velocity and acceleration, tension in the tape connecting the subject to the machine, and electrical activity of the muscle groups involved in a movement are the quantities measured. Response variables are photographed from the screen of a cathode ray tube.
G. I. R 10

1637
USN Aviation Ordnance Test Station. CONTROL SYSTEMS - AVIATION ORDNANCE - GUIDED MISSILES - PYROTECHNICS - COUNTERMEASURES. Feb. 1956, 68pp. USN Aviation Ordnance Test Station, Chincoteague, Va.

1637

This brochure describes the facilities and capabilities available at the Naval Aviation Ordnance Test Station, Chincoteague, Virginia. The general mission of the establishment is to test and evaluate aviation ordnance air-borne pyrotechnics, and guided missile and airborne counter measures. The activities include applied research, development test and evaluation, experimental prototypes, in-service training and instrumented range services. Some of the accomplishments of the station are described.
I

1639

Camp, R.T., Jr. THE EFFECT OF A NOISE ENVIRONMENT UPON SPEAKER INTELLIGIBILITY. Contract N6ONR 22525, Proj. NR 145-993, BuMed. & Surgery Proj. NM 601 104 500, Rep. 63, June 1956, 9pp. USN School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

1639

To compare the intelligibility of a voice speaking in a quiet environment with the same voice speaking in the presence of noise, a trained speaker recorded speech intelligibility tests under both conditions. In the quiet condition the speaker received a normal airborne side-tone from mouth to ear; in the noise condition he received the side-tone, mixed with noise (108 decibels) over head phones. The recordings from both sessions were presented to 4 groups of listeners (87) at equated speech levels and speech-to-noise ratios in the presence of noise (114 decibels). Intelligibility scores were analyzed for differences due to conditions of speaking.
I. R 7

1647

Hartman, B.O., Burke, J.T. & Walker, R.Y. THE ACCURACY OF THROWING HAND GRENADES AS A FUNCTION OF THEIR WEIGHT, SHAPE AND SIZE. Proj. 6 95 20 001, Subtask AMRL S 3, MEDEA, Rep. 117, June 1953, 23pp.
USA Medical Research Lab., Fort Knox, Ky.

1647

To investigate the influence of shape, weight and size on accuracy and consistency with which hand grenades are thrown, 25 subjects threw at a target 30 yards away. Four shapes (potato masher, tear drop, sphere, and standard), three weights (12, 18, and 24 ounces) and three sizes (2.0, 2.1, and 2.2 inches diameter) were used. Performance data (radial distance from bull's eye and direction) were studied by analysis of variance for effects of the variables. Recommendations concerning design of the hand grenade are offered.
T. G. I.

1648

Alluisi, E.A., Barker, J.S., Inaba, K., Mungesser, F.L., Jr., Tansaro, J.P., & Brune, R.L. LINEAR PERSPECTIVE AS A SOURCE OF PSYCHOLOGICAL ERROR IN BINOCULAR STEREO-SCOPIC RANGE FINDING. Proj. 6-95-20-001, Subtask AMRL S-2, Rep. 97, Oct. 1952, 47pp. DA, Office of Surgeon General, Army Medical Research Laboratory, Fort Knox, Ky.

1648

To investigate linear perspective as a source of psychological error in binocular stereoscopic range-finding on terrestrial targets, subjects ranged targets of three sizes on a stereoptometer (description given in appendix) under two conditions: (1) true stereoscopic acuity requiring judgment of depth or alignment in the median plane, and (2) interocular-vernier acuity requiring judgment of position or alignment in the frontal plane. Errors in ranged distance of targets of different sizes are analyzed as a function of assumed differences in sizes. Implications of the results for perception theories are discussed.
T.I.R26.

1649

Alluisi, E.A., Inaba, K., & Mungesser, F.L., Jr. CHANGES IN VISUAL DEPTH PERCEPTION WITH THE WEARING OF CONTACT LENSES. AMRL Proj. No. 6-95-20-001, Subtask, Relationship between Optical Aids and Perception in Visual Observation, Rep. 105, Dec., 1952, 27pp. Dept. of Army, Office of Surgeon General, Medical Research and Development Board, Army Medical Research Lab., Fort Knox, Kentucky.

1649

To determine changes in visual depth perception with the wearing of contact lenses, a stereo-ranging task was administered to 10 subjects (each had been previously refracted and fitted with spectacles and 4 types of contact lenses). Data for spectacles and each of 3 types of contact lenses at each of 6 measurement periods during a 460-minute wearing period are analyzed for differences in stereoscopic acuity (standard deviation of ranging) and spatial localization (arithmetic mean of ranging) due to type of lens, subject, and interactions between them. Recommendations for further study are outlined.
T.G.R7.

1650

Broussard, I.G., Walker, R.Y., & Roberts, E.E., Jr. THE INFLUENCE OF NOISE ON THE VISUAL CONTRAST THRESHOLD. Subtask under Human Engineering Studies, AMRL Proj. No. 6-95-20-001, Subtask, Hearing and Vibration Problems with Mechanized Equipment, Rep. No. 101, Nov., 1952, 17pp. Army Medical Research Lab., Fort Knox, Kentucky.

1650

To test the effect of noise on perception of small light differences, two groups of subjects (28 each) made judgments of target location (a brightness increment varied from .0173 to .2625 foot lamberts) exposed for ninety seconds on a field of constant brightness (2.275 foot lamberts) under two noise conditions: high level (ninety decibels) for two hours preceding and during testing and moderate (45 decibels). Contrast thresholds were determined from correct response frequencies and subjected to analysis to determine the relative effects of the two noise levels. Further analysis is made of the time factor.
T.G.I.R24.

1651
Harker, G.S., & Brune, R.L. THE STEREOP-
TOMETER-AN INSTRUMENT FOR THE STUDY OF
BINOCULAR VISION. AMRL Proj. No. 6-95-
20-001, Sub-task, Relationship between
Optical Aids and Perception in Visual
Observation, Rep. No. 106, Dec., 1952, 9
pp. Army Medical Research Lab., Fort
Knox, Kentucky.

1651
This report describes an instrument developed for
laboratory use to study factors in the individual, the
range finder, and the target field which affect ster-
eoscopic range finder performance. The elements of
the system (reflex sight and mechanical system), cal-
ibration, test object cues available to the observer,
and possibilities of use are discussed. Construction
diagrams are included.
I,R.

1652
Gogel, W.C., Harker, G.S., Tammaro, J.P.,
Inaba, K., & Brune, R.L. THE EFFECTIVE-
NESS OF SIZE CUES TO RELATIVE DEPTH AS A
FUNCTION OF THE LATERAL SEPARATION OF OBJECTS
Proj. No. 6-95-20-001, Rep. No. 125, Oct.,
1953, 17pp. Army Medical Research Lab.,
Fort Knox, Kentucky.

1652
To investigate size cues in depth discrimination
judgments, eight subjects viewed two sizes of playing
cards (half and double size) located at the same dis-
tance and adjusted a disc of light to apparent equal-
ity with one or the other of the two, for two lateral
separations of the cards (3.8 and 22.9 centimeters).
Additional judgments were made by 10 subjects with a
change in size (normal and double size) and with one
card viewed monocularly and the other card and the
disc viewed binocularly. Equality settings are anal-
yzed for the effectiveness of size cues under these
conditions.
T,I,RL3.

1653
Reedy, J.D. THE RELATION OF POWER AND ENDURANCE TRAIN-
ING TO PHYSICAL EFFICIENCY. Proj. 6-95-20-001, Subtask
AMRL S 4, Rep. 118, June 1953, 49pp. USA Medical Re-
search Lab., Fort Knox, Ky.

1653
This study attempted to determine what changes in
physical condition result from training for power (by
lifting weights), training for endurance (by performing
calisthenics), or training for both power and endurance.
The Ss; 116 enlisted men divided into four groups, un-
derwent appropriate training for 10 weeks. The data
consist of pre- and post-training scores on a variety
of tests that included the Army Physical Fitness Test,
the Harvard Step Test, five muscle-power tests, deter-
mination of lactic acid and hemoglobin levels in the
blood, and anthropometric measurements.
T, R 24

1654
Gogel, W.C., Tammaro, J.P., Nordling, D.A.,
& Nungesser, F.L., Jr. THE PERCEPTION OF
THE RELATIVE DEPTH POSITION OF OBJECTS AS
A FUNCTION OF OTHER OBJECTS IN THE FIELD
OF VIEW. Proj. No. 6-95-20-001, Rep. No.
107, Jan., 1953, 17 pp. Army Medical
Research Lab., Fort Knox, Kentucky.

1654
To investigate perception of the relative depth
positions of objects as a function of other objects
in the field, a difference between apparent and phys-
ical depth positions of laterally separated objects
was produced through use of a series of similar objects
of graduated sizes. Subjects adjusted a test object
(small disc of light) to depth equality with any
given part of the display or with a reference object
for various degrees of lateral displacement from refer-
ence object. Differences in equality settings for the
various conditions are analyzed. A hypothesis is
formulated concerning cues most essential in overcoming
binocular depth illusion.
T,I,RG.

1655
Corso, J.F. & Harker, G.S. THE USE OF VARIABILITY SCORES
FOR DETERMINING THE PROBABILITY OF FIRST-SHOT HITS OF
STEREOSCOPIC RANGE FINDER OPERATORS. Proj. 6-64-11-05,
Sub-Proj. 11-05 (1), MECEA, Rep. 48, Sept. 1950, 7pp.
USA Medical Research Lab., Fort Knox, Ky.

1655
This study derives from Gaussian statistics a mathe-
matical formula which can be used to calculate the prob-
ability of a first-shot hit for any given range finder
operator variability score. The choice, from the tables
given, of a particular variability score as a criterion
in the selection of stereoscopic range finder operators
needs to be validated by the study of a large number of
operators over a reasonable period of time.
T, G, R 4

1656
Harker, G.S., & Wickersham, R.A. BINOCULAR
SUMMATION OF GEOMETRICAL PATTERNS AS A
RANGE INDICATOR. Proj. No. 6-95-20-001,
Rep. No. 96, Oct., 1952, 17 pp. Army Medical
Research Lab., Fort Knox, Kentucky.

1656
To evaluate the sensitivity of binocularly sum-
mated reticle patterns in stereoscopic range finding,
the relative sensitivities of various patterns were
determined by comparing them with stereoscopic ret-
icles in a modified telescopic scope and in the ster-
eoptometer under laboratory conditions. Performance
scores are analyzed statistically for differences due
to patterns and type of reticle used. The approach
used in constructing the summated reticle patterns
is discussed together with the feasibility of using
them in practical situations.
T,G,I,RL1.

1658
Briggs, G.E., Bahrick, H.P., & Fitts, P.M.
THE INFLUENCE OF FORCE AND AMPLITUDE CUES ON
LEARNING AND PERFORMANCE IN A COMPLEX TRACK-
ING TASK. Contract AF 18(600)-1201, Proj.
7716, Tasks 77292, 57050, AFPTRC-TN-57-33,
March 1957, 12pp. Operator Laboratory,
AFPTRC, Randolph AFB, Tex.

1658
To determine the relative effectiveness of force and
amplitude cues on learning and performance of a complex,
two-dimensional tracking task, four groups of subjects
were trained in an F-80 interceptor simulator with a
control column in which the force and/or amplitude cues
could be varied. Group 1 trained with normal cues for a
given airspeed and altitude; the other groups trained
when one or both cues were reduced by a factor of four.
After sixty training trials, all groups practiced for
thirty trials on control column of Group 1. Tracking
proficiency was scored as time-on-target during final
three seconds of each 40-second run. Both training and
transfer performance were studied for differential ef-
fects of varied cues. Implications for utilization of
training devices are indicated.
G. T. I. R-10

1659
Riblett, V.T. RATIO CHANGE - VELOCITY ELBOW. Tech.
Rep. 5660, April 1957, 6pp. USA Prosthetics Research
Lab., Walter Reed Army Medical Center, Washington,
D.C.

1659
This report describes an elbow and harnessing system
designed for very short above-elbow shoulder-disarticu-
lation and for fore-quarter amputees. The device permits
the amputee to lift the forearm and lock it in a pre-
selected position without dropping the forearm while op-
erating the elbow lock. Four amputees, two with each of
the conditions described above, have been fitted with
the unit.
I.

1661
Case, H.W., Reiter, I., Feblowicz, E.A., & Stewart, R.G. THE HABITUAL TRAFFIC VIOLATOR. Highway Res. Bd. Bull. 120, 1956, 31-36. (Institute of Transportation and Traffic Engineering, UCLA).

1661
To study individual characteristics of the habitual traffic violator, 300 motor vehicle operators who had a multiple-violation record were interviewed. From the interview and an analysis of citations for the offenses, the following data were obtained: population groupings, age, sex, occupational status classified according to skill level, state of birth, miles driven per day, type and age of vehicle, type of violation, and an estimate of the intelligence and personality classification. A more detailed clinical analysis was made of 100 cases in order to ascertain information about attitudes toward the law, police enforcement, concept of self, personality characteristics, and intelligence level. Percentage modes of the various distributions were presented. T. G. R 5

1662
Buskirk, E.R., Lampietro, P.P., Welch, B.E., & Marcinek, J.G. CALORIC INTAKE AND ENERGY EXPENDITURE OF EIGHT MEN IN A TEMPERATE ENVIRONMENT. Proj. 7-83-01-004C, Tech. Rep. EP-52, March 1957, 11pp. Quartermaster Research & Development Center, Natick, Mass.

1662
To study caloric intake and expenditure in a temperate climate, measurements were made on eight men during a twelve day period at Natick, Massachusetts. Outdoor activity consisted in marching over a marked course at 3.4 miles per hour for four hours. Daily measurements of weight and skinfold thickness (body density and body fat estimates) were made. Caloric consumption and caloric expenditure were calculated from food weighings and energy cost times time spent in each activity of the day. Weather records of temperature, humidity and wind speed were kept. The data were analyzed and discussed in terms of relationships between climate, caloric requirements, and energy expenditure.
T. R 10

1664
Chapanis, A. AN EVALUATION OF PROBLEMS OF CHART READING UNDER RED ILLUMINATION. Jan. 1953, 11pp. Armed Forces-National Research Council Vision Committee Secretariat, University of Michigan.

1664
This report summarizes the status of problems encountered in chart (aeronautical map) reading under red illumination. A summary of a working group conference is presented with additional notes, discussion, and references which were supplied by the participants at a later date. Operational, visual, and technical requirements are discussed in relation to present state of knowledge. Recommendations for areas needing investigation are made.
R 28

1665
Lewis, D.H. THE G-PROTECTION PROVIDED BY THE FULL PRESSURE HALF SUIT. Proj. NM-001 100 310, NADC MA-5511, Rep. 1, Sept. 1955, 23pp. Aviation Medical Acceleration Lab., NADC, Johnsville, Penn.

1665
To assess the protection against accelerative forces (g) provided by the lower half of the Navy's full pressure altitude suit, four subjects were tested on the human centrifuge. A base line of tolerance (criterion was loss of peripheral vision) was established for each subject in a relaxed and unprotected condition. Tests were then made while wearing the full pressure half suit, while exerting muscular straining, for the Z-2 suit (currently in use), and for the Z-2 suit plus straining. The amount of protection was expressed in units of g above base line and compared for the four conditions. Recommendations for further improvement of the half suit in terms of comfort and protection are made.
T. G. I. R 2

1666
Kraft, C.L. A BROAD BAND BLUE LIGHTING SYSTEM FOR RADAR APPROACH CONTROL CENTERS: EVALUATIONS AND REFINEMENTS BASED ON THREE YEARS OF OPERATIONAL USE. Contract AF 33(616)-3612, Proj. 7192, NADC-TR-56-71, Aug. 1956, 96pp. Aero Medical Laboratory, NADC, Wright-Patterson AFB, Ohio.

1666
This report contains detailed specifications for the installation and use of a Broad Band Blue (selective chromatic) lighting system for radar approach control centers. The system provides sufficient light for scope observers, maintenance personnel and other individuals to work simultaneously in the operations room. The varied requirements of a lighting system are stated, the relevant psychophysiological and physical facts are summarized, the Broad Band Blue and alternative lighting systems are critically evaluated, and the results of extensive operational suitability tests of the Broad Band Blue system are given. As a ready reference, the essential characteristics of the system are summarized in tabular form. Applicability to other types of radar control centers is discussed. T. G. R 36

1667
Yarbrough, J.R. PHASE VI TEST OF THE H-25A HELICOPTER. AF Tech. Rep. AFFTC 53-22, June 1953, 38pp. USAF Flight Test Center, Edwards AFB, Calif.

1667
This report presents the results of a 150-hour functional development test on the production model H-25A helicopter, a search and rescue, utility-cargo type aircraft. Various types of test missions were flown and performance records made; problems of maintenance were analyzed; pilots' comments were obtained on general handling qualities, cockpit and cabin items, controls and flight characteristics, landing and ground operation, and hoist operation; and operational data as to availability and ability to perform missions were analyzed. Recommendations are included.
T. G. I.

1669
Glorig, A. (Dir.). SUBCOMMITTEE ON NOISE IN INDUSTRY OF THE COMMITTEE ON CONSERVATION OF HEARING OF THE AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY. QUARTERLY REPORT NO. 7, JULY 1 TO SEPTEMBER 30, 1955. 12pp. American Academy of Ophthalmology and Otolaryngology, Los Angeles, Calif.

1669
This quarterly report includes an analysis of industrial audiometric environments, a discussion of some of the steps necessary for gathering audiometric data in industry and a brief note on statistical analysis of audiometric data. A list of publications by members of the Subcommittee on Noise in Industry is appended.
R 19

1670
Nutting, R.C. EVALUATION OF SIGHT FOR 81mm MORTAR. Proj. E 1125, Dec. 1955, 2pp. Marine Corps Equipment Board, USMC Development Center, Quantico, Va.

This is a report on the evaluation of a sight for 81mm Mortar. The evaluation was on the basis of information available pertaining to the characteristics and capabilities of the M34A2 series Sight Unit. The features of the M34A2 series Sight Unit were then compared with the proposed Mortar sight.

1675
USA White Sands Proving Ground. FUNCTIONAL COMPATIBILITY OF PROTECTIVE CLOTHING AND GAS MASKS PROVIDED FOR USE WITH THE CORPORAL SYSTEM. INTERIM REPORT. Tech. Memo. 198, Jan. 1955, 14pp. USA White Sands Proving Ground, N.M.

1671
Emerson, G.O., Metcalf, R.D., & Glover, H.C. THE INADEQUACY OF VISUAL SEARCH IN AVOIDING MID-AIR COLLISIONS. Proj. 7157, WADC-TN-56-145, March 1956, 7pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

1671
The thesis of this paper is that visual search is inadequate for the certain detection of other aircraft in sufficient time to avoid collision. Monocular and binocular blind areas as produced by aircraft structural members are described and illustrated. Graphs are presented which illustrate comparative danger from various azimuthal positions expressed as functions of time to collision. Suggestions for improving and augmenting visual search are included.
I. G.

1672
Harker, G.S. & Weaver, L.A. RELATIVE PRECISION OF RANGE INFORMATION OBTAINABLE WITH FIXED BALLISTIC AND WANDER MARK STEREOSCOPE RETICLES. Proj. 6 95 20 OGI, Rep. 163, Oct. 1954, 10pp. USA Medical Research Lab., Fort Knox, Ky.

1672
To evaluate a ballistic reticle as a stereoscopic range-finding sight under field conditions, it was compared with the Army "V" wander mark reticles, both were mounted in Navy Mark 63 stereoscopic range-finders placed 30 ft. above ground with designated targets in the terrain at varying distances (779 to 2083 yards). Five experienced Ss were given seven training periods before data were obtained. Two groups of naive Ss were given one training period on one or the other reticle before obtaining data. Results are analyzed for relative precision of ranging performance with respect to the two reticles and the amount of training given.
T. G. I. R 8

1673
Adam, J.M., Ellis, F.P. & Lee, T.S. DAILY VARIATIONS IN PHYSIOLOGICAL VALUES FOR EUROPEAN AND ASIAN MEN WORKING AT HIGH TEMPERATURES IN THE TROPICS. R.N.P. 53/749, July 1953, 8pp. Medical Research Council, Royal Naval Personnel Research Committee, University of Malaya, Singapore.

6 British naval ratings who were acclimatized to the tropics and 3 Asians (2 Malays and 1 Indian) were observed while they carried out similar daily work in a similar climatic environment for a period of 14 days at Singapore. The uniformity trials were carried out at dry- and wet-bulb temperatures and air movements of 90/86° F, 50 ft./min; and 120/83° F, 500 ft./min. When allowances are made for differences in the respective levels of motivation, nutrition, and understanding of the purpose of the experiment, there was not a great deal of difference between these 2 groups of young men in the way they responded to work at high temperatures. The most important difference was that the British group sweated more than the Asian group and lost more chloride in their sweat.
R 13

1674
Mowry, H.W., Webb, W.B., & Garvin, E.A. READABILITY OF INSTRUCTIONAL MATERIALS AND METHODS FOR ANALYZING. Contract Nonr 816(02), June 1955, 53pp. ONR, Washington University.

1674
To compare the reading difficulty level of study material in Naval Air Technical Training courses with the reading ability of trainees, typical reading materials were collected from three aviation schools: Machinist Mate, Structural Mechanics, and Electronics Technician. These materials were analyzed according to a modified Flesch reading ease formula. Samples with a grade level of 10-12 were also measured by the Dale-Chall formula. The formal education level of the trainees was computed from a sample of those trainees who were graduated or dropped from the school during spring, 1954. Grade level difficulty was compared with percentage of trainees who could be expected to read at that level. Recommendations relating to preparation of training materials are included. T. R 11

1675
This is an interim report (after a three-month period) on tests conducted to investigate the functional compatibility of protective clothing (gloves, boots, hood and one-piece suit) and the mask (Scott Air Pak or Chemox) provided for use with the CORPORAL system. Tests conducted: ability of wearer to hear normal tones, to use telephone, to run, to sit in vehicles, to pick up articles from ground; operational tests during eight fueling operations; questionnaires on suitability submitted to wearers; storage; exposure to sun, wind and dust; and operational tests during defueling. The results were reported in terms of adequacy of protection provided, design efficiency, ease of movement, quality of workmanship, and durability. Recommendations are included.
I. R 2

1676
Broadbent, D.E., & Ford, H.K. TWO-CHANNEL LISTENING IN THE AIRCRAFT SITUATION. PPRC945, Nov. 1955, 6pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

1676
To assess the practical value of multiple channel listening for aircraft, a field trial was conducted. An aircraft was equipped with two radio sets fitted with special connections to pilot's headphones over which was transmitted conversation with call signals to the plane at intervals. Standard conditions involved presentation to both ears; experimental condition presented two conversations, one to each ear, with aircraft calls presented to both. The pilot's task was to fly a designated flight pattern and acknowledge any calls heard on headphones. Photographic records were made of flight performance and acknowledgments were recorded by co-pilot. Analysis of data was made in terms of accuracy of flight and listening performance. Comparisons with laboratory results are made. R 10

1677
Dunlap and Associates, Inc. PILOT PERFORMANCE WITH TWO DIFFERENT ATTITUDE DISPLAYS. Contract Nonr 1076(00), July 1955, 21pp. ONR, Dunlap and Associates, Inc., Stamford, Conn.

1677
To obtain further information with regard to flight performance with attitude displays which incorporate either a moving horizon (standard) or a moving airplane, eight ex-pilots were used to determine whether they could adapt more quickly to the new display than the one they had used previously. In the C-118 jet simulator each subject flew test maneuvers designed to sample realistic aspects of instrument flight control using both attitude displays in counter-balanced order. Performance measures (reversals; time to recover from unusual attitude; time sample readings of airspeed, altitude, and heading; aileron control effort) were analyzed for differences due to type of display used. Preferences and opinions were obtained from questionnaires. T. G. R 3

1679
Radio Corporation of America. STUDY OF COMMUNICATION IN HIGH-LEVEL AMBIENT NOISE FIELDS. Contract DA-36-033-sc-64469, Rep. 4, 1 May-31 July 1955, 9pp. RCA, Camden, N.J.

1679

This progress report on Signal Corps voice communication systems used in high-level noise environments presents an articulation evaluation of the communication efficiency of standard Signal Corps equipment when installed in two representative vehicles: a Tank, M4, and a Vehicle, Armored, Infantry, Tracked, T-39. A crew of five male subjects was trained in the laboratory on test material and techniques. Articulation tests were then conducted comparing the VNC-7 with the AN/AIC-10 equipment under known noise conditions in the laboratory and then with the VNC-7 equipment installed in the two vehicles. Tests were made with noise-to-noise, quiet-to-noise, and noise-to-quiet talker/listener conditions and word articulation scores computed. Subjective criticisms of the equipment are reported. T. C.

1680

Beitscher, H.R., & Webster, J.C. INTELLIGIBILITY OF UHF AND VHF TRANSMISSIONS AT FIFTEEN REPRESENTATIVE AIR TRAFFIC CONTROL TOWERS. J. acoust. Soc. Amer., 1956, 28(4), 561-564. (U.S. Navy Electronics Laboratory, San Diego, Calif.).

1680

The intelligibility of air traffic control communications carried out over ultra-high frequency and very-high frequency channels is compared. A multiple choice word list was read in the air traffic control tower and recorded in an aircraft flying around it at a radius of 20 miles, while another talker in the aircraft read the same list to be recorded in the tower. This test was made at 15 control towers. The recorded word lists were played to five listeners in the laboratory interspersed with dummy lists containing alternate words. The results are factor analyzed for the effects of the frequency channel, the tower and the direction of communication (tower to plane or plane to tower). T. G. R. 3

1681

Bertsch, W.F., Webster, J.C., Klump, R.G. & Thompson, P.O. EFFECTS OF TWO MESSAGE-STORAGE SCHEMES UPON COMMUNICATIONS WITHIN A SMALL PROBLEM-SOLVING GROUP. I. acoust. Soc. Amer., 1956, 28(4), 550-553. (Human Factors Div., USN Electronics Lab., San Diego, Calif.).

1681

This study was made to determine the usefulness of a two message-storage system to an operator receiving messages from four sources which sometime transmit simultaneously. The messages consisted of an address, a station identification, and three pieces of information to be acknowledged and recorded on a plotting board. The message density was preprogrammed to give time when there was a pause of up to 20 seconds between messages and time when three messages were competing simultaneously. The experiment was run under three conditions: (1) no message-storage; (2) a fixed nine second message-storage used at the option of the operator; (3) a variable time message-storage under the control of the operator. The results are described in terms of the number of errors made on the plotting board and the number of messages that the operator requested repeated. T. R. 4

1683

Lloyd, V.V. THE INTERACTION OF STIMULUS AREA AND INTENSITY-AS CUES IN THE PERCEPTION OF DISTANCE. J. gen. Psychol., 1953, 49, 167-183. (Department of Psychology, Princeton University, Princeton, N.J.).

1683

To determine the degree to which variations in area and intensity influence distance judgments, four subjects viewed seven illuminated squares of varied sizes and rated them in order of their apparent distance. Two series of from 1.0 to 7.3 and 17.6 and 55.0 square degrees of visual angle in area were studied at five intensity levels from .001252 to 12.52 millilamberts. The data are analyzed and plotted to show depth perception as a function of area and intensity; the interactions of both are studied. T.G.R. 4

1685

Billger, R.C., & Hirsh, I.J. MASKING OF TONES BY BANDS OF NOISE. J. acoust. Soc. Amer., 1956, 28(4), 623-630. (Central Institute for the Deaf, St. Louis, Mo.).

1685

The masking of pure tones by seven different bands of noise each 250 mels in width and having known cut-off characteristics was measured on five listeners at levels from 40 to 100 db (steps of 20 db) and frequencies from 100 to 10,000 cps. In a follow-up experiment masking was examined as a function of level in 10 db steps from 70 to 120 db for one band of noise (1000 - 1420). Masking in, above, and below the band of noise is reported, and the implications of these results for the generality of the critical band concept is discussed. G. R. 11

1686

Meely, K.K. ANALYSIS OF THE NOISE GENERATED BY THE CS2F, NEPTUNE, VISCOUNT, C-5 AND COMET 3 AIRCRAFT. POD Proj. D77 03 01.01 & DRM Proj. 27, DRM Rep. 27 8, April 1957, 32pp. Defense Research Medical Labs., Toronto, Ontario, Canada.

1686

To measure over-all levels and spectra of noise generated by CS2F, Neptune, Viscount, C-5, and Comet 3 Aircraft during flight the same standard procedure outlined in Defense Research Medical Laboratory Report Number 27-7, August, 1954 were used. The procedures are not given in the present report. Results for each craft are given in terms of over-all noise level, and noise level for various positions. Noise spectra for maximum and for cruising speed are presented as graphs. Noise generated by the Neptune and Viscount Aircraft on the ground also was measured. G. I. R. 7

1687

Chang, S.H. TWO SCHEMES OF SPEECH COMPRESSION SYSTEM. J. acoust. Soc. Amer., 1956, 28(4), 565-572. (Northeastern University).

1687

Two methods are described for reducing the bandwidth necessary for the transmission of intelligible speech. The first scheme involves extracting two discrete parameters--voicing and turbulence--and one continuous parameter--fundamental frequency. The second scheme, treated in less detail, outlines the requirements for identifying acoustic elements with phoneme-like properties. G. R. 24

1689

David, E.E. Jr. NATURALNESS AND DISTORTION IN SPEECH PROCESSING DEVICES. J. acoust. Soc. Amer., 1956, 28(4), 586-589. (Bell Telephone Laboratories, Murray Hill, N.J.).

1689

The important parameters for evaluating a speech processing device are the criteria of fidelity, the signal to noise ratio, and the bandwidth necessary to transmit the reduced signal. From these parameters an efficiency rating can be specified. An important constraint in comparing two speech processing devices is that they have equal fidelity according to the criterion being employed. T. R. 8

1690

Sanders, T., & Morris, H. INVESTIGATION OF THE USE OF THE PERISCOPE SEXTANT DURING TWILIGHT. BuAer Proj. TFD NAX AE-9149, Rep. NAES-INSTR-1-53, Jan. 1953, 4pp. Aeronautical Instruments Lab., NAMC, Philadelphia, Penn.

1690

To investigate the usefulness of the periscope sextant during twilight, two observers located celestial bodies with the unaided eye and with the periscope sextant. Observations were made (1) from the roof of a building only in clear weather and when there was a minimum of haze and smoke in the atmosphere, and (2) from an S-1B aircraft in flight. The times at which the bodies were first observed and the corresponding altitude of the sun were compared for the various conditions of observation. Discussion is in terms of the effectiveness of the periscope in reducing the twilight band width for celestial observations.

2.

1691

Fairbanks, G. EXPERIMENTAL STUDIES OF TIME COMPRESSION OF SPEECH. J. acoust. Soc. Amer., 1956, 28(4), 591. (Speech Research Laboratory, University of Illinois).

1691

This is an abstract of an oral paper presenting the results of some psychophysical experiments on speech-compression by an automatic technique of time-frequency expansion-compression. The effects of time compression on intelligibility and expressed preference are compared with those of simple frequency compression.

R 5

1692

Flanagan, J.L. BAND WIDTH AND CHANNEL CAPACITY NECESSARY TO TRANSMIT THE FORMANT INFORMATION OF SPEECH. J. acoust. Soc. Amer., 1956, 28(4), 592-596. (Acoustics Laboratory, Massachusetts Institute of Technology).

1692

The channel capacity and signal-to-noise ratio necessary to transmit continuous data on the first three formants of speech are computed on the basis that the error in transmitting each formant signal is less than the just noticeable difference at least 65 % of the time. The associated minimum band width, signal-to-noise ratio and channel capacity are computed.

T. O. R 15

1693

Jerger, J.F., & Carhart, R. TEMPORARY THRESHOLD SHIFT AS AN INDEX OF NOISE SUSCEPTIBILITY. J. acoust. Soc. Amer., 1956, 28(4), 611-613. (Audiological Laboratory, Northwestern University).

1693

The purpose of this study was to evaluate the duration of the temporary shift in the threshold for a 4500 cps tone, after exposure to a 3000 cps tone at 100 db for one minute, as an index of susceptibility to noise-induced hearing loss. Audiograms were obtained on 178 subjects at 500, 1000, 2000, 3000, 4000, 6000, and 8000 cps. No subject had a hearing loss of more than 15 db at any of these frequencies. The duration of the temporary threshold shift was measured before the subjects were exposed to jet engine noise in test cells for an average of 12 hours over a period of three days. Audiograms were obtained again eight weeks later. The relation between the duration of the threshold shift and the size of the noise-induced hearing loss is presented.

O. R 3

1694

Isaak, R.D. UNDERWATER COMMUNICATION. J. acoust. Soc. Amer., 1956, 28(4), 556-557. (Acoustics Division, Navy Electronics Laboratory, San Diego, Calif.).

1694

To determine the optimum type of signal for acoustic transmission under water, messages were transmitted between two submerged submarines by (1) normal speech, (2) differentiated speech, (3) clipped speech, (4) quarter-speed speech, (5) Morse code with varying signal tone. The difficulties of underwater acoustic transmission--high attenuation of sound, refraction toward the bottom, bottom reflections, and sea noise--are discussed. An overall evaluation of these types of signal for underwater communication is made without a detailed report of experimental findings.

R 2

1695

Martin, D.W., Murphy, R.L., & Meyer, A. ARTICULATION REDUCTION BY COMBINED DISTORTIONS OF SPEECH WAVES. J. acoust. Soc. Amer., 1956, 28(4), 597-601. (The Baldwin Piano Company, Cincinnati, Ohio).

1695

Speech intelligibility was measured under different types of distortion--gross high-frequency attenuation, gross frequency response irregularity, multiple echoes, and random amplitude modulation--single and in combination. At least two talkers read four lists of phonetically balanced words to four to six listeners with each type or combination of types of distortion introduced into the channel. The results are expressed in terms of the reduction in word articulation.

G. P 7

1696
Alexander, I.E. & Githler, F.J. CHRONIC EFFECTS OF JET ENGINE NOISE ON THE STRUCTURE AND FUNCTION OF THE COCHLEAR APPARATUS. J. comp. physiol. Psychol., Aug. 1952, 45(4), 381-391. (Princeton University, Princeton, N.J.).

Electrical and histological changes in guinea pig ears were measured 6 to 8 weeks after a 15 min. exposure to jet engine noise. The ambient sound level at cage distance from the engine was in excess of 140 db. for the total measurable frequency band 25 to 7,500 cps. The group audiogram loss was 34db. This figure indicates that the recovery trend which had been observed in groups measured at shorter time intervals has been reversed. Chronic ears were poorer in sensitivity than those tested at more acute stages. Long-term effects were confined to the cochlea. No middle-ear damage was observed. The primary area of damage to the cochlea was found between 6 to 12 mm. from the basal end. However, more destruction was seen at the base than in the apex. It appeared that degeneration spreads from the middle of the cochlea basally. Electrical sensitivity was found to be depressed in accordance with the distribution of damage in the cochlea. These results support the position of total cochlear involvement in response to sound. That is, localization exists only in a gross fashion. It is concluded that jet engine noise represents a serious occupational hazard and suitable protective measures are necessary.

R 7

1698
Neely, K.K. STUDY OF MAYDAY AND SOS AS
RADIO-TELEPHONE DISTRESS SIGNALS. J. acoust.
Soc. Amer., 1956, 28 (4), 554-555. (Defence
Research Medical Laboratory, Toronto, Canada).

1698
The detectability thresholds of the words SOS and
MAYDAY as heard against a background of white noise and
speech were determined in order to evaluate them as sig-
nals of distress for use in radiotelephone communications.
The test words were recorded as spoken by each of 12 per-
sons of varying national accents. The recordings were
mixed with words read from a Multiple Choice Intelligi-
bility test and played over earphones to each of ten lis-
teners of varying national backgrounds in an environment
of white noise at a level of 103 db. The thresholds of
detectability of the two words are compared in relation
to the nationality of the speaker and listener.
T. G. R 4

1699
Pietrasanta, A.C. JET NOISE PROBLEM IN AIR-
CRAFT CARRIER ISLANDS. J. acoust. Soc. Amer.,
1956, 28(3), 427-433. (Bolt Beranek &
Newman Inc., Cambridge, Mass.).

1699
The interference with speech communication in the
control islands of aircraft carriers resulting from the
high noise levels generated by aircraft operations, espe-
cially the rumble of jet aircraft, is discussed in rela-
tion to criteria for effective speech communication as a
function of the distance between the talker and the
listener. Octave band analyses of the noise levels at
various points in the control islands are reported. The
probable noise levels involved in future jet operations
are estimated and the amount of noise reduction required
to meet the criteria is calculated.
T. G. R 7

1700
Pietrasanta, A.C. NOISE MEASUREMENTS AROUND
SOME JET AIRCRAFT. J. acoust. Soc. Amer.,
1956, 28(3), 434-442. (Bolt Beranek & Newman
Inc., Cambridge, Mass.).

1700
Noise fields around several jet aircraft were mea-
sured as a function of engine operating condition. Pat-
terns of directivity are given as a function of frequency
as analyzed in octave bands. The power level of engine
operation is related to the acoustic power and a predic-
tion procedure developed for estimating the characteris-
tics of the noise fields near jet aircraft operating at
military power without afterburners.
T. G. R 8

1701
Sherwin, C.W., Kodman, P. Jr., Kovaly, J.J.,
Protha, W.C., & Melrose, J. DETECTION OF
SIGNALS IN NOISE: A COMPARISON BETWEEN THE
HUMAN DETECTOR AND AN ELECTRONIC DETECTOR.
J. acoust. Soc. Amer., 1956, 28 (4), 617-622.
(Control Systems Laboratory, University of
Illinois).

1701
The human listener as a detector is compared to an
electronic detector consisting of an RLC band pass filter,
a square law detector, and an exponential integrator. A
preliminary experiment served to determine the signal-to-
noise ratio at which the subjects, four adult males,
could detect a 1000 cps tone 60% of the time. This mix-
ture of signal and noise was tape recorded with signal
durations of from 0.03 to 1.0 sec. and played to both
the subjects and the electronic detector. The parameter
values for which the electronic detector most resembled
the human listener are given, and the residual discrepan-
cies between their behaviors are described.
T. G. R 6

1702
Stevens, K.N., & House, A.S. STUDIES OF
FORMANT TRANSITIONS USING A VOCAL TRACT ANALOG.
J. acoust. Soc. Amer., 1956, 28 (4), 578-585.
(Acoustics Laboratory, MIT).

1702
The formant frequencies associated with the transi-
tional and stop portions of vocal consonant syllables
were examined by means of a 15 section electrical analog
of the vocal tract. The characteristics of various kinds
of articulatory processes were simulated and the formant
frequencies of transitional portions measured. The
implications of the results for the "loose hypothesis"
of formant transitions are discussed.
G. R 12

1703
Tollhurst, G.C. SPEECH RECEPTION AND TEMPORARY
HEARING LOSS AS A FUNCTION OF EXPOSURE TO
HIGH-LEVEL NOISE. J. acoust. Soc. Amer.,
1956, 28 (4), 567-580. (Ohio State Research
Foundation and U.S.N. School of Aviation Med-
icine, Pensacola, Fla.).

1703
To determine the masking of speech and the temporary
loss of hearing produced by intense noise as a function
of its level, spectrum, and duration, a total of 1402
listeners were exposed to noise for two hours. Six
broad band noises at sound pressure levels of 100 db and
over were used varying in the slope of the spectrum level
between 1000 and 10,000 cps from -6 to +3 db per octave.
A tape recorded multiple choice intelligibility test was
administered at 105 db sound pressure level during the
exposure, and thresh- 's were determined for pulses of
5000 cps tone and wh noise during periodic quiet in-
tervals 60 secs. in duration. Articulation scores and
hearing thresholds are reported as functions of the
noise level, spectrum, and time of measurement. G. R 10

1704
Tollhurst, G.C., & Peters, R.W. EFFECT OF
ATTENUATING ONE CHANNEL OF A DICHOTIC CIRCUIT
UPON THE WORD RECEPTION OF DUAL MESSAGES.
J. acoust. Soc. Amer., 1956, 28 (4), 602-605.
(U.S. Naval School of Aviation Medicine, Naval
Air Station, Pensacola, Fla.).

1704
To determine the effects of the loudness level of a
message arriving in one ear upon its intelligibility, and
upon the intelligibility of another message arriving
simultaneously in the other ear, 12 panels of 17 to 30
subjects listened to messages consisting of groups of
words from a multiple choice intelligibility test. The
average sound pressure level in one ear was fixed at
95 db, and the average sound pressure level in the other
ear was varied from 80 to 95 db by 3 db steps. The
intelligibility of the messages arriving in each ear is
described as a function of the varying loudness level.
G. R 12

1706
Vilbig, F., & Haase, K.H. SOME SYSTEMS FOR
SPEECH-BAND COMPRESSION. J. acoust. Soc.
Amer., 1956, 28 (4), 573-577. (AFRC).

1706
Several methods are discussed for reducing the band
width required for the transmission of intelligible
speech. Simple spectrum alteration methods are described
briefly and their limitations pointed out. The other
systems involving some form of voice-coding fall into
three groups--envelope extraction or summing, envelope
pulse coding, and formant frequency coding. The equip-
ment associated with each of these methods is described.
G. R 7

1707
Miller, R.B. SOME WORKING CONCEPTS OF SYSTEMS ANALYSIS. Feb. 1954, 6pp. American Institute for Research, Pittsburgh, Penn.

1709
Following an extensive definition of the concept of "system", the author outlines, defines and discusses some of the working concepts of systems analysis. Among the terms and concepts treated are the following: perceptual-discriminatory channels (of the human operator), critical discriminations, monitoring arrangements, task analysis, etc. A discussion of the relative advantages of the system method enumerates factors relevant to the theoretical and operational utilization of this approach.
I.

1708
Weiss, B. BUILDING "FEEL" INTO CONTROLS: II. PRESSURE FEEDBACK, SHORT MOVEMENTS, AND THE INFLUENCE OF MIXED VERSUS CONSTANT SERIES OF DISPLACEMENTS. Contract N6onr-241, T.O. 6, Proj. 20-M-1d, Tech. Rep. 241-6-25, Aug. 1955, 6pp. SDC, University of Rochester.

1708
This study was designed to evaluate the effect of varying pressure cues on control displacements of small magnitudes (less than 7.5 degrees). Utilizing four pressure ranges: 0, 0-7.5, 0-15, and 0-30 lbs., and four displacements (maximum displacement of 6°), eight subjects were evaluated for range effect as they attempted to compensate for the vertical displacement of a spot of light from the center of an oscilloscope screen. The data were analyzed in terms of mean percentage constant errors as a function of pressure and displacement. Conclusions are drawn concerning the effects of lag in visual feedback and of a mixed sequence of displacements on relative error in positioning with stick type controls.
T. C.

1709
Roscoe, J.H. (Chm.). THE POLAR BIBLIOGRAPHY. VOLUME I. 15 AUGUST 1956. AFM 200 132, DA Pamphlet 70-1, 223pp. US Technical Information Div., Library of Congress, Washington, D.C.

1709
The Polar Bibliography includes informative abstracts of all types of information relating to polar and sub-polar regions; data on experiments, tests and performance of equipment now in use or proposed for use in these regions; operational information and cold weather techniques; and data relating to man in cold environment. Sources used include formal staff reports, staff studies and memoranda for the record, as well as other unpublished papers, pamphlets, manuals and books prepared by the military and issued since 1939. A detailed subject index has been provided.
R 1000

1710
Powers, K.H. A UNIFIED THEORY OF INFORMATION. Tech. Rep. 311, Feb. 1956, 105pp. Research Laboratory of Electronics, MIT.

1710
"The probabilistic theory of information is extended to processes involving the most general probability distributions. A change of probability measure on an abstract space serves as the appropriate mathematical model for the fundamental information process. A unified definition for the amount of concomitant information, which takes the form of a functional of the a priori and a posteriori measures, is introduced. This definition is sufficiently general to be applied to a theory that includes both the discrete and continuous theories as special cases. The definition is applied in a study of the information associated with the realizations of a stochastic process. A brief investigation is made of the problems of communication in the presence of noise and through linear networks." R 28

1711
Guillickson, H. MATHEMATICAL TECHNIQUES AS RELATED TO PSYCHOLOGICAL PROBLEMS. Contract N6onr 270 20, Final Summary Report, June 1956, 10pp. USM Office of Naval Research, Washington, D.C. (Princeton University, Princeton, N.J.)

This report summarizes the work done from Sept. 1951 to June 1956 under Contract N6onr 270 20 (mathematical techniques as related to psychological problems). This report is in 5 sections: a) the technical reports (20) published by the project are listed; b) reports (17) of project research made at scientific groups are listed; c) graduate students (10) aided in preparing Ph.D. dissertations are listed along with their dissertation titles; d) personnel (11) associated, now or in the past, with the project are listed; e) brief descriptions of 13 studies now in process (as of June 30, 1956) are given. (MEIAS)
R 47

1712
Doty, L.A., Asher, J.W., Hanley, T.D., & Steer, M.D. THE RELATIONSHIP BETWEEN LISTENER ACCURACY AND CONCURRENT PSYCHOMOTOR ACTIVITY. Contract N6ori-104, SpecDev Can Proj. 20-F-8, Tech. Rep. 104-2-43, Oct. 1955, 20pp. SDC, Purdue University.

1712
This study was designed to evaluate the effects on listener accuracy of simultaneously performing a psychomotor task. A total of 29 subjects were presented with a recorded list of words under four conditions of simultaneous activity: (1) marking words heard (no psychomotor task to perform); (2) extinguish lights with hand switches; (3) extinguish lights with foot pedals; and (4) a combination of the second and third conditions. Listening accuracy was defined as the number of correctly identified words. The results are presented and discussed in terms of mean accuracy scores as a function of psychomotor task complexity.
T. I. R 2

1713
Moser, H.M., Dreher, J.J., & Oyer, H.J. THE RELATIVE INTELLIGIBILITY OF SPEECH RECORDED SIMULTANEOUSLY AT EAR AND MOUTH. Contract AF 19(604)-1577, Tech. Rep. 28, Supplementary Rep. 2, AFPCRC TN 55-64, May 1956, 8pp. Operational Applications Laboratory, AFPCRC, Bolling AFB, Washington 25, D.C. (Ohio State University Research Foundation).

1713
To study the relative intelligibility of speech recorded simultaneously at ear and mouth, a noise cancelling lip microphone (M33/AIC) and an ear microphone with clay covered plastic shield for noise exclusion were used. Six male speakers read three randomizations of a list of monosyllabic air traffic control words, recorded in ambient white noise fields of 25, 95, and 105 decibels. Twelve trained listeners made intelligibility judgments of the three lists under signal-to-noise ratio of -6 decibels (additional white noise superimposed on speech). Scores (percent intelligibility) were compared for speech recorded at mouth and ear. Advantages and disadvantages of the two positions are discussed.
T. G. R 1

1714
 Defence Research Medical Labs. DEFENCE FOOD NOTES.
 Issue 3, Dec. 1955, 57pp. Defence Research Medical
 Labs., Toronto, Ontario, Canada.

1711

This publication of the Defence Research Medical
 Laboratories, Food Research Group, presents a description
 of ration and survival packs designed for use by the
 Canadian Armed Services; an article on the factors in-
 volved in cold weather feeding; and a series of abstracts
 and summaries of papers prepared by the Food Research
 Group and published in the open literature. Included
 among the ration and survival packs are the following:
 5-lbm (Arctic) Ration Pack (RFX 1 series), 1-lbm Light-
 weight (Arctic) Ration Pack (RFX 3 series), Meal Pack
 (RFX 4 series), Arctic Survival Food Packet (RFX 2
 series), Air Force Food Packets A7771 and A7772, etc.
 R 134

1715

Tolson, J. COMPARATIVE PHYSIOLOGICAL TRIAL
 OF FOUR TYPES OF JERKIN. Rep. 46, Feb. 1955,
 18pp. Clothing and Equipment Physiological
 Research Establishment, Directorate of Physio-
 logical and Biological Research, Ministry of
 Supply, London, England.

1715

This is a report of a comparative study of four
 types of jerkin: (1) the standard Jerkin (leather lined
 with serge); (2) a Jerkin of PVC proofed material lined
 with serge; (3) PVC proofed material lined with shirting,
 angora; and (4) a Jerkin of Cambr cloth. A total of
 24 subjects wore the various jerkins under conditions
 simulating cold weather. Skin temperatures taken at
 appropriate sites were recorded along with the sub-
 jects' own evaluation of the jerkins. The results are
 presented and discussed in terms of the relative ther-
 mal protection afforded by each of the jerkins.
 T. G. I. R 1

1717

Torrey, Jane W. EVALUATION OF COLOR VISION
 TESTS: ANNUAL SUMMARY REPORT OF PROGRESS.
 Contract Nonr 996(03), Nov. 1956, 5pp. ONR,
 Connecticut College.

1717

This is an annual summary report of research on the
 general problem of color vision and color vision tests.
 Two studies in progress are outlined. The first en-
 tails a survey of color defect in women to arrive at an
 accurate estimate of the incidence of this defect among
 females. The results of this survey for 390 subjects
 are presented. The second study is concerned with de-
 termining the hue, saturation, and brightness discrim-
 ination thresholds among normal and color defective
 individuals. A description of the apparatus (a pro-
 jection device) being built especially for this study
 is presented along with a statement concerning its
 potential completion.
 T. G.

1718

Sevier, R.D. EVALUATION OF SCOTT NOISE LEVEL
 ANALYZERS DEVELOPED UNDER CONTRACT 55-527-F.
 Proj. TED TPR AE 6534, Rep. 1, Final Rep.,
 Dec. 1956, 22pp. Naval Air Test Center,
 U.S. Naval Air Station, Patuxent River, Md.

1718

This article presents a description and evaluation
 of the Scott noise level analyzer, an instrument designed
 to analyze aircraft noise within the range of 40 to 140
 decibels. The extension of this range to 200 decibels
 by means of a high intensity adapter unit is also dis-
 cussed. The evaluation included the following: accuracy
 of calibrated attenuator, frequency response of indi-
 vidual pass-bands, overall sound level accuracy, micro-
 phone noise and hum, flight evaluation, and many other
 aspects. The results are presented and discussed in
 terms of the specific performance of the analyzer under
 the individual tests and its general suitability with
 respect to particular types of aircraft and noise eval-
 uation situations.
 T. G. I.

1719

Beldam, F.E.M. A COMPARISON OF EXPERIMENTAL
 ALTITUDE PRESENTATIONS. Rep. 57/1, Jan.
 1957, 17pp. Institute of Aviation Medicine,
 Royal Canadian Air Force, Toronto, Canada.

1719

Designed to determine an optimum altimeter presen-
 tation, this study compares the interim fix (Type M-I
 Modified Three-Pointer) with two instrument presen-
 tations, i.e., a five digit counter and a white on black
 logarithmic scale, and with a Kollsman counter-pointer.
 24 flight cadets made a series of readings with each of
 the instruments under varied conditions of lighting and
 exposure. The mean errors occurring with each type of
 altimeter were recorded. The results are discussed in
 terms of the instrument, lighting conditions, and ex-
 posure time which leads to the least number of errors
 in reading.
 T. I. R 2

1720

Pascals, L.R., Grossman, M.I., & Sloane, H.S.
 CORRELATION BETWEEN THICKNESS OF SKINFOLDS
 AND BODY DENSITY IN 88 SOLDIERS. Proj. 6-60-
 11-019, Rep. 162, April 1955, 24pp. Medical
 Nutrition Laboratory, Fitzsimons Army Hospital,
 Denver 8, Colo.

1720

This study was designed to evaluate the relations
 between thickness of skinfold (at various sites) and
 body density with the ultimate goal of deriving equa-
 tions which would permit estimation of body density from
 measurements of skinfold thickness. Skinfold measure-
 ments were made at various sites with 88 subjects (18
 to 25 yrs. of age) and correlated to body density mea-
 surements. On the basis of the relation among certain
 skinfold thicknesses, sites and body density a multiple
 regression equation was derived. This equation is re-
 commended for use in estimating body density from skin-
 fold thickness measurements.
 T. G. R 13

1721

Davis, H., & Weinstock, J.K. AN ENGINEERING
 ANALYSIS OF CARGO HANDLING: III. ANALYSIS
 OF STOCHASTIC MODEL OF CARGO HANDLING. Con-
 tract Nonr 333(07), Rep. 56-34, July 1956,
 33pp. ONR, Department of Engineering,
 University of California.

1721

This article presents an analysis of a stochastic
 model of cargo-handling systems. The primary factor
 investigated is the effect of cycle-to-cycle performance
 variability upon productivity in the link-node model.
 Mathematical and simulation techniques were used to
 evaluate two- and three-link systems with zero storage
 capacity at the nodes. The results are presented and
 discussed in terms of the effect of cargo-handling time
 upon retardation of commodity flow and the general de-
 gree of retardation present in cargo-handling systems.
 T. G. I. R 5

1723

Grim, H.L. DESIGN AND CONSTRUCTION OF A
 COMMUNICATION SIMULATOR SYSTEM. Proj. 4651,
 WADC Tech. Note 56-94, July 1956, 29pp.
 Directorate of Flight and All Weather Testing,
 WADC, Wright-Patterson AFB, Ohio.

1723

The Communication Simulator System described in this
 report was designed to provide a communication link be-
 tween Radar Approach Control Center (RAPCON) controllers
 and radar target simulator operators. The system will
 provide up to thirty simulator operators with a thirty
 channel talk and receive circuit to the RAPCON control-
 lers. The system was integrated into standard RAPCON
 communication equipment (AN/FSA-4 Control Monitor Group)
 without affecting its normal operation. This enables
 the controller to communicate with "live" aircraft and
 simulator operators simultaneously. The combination of
 radar target simulator and communication simulator pro-
 vides a means for the development of new procedures and
 techniques for air traffic control research. 1.

1726

McLaughlin, S.C. EFFECT ON FACILITATION OF DARK ADAPTATION AS A FUNCTION OF INFRA-RED RADIATION. Spp. Tufts College, Medford, Mass.

1726

This paper presents an analytical review of experimental investigations related to the facilitative effect of infra-red radiation on dark adaptation. The need for further investigation of this problem is pointed out, and implications for both theoretical and practical problems are discussed.

87.

1727

USM Special Devices Center. INDEX OF SPECIAL DEVICES PUBLICATIONS. NAVEXOS P-530 A, Nov. 1949, 31pp. USM Special Devices Center, Port Washington, N.Y.

This report is a list of all currently available manuals, bulletins, and reports that have been published by Special Devices Center. This listing is broken down into 4 categories: a) Naval Aviation Training Bulletins-287; b) Miscellaneous Bulletins-7; c) Operating, Maintenance, Instructions, Utilization Manuals and Handbooks, Parts Catalogs-186; d) Miscellaneous and Special Publications-21. These publications are listed by Device Number. (MEIAS)

R-501

1729

Glover, H.C. HIGH ALTITUDE HELMET VISUAL PROBLEMS. Proj. 6333, Task 63617, WADC Tech. Rep. 56-572, Nov. 1956, 14pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

1732

Alcott, W.S. AIRFIELD APPROACH LIGHTS. Contract AP 33(600)-29600, Proj. 6061, Task 60427, WADC Tech. Note 55-778, Dec. 1955, 178pp. Equipment Laboratory, WADC, Wright-Patterson AFB, Ohio. (United Engineers Inc.).

1729

This report presents an analysis of the various visual problems encountered in the design and usage of high altitude suit visors. These are (1) restrictions to field of view; (2) optical distortions produced by shape of visor; (3) loss of visual field through optical sights caused by excessive distance that the eye is placed from the sights from the visor; and (4) visual impairment due to fogging of visor and to methods used to eliminate the fogging. Design criteria for helmet visors are outlined.

T. G. I. R 1.

1732

To develop red and green airport approach and overrun lights of improved characteristics, an engineering study was made of light sources, reflectors, lenses, and color filters. The investigation included bibliography, correspondence, personal visitation, evaluation and design on each of the following: light sources, glass, plastic, filters, and lighting equipment design. Various designs incorporating possible improvements were developed for consideration. Appendices include lists of manufacturers and authorities consulted and bibliographies.

T. G. I. R 750

1730

Beraneck, L.L. OFFICE NOISE STUDIES AT HILL AIR FORCE BASE. Contract AP 33(616)-2151, Proj. 7210, WADC Tech. Note 56-58, Aug. 1956, 64pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Bolt Beranek and Newman, Inc.).

1734

Fulton, J.F., Hoff, Marie M., & Perkins, Henrietta T. (Ed.) A BIBLIOGRAPHY OF VISUAL LITERATURE 1939-1944. Publication 11, Historical Library, Yale Medical Library, 1945, 201pp. Committee on Aviation Medicine, Division of Medical Sciences, National Research Council, Washington, D.C.

1730

To discover maximum noise levels that office personnel find acceptable, and their reactions to noisy offices, a survey was conducted at Hill Air Force Base. A questionnaire composed of 15 rating scales was administered to 190 people scattered over 17 different offices. The rating scales yielded workers' estimates of the "noisiness" of their environment and of the effect of noise on various aspects of their work. Noise measurements were made in the office at time subjects were replying to questionnaire and, over a full day each, at three selected locations. The results of the rating scales were compared with speech interference levels and loudness levels. A criterion for maximum noise acceptable to office personnel was derived. Intermittent and steady noises are discussed. T. G. I. R 11

1734

This book presents a bibliography of the literature on vision that has relevance to military operations. The period covered is 1939 through 1944. Areas covered are: anatomy and ophthalmology, physiology and psychology, visual examination and testing (including methods and instruments), correction of ocular defects in military personnel, training for military specialties (including optimal conditions and procedures, job analyses), ocular trauma (in military services), goggles and ocular protection, illumination, and visibility. Author and subject index are given and a brief description of the more active agencies in Great Britain, the United States, and Canada which have conducted research on visual problems.

R-4886

1731

Hoffman, C.S. EVALUATION OF EXPERIMENTAL RUNWAY DISTANCE MARKERS. Proj. 6061, WADC Tech. Note 56-393, Jan. 1957, 10pp. Directorate of Flight and All-Weather Testing, WADC, Wright-Patterson AFB, Ohio.

1735

Graybiel, A., Niven, J.I., & MacCorquodale, K. THE EFFECT OF LINEAR ACCELERATION ON THE OCULOGYRAL ILLUSION. Res. Proj. NM 001 110-100, Rep. 42, July 1956, 16pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

1731

This study was designed to evaluate experimental runway distance markers. The markers, each being four-foot square with nonreflective white numerals against a background of international orange, were placed in appropriate positions on a runway and externally lighted by two different methods (to control brightness). Questionnaires were completed by 52 pilots (of various types of aircraft) following use of the runway for normal day and night takeoffs and landings. The relative adequacy of these markers under daytime and night conditions is discussed on the basis of the pilots' answers concerning visibility, information provision, preferred marker design, etc.

I.

1735

To study the influence of linear acceleration on the response to stimulation of the semicircular canal, experiments were performed on five healthy persons on the human centrifuge. Angular acceleration was kept constant and linear acceleration was varied by having the subject seated near the center of rotation or 17 feet from center. The oculogyral illusion was used as an indicator of stimulation of the semicircular canals and was measured by having the subject fixate a collimated star in the dark and signal the onset and cessation of apparent rotations which occurred. The data (durations of illusion) were studied by analysis of variance for effect of linear acceleration.

T. R 19

1736
Hallenbeck, G.A. & Glazier, J.C. RATES AND TIMES OF FREE FALL OF ANTHROPOMORPHIC DUMMIES AND OF MAN. Serial TSEA 696 100, March 1946, 31pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1739
Skilling, D.C., McCutchan, J.W., & Taylor, C.L. A QUANTITATIVE INVESTIGATION OF THE MA-1 VENTILATING GARMENT WHEN USED WITH A MODIFIED MK-IV ANTI-EXPOSURE SUIT. Contract AF 33 616-32, Proj. 7155, WADC Tech. Rep. 56 209, Dec. 1956, 21pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (University of California)

1736
To determine the fall time, terminal velocity and drag coefficient of a man falling freely from a high altitude in a delayed-opening parachute jump, 3 dummies weighing 180, 220, and 280 pounds and one man weighing 240 pounds wearing field equipment were dropped from altitudes up to 50,000 feet. Their fall was followed by automatically tracking radar. The variability of drag coefficient and fall time is discussed in relation to operational conditions and the use of automatic parachute-opening devices operating on a simple time delay.
T. G. R 8

1739
To provide information concerning the physiological state of human subjects wearing the MA-1 ventilating garment, an MK-IV exposure suit, and other garments comprising 2.15 clo of thermal resistance in thermal environments ranging from 160°-240° F, measurements were made on two subjects. The ventilating garment was given air inputs ranging from 6-14 ft. 3 per minute in volume and 50°-90° F in temperature. The thermal responses were analyzed in terms of heat storage, body temperatures, heart rates, sweat rates, and composite indices of these variables. Predictive equations were developed for estimating the protective limit of the air-ventilated assembly. Studies of the mode of protection of the suit are reported. T. G. I. R 11

1737
Henschke, U.K. & Mauch, H.A. A STUDY OF THE DESIGN FOR A THREE-DIMENSIONAL HAND CONTROL FOR AIRCRAFT. TSEA 696 110, GS AAF Wright Field 42, May 1947, 12pp. USAF Aero Medical Lab., Air Materiel Command, Wright Field, Ohio.
This paper discusses the possibilities for the design of a three-dimensional hand control for aircraft based on former studies. The different possible arrangements can be evaluated in the following way: a) starting from the 3 linear and the 3 rotary movements (which can be derived from the 6 degrees of freedom of a point in space) it is found that 11 movements are logical for elevator control, 9 for rudder control, and 9 for aileron control; b) there are 31 different combinations for these logical movements; c) only 2 of these combinations are acceptable. The 2 suitable combinations of control movements for a three-dimensional hand control are: a) turning a wheel about the longitudinal axis for aileron and for rudder, lateral movement for rudder and aileron; and longitudinal (fore and aft) movement for elevator. For the first flight tests of a three-dimensional hand control, the attachment of a wheel (turning about the longitudinal axis) for rudder control to a normal two-dimensional control stick offers the simplest technical solution.
R 2

1740
Graybiel, A., & Niven, J.I. PERSISTENCE OF THE AUTOKINETIC ILLUSION IN PERSONS WITH BILATERAL INJURY OR DESTRUCTION OF THE LABYRINTH OF THE INNER EAR. Res. Proj. WM 001-110 100, Rep. 41, July 1956, 4pp. USN School of Aviation Medicine, US Naval Air Station, Pensacola, Fla.

1740
To explore the possibility that in the absence of angular acceleration, the sensory elements in the cupulae might be stimulated in random fashion by weak currents in the endolymph, seven deaf persons with bilateral labyrinthine injury were used as subjects. In each trial the subject sat in darkness for one minute fixating a spot of light 16 feet away. In half the trials the light was stationary and in half it was moving. The task was to trace the direction of movement on a paper pad and then estimate distances of movement. The frequency and magnitude of actual and autokinetic movements were compared.
T. R 1

1738
Clark, D.M. MEDIASTINAL EMPHYSEMA (PNEUMOMEDIASTINUM) FOLLOWING EXPLOSIVE DECOMPRESSION OF HUMANS: REPORT OF TWO CASES. TSEA 3 695 291, Jan. 1945, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

2 cases of mediastinal emphysema following explosive decompression of humans from a simulated cabin altitude of 8,000 ft. to a simulated flight altitude of 31,000 ft. in 0.5 sec. are reported, with a review of pertinent information concerning pathogenesis and diagnosis. Apparently the findings in these cases represent the first reported objective evidence of pathological changes following explosive decompression of humans. In experimental animals and in clinical material, it has been demonstrated conclusively that pneumomediastinum may be produced by increased intraalveolar pressure and overdistention of pulmonary alveoli. After observation of 5s during explosive decompression there can be no doubt that increased intraalveolar pressure and alveolar distention result from the procedure. In the cases reported here, even if no factor producing increased intraalveolar pressure and alveolar distention were present, it would be extremely difficult to explain as "spontaneous" the appearance, at exactly the same time and place, of 2 cases of pneumomediastinum, considering the fact that the total number of reported cases of spontaneous pneumomediastinum to date is thought to be no greater than 75 or 100.
R 28

1741

Gagge, A.P. EXPLOSIVE DECOMPRESSION-A SUMMARY AND EVALUATION FOR AIRCRAFT PILOTS. TSEAL 3 695 291, July 1945, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

Analytical methods are developed in this report which allow the aircraft designer to analyze and evaluate any danger of explosive decompression that may result from the use of cabin pressurization at altitudes. These methods are applied to a typical medium and heavy bombardment aircraft, and fighter-type aircraft; and practical criteria are proposed by which aircraft designers and engineers may evaluate the danger of decompression that may result from enemy gunfire or from structural failure of pressure cabin aircraft in flight. A series (3) of experiments are summarized in tabular and graphic form. These experiments contain the only experimental data available to date (1945) that are of significance to aircraft designers in evaluating the danger of explosive decompression and in the design of cabin pressure controls.

R 9

1745

Randa, I. F.E. THE CENTER OF GRAVITY OF THE SEATED FIGHTER PILOT. TSEAL 3 695 321W, Dec. 1944, 5pp. USAF Aero Medical Lab., Hq., Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

The center of gravity of 10 Ss, when seated according to requirements in the Handbook of Instruction for Aircraft Designers, was determined. S was balanced, as seated in the mock-up, on a 1/4" "knife" edge and photographed with a vertical line passing through the fulcrum point. S was then balanced at another fulcrum point, also with the vertical line shown. The 2 photographic negatives of these positions were superimposed and a positive print made of the 2 together. The point of intersection of the 2 vertical lines is then the center of gravity of the seat and man. A correction formula is then applied to eliminate the factor of the seat itself. The average location of the 10 Ss wearing light clothing, and seated according to requirements in the Handbook of Instruction for Aircraft Designers, is 19.46" from the seat and 11.60" from the back; distances being recorded perpendicular to the respective surfaces. In general, the center of gravity tended to lower with shorter statures and rise with taller statures.

R 0

1746

Benton, R.S. COMPARISON OF VARIABILITY IN FLYING CLOTHING. TSEAL-3-695-32JJ, Dec. 1944, 7pp. Aero Medical Lab., Headquarters, Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

1746

The amount of variation in certain standard dimensions of flying clothing made from manufacturers' patterns is contrasted with that made from patterns supplied to manufacturers by the Air Technical Service Command. The clothing items studied were the Summer Flying Suit-AW-S-3114, the Intermediate Flying Jacket-B-15, and the Intermediate Flying Trousers-A-11. The results are reported in inches of deviation from ATSC standards.

T.

1747

Damon, A. GUNNERS' PROVISIONS IN PROPOSED MARTIN "STREAMLINED" TURRETS FOR THE B-32. TSEAL 3-695-32LL, Jan. 1945, 5pp. USAF Aero Medical Lab., Hq., Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

The purpose of this report was to analyze gunners' provisions including comfort, efficiency, vision, and safety in blueprint drawings of 2 streamlined turrets for the B-32 plane. No final comment on the 2 turrets could be made until mockups of the turrets were available. However, some comments on specific features were made. It was felt that of the 2 turrets, the upper is much better from the gunners' standpoint. The range of gunner size is 5'10" and 120 lbs. to 5'10" and 170 lbs. Comfort, efficiency, vision, and safety are all seriously impaired chiefly in the lower turret. Numerous improvements were recommended to improve conditions for the gunner.

R 2

1748

Williams, Mary F. & Randall, F.E. MASTER CHARTS FOR DISTRIBUTION OF CLOTHING SIZES FOR FEMALE PERSONNEL. TSEAL 3 695 321W, Jan. 1945, 8pp. USAF Aero Medical Lab., Hq., Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

Presented are 2 sets of charts, 1 set on flying nurses and 1 on WASPs, either of which can be used in scheduling clothing, provided the basis of issues is determined properly for present flying nurses. Included are frequency distribution charts for chest circumference and arm length, charts for waist circumference and waist height, and charts for hip circumference and waist height. The data provide an objective system for assessing clothing-size behavior on female Army Air Force flying personnel, and serve as a means for establishing percentage distributions for procurement of sizes of clothing.

R 0

1749
Patt, D.I. OPTIMUM SHAPE AND MINIMUM SIZE OF CATWALKS IN PARACHUTE AIRCRAFT. TSEAL 3 695 3235, April 1945, 10pp. USAF Aero Medical Lab., Hqs., Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

The subjects used in the experiments described below ranged in height from 5'11" to 6'3" and in weight from 155 to 200 lbs., representing the top 5% size range of 3,000 flying personnel analyzed in an earlier survey by the Materiel Command. Each subject wore the following personal equipment: flying boots, Type A-6; intermediate flying suit (B-15 jacket, A-11 trousers); intermediate flying helmet, Type A-11; equipped with an A-14 oxygen mask; walk-around bottle, Type A-6; and each of two types of parachutes. Each subject, wearing first the back type (B-8) parachute and then the chest-type (QC) parachute harness (with and without parachute) was caused to walk through a catwalk mock-up of varying dimensions until the minimum dimensions for safe progress were determined. Photographs illustrating the subject mock-up and its use are presented. Telephone communications with the Structures Unit, Aircraft Laboratory, revealed that for purposes of stress, weight and bomb clearance, a trapezoid is the most desirable cross-sectional shape for a catwalk. Hence the mock-up was constructed as a trapezoid of variable dimensions. Results of tests show that the cross-sectional inside dimensions of a catwalk should form a trapezoid not less than sixty-three (63) in. in height, not less than twenty-two (22) in. across the top and not less than twelve (12) in. at the base.

1752
Cover, R.A. A COURSE IN HUMAN ENGINEERING. Amer. Psychologist, 1956, 11(5), 241-243. (St. Lawrence University, Canton, N.Y.).

Reported is the basic outline of a course in "Experimental Industrial Psychology" offered at the St. Lawrence University. The formal aspect of the course including the text (Applied Experimental Psychology by Chapman, Morgan and Garner), as well as several collateral readings were discussed. Besides this aspect of the course, the Ss were required to conduct an individual research project. This project was done in 3 parts. The over-all plan was to identify some practical human engineering problem and to apply psychological data and techniques, plus ingenuity and realistic solutions. In Part I, the students selected a problem and a complete job analysis was conducted. In Part II, recommendations emerging from the job analysis were made. This allowed the students to become familiar with the literature and techniques available. Part III required the students to discuss how the recommendations had, or had not, remedied the problem as analyzed. The value of this type of program was discussed as well as the alternative to this type of program. (MEIAS)

1750
Patt, D.I. COCKPIT DIMENSIONS IN RELATION TO HUMAN BODY SIZE. TSEAL 3 695 3227, April 1945, 5pp. USAF Aero Medical Lab., Hqs., Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

A series of measurements was made on a selected group of 52 Ss (ranging in size from 5'3" and 125 lbs. to 6'3" and 205 lbs.) to determine minimum fighter cockpit widths at shoulder and elbow level, optimum seat-to-rudder pedal distance and the range of seat-to-eye height in each of 3 positions. Results obtained indicate that the absolute minimum fighter cockpit widths at shoulder and elbow level are 24 and 26" respectively. The distance from the seat reference joint to rudder pedal bar ranged from 35.5 to 41.5 with a mean of 39.1". The range of seat-to-eye heights was 28.1 to 35.1", with a mean of 31.8", when sitting erect with back forming a 90° angle with the seat. When Ss were tilted back 13.5° from the vertical, making an angled 103.5° with the seat, an average of 1.3" in seat-to-eye height was lost, giving a range of 26.9 to 34.0", with a mean of 30.5". An additional 1.2" average (range 0.3 to 2.6") is lost in the latter position due to natural slump. The results of experiments on seating indicate that a properly designed seat will reduce natural slump to a minimum, so these last figures are subject to change with the advent of new seats.

R 0

1751
Dye, E.R. KINEMATIC BEHAVIOR OF THE HUMAN BODY DURING CRASH DECELERATION. Jan. 1950, 14pp. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.

1751
The report describes the construction of a sheet metal "man", a piece of experimental apparatus intended primarily for use in a study of the problem of impact blows to the head during crash deceleration. The manner in which the dummy was used is described in detail and a summary of results is presented for various tests in which the kinematic behavior of the body was observed during crash deceleration with and without a seat belt, with the belt at various angles and adjustments, and with the arms in various positions. Other uses of this equipment are suggested for the designer who wishes to make his airplane safer during crash deceleration.

T. G. I.

1753
Guillemin, V., Jr. ELECTRIC THERMOMETER, AML MODEL. TSEAL-3-695-49B, Apr. 1945, 6pp. Aero Medical Lab., Headquarters, Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

1753
This report describes "an electric thermometer designed to measure body temperature of personnel, and temperatures of equipment, on field and flight tests of clothing, oxygen equipment, and other personal equipment." Photographs, details of construction and a wiring diagram are included in the appendices.

I.

1755
Gagge, A.P. HUMAN FACTORS IN AIRCRAFT DESIGN. TSEAL 3 695 53, May 1945, 11pp. Aero Medical Lab., Headquarters, Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

An overview of human factors in aircraft design is provided. It is not intended as a detailed analysis, but to present in a general way the considerations that must be made in aircraft design for the human factor. The topics covered are: a) space and weight requirements; b) altitude tolerance; c) heat and cold tolerance; d) sound; e) vision; f) acceleration. It is noted that in the long run the surest way to improve pilot and aircrew efficiency is to reduce his concern for personal equipment by the proper design of the aircraft itself. (MEIAS)

1756
Taylor, C.L. THERMAL REQUIREMENTS FOR AIRCRAFT CABINS. TSEAL-3-695-56, Aug. 1945. 53pp. Aero Medical Lab., Headquarters, Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

1756
The tolerance of man to extreme thermal environments is reviewed as it bears upon the design of aircraft cabins. The theoretical variables involved in heat exchange between man and his environment are analyzed, equations developed, and related to the results of experiments on human exposure to hot and cold conditions. The influence of factors peculiar to aircraft cabins are included.
T.G.228.

1757
Taylor, C.L. HUMAN TOLERANCE FOR SHORT EXPOSURES TO HEAT AND HUMIDITY. TSEAL-3-695-56B, Feb. 1946. 24pp. Aero Medical Lab., Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

1757
To supplement the findings of an earlier investigation on the heat tolerance of man as it limits human capacities in high speed aircraft, an experiment on five men exposed to a varying hot environment over a period of 48 hours is reported. Earlier tolerance time curves are amended, sweat losses measurements are discussed and an index of physiological response is developed in relation to the environmental conditions and the tolerance limits of man.
T.G.24.

1759
Jhapanis, A., & Schachter, S. VISUAL EFFECTIVENESS OF LOW REFLECTANCE COATINGS APPLIED TO TRANSPARENT AREAS OF AIRCRAFT. TSEAL-3-695-62, Oct. 1945. 24pp. Aero Medical Lab., Air Technical Service Command, Engineering Div., Wright Field, Dayton, Ohio.

1759
To determine effect on night vision of low reflectance coatings applied to the transparent areas of aircraft, thirteen such coatings (applied to plate glass, laminated glass, or plastic) were evaluated for (1) effects of haze (Johnson Night Vision Tester and Luckiesh-Hess Low-Contrast Test Chart used with conditions of no glass, uncoated glass, and several coated samples); (2) effects of specular reflectance (JNL Night Vision Tester; under conditions where reflected light from instrument panel was thrown on the intervening glass). The results are analyzed and discussed in terms of the value of such coatings in improving the night vision of pilots.
T.G.I.R10.

1758
Patt, D.L., Damon, A. C. RANDALL, F.E. PRINCIPLES OF SEATING IN FIGHTER TYPE AIRCRAFT. Serial TSEAL 3 695 58, Sept. 1945, 43pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This study was conducted to determine the fundamental requirements of seating in fighter type aircraft for uses in design of future aircraft and where possible, in modifying present aircraft in such a way that the operating efficiency of the pilot may be extended over a period of time commensurate with the airplane's range. Three separate studies were conducted. In these experiments, 25 pilots were given free choice of cockpit dimensions and seat adjustments which were adjusted so that the distances from the point of heel rest to the horizontal line of vision was 39 1/4 in. Comfort was maintained for an average of 5 hours and 55 min. Using the same horizontal line of vision distance, 24 pilots made check runs on the average dimensions, angles, and contours which were held the longest in the initial phase. Seating comfort was held for an average of 7 hrs. and 19 min. Four horizontal lines of vision-to-the-floor distances on cockpit and seat dimensions were studied (35", 37", 41", and 43"). It was determined that the fundamental requirements of seating in fighter type aircraft are dependent upon seat angulation, differential support of the individual's weight over the seat contour, and upon the control arrangement.
R O

1760
Damon, A. ANTHROPOMETRIC DATA ON ARMY AIR FORCES FLYING PERSONNEL. EXP 149 695 4C, Oct. 1942, 58pp. USAF Materiel Center, Experimental Engineering, Wright Field, Dayton, Ohio.

Reported here is an anthropometric survey conducted on 2961 aviation cadets and 584 gunnery students who were measured at Southeast and Gulf Coast Air Forces Training Centers. Included in the report are the data, techniques of measurement, percentile distributions and a description of how to use the distributions. 28 bodily measurements were taken. Correlations of stature, weight, and sitting height with other body segments were made. It was found that for purposes of selecting men for specific turret size, most of the important measures can be predicted from stature and weight.
R O

1761

Randell, R.E. ARTICULATED PLASTIC MANIKIN STANDARDS. MEMORANDUM REPORT. Serial ENG 49 695
28, June 1943, 26pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

The anthropometric data obtained from 2961 aviation cadets were analyzed on the basis of total stature range and were divided into equal thirds. From these 3 divisions in stature, the corresponding populations were taken and the total set of data on each sub-series was averaged. These averages were then used to establish the dimension required for 3 arbitrary manikin standards. One represented an average for the entire series, one for the short third of the stature range, and one for the long third of the stature range. The average stature range was 156-198 cm (61.5 to 78 in.). The average of the short 1/3 of the stature range (17.3% of the population) was 156-169 cm (61.5 to 66.5 in.). The average of the long third of the stature range equalled 184-198 cm (72.5 to 78 in.). Three plastic manikins were constructed on the basis of these dimensions for the purpose of serving as basic size reference: in any way required by aircraft accessory designers and manufacturers, as well as any further needs brought out on clothing and other related subjects.

R 0

1762

Cochran, L.B., Gard, F.W., & Kersworthy, Mary E. G x TIME FLIGHT PATTERNS IN THE NAVAL TRAINING COMMAND. PHASE VI: AEROBATIC AND GUNNERY MANEUVERS AS FLOWN IN ADVANCED TRAINING UNIT 201. Res. Proj. NM-001-100 103, Rep. 4, June 1956, 18pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

1762

To determine the radial acceleration stresses encountered by student aviators in advanced training, G x time flight patterns were recorded by personnel of the Advanced Training Unit 201 in F9F-2 aircraft. Syllabus maneuvers recorded were: Immelman, gunnery, loop, barrel roll, 40° dive, and wing over. The records were analyzed to determine the magnitudes and durations of acceleration stresses for each maneuver. The findings are discussed in relation to the indoctrination program for flight personnel. Recommendations are included.

T. G. R 9

1764

Ellison, D.G. & Gray, Florence E. FREQUENCY RESPONSES OF HUMAN OPERATORS FOLLOWING A SINE WAVE INPUT. Contract W33 038 AC 13968, Memo. Rep. MCRD 694 2H, Rep. 14, Sept. 1948, 41pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Psychology, Indiana University, Bloomington, Ind.).

1764

To test the linearity of the human operator, four subjects were required to track a sine wave input by operating double handgrips which rotated on a vertical axis. An "input" pointer moved in a horizontal slot; a second pointer directly below the input pointer is controlled by the handgrips. Experimental variables were 1) input frequency (one-half to four cycles/second), 2) input amplitude, and 3) ratio between handgrip rotation and output pointer movement. The records were analyzed to determine 1) amplitude of movement of output pointer as a percentage of input pointer amplitude and 2) phase shift of the output in degrees (displacement in time of input-output waves).

T. G. I. R 2

1763
Craig, D.R. & Ellison, D.G. A COMPARISON OF ONE-HANDED AND TWO-HANDED TRACKING. MCRD 694 2H, July 1948, 29pp. USAF Aero Medical Lab., Hqs., Air Materiel Command, Engineering Div., Wright-Patterson AFB, Dayton, Ohio. (Indiana University, Bloomington, Ind.).

An experiment is reported which compared the accuracy of 1- and 2-handed tracking using extended handgrips and compared the accuracy of tracking with squeeze-grip range control handles and with extended handgrips. 2 groups of Ss tracked the Pedestal Sight Manipulation Test (PSMT) 2 trials per day for 11 days using a sight fitted with extended handgrips. One of these groups (21 Ss) used 2-hands on the offset handgrips when tracking. The other group (22 Ss) used the preferred hand on the corresponding offset handgrip. A third group (26 Ss) used the sight fitted with squeeze-grip range control handles. Ranging and control operations were not used. 2-handed tracking was significantly superior ($p < .05$) to 1-handed tracking in terms of time on target on all trials. Use of the extended handgrips with both hands resulted in superior tracking in elevation to that obtained with squeeze-grip controls. No significant differences were obtained in the case of azimuth or combined azimuth and elevation. These differences in performance might be increased or decreased by changes in the mass and inertia of the sight, by changes in the manipulative techniques used in operating the sight, or by changes in the operating characteristics of the control mechanisms of the sight.

R 6

1765
Ellison, D.G. & Hill, H. THE INTERACTION OF RESPONSES TO STEP FUNCTION STIMULI: 1. OPPOSED STEPS OF CONSTANT AMPLITUDE. MCRD 694 2P, Nov. 1948, 37pp. USAF Aero Medical Lab., Hqs., Air Materiel Command, Engineering Div., Wright-Patterson AFB, Dayton, Ohio. (Indiana University, Bloomington, Ind.).

This study was designed to study reaction time, movement time, and amplitude of responses made in tracking 2 successive opposed step function stimuli movements of constant amplitude and varying temporal separation. The experiment was conducted in part to check the results of a study by Vince (1951). The task was basically the same as that in the Vince study with the exception that the direction of the movements in this task was horizontal as opposed to vertical. Also, 2 paper drives, 1 for the stimulus presentation and 1 for recording, were used. The task of the 30 Ss was to follow any changes in position of a vertical black line which was viewed through a narrow horizontal slot with a pencil-type stylus. The stimuli were sudden movements (step functions), 1 inch to the right or left in randomized order, with a return movement to the base line after intervals varying from 0.05 to 1.6 secs. It was found that as the interval between 2 successive stimuli of a pattern was reduced below 0.5 secs., the amplitude and movement time of the first movement were reduced. Also, as the interval was reduced below 0.3 secs., the reversal of the stylus movement following the second stimulus was delayed. The data was not in complete disagreement with the original study but the interpretations were not the same.

R 3

1766

Jenkins, W.O. THE ACCURACY OF PILOTS AND NON-PILOTS IN APPLYING PRESSURES ON A CONTROL STICK. TSEAA 694 3, Aug. 1946, 20pp. USAF Air Materiel Command, Aero Medical Lab., Engineering Div., Wright Field, Dayton, Ohio.

A semi-rigid control stick was mounted on a stand in front of a cockpit seat. 20 AAF pilots and 13 non-pilot Ss were blindfolded and given practice trials in producing specific pressures. Ss attempted to apply pressures of 1, 5, 10, 20, and 40 lbs. for fore and aft action, and of 1, 5, 10, 20, and 30 for lateral operation. 20 successive attempts were recorded for each S in each direction at each pressure. Consistency of performance was determined by computing the variability of each S's performance about his average. Relative consistency was determined by dividing the measure of variability by the standard value at each of the 5 points in the 4 directions. Variability of pressure reproduction increased directly as a function of the standard pressure for both the pilot and non-pilot groups. Relative consistency improved rapidly from 1 to 10 lbs. and was asymptotic near 20 lbs.; beyond 20 lbs. relative consistency was approximately constant. There were no differences between the 4 directions. Ss tended to apply too much pressure when trying for low pressures and too little when trying for high values. Pilots were more accurate than non-pilots. However, number of flying hours was not related to accuracy. It was concluded that a basic factor in flight control design is the pressure cue. In any control design the availability of this cue should be maximized to increase the ability of pilots to fly with precision.

R 10

1767

Jenkins, W.O. THE ACCURACY OF PILOTS IN APPLYING PRESSURES ON A WHEEL-TYPE CONTROL. TSEAA-694-3A, Sept. 1946, 11pp. Engineering Div., Air Materiel Command, Wright Field, Ohio.

1767

In order to determine the accuracy with which pilots are capable of applying pressures on a wheel-type control, 20 Air Force pilots were given 15 successive trials (following practice trials) on an aircraft which was mounted to a shaft in such a manner as to permit aileron action. Six conditions of pressure were utilized: 1, 5, 10, 20, 30, and 40 pounds. Variability of pressure reproduction was assessed as a function of the magnitude of standard pressure. The results are discussed in terms of accuracy of performance and individual variation under each of the conditions of standard pressure. Recommendations are offered concerning optimal pressure ranges for control systems employing pressure as a primary cue.

T. G. R 2

1768

Jenkins, W.O. THE ACCURACY OF PILOTS IN APPLYING PRESSURES ON RUDDER PEDALS. TSEAA 694-3B, Sept. 1946, 12pp. USAF Air Materiel Command, Aero Medical Lab., Engineering Div., Wright Field, Dayton, Ohio.

Studied was the accuracy with which pilots reproduced pressures on a pair of semi-rigid rudder pedals as a function of the absolute magnitude of pressure being applied to the control. In order to gather information concerning pressures providing the best "feel of controls", a pair of semi-rigid pedals were mounted in front of a cockpit seat. The pressures used were 5, 10, 20, 40, and 60 lbs. The data obtained on the 20 Ss indicates that variability increased as a function of the standard pressure from 5 to 60 lbs. Relative variability improved as the standard pressure increased from 5 to 20 lbs. and beyond the latter values was approximately constant. Merely resting the foot against the pedal resulted in an average pressure of 7 lbs. When reproducing low pressures, pilots applied too much pressure, and when reproducing high pressures, they tended to apply too little force.

R 5

1769

Jenkins, W.O. INVESTIGATION OF SHAPES FOR USE IN CODING AIRCRAFT CONTROL KNOBS. TSEAA 694 4, Aug. 1946, 14pp. USAF Air Materiel Command, Aero Medical Lab., Engineering Div., Wright Field, Dayton, Ohio.

The study was conducted to select a set of control knobs of different shapes which could be recognized immediately by pilots through the sense of touch alone. A series of 25 knob shapes, including shapes now in use and some experimental shapes, were constructed. A group of 40 blindfolded Ss compared each knob shape with every other shape while wearing an A-11-A, medium weight flying glove and with the bare hand. On the average, 12% errors were made in distinguishing between the 25 different shapes with the bare hand and 20% while wearing the flying glove. Hesitation-type errors in which the pilots hesitated over an incorrect shape, but finally recognized that it was not the correct shape, occurred with 30% frequency with the bare hand and 40% with the glove. Practically all pilots made some errors of both types. The knob shapes tend to fall into families on the basis of error pattern. One family includes knobs having edges, corners, and flat surfaces. Another is characterized by rounder surfaces. Knob shapes belonging to the same family tend to be confused with one another, but not with shapes of another family. (HEIAS)

R 3

1770

Jenkins, W.O. A FOLLOW-UP INVESTIGATION OF SHAPES FOR USE IN CODING AIRCRAFT CONTROL KNOBS. TSEAA 694 4A, Aug. 1946, 6pp. USAF Air Materiel Command, Aero Medical Lab., Engineering Div., Wright Field, Dayton, Ohio.

Eight knobs which had been found to yield the fewest errors in an earlier study were employed along with 3 new shapes employed in the "Ideal cockpit" developed by the US Navy Department. 30 Army Air Force pilots were blindfolded and required to judge whether the knobs, presented in pairs, were the same or different. The knob shapes were tested with bare hands and with an A-11-A flying glove. Out of a total of 1,980 comparisons only 9 errors were made. 6 out of 9 errors were made while the flying glove was worn. 8 of 9 errors involved 1 of the Navy knobs. It was concluded that these knobs are readily distinguishable to touch.

R 1

1771

Jenkins, W.O. A FURTHER INVESTIGATION OF SHAPES FOR USE IN CODING AIRCRAFT CONTROL KNOBS. TSEAA 694 48, Sept. 1946, 11pp. USAF Air Materiel Command, Aero Medical Lab., Engineering Div., Wright Field, Dayton, Ohio.

This study was undertaken as a basis for selecting a set of control knobs of different shapes which could be recognized immediately through the sense of touch for use on radar, radio, bombing, and cockpit equipment. A series of 22 knob shapes constructed and a group of 40 blindfolded Ss compared each knob shape with every other shape. Comparisons were made with the bare hand and while wearing an A-11-A flying glove. A set of 8 knobs was selected by means of an examination of the error pattern among the 22 shapes. There were no errors or hesitations made by an individual in distinguishing between these 8 knobs.

1772

Narrick, M.J. DIRECTION OF MOVEMENT IN THE USE OF CONTROL KNOBS TO POSITION VISUAL INDICATORS. AND APPENDIX I. Serial TSEAA 694 4C, April 1947, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1772

This study was designed to determine human preferences in the arrangements of and motion relationships between indicators and controls. Ninety-two Army pilots were used as subjects in two experiments in which each subject manipulated a control knob to move an indicator light from an off-center to center position. In the initial experiment both clockwise and counterclockwise motion produced the required result. In the second experiment the motion relationship was fixed for each particular run but reversed from one run to another. Control-indicator arrangements were varied. Results are discussed in terms of optimal control-indicator arrangements, preferred movement ratios, and the effects of variation in these dimensions upon speed and accuracy of performance.

T. I.

1777

Brown, C.W., Chiselli, E.E., Jarrett, R.F., & Minus, E.W. COMPARATIVE EFFECTIVENESS OF SPEED OF DETECTION OF VISUAL STIMULI IN THE PRONE AND SEATED POSITIONS. Contract W-33-038-ac-15098, MCRSXD-694-41, May 1948, 18pp. USAF, Air Materiel Command, Aero Medical Lab., Engineering Div., Wright-Patterson AFB, Dayton, Ohio.

1777

To measure speed of determining peripheral visual stimuli in the horizontal plane for seated and for prone positions, 23 subjects (some pilots) were required to respond differentially to two signal lights placed at each side of the head at 45 and 135 degrees from forward line of sight. Detection times were measured and analyzed for positional effects. Fatigue factors involved in the prone position are discussed. T.C.Rl.

1773

Jones, R.E. A SURVEY OF PILOT PREFERENCE REGARDING KNOB SHAPES TO BE USED IN CODING AIRCRAFT CONTROLS. Serial TSEAA 694 4E, Feb. 1947, 7pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

This study was designed to determine pilot preferences as to which aircraft controls should be coded and which of 11 knobs should be used on different controls. Models of the 11 knob shapes were presented to 60 pilots who rated on a questionnaire: a) the shapes which they considered impractical; b) which controls they would prefer to have coded and which knob shapes should be used on these controls. It was found that 6 controls were considered to be in need of coded knobs. Of the 11 knobs, 2 were considered distinctly inferior to the other 9 by the pilots. Characteristics of these knobs were that they had sharp edges which made an uncomfortable grip and which presented danger for snagging on gloves and flying clothing. There was a fair amount of agreement among pilots as to the controls that need coding and as to the knob shapes to be assigned to several of these controls.

R 4

1774

Grether, W. DESIGN OF AIRCRAFT SWITCH PANELS FOR MAXIMUM EASE OF CHECKING OF SWITCH POSITION. TSEAA 694 4F, April 1947, 5pp. USAF Air Materiel Command, Aero Medical Lab., Wright Field, Dayton, Ohio.

A proposal regarding the design of toggle switches used in aircraft switch panels which should increase the speed and accuracy with which the pilot or other crew member can identify and locate the "off" position for all switches was reported. It was suggested that all switches in the aircraft switch panels be "off" or at a safe setting at the center position. If this proposal were carried out, it would necessitate the development of new types of toggle switches for Army Air Force use.

R 0

1775

Grether, W. DIRECTION OF CONTROL IN RELATION TO INDICATOR MOVEMENT IN ONE-DIMENSIONAL TRACKING. TSEAA 694 4G, Oct. 1947, 9pp. USAF WADC, Aero Medical Laboratory, Wright-Patterson AFB, Dayton, Ohio.

Tested were a group of 36 Army Air Force pilots and a group of 40 college students to determine whether direction of control in relation to indicator movement is a significant factor in determining human efficiency in performing a one-dimensional tracking test. A simplified cockpit mockup which included an instrument panel, a seat, rudder pedals, and a stick was used. Two types of controls were studied: a) reciprocating rudder pedal movement; b) lateral (ailerons) stick movement. For both control movements the upper reference mark on the indicator was used, and the task of the S was to keep the pointer centered over this mark. The 4 experimental conditions were: a) rudder pedal direct; b) rudder pedal reversed; c) stick lateral reversed. The results indicate that in the case of the pilot carrying out the one-dimensional tracking task by means of rudder pedal, the direction of control in relation to indicator movement had a significant effect upon performance. It is assumed that the findings of this study are valid only for one-dimensional tracking.

R 3

1778 Brown, C.V., Chiselli, E.E., Jarrett, R.F., Minium, E.W., et al. **MAGNITUDE OF FORCES WHICH MAY BE APPLIED BY THE PRONE PILOT TO AIRCRAFT CONTROL DEVICES. I. THREE-DIMENSIONAL HAND CONTROLS.** Contract W-33 038 ac 15098, MCNED-694-4J, March 1949, 68pp. USAF Aero Medical Laboratory, Wright-Patterson AFB, Dayton, Ohio.

Investigated were the forces which pilots could be expected to apply to aircraft controls from the prone position. Three dimensions of hand movement suitable for operation of elevator, rudder, and alleron controls. The dimensions were described as "push-pull", "push-right-pull-left", and "rotation" about the longitudinal axis. For purposes of comparison, measurements were also made of the forces which could be applied to the identical hand grips from the seated position. Tested were 65 S1, all except 2 being pilots. In terms of forces which can be applied to hand operated controls, the prone position compares favorably with the seated position for aircraft pilots. The "push-right-pull-left" movement dimension, suitable for operation of rudder controls, is unfavorable for application of high control forces. The prone position is inferior to the seated position for the "rotation" movement normally used for alleron control. The prone is superior to the seated position for application of "pull" forces on elevator controls. (MEIAS)

R 5

1779 Van Saun, H.R. **THE COMPARATIVE INTERPRETABILITY OF TWO METHODS OF PRESENTING BOMBING INFORMATION BY RADAR.** TSEAA-694-5, Oct., 1946, 20 pp. AAF, Air Materiel Command, Aero Medical Lab., Engineering Div., Wright Field, Dayton, Ohio.

1779 To determine which type of radar bombing scope, cartesian grid (E-scope) or polar grid (sector scope), is most accurately read in conjunction with a PFI navigation scope, 48 subjects studied a target (terrain feature) on PFI photograph and then identified it on a paired bombing scope photograph (200-pair test) under conditions where (1) both scopes were heading stabilized, and (2) PFI scope was azimuth and bombing scope was heading stabilized. Number of problems correctly completed in a given time and number of errors are analyzed in terms of scope type and orientation of scopes. Learning effects are noted.

T,G,I,R1.

1780 Grether, W.F. **DESIGN OF CLOCK DIALS FOR GREATEST SPEED AND ACCURACY OF READING IN MILITARY (2400) HOUR TIME SYSTEM.** TSEAA-694-8, Oct., 1946, 16 pp. AAF, Air Materiel Command, Aero Medical Laboratory, Engineering Div., Wright Field, Dayton, Ohio.

1780 To study design factors which influence the speed and accuracy of reading clocks in the military or 2400-hour time system, 162 subjects read time from eleven different designs of clock dials--five variations of the 12-hour and six of the 24-hour dials. Other design factors studied were: minute scale--use of numerals, minute graduations, placement at top or bottom of dial; hour scale--use of numerals, 24-hour position. Both accuracy and speed scores were obtained and analyzed in terms of the effects of different design factors. Recommendations are included for a design for further experimentation.

T,G,I.

1781 Grether, W.F. & Merrick, M.J. **PROPOSAL FOR PRESENTING LOCALIZER AND GLIDE PATH INFORMATION TO THE PILOT.** TSEAA 694-24, March 1947, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1781 This memorandum describes a possible method of presenting localizer and glide path information to the pilot from cross-pointer navigation equipment. It is suggested that the localizer indicator be combined with a remote indicating magnetic compass having a rotatable scale and that the glide path indicator be combined with the gyro horizon. The manner in which the pilot could use such presentations is discussed, together with a justification of the method in terms of assumed advantages in pilot usage. Diagrams are included.

T,R2.

1782 Hemphill, J.K., Matheny, W.G. & Walker, R.V. **THE EVALUATION OF A PSYCHO-MOTOR TASK FOR USE IN THE STUDY OF MARKING SIGNALS.** Contract W33 038 AC 14701, Aug. 1947, 24pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Maryland, College Park, Md.).

1782 To evaluate a suitable task for use in experiments on the attention-getting value of warning signals, the S.A.M. Single Dimension Pursuit Test (compensatory tracking) was modified by adding a signal light to which the subject could respond by operating a toggle switch. Sixteen subjects, half of whom were pilots, were tested under conditions where length of practice period, rest period, and appearance of light signal were varied. Time on target and response times to signal appearance are analyzed with respect to the effects of previous experience, practice, and rental set (for signal or task).

T,G.

1783 Wise, H.G., Jr. **A SURVEY OF CURRENT RESEARCH AND DEVELOPMENT ON COCKPIT AND INSTRUMENT PANEL LIGHTING SYSTEMS BY AIRLINES AND AIRCRAFT MANUFACTURERS.** MCNED-694-8D, May 1948, 14pp. AAF, WADC, Aero Medical Laboratory, Wright-Patterson AFB, Dayton, Ohio.

1783 To gain information on research and development (during 1948) pertinent to problems of cockpit and instrument lighting systems, visits were made to one university laboratory and several aircraft manufacturers. A summary report is presented of the salient features of the lighting systems observed, of conferences with company representatives, and comments of the observers. The systems studied included indirect lighting, flood lighting, and lucite edge lighting. Suggestions for needed research are included.

1784 Grether, W.F. **A STUDY OF SEVERAL DESIGN FACTORS INFLUENCING PILOT EFFICIENCY IN THE OPERATION OF CONTROLS.** Memo. Rep. TSEAA 594 9, Nov. 1946, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

1784 To investigate the effect upon human efficiency in operating aircraft type controls of several variations in the type of control movement used, tests were carried out in a simplified cockpit mockup. The task was to keep an oscillating pointer centered on a reference mark by a control. Five possible control movements were available: rudder pedal, and two planes of movement (as for alleron and elevator control) of either stick or wheel. Several variations of leg and arm angle were investigated as well as type of control movement. Efficiency was measured by time-on-target and analyzed for differences due to type of control, direction of movement of hands and arms, leg angle and arm angle.

T, I, R 7

1706
Warrick, H.J., & Lund, D.W. EFFECT OF MODER-
ATE POSITIVE ACCELERATION (G) ON ABILITY TO
READ AIRCRAFT-TYPE INSTRUMENT DIALS. Man
Rep. TRDA-604-10, Nov. 1946, 13pp. Agre
Medical Lab., Air Materiel Command, Wright-
Patterson AFB, Ohio.

1785

To determine whether or not a pilot's ability to read aircraft instrument dials is impaired by moderate positive acceleration, 31 noted military pilots responded orally (through microphone) to a printed dial reading test (also common aircraft instrument dials reproduced with a reading given above it which was either same as or different from dial reading). During testing the subject was on a human centrifuge under conditions of 1-1/2 or three G's. The data include right minus wrong scores, errors, and number of attempts; analysis compares performance under the different levels of G force used.

T.J.M.

1786
Christensen, J.M. SOME TYPICAL SKY AND
EARTH BRIGHTNESSES AT ALTITUDES 10,000 TO
40,000 FEET AND THEIR RELATIONSHIP TO THE
EYE-ADAPTATION PROBLEMS OF THE RADAR OPERA-
TOR. TS2AA-694-11, Dec., 1946, 16 pp.
AAF, Air Materiel Command, Aero Medical
Lab., Engineering Div., Wright Field,
Dayton, Ohio.

To measure the extremes of illumination within the visual range which are encountered at high altitudes, 2 flights were made and brightness observations taken of sky, earth, and interior of plane at altitudes from 10,000 to 40,000 feet. Using standard laboratory data of the course of dark adaptation, a number of conclusions are derived concerning the relationships between the brightness observations and the visual problems of the radar operator of a plane flying at these altitudes.

36,823.

1786
 Milton, J. L., Jones, R. C., Morris, J. B., 2 FltS, P.M., PILOT REACTION TIME: THE TIME REQUIRED TO COMPREHEND AND REACT TO CONTACT AND INSTRUMENT RECOVERY PROBLEMS. TSCA 69-12a, May 1967. 13pp. USAF Air Materiel Command, Aero Medical Lab., Wright-Patterson AFB, Ohio.

Reported is an investigation of the time required by pilots to comprehend and interpret aircraft instrument readings and make the necessary adjustments in the attitude of the plane under both contact and instrument conditions. The 20 pilots tested wore a pair of sandpapered plexiglass goggles which permitted passage of light but restricted the 3° view of the instruments during the pretest period. The plane was out of initial of 4 standardized maneuvers, the goggles were opened and the 3° determined the attitude of the aircraft and attentioned to recover to straight and level flight as rapidly as possible. Instrument comprehension time was 0.20 or 15% longer than contact comprehension time. Comprehension time here defined as the time for accommodating and focusing the eyes, for comprehending what is seen, and for initiating a control movement. The results indicate that significant improvements in flight instruments are possible, since the present flight panel is more difficult to comprehend than the real horizon. (HMAS)

1759
Greiber, M.F. THE EFFECT OF VARIATIONS IN INDICATOR DE-
SIGN UPON SPEED AND ACCURACY OF ALTITUDE READINGS. Sept.
1947, 19pp. USAF Aero Medical Lab., Wright-Patterson
AFB, Ohio.

1709 To compare different altimeter designs, printed test booklets presented twelve settings for each of nine altitude indicator designs (the conventional three-point indicator and eight variations). The tests were taken by four groups of 97 pilots and 79 non-pilots in counter-balanced order to cancel learning effects. Time and error scores are analyzed and interpreted with respect to the speed and accuracy with which each of the several indicators could be read. Applications of the results to problems of indicating altitude in aircraft are discussed; recommendations are included.

T.I.33.

1790
Grether, W.F. ANALYSIS OF TYPES OF ERRORS
IN READING-OF THE CONVENTIONAL THREE-POINT
ALTIMETER. NUREXO-694-144, March, 1948,
23 pp. USAF, Air Materiel Command, Aero
Medical Lab., Engineering Div., Wright-
Patterson AFB, Dayton, Ohio.

1790 To study the types of reading errors made on the conventional three-point altimeter, error data was obtained from a study (see Acc. No. 1739) in which 57 pilots and 79 non-pilots made altitude readings on varied indicator designs. An analysis of the data yielded a classification of major types of errors for which frequency tabulations were then made for the conventional indicator and a counter-pointer indicator. The discussion is concerned with the factors in multi-revolution instruments which cause reading errors.

T.I.12.

1787
 1. Refs. P.H. & Jones, R.E. ANALYSIS OF FACTORS CONTRIBUTING TO 460 "PILOT-ERROR" EXPERIENCES IN OPERATING AIRCRAFT CONTROLS. TSEA 694.12; July 1947, 32pp.
 2. Ref. USAF Air Materiel Command, Aircraft Medical Lab., Engineering Div., WRIGHT Field, Dayton, Ohio.

Accounts of errors in using aircraft controls were obtained through recorded interviews and written reports. Pilots in the Air Materiel Command, the Air Training Command, and the AAF Institute of Technology, and former pilots in civilian universities contributed error accounts. In order to minimize personal opinion only detailed factual information furnished by an eye-witness or by the pilot who made the error was accepted. It was found that all errors could be classified under 6 major categories: a) substitution error (50%); b) adjustment errors (18%); c) forgetting errors (18%); d) reversal errors; e) unintentional activation; and f) unable to reach (10%). Practically all pilots of present day AAF aircraft, regardless of experience or skill, report that they sometimes make errors in using cockpit controls. The most likely cause of each type of error are discussed and design changes for eliminating or reducing these errors are suggested. (HEIAS)

1791

Warrick, M.J., & Grother, W.F. THE EFFECT OF POINTER ALIGNMENT ON CHECK READING OF ENGINE INSTRUMENT PANELS. NCRXD-694-17, June, 1948, 33pp. USAF, Air Materiel Command, Aero Medical Lab., Engineering Div., Wright-Patterson AFB, Dayton, Ohio.

1791

To determine the effect of pointer alignment positions on check reading performance, a four by four arrangement of 16 simulated engine instruments (1-3/4 inch diameter) is used in which subjects check read the panel and took appropriate action by positioning one or more toggle switches. Six pointer alignment positions (9, 12, and 3 o'clock, and mixed alignment about each) and two test situations (identification of any deviation and of direction of deviation) were investigated. Response times and errors are analyzed and interpreted with regard to optimum alignment positions. Practical implications for design are discussed; recommendations are included.

7,6,1.

1792
Grother, W.F. & Connell, Shirley C. PSYCHOLOGICAL FACTORS IN CHECK READING OF SINGLE IN STRUMENTS. NCRXD 694-17A, Sept. 1948, 21pp. USAF, Air Materiel Command, Aero Medical Lab., Engineering Div., Wright Field, Dayton, Ohio.

The suitability of 5 different principles of instrument indication for check reading purposes was studied. Two types of reading evaluation were made: a) simple check reading, or the mere detection of a deviation, and b) qualitative reading, or judgment of the direction of a deviation. In each of the 3 experiments conducted, the task of the 5 was to respond to appropriate movement of a toggle switch to random presentations of the 5 simulated instruments in an exposure apparatus. The standard airspeed indicator and 4 other simulated instruments were compared for ease of check reading. In one of the experiments the 5 was required to judge whether or not the instrument reading had changed from a desired reading (check reading). The other 2 experiments required the additional judgment of the direction of deviating readings. The results of these experiments showed that the time for simple check reading and making of an appropriate switch movement ranged from 0.51 sec. for a rotating pointer to 0.64 sec. for a rotating dial indicator. For the more complex qualitative reading the response times ranged from 0.59 to 1.09 sec. with considerable variation depending upon the type of indicator and direction of switch movement. In general the moving pointer indicators were superior to those with moving scales. For both types of reading which were measured the direct reading counter with three digits gave results comparable to the best indicators.

R 6

1794

Spragg, S.P.S., & Rock, M.L. DIAL READING PERFORMANCE AS RELATED TO ILLUMINATION VARIABLES. II. SPECTRAL DISTRIBUTION. Memo. Rep. NCRXD-694-21A, Dec. 1948, 8pp. USAF, WADC, Aero Medical Laboratory, Wright-Patterson AFB, Dayton, Ohio. (University of Rochester)

1794

To investigate the relation between dial reading performance and color (spectral distribution) of the illumination at low brightness levels, twenty subjects read dial settings on photographic reproductions of dials (2.5 inch diameter, graduated from 0 to 100 in ten unit steps) at distance of 28 inches. Four illumination colors were used: yellow-green, yellow-orange, orange-red, and deep red, each at two brightness levels of 0.01 and 0.10 foot lamberts. Error and time scores are analyzed statistically and interpreted in terms of color and brightness functions.

6,7,32.

1797

Damon, A. CLOTHING COMMENTS AND FLAK HELMETS IN THE EUROPEAN THEATER OF OPERATIONS, JULY-SEPTEMBER 1944. Memo Rep. TSEAL-3-695-3200, Nov., 1944, 6 pp. AAP, Air Materiel Command, Aero Medical Lab., Wright-Patterson AFB, Dayton, Ohio.

1797

This report is a verbal summary of flyers' (8th and 9th Air Forces - 1944) comments in regard to flying clothing in general and to felt boots and the M-4 flak helmet in particular. Discussion and conclusions pertain to clothing allotments, clothing requirements relevant to the work space, comfort, and needs for future development of clothing for flyers.

1793

Warrick, M.J. DIRECTION OF MOTION STEREOTYPES IN POSITIONING A VISUAL INDICATOR BY USE OF A CONTROL KNOB. II. RESULTS FROM A PRINTED TEST. NCRXD 694-19A, Oct. 1948, 21pp. USAF, WADC, Aero Medical Laboratory, Wright-Patterson AFB, Dayton, Ohio.

This investigation tested the "clockwise-clockwise hypothesis" that states that human operators expect a clockwise control motion to result in a clockwise motion of the corresponding indicator and a counter clockwise motion to result in a counter clockwise motion to result in a counter clockwise motion of the indicator. Fifty male college students were asked to indicate on a printed test which direction they would rotate a control knob to move a semi-circular indicator to a reference position. The responses of these subjects indicated that they tended to associate a clockwise (counter clockwise) control motion with a clockwise (counter clockwise) indicator motion irrespective of the positions or orientation of the indicator in respect to the control. It appears reasonable to propose that this tendency be considered when designing equipment in which a semi-circular indicator is to be controlled by use of a rotatable knob. A detailed analysis of the results of the printed test showed that the number of subjects whose responses indicated that they associated a clockwise (counter clockwise) control motion with a clockwise (counter clockwise) indicator motion was greater in certain arrangements of indicator and control. It is proposed that, other things being equal, these arrangements of indicator and control be used on equipment in which a rotatable knob positions a semi-circular indicator if it is imperative that the operator not move the control in the wrong direction.

R 3

1798 Parreck, H.O., Eldridge, R.H., & Koster, H.F. PHYSIOLOGICAL EFFECTS OF INTENSE SOUND. Final Rep. NCRD 895 718, May 1948, 15pp. USAF Air Materiel Command, Aero Medical Lab., Engineering Div., Wright-Patterson AFB, Dayton, Ohio.

Reported are the results obtained from a preliminary study on the physiological effects of intense noise on man and animals. The sound sources used were: a turbo-jet engine, J-33-g mounted in an outside test stand; and a siren mounted in an anechoic chamber. Laboratory personnel, guinea pigs and rats were subjected to these intense sounds. Severe but temporary losses of hearing were found to occur to the human as along with marked heating of the skin, strong vibration in various parts of the body, sensations of muscular weakness, and excessive fatigue. Guinea pigs and rats have been killed when exposed to the intense sound field of the siren for periods as short as 8 minutes. The death is caused by an excessive elevation of the body temperature.

1800 Mahler, M.R., Bennett, G.K., Doppelt, J.E., Golan, D.G., et al. PSYCHOLOGICAL STUDIES OF ADVANCED NAVAL AIR TRAINING: EVALUATION OF OPERATIONAL FLIGHT TRAINERS. Contract NSCNR 99901, Proj. NR 780 011, SDC Proj. 20 A 8, SDC TR 999 1 1, Sept. 1950, 151pp. USN Special Devices Center, Port Washington, N.Y. (The Psychological Corporation, New York, N.Y.).

1800 This study is concerned with the evaluation of Operational Flight Trainers in the program of the Naval Air Advanced Training Command. A series of experiments was run using 23-24 matched pairs of students in evaluating each of two trainers. Besides training conditions, variables were: students, instructors, syllabus, standards, and flight conditions. Results (differences in proficiency between groups trained with and without trainers) are interpreted with regard to savings in flight time, student proficiency, effective use of trainers, and trainer design.
T. G. I. R 15

1801 Legg, J.C. OPERATIONAL EVALUATION OF THE AN/SPA-23 HORIZONTAL INDICATOR. Task 431-L 4651-64541, WADC TN-56-522, Jan. 1957, 13pp. Directorate of Flight & All Weather Testing, WADC, ARDC, Wright-Patterson AFB, Ohio.

1801 To determine if the AN/SPA-23 Horizontal Indicator would be more suitable for air traffic control purposes than the vertical indicators presently used in Air Force RAPOON Centers, the equipment was installed in a Center and used to control aircraft on a variety of flight test missions. Operators were instructed to take note of ease and/or deficiencies of operation while controlling the flights. Air traffic was not heavy enough to define the limits of the capability of the indicator; however, deficiencies and advantages of operation are listed. Recommendations are included.
I.

1802 USA Arctic Test Branch. SERVICE TEST OF COLD-WET UNIFORM. REPORT OF TEST - PROJECT NR 2699 (ARCTIC). DA Proj. NR 7 79-01-002, RDB Tech. Obj. PO 8, July 1956, 59pp. USA Arctic Test Branch, Big Delta, Alaska.

1802 To determine the comparative suitability of two vapor-barrier suits, Coldbar T53-25 and T53-26, as replacements for standard cold-wet uniforms and as special purpose uniform for Army use under cold-wet conditions, a service test was conducted. Selected soldiers wore the uniforms for periods of 14 to 158 days during performance of field and garrison duties. Ambient temperatures ranged from 30 to -62 degrees Fahrenheit and winds varied from calm to 65 miles per hour. The degree of acceptability and adequacy for body warmth was based on troop reaction. Observed deficiencies and suggested modifications were tabulated. Recommendations are included.
T. I.

1805 Buskirk, E.N., & Bass, D.E. CLIMATE AND EXERCISE. Proj. 7-83-01-0058, Tech. Rep. EP-61, July 1957, 32pp. USA Quartermaster Research and Engineering Center, Natick, Mass.

1805 The effect of climate on man's ability to perform exercise is reviewed, with special emphasis on effects of hot environments. The topics treated are: the physiology of temperature regulation and the manner in which temperature regulatory mechanisms are altered during exercise; the interactions between exercise and external heat load and the importance of cardiovascular adjustments; acclimatization to heat and the effect of physical conditioning on performance; the role of clothing during work in heat; and heat stress indices.
T. G. I. R 57

1806 Olson, H.C. & Willard, N., Jr. A SIMPLIFIED METHOD FOR RATING THE PERFORMANCE OF STEREOSCOPIC RANGE FINDER OPERATORS. Tech. Rep. 34, Dec. 1956, 21pp. USA Human Research Unit No. 1, Fort Knox, Ky.

1806 The purpose of this study was to develop a simple technique for rating the performance of stereoscopic range finder operators. Data were collected during the training of 179 subjects on the relative efficiency of the standard method of performance evaluation i.e., computation of Units of Error, and a new method (the Range Finder Scoring Graph) which utilizes a scoring graph and simple computation. The relative difficulty of computation and accuracy of each of the measurement techniques provides a basis for recommendation for adoption of the new technique.
T. G.

1807 General Electric Co. TURBOJET ENGINE CONTROL SYSTEM STUDY. Prepared under Contract Nonr-1737(00), Proj. RSAER-S1 (9-U-94), Dec. 1956, 216pp. Special Devices Center, Port Washington, N.Y. (General Electric Co., Johnson City, N.Y.).

1807 This report presents the results of Phases I and II of a study of the turbojet engine, its controls, and their relation to over-all aircraft performance. A turbojet engine was simulated on an analog computer, the optimum values of the principle variables determined, and control systems were devised to obtain the optimum performance. Emphasis was placed on the consideration of the engine as a part of a larger system composed of an airframe and its flight controls, an engine and its controls, and a human pilot and his capabilities. Recommendations for further phases of the study are included.

1809 Edwards, W. VARIANCE PREFERENCES IN GAMBLING. Amer. J. Psychol., Sept. 1954, 62(3), 441-452. (Johns Hopkins University, Baltimore, Md.)

Previous experiments suggest a mathematical model for predicting decisions among bets. This model asserts that people choose among bets as to maximize subjectively expected utility. The possibility exists, however, that people also prefer some bets to others on the basis of their variance; in addition to the utilities and subjective probabilities involved. This, if so, would be damaging to the model. 2 preliminary experiments failed to demonstrate the existence of variance preferences. In the main experiment, 55 were required to choose between bets with high and low variances. The most significant variable determining choice was the probabilities involved, and the probability preferences found were essentially the same as those found in other experiments. When probabilities were held constant, however, the choices did reveal the existence of variance preferences. The introduction of conditions making high variance desirable produced more bets of high variance, but the introduction of conditions making low variance desirable did not produce more bets of low variance. This is due to the fact that Ss tend to change their habits when they lose money, but not when they win. It is concluded that variance preferences exist, but they are secondary in importance as compared with probability preferences.

R 38

1810 Coburn, R. & Hedlund, J. A "FLYING SPOT" 3-COORDINATE RADAR SIMULATOR. NE 121303, Prob. NEL N3 1, Subtask 3, Tech. Memo. 69, Nov. 1954, 29pp. USN Electronics Lab., San Diego, Calif.

1810 This memorandum describes a "flying spot", three-coordinate radar simulator designed to feed height and plan types of radar indicators with synthetic video for up to 36 targets moving in three dimensions. Characteristics of the equipment and its uses for research on radar problems and certain types of training programs are discussed. Principles of operation and details of construction are given.

T, I.

1818 Documentation Incorporated. AIRCRAFT INSTRUMENTATION DATA PRESENTATION AND HUMAN ENGINEERING SURVEY. PROGRAM FOR DEVELOPMENT OF INTEGRATED PRESENTATION OF FLIGHT INFORMATION: UNITERM COORDINATE INDEX. Contract NOKR 1908(00), ca. 1954. Documentation Incorporated, Washington, D.C.

1818 This volume, to be used with its companion work of abstracts (see Acc. No. 1819), is the Uniterm Coordinate Index to publications concerned with aircraft instrumentation, data presentation, and human engineering. It contains retrieval words (uniterm) for unclassified abstracts arranged in numerical and alphabetical order. Names of instruments, manufacturers, governmental agencies, and other sources, as well as the basic working vocabulary of the fields, are included. An author index follows the Uniterm index. Instructions for the most effective usage of the index are included.

R2500.

1819 Kreftien, A. (Prof. Dir.). AIRCRAFT INSTRUMENTATION DATA PRESENTATION AND HUMAN ENGINEERING SURVEY. PROGRAM FOR DEVELOPMENT OF INTEGRATED PRESENTATION OF FLIGHT INFORMATION. Contract NOKR 1908(00), Feb. 1954, 235pp. Documentation Incorporated, Washington, D.C.

1819 This compilation of annotated references, with its Uniterm Coordinated Index (see Acc. No. 1818) is a working tool for research and development in the Program for the Development of Integrated Presentation of Flight Information. Code letters are given for each abstract which identify the source for ordering the document and the source or agency responsible for the work.

R2500.

1820 Black, J.W. THE EFFECT OF ROOM CHARACTERISTICS UPON VOCAL INTENSITY AND RATE. J. acoust. Soc. Amer., March 1950, 22(2), 174-176. (Department of Speech, Ohio State University, Columbus, Ohio).

1820 To determine the effect of room characteristics upon a speaker's rate and intensity of reading, groups of 23 males read 12 test phrases in each of eight rooms. The rooms represented two shapes (circular and rectangular), two sizes (150 and 1600 cu. ft.), and two reverberation times (0.8 to 1.0 and 0.2 to 0.3 sec.). Microphones led to two meters that registered vocal intensity and, in one instance, duration of the phrases. Each set of measurements was treated by analysis of variance.

T.

1821 USN Motion Study Unit. NAVAL MOTION STUDY UNIT: AIR TRAFFIC CONTROL AT R.N.A.S. FORD. Memo 14, Sept. 1952, 8pp. USN Motion Study Unit, OR, London, England.

1821 To obtain information that would help identify problems of organization and procedures in Air Traffic Control, a preliminary survey of a specific airfield was selected for observation. Questions of layout and physical relations between sections were raised, and several suggestions for improvement were put forward for consideration. Problems that should be investigated before precise recommendations for standard layout of sections and arrangement of personnel included: (1) space and operational requirements of equipment, and (2) capacities and limitations of personnel.

T. R 3

1823 Smith, W.M. PAST EXPERIENCE AND THE PERCEPTION OF VISUAL SIZE. Amer. J. Psychol., July, 1952, 65, 389-403. (Princeton Univ.)

1823 To determine the effect of controlled experience on the apparent size and distance of geometrical forms, 52 subjects were tested initially by judging when triangles and circles, as viewed monocularly, were the same apparent distance as a reference object, viewed binocularly. Four groups, formed on the basis of mean settings of size for triangle, were given varied experiences in size estimation before retesting. Analysis of the test-retest size measures with respect to the effect of experience is made. Discussion relates the results to perception of size in the ordinary environment.

T, I, R26.

1824 Spencer, J. COMPARISON OF TWO VISUAL WARNING SYSTEMS IN AIRCRAFT. PRAC. 790, June, 1952, 2 pp. RAF Inst. of Aviation Medicine, Flying Personnel Res. Committee, Farnborough.

1824 To study systems for presenting visual warnings of certain types of failure likely to occur in aircraft, two arrangements were compared under flight conditions: (1) warning lights dispersed around instrument panel as close to the appropriate controls as possible, and (2) warning lights centralized on one panel, with two flashing, attention getting signals on cockpit coaming. Ten pilots completed low level cross-country flights while responding to artificially produced warnings. Response times for each system were analyzed and compared. Pilot preferences are discussed.

1825

Smith, W.H. GILINSKY'S THEORY OF VISUAL SIZE AND DISTANCE. *Psychol. Rev.*, May 1952, 52, 239-243. (Princeton University, Princeton, N.J.).

An attempt has been made to evaluate certain aspects of Gilinsky's theory of perceived size and distance. The evaluation has concerned itself principally with size-constancy relationships: a) The restriction of theory to the cases where perceived size is proportional to physical distance requires that a number of data be ignored or explained away. The formulation specifically denies that perceived size may increase with distance, a denial which is contrary to fact; b) The use of the concept of "normal viewing distance" in the formulation raises some serious questions about the generality of the theory; c) Certain inconsistencies are apparent in the derivation of the theory on the basis of size-constancy principles; d) Both the derivation and meaning of the A parameter in the theory are questionable; e) Even allowing the restriction noted in (a) above, the theory is not confirmed by experimental evidence.

R 5

1826

Wilson, M.R. RED-GREEN FILTERS FOR SIMULATED INSTRUMENT FLYING. Proj. 21 1207-0003, Dec. 1952, 6pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

1826

To evaluate red-green filters for simulated instrument flying, the visual acuity of forty-five subjects was measured for each eye and binocularly without filters and with red, green, blue, and amber plastics in daylight illumination. Tests were Armed Forces Visual Acuity Chart and standard a/c instrument figures mounted on a special chart. The average acuities under the different conditions are presented as well as the significance of the differences occurring.

1838

Johnson, E.E. A SURVEY OF TANK CREW PROBLEMS. Proj. 6 95 20 001, NEDEA, Rep. 93, Aug. 1952, 8pp. USA Medical Research Lab., Fort Knox, Ky.

1830

Bricker, P.D. & Chaponis, A. DO INCORRECTLY PERCEIVED TACHISTOSCOPIC STIMULI CONVEY SOME INFORMATION? *Psychol. Rev.*, May 1953, 60(3), 181-188. (Johns Hopkins University, Baltimore, Md.).

1830

To investigate the possibility that incorrectly perceived stimuli convey some useful information, 10 Ss were shown nonsense syllables under conditions such that they could recognize half or less on the first trial; incorrectly identified stimuli were shown again and Ss required to keep guessing until correct identification was made. The mean number of additional guesses were compared with the mean of a distribution of random guesses following presentation of stimuli which were not available to the Ss as responses. Discussion is in terms of "cues" which carry information of a useful nature, of word preferences, and word sequence preference.

T. G. R 9

1838

To point up problems of the tank crew which may be alleviated by human engineering research, 894 tank crewmen attending the Armored School, Fort Knox, Kentucky, were oriented as to kinds of problems the human engineer is interested in and then asked to relate some relevant incident that they had either observed or participated in. A total of 623 incidents were found: to concern general problems of human engineering and 521 of these concerned the tank crew. These incidents were categorized as they applied to the commander, gunner, loader, driver and crew in general. Recommendations are made for improved survey techniques.

T. R 2

1833

Lifton, K.A. ERRORS IN TIME-STUDY JUDGMENTS OF INDUSTRIAL WORK PACE. *Psychol. Monogr.*, 355, 1953, 67(5), 1-14. (Occupational Research Center, Purdue University, Lafayette, Ind.).

In a study designed to determine the nature of the errors involved in time-study ratings of work pace, 6 expert time-study men made ratings of the filmed performances of 5 workers doing each of 4 jobs at each of 5 previously established paces. It was found that: a) pace ratings involved considerable error-standard error of pace ratings from different raters on different jobs, workers, and paces was .16%; b) some raters rate higher than others; c) some raters are more consistent than others; d) some raters are rated higher than others, even when all perform the same job at the same paces; e) some raters are rated more reliably than others; f) raters tend to overrate low paces and underrate high paces; g) normal pace is rated most reliable; h) some jobs are rated more reliably than others; i) interactions are important--some raters rated some jobs higher than others; some raters rated some workers higher than others; some workers were rated higher on some jobs than on others and not all raters follow the same pattern; j) worker's judgment on equating the jobs differ from the pace ratings of time-study men; k) individual differences among the worker's judgments are large; l) some workers can judge more reliably than time-study men can rate; m) a correlation of +.46 exists between the workers judgments and the pace ratings of the time-study men.

R 9

1834

Scidmore, W.H. PROPOSED SCHEMATIC OPTICAL SYSTEM FOR DIRECT FIRE TELESCOPE FOR THE TANK T 92. DA Proj. 5T4507027, Ordnance Proj. TT2-781, Rep. TN-1065, June 1955, 5pp. Fire Control Instrument Group, Frankford Arsenal, Philadelphia, Penn.

1834

A proposed optical schematic FASK 550519, which may be considered as the basis for an optical system for the direct fire telescope for the Tank T92, is presented. Various military characteristics that must be satisfied are discussed and initial optical design criteria are established for formulation of a final optical system.

G. I.

1840

Minsky, M.L. DISCRETE SELECTION PROCESSES. Contract N0MR 494 (03), Proj. NR 145 038, Rep. 1954 494 03 21, July 1954, 21pp. Dept. of Systems Analysis, Tufts University.

1840

The behavior of those processes by which a system progresses toward an assigned goal through a sequence of discrete trials and evaluations is considered. Each activity cycle of the system requires the selection of one from a set of possible alternate actions. Considered here are a number of schemes for selection and certain "universal" decision procedures discussed. The effect of introducing a random element into the system is examined and some attention is devoted to an examination of the relation between discrete selective processes and the processes underlying performance of servo-mechanisms.

I.

1843
Sloan, Louise L., & Altman, Adelaide. **FACTORS INVOLVED IN SEVERAL TESTS OF BINOCULAR DEPTH PERCEPTION.** A.M.A. Arch. Ophthalmol., Oct. 1954, 52, 824-844. Contract 248(24). ONR, Johns Hopkins University.

1843
To determine what aspects of depth perception are measured by representative tests, a theoretical analysis of factors involved is made and related to three tests: Ewald-Jolman, Yehouff Stereopter, and Vision Tester. Data are obtained under experimental conditions which eliminate, as far as possible, differences not essential elements of the test. A comparative analysis of the test results is made with further study of the relation of acuity and phoria scores to depth scores (Vision Tester). Interpretation is based on the significance of unocular cues and the effect of specific ocular defects on binocular depth perception. T.G.R.34.

1845
Shackel, B. **SOME DESIGN REQUIREMENTS FOR OPTIMUM HUMAN TRACKING PERFORMANCE.** 1955, 10pp. Applied Psychology Research Unit, MRC, Cambridge, England.

1845
To determine the optimum relations between linear control and linear display movements, a one-dimensional compensatory tracking task was used with a positional joystick control lever and an instrumental display. With a control-display movement ratio of 3:1 the following conditions were tested: (1) with and without an elbow rest, (2) length of training session (30 and 150 minutes), (3) length of continuous run (10, 5, and 3 minutes), and (4) length and spacing of rest periods. A further study was made of control-display movement ratios to test the effect of distance of the instrumental display from the operator's eyes on performance. Error scores were analyzed to find conditions yielding optimum performance. G.

1849
Barnes, R.M., Mundel, M.E. & MacKenzie, J.M. **STUDIES OF ONE AND TWO-HANDED WORK. I. GRASPING SMALL PARTS FROM DIFFERENT TYPE BINS. II. GRASPING VARIOUS SIZED PARTS. III. POSITIONING SMALL PARTS.** University of Iowa Studies, New Series 384, Bull. 21, March 1940, 67pp. University of Iowa.

1849
This bulletin is the fifth in a series describing investigations of hand motions used in factory work. The first section describes and presents the results of a study on grasping small parts from different type bins; section two deals with grasping various sized parts; and section three treats the positioning of small parts. In all the studies the efficiency of one-versus two-handed work was studied. The results are given in time required for each part of the movement cycle (therbligs) as well as total cycle time. T. G. I. R 5

1853
Clark, B., & Graybiel, A. **THE BREAK-OFF PHENOMENON: A FEELING OF SEPARATION FROM THE EARTH EXPERIENCED BY PILOTS AT HIGH ALTITUDE.** Res. Proj. NM 001 110 100, Rep. 43, Aug. 1956, 6pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

1853
Pilots of jet aircraft when flying alone to high altitudes have reported an unusual experience which has been termed "break-off" or physical separation from the earth. To investigate the occurrence of this phenomenon, 137 jet pilots were interviewed utilizing a modification of the critical incident technique. A content analysis of the data was made to further define the experience and to find factors related to it such as age, flying experience, conditions of flight at time of experience, personality factors. The implications for flying are discussed. R 4

1855
Evans, R.N. **A SUGGESTED USE OF SEQUENTIAL ANALYSIS IN PERFORMANCE ACCEPTANCE TESTING.** Contract N6CR1 07142, Proj. NR153 124, ca. 1950, 31pp. University of Illinois, Urbana, Ill.

1855
Procedures for performance acceptance testing are examined and sequential sampling procedures (widely used in industrial acceptance of supplies) are proposed as an economical and useful procedure. The major sections of the report are devoted to an examination of sampling in testing, choosing a sequential sampling plan, and tentative suggestions for putting a sequential sampling plan into operation. T. G. R 5

1856
Hardy, L.H., Rand, Gertrude, & Rittler, M. Catherine. **H-R-R POLYCHROMATIC PLATES.** J. opt. Soc. Amer., July, 1954, 44, 509-523. (Columbia Univ.)

1856
To evaluate the H-R-R Polychromatic Tests (description included) 780 subjects of normal and defective color vision were given a battery of color tests. Comparisons were made for screening ability with the American Optical Plates (revised); for classifying type of defect, the Nagel anomaloscope; and for classifying extent of defect, the Nagel anomaloscope, Ichihara diagnostic plates, and the Dichotomous test. Further comparisons are made with results from various aptitude tests designed to select color deficient persons who can meet the color requirements of specific but different tasks. The practical implications for vocational selection and guidance are discussed. T.G.R.15.

1857
Christie, L.S. & Luce, R.D. **SUGGESTIONS FOR THE ANALYSIS OF REACTION TIMES AND SIMPLE CHOICE BEHAVIOR.** Contract DA 36 039 SC 56695, DA Proj. 3.99.10.101 & Proj. 8 1034, Rep. R 53, April 1954, 39pp. Control Systems Lab., University of Illinois, Urbana, Ill.

1857
A model is proposed for the way human beings organize the decisions required by simple choice situations into a series of component decisions. The thesis of the authors is that such an organization of decisions must be reflected in the distribution of reaction times and that, therefore, it may be possible to infer the organization from empirical studies. The model is not firmly based on empirical studies, however, and thus the proposal is described as speculative. Two experiments are suggested that may help determine the value of the model. G. R 15

1858
Fleming, J.G. **HUMAN ENGINEERING IN POWER PLANT INSTRUMENTATION.** Presented at the Instrument Society of America Eighth National Instrument Conference and Exhibit held in Chicago, Illinois, Sept., 1953.

1858
This paper is oriented toward the engineer in dealing with practical efforts to apply the findings of industrial or human engineering psychologists to engine instrumentation. The task of the human engineer is defined and related to the engineer's task. Specific examples of improved scale design and panel arrangements are offered in illustration of this field of technology. T.R.10.

1859
Fleming, J.G. MAN RUNS A POWER PLANT. Symposium on Instrument Design, Feb. 1952, 7pp. Pennsylvania Electric Assoc., Philadelphia, Penn. (The Bristol Co., Waterbury, Conn.).

1859
The design of mechanical instruments as dependent upon the man-machine system they serve is examined in terms of the needs of a power plant. Recent growth in production and complexity of installations have given rise to new problems of non-scheduled interruptions attributable to the human element. The various ways in which mechanical instruments for indicating information, for recording information and for controlling the system are discussed.
R. 8

1861
Saul, E.V. & Jaffe, J. GRAPHICS GUIDE. (A PROTOTYPE GUIDE ON THE DESIGN AND USE OF GRAPHIC TRAINING AIDS). Contract MONR 494(08), SDC TR 494 08 2, Oct. 1954, 103pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

1861
This report was prepared to aid Army personnel who design, prepare, and use graphic training aids. The contents are based on data obtained through an extensive search of pertinent psychological literature and are presented here in a simplified direct form. Chapters cover: general comments to the designer; the use of pictures, words, layout, lettering, color; preparation of projected aids (television, slides, film strips, transparencies); and the role of the instructor. Practical guides for the designer are a part of each chapter. A glossary of terms and index are included.
T.

1862
Clark, B., & Graybiel, A. VERTIGO AS A CAUSE OF PILOT ERROR IN JET AIRCRAFT. Res. Proj. NM 001 110 100, Rep. 44, Aug. 1956, 20pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

1862
To obtain information on vertigo as experienced by jet pilots, 137 Navy and Marine Corps aviators assigned to jet aircraft were studied. Individual interviews and a check list of vertigo experiences were used. The data were classified as to type: (1) vertigo of attitude and motion; (2) visual vertigo; and (3) vertigo involving geographical disorientation. Individual descriptions, number and percent in each classification, number of checked items showing a relationship to emotional responses, flight conditions, and pilot's method of coping with vertigo were analyzed. A comparison of experiences with vertigo in jet and propeller aircraft was drawn and preventive procedures discussed.
T. R 7

1863
DuBois, E.F. THE ANATOMY AND PHYSIOLOGY OF THE AIRPLANE COCKPIT. Aeronautical Engineering Rev., April 1945, 4, 1-3. (Cornell University Medical College, Ithaca, N.Y.).

This paper points out the development of aviation physiology and the slow recognition of the engineer to take into consideration the anatomical characteristics and physiological and psychological capacities of the human operator. Since 1942 there has been a wider recognition and application of principle of physiology to the practical needs of aviation. There are certain military requirements, especially maneuverability, gunnery and safety factors which the anatomist, physiologist, and psychologist could bear in mind and establish certain general principles of cockpit design. Some of the problems and elements of the airplane cockpit are considered along with possible improvements in terms of anatomy and physiology of the pilot.
R. 4

1864
Bartlett, H.R., Williams, S.B., & Hanes, R.M. VISIBILITY ON CATHODE-RAY TUBE SCREENS: THE EFFECT OF SIZE AND SHAPE OF PIP. J. opt. Soc. Amer., June 1940, 30, 463-470. Contract NS-ori-186. ONR, SDC. (Johns Hopkins University)

1864
To determine the effect upon visibility on cathode-ray tube screens (7EP7) of changes in size and shape of signal, two trained subjects made threshold judgments of the appearance of a pip on the PPI screen. A wide range of beam widths (angular dimension) and pulse lengths (radial dimensions) were investigated at each of three field brightnesses (about 0.0001, 0.1, 2.0 footlamberts). Tables, graphs, and empirical equations summarize the data and relationships to more general visual problems are discussed.
T. G. I. R 9

1865
Bartlett, H.R., & Williams, S.B. SIGNAL MARK SIZE AND VISIBILITY OF RADAR SIGNALS ON A PLAN POSITION INDICATOR. Contract NS-ori-166, T.O. I, Sept., 1947, 16 pp. ONR, Special Devices Center, Port Washington, L.I., N.Y. (Johns Hopkins Univ.)

1865
To evaluate the effect of signal size in radar visibility, preliminary experiments were made on a 7EP7 radar screen and signal size varied by 1) regarding the screen from different distances, 2) changing the length of signal by widening the azimuth gate, 3) changing the thickness of signal by switching to different presentation range scales, and 4) moving signal from center to periphery of screen. The data are presented as tentative findings; further research on this problem is indicated.
G. R 3

1867
USAF Air Training Command. REPORT OF THE TRAINING ANALYSIS & DEVELOPMENT CONFERENCE. Oct. 1951, 60pp. USAF Air Training Command, Scott AFB, Ill.

1867
This is the report of a conference aimed at reviewing progress in the Training Analysis and Development program, interchanging ideas and information, and solving 12 specific problems in administrative policy and method. The conference did not include any reports on specific experimental results.
I.

1868

Adams, J.A. WARM-UP DECREMENT IN PERFORMANCE ON THE PURSUIT-ROTOR. *Amer. J. Psychol.*, July 1952, 65(3), 404-414. (State University of Iowa, Iowa City, Iowa).

1868

The Epicyclic Pursuit Rotor modified to approximate the Koerth Pursuit Rotor was used to investigate amount of warm-up decrement with massed and distributed practice. Each group of Ss spent six minutes a day for five days in the paced pursuit task. One group had 36 trials of ten seconds with 40-second rest intervals; the other practiced continually for six minutes with scores recorded every ten seconds. Scores were for time on target and warm-up decrement. T. G.

1869

Atkinson, C.J. VOWEL MATCHING EXPERIMENT. Supplementary Rep. 2, Aug. 1955, 20pp. State University of Iowa.

1869

The ability of a talker to match the loudness levels of heard vowels was measured on 21 subjects. Each subject made nine matches with each of five English vowels, three at each of three levels. One such set of matches was made by the subject by adjusting the level of his own speech in successive trials, and another by adjusting the level of a recorded vowel played to him over a loud-speaker. The sound pressure levels of the recorded and spoken vowels, measured with a microphone at distance of three inches from the ear of the subject, are factor-analyzed for the significance of differences between vowels, levels and talkers. The effect of restricting the frequency range of vowel reproduction was measured in a similar experiment. T. I. R 3

1870

Altman, Adelaide, & Rowland, W.M. MEASURES OF ACUITY WITH OPTICAL SIMULATION OF DISTANCE. *Quart. Rev. Ophthalmol.*, March, 1952, 8, 3pp. Contract N6onr-24307, ONR. (Johns Hopkins Univ., Wilmer Ophthalm. Inst.)

1870

To compare the results of tests of visual acuity in which distance is simulated optically with tests at true distances, the acuities of 157 eyes were measured with letter test targets in an Ortho-Rater and at true distances under experimental conditions which were otherwise similar. Subjects had no ocular defects or diseases other than uncorrected errors of refraction. The data are analyzed statistically and discussed in terms of a simplified procedure for rapid mass testing of visual acuity.

1871

Morse, P.M. FUNDAMENTAL INVESTIGATIONS IN METHODS OF OPERATIONS RESEARCH. Contract DA-19-020-ORD-2684, Proj. 599-01-004, TB-0001, 968, Tech. Rep. 3, Aug. 1955, 34pp. Massachusetts Institute of Technology.

1871

This technical report summarizes accomplishments of the project on fundamental investigations in methods of operations research from December 1954 through August 1955. Active projects reported are: waiting-line handbook, probability models in standard cost items, use of the science library by Massachusetts Institute of Technology personnel, controlling book circulation in a university library, waiting-line theory applied to purchasing of library books, and traffic light scheduling. Precise of two completed projects are presented: waiting-line models applied to manufacturing problems and stock valuation study. Included are lists of project personnel seminar topics and current publications. G. R 3

1872

Armington, J.C. AN ELECTRONIC PSYCHO GALVANOMETER FOR STUDENT USE. *J. Psychol.*, Feb. 1949, 28, 3-7. (Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.).

1872

The construction of a psychogalvanometer suitable for demonstration, lie detection, and student use is described. The meter proper may be used with an extension cord at a point remote from the chassis, making possible projection of the meter dial upon a screen. Because of its non-linear characteristics the instrument may be used from subject to subject without any balancing or adjustment of resistance networks; only the voltage of a single flashlight cell is applied to the subject. It is compact, portable and cannot be damaged by improper operation. I. R 4

1874

Asch, S.E., Witkin, H.A. STUDIES IN SPACE ORIENTATION: I. PERCEPTION OF THE UPRIGHT WITH DISPLACED VISUAL FIELDS. *J. exp. Psychol.*, June, 1948, 38, 325-337.

1874

To determine the relative importance of visual and postural factors in the perception of the upright, 49 subjects observed a tilted mirror scene (room at 30 degree tilt) and adjusted a rod to vertical position in alignment with own body position. Two viewing conditions were used: (1) through a tube which excluded the mirror edge, and (2) without the tube and with full knowledge of the mirror. Scores are presented as mean deviations in degrees from the true vertical; introspective comments are included. The implications for theory of space orientation are discussed. G.R3.

1875

Asch, S.E., & Witkin, H.A. STUDIES IN SPACE ORIENTATION: II. PERCEPTION OF THE UPRIGHT WITH DISPLACED VISUAL FIELDS AND WITH BODY TILTED. *J. exp. Psychol.*, Aug., 1948, 38, 455-477.

1875

To study the relative importance of visual and postural factors in spatial orientation, subjects viewed a small tilted room (22 degrees), on the back wall of which was an adjustable rod. Judgments of the true upright were made by adjusting the rod: (1) with the subject upright and viewing the room through a tube, then with tube removed, (2) with subjects tilted in the same and opposite directions to room tilt, and (3) over an extended period of time. Measurements of deviations of rod settings in degrees from the true upright are analyzed and discussed in terms of the way in which the upright is normally established. T.G.R2.

1877

Matthews, J.L. (Chm.). TINTED OPTICAL MEDIA. *National Safety News*, 1952, 2pp. Safety Reprint General 31.

1877

This report on tinted optical media, primarily sunglasses and tinted glasses for constant wear, is based on the best scientific information available. Basic principles involved are clarified by definition and specific questions answered concerning the effect of such media on visual acuity, ocular comfort, perception of color, and cataract; the valid claims which advertising can make; and the minimum requirements to be met. General comments with respect to usage are included.

1878
Watson, G.T. WINTER ENVIRONMENTAL TESTS, 1957, FT. CHURCHILL, MONTANA, CANADA, OF WEAPON SYSTEM OF RIFLE, MULTIPLE, 106MM, S.P., M50-THREE HUNDRED SEVENTY-FIFTH REPORT ON TBS - 1401 PART II TWENTY FOURTH REPORT - CROSS REFERENCE TS4 4020. DATES OF TEST: 30 JANUARY 1957 - 7 FEBRUARY 1957. March 1957, 81pp. USA Development and Proof Services, Aberdeen Proving Ground, Md.

1878
To determine the accuracy, mechanical reliability, and durability of the weapon control system under winter climatic conditions, the weapon system was given detailed examination prior to the tests; throughout tests observations were made for part breakages; turret raceway brinelling checked; ease of tracking a moving target determined; adequacy of tube traveling lock and turret lock were observed, and accuracy firings were conducted. Results are in terms of detailed inspection of weapon parts and of tests of their working condition. Recommendations are made concerning acceptance inspection procedure. Appendices include detailed firing records, accuracy chart, ammunition data card and so forth.
I. R 5

1879
Barber, J.L., & Garner, W.R. THE EFFECT OF SCALE NUMBERING ON SCALE-READING ACCURACY AND SPEED. *J. exp. Psychol.*, Apr., 1951, 41, 298-309. Contract NS-ori-166, T.O. I, Rep. 166-I-115, Proj. Design. NR-784-001, ONR, Special Devices Center, Port Washington, L.I., N.Y. (Johns Hopkins Univ.)

1879
To determine the influence of scale numbering on scale-reading proficiency, twelve subjects estimated the position of targets on a rectangular grid. The grid had three numerical scales: progression by 5's, 10's, and 20's; there were two task instructions, for speed and for accuracy. Reading times and errors in interpolation between scale markings are analyzed and interpreted in terms of speed and accuracy and type of instruction. Other habits and preferences are discussed.
T.G.I.R7.

1880
Dorst, P.W. EVALUATION OF COLOR RECOGNITION DEVICES FOR MAKING COLOR SEPARATIONS FROM MULTICOLOR MAPS AND CHARTS. Proj. 8-35-09-110 (8-35-09-010), Rep. 1401, May 1955, 27pp. USA Engineer Research and Development Lab., Fort Belvoir, Va.

1880
To evaluate color recognition devices for making color separations from multicolor maps and charts, the problem was analyzed and the essential characteristics of a usable map scanner were formulated. Commercial scanners and a special equipment built by Edward Sterns and Company were assessed. A suggestion is made for further exploration of other schemes for color recognition.
I.

1881
Bryer, D.H., & Gebhard, J.W. AN ELECTRONIC STIMULATOR FOR USE ON THE HUMAN EYE. *Amer. J. Psychol.*, July 1952, 65, 450-457. (Johns Hopkins University, Baltimore, Md.)

This report describes a stimulator developed as a research instrument for safe use on the eye although there is no reason why it cannot be used on other tissues as well. It has given stable, trouble-free service in the laboratory. It has a versatile wave form output - positive and negative rectangular pulses, square waves, trains of pulses alternating in polarity and a means of introducing sine waves and clipped sine waves into the output. Precise control over amplitude, rate of repetition, and duty cycle are possible with this instrument. (NEIAS)
R 11

1882
Bartley, S.H., & Chute, Eloise. A PRELIMINARY CLARIFICATION OF THE CONCEPT OF FATIGUE. *Psychol. Rev.*, May 1945, 52(3), 169-174. (Dartmouth Eye Institute, Hanover, N.H.)

This paper was presented in an attempt to give a brief view of fatigue and of the related concepts of work output and impairment, and to describe how fatigue comes about. Environmental conditions are taken into consideration both of a social and physical nature. Fatigue is also discussed in relation to activity, localization, conflict, personality, and causation. (NEIAS)

1883
Beebe-Center, J.G., Carmichael, L. & Mead, L.C. DAYLIGHT TRAINING OF PILOTS FOR NIGHT FLYING. *Aeronautical Engineering Rev.*, Nov. 1944, 3, 10pp.

1883
This paper reports a series of studies dealing with the psychophysical aspects of a technique for simulating night conditions for training pilots in night flying (use of green filter on windows of plane and red goggles on trainees). Five main problems were studied: (1) the extent to which the technique impairs depth perception, (2) individual differences in acuity with the combined filters, (3) nature of the adaptation curve for vision through the combined filters; (4) safety factors, and (5) specifications for both filters. A series of measurements of the change in illumination from noon to nightfall is included.
T.G.I.R8.

1884
Beebe-Center, J.G., Mead, L.C., Wagoner, K.S., & Hoffman, A.C. VISUAL ACUITY AND DISTANCE OF OBSERVATION. *J. exp. Psychol.*, Dec., 1945, 35, 473-484. (Tufts College, Medford, Mass.)

1884
To determine the effect of large observation distances on visual acuity, 23 subjects judged the orientation of a stimulus object (white E on black background) at distances varying from thirty to 300 feet and at two miles; measurements were also made at a standard distance by varying the stimulus sizes. Acuity data (reciprocal of the visual angle, in minutes, subtended by a limb of the stimulus object when the orientation of E could just be discriminated) are analyzed as a function of distance; both theoretical and practical implications are discussed.
T.G.R10.

1885 Halsey, Rita M., Curtis, C.E., & Farnsworth, D. FIELD STUDY OF DETECTABILITY OF COLORED TARGETS AT SEA. Proj. NM 002 014-09-03, Color Vision Rep. 31, Rep. 265, XIV(5), May 1955, 1-37. USN Medical Research Lab., New London Submarine Base, Conn.

Air-to-sea sightings of various colored targets were made in fair weather. Observers were stationed in an aircraft flying at 700 feet altitude in an established search pattern. Targets were aluminum spheres painted with different test colors as follows: 16 ordinary paints of varying brightness and saturations in the yellow through red range, including certain Army-Navy standard colors; black and white; and four fluorescent paints. Targets were presented singly, and the distance at which each was detected was recorded. Colors which were detected at the greatest distances were the yellow-red and orange-red fluorescent; next in detectability were ordinary paints of high brightness and of saturation. The effects of certain operational and observational variables are discussed. The data may be used as guides in selecting colors for survival gear and in establishing rescue search patterns.

1886 Schubert, E.D. SOME PRELIMINARY EXPERIMENTS ON BINAURAL TIME INTERVAL AND INTELLIGIBILITY. Contract DA 36-039-sc-63144, Supplementary Rep. 1, Sept. 1955, 26pp. State University of Iowa.

1886 To investigate the effect on intelligibility in noise of having a speech signal arrive at one ear earlier than another, a series of preliminary experiments were conducted. The intervals employed ranged from 200 microseconds to seven milliseconds; materials were individual monosyllabic words and single continuous material. For each kind of material a listening condition was included with one headphone 180 degrees out of phase with the other to afford a comparison with other time intervals tested. Percentage of the monosyllabic words correctly understood and of words correctly reported from continuous material were analyzed as functions of the difference in arrival time at the two ears. The need for further experimentation is stressed.

T. G. I. R 16

1887 Bjurstedt, H. HÖRTRYCKSÄNDNINGENS FYSIOLOGI. (THE PHYSIOLOGY OF HIGH-PRESSURE BREATHING). Meddelanden från Flyg-och Navalmedicinska Samfundet, 1953, 4, 22-26. Library Translation. 523, UDC 611.2:613.48:629.13.077.2, March 1955, 7pp. Ministry of Supply, Royal Aircraft Establishment, Farnborough, Hants, England.

1887 The physiology of breathing at high altitudes and the design principles applicable to high pressure suits and breathing apparatus are discussed. The importance of a balanced distribution of pressure on the body and the effects on the lungs of breathing under pressure are stressed. The "Capstan" or partial pressure suit is described together with some experience in its use.

G. I. R 6

1888 Berens, C., & Sells, S.B. EXPERIMENTAL STUDIES ON FATIGUE OF ACCOMMODATION. Arch. Ophthalmol., Feb., 1944, 31, 148-159. (N.Y. Univ., Dept. of Ophthalmol.)

1888

To study fatigue of accommodation, effect of prolonged visual exercise on 57 clinic patients with complaints of ocular fatigue or other symptoms of asthenopia was determined. Measurements were made of the initial and final near points of accommodation for each eye, separately and together, on ergographic tasks (astigmatic cross and a line of letters from the Behren's accommodation card at five footcandle illumination). The data are examined for evidences of fatigue of accommodation (change in near points) and for differential effects in the "working eye" and the occluded eye. Further analyses will be made of other effects at a later date.

T, I, R 8.

1889 Berry, R.N. QUANTITATIVE RELATIONS AMONG VERNIER, REAL DEPTH, AND STEREOSCOPIC DEPTH ACUITIES. J. exp. Psychol., Dec., 1948, 38, 708-721. (Brown University)

1889

To study the relations among vernier, real depth, and stereoscopic depth acuities, three tasks were presented under as nearly identical conditions as possible to three subjects. In each case the vertical separation of two black rods, placed vertically one above the other with the lower rod movable in both medial and frontal planes, was judged; brightness, color of visual field, distance, size and shape of test rods were identical. Six vertical separations were used: from 3.6 to 891 seconds of visual arc. The threshold data are analyzed statistically for interrelations and theoretical implications are discussed.

T, G, I, R 13.

1890 Berry, R.N., Riggs, L.A., & Duncan, C.P. THE RELATION OF VERNIER AND DEPTH DISCRIMINATIONS TO FIELD BRIGHTNESS. J. exp. Psychol., June, 1950, 40, 349-354. (Brown Univ., Psychol. Lab.)

1890

The relation of vernier and depth discriminations to field brightness was investigated by having each of three Ss view two steel rods, the lower one of which could be displaced laterally (vernier) or in the median plane (real depth). Using the method of constant stimuli, determinations of threshold were made for six brightnesses (192, 0.16, 4.8, 0.04, 0.90, and 0.07 ml) of vernier and real depth. Thresholds for each of the Ss for each of the brightnesses in the vernier and real depth situations are presented in the form of tables and figures. The data are also replotted to show the mean thresholds in terms of the angle measured at the individual eye.

1891

Berry, R.N., Riggs, L.A., & Richards, W. THE RELATION OF VERNIER AND DEPTH DISCRIMINATION TO WIDTH OF TEST ROD. J. exp. Psychol., Aug., 1950, 40, 520-522. (Brown Univ., Psychol. Lab.)

1891

To test the effect of angular width of test object on vernier and depth discrimination, three subjects viewed two vertical black rods against a homogeneous white background. The lower rod, movable either in frontal or medial plane, was judged in reference to the upper rod as either: front, back, right, or left. Five widths of test rod were used: 26.8, 53.5, 107, 214, and 424 seconds of visual arc, with a total angular height of one degree, thirty minutes. The threshold data are studied for differences due to width. Other factors influencing judgments are discussed.

T, G, R 6.

1892

Hilger, J.A. OPERATIONAL SUITABILITY TEST OF FIREMAN'S COAT COVER, TYPE MA-1, TROUSER COVER, TYPE MB-1, AND COMPATIBILITY WITH FIREMAN'S COTTON DUCK COAT AND TROUSERS. FINAL REPORT. Proj. APG/CSC/495 AB, Sept. 1955, 29pp. USAF Operational Test Center, Eglin AFB, Fla.

1892

To determine the operational suitability of the MA-1 coat and MB-1 trouser covers while fighting high temperature fires and their compatibility with the fireman's cotton duck coat and trousers, the following tests were conducted: covers were issued to a regular crash crew for a 45-day period during which ten crash fires and rescue operations were simulated; exposure of dummies to high temperatures and recording of "skin" temperatures using thermocouples attached to them; subjecting test personnel wearing the covers to applications of various extinguishing agents; recording the time to don the covers over various clothing combinations and in cold temperatures; and checking for damage to covers during all tests. The capabilities and limitations of the covers are discussed with recommendations. G. I.

1894

Bitterman, M.E. LIGHTING AND VISUAL EFFICIENCY: THE PRESENT STATUS OF RESEARCH. Illuminating Engineering, Sept., 1948, 43, 906-922. (Cornell Univ., Dept. of Psychol.)

1894

This paper examines some of the important theoretical concepts and experimental findings which bear on the problem of illumination standards. The discussion is largely in terms of intensity levels. Performance measures of efficiency, performance under conditions of "maximum effort" and cost of visual work in physiological terms are treated. The need for fundamental research on which to base standards is stressed. R52.

1895

Bitterman, M.E., Ryan, T.A., & Cottrell, C.L. MUSCULAR TENSION AS AN INDEX OF VISUAL EFFICIENCY: A PROGRESS REPORT. Illuminating Engineering, Nov., 1948, 43, 1074-1081.

1895

This is a brief progress report on a study of muscular tension as an index of visual efficiency. The apparatus employed is a four-channel Grass electroencephalographic amplifier which is led into a rectifying and integrating circuit. Various visual tasks have thus far been studied in preliminary experiments; analysis of the findings has led to a new approach to the problem--that of using controlled rates of work. Plans for further work are discussed. G, I, R6.

1896

Black, J.W. A COMPENSATORY EFFECT IN VOCAL RESPONSES TO STIMULI OF LOW INTENSITY. J. exp. Psychol., June 1950, 40, 396-397. (Kenyon College, Gambier, Ohio). (ONR, SDC)

This study was conducted to investigate the possibility that the responses to just-perceptible stimuli are more intense than to ones heard slightly more clearly. This would be an exception to the generalization that messages are said back with an intensity that increases with higher levels of stimuli. 25 male Ss listened to 5 lists of 8 words each and repeated each word as soon as it was heard. Under some conditions the Ss were instructed to say the opposite word. 5 intensity levels were used with the lowest level being 5 db above threshold and increments of 6 db from the first level for the 4 other conditions. An analysis of variance indicates no difference between the repeat and opposite conditions. Variability among Ss in their responses to the experimental conditions of intensity was found to be significant. The 3 lowest levels of stimuli elicited mean responses that were significantly more intense than the mean responses to level 4.

R 1

1897

Black, J.W. SOME EFFECTS OF AUDITORY STIMULI UPON VOICE. J. aviat. Med., June 1950, 21(3), 251-255. (Ohio State University, Columbus, Ohio).

A series of studies designed to find some of the determinants of momentary vocal patterns are summarized. Momentary or transient aspects of voice are considered in opposition to any generalization that associates a single or limited vocal complex with an individual talker. 2 generalizations are suggested by the summaries of these studies: a) momentary vocal patterns are in part determined by the second or "other" party in 2-way communication. This places a responsibility upon the interrogator for shaping in some measure the intelligibility of the reply that he anticipates; b) the level of the side-tone is gauged by experience and adjusted to accommodate the "normal". For efficient communication within an aircraft, the necessity is indicated for establishing through training an experience of optimum side-tone.

R 6

1898

Blackwell, H.R. CONTRAST THRESHOLDS OF THE HUMAN EYE. J. opt. Soc. Amer., Nov., 1946, 36, 624-643.

1893

To determine contrast thresholds for the normal human observer (binocular) under a wide variety of conditions, approximately 450,000 responses were obtained from trained observers of the threshold for circular stimuli brighter than and darker than the background for two values of stimulus area (diameters from 121.0 to 3.60 minutes of arc), and adaptation brightnesses (from zero to 100 footlamberts). The data are analyzed statistically and the various relations presented graphically. G, I, R2.

1899

Blackwell, H.R. STUDIES OF PSYCHOPHYSICAL METHODS FOR MEASURING VISUAL THRESHOLDS. J. opt. Soc. Amer., Sept. 1952, 42(9), 606-616. (Vision Research Lab., University of Michigan, Ann Arbor, Mich.).

1899

To search for a psychophysical procedure for measuring the visual threshold which would show maximum reliability and independence of variables irrelevant to visual functions, a series of experiments were made covering such variables as: response used to indicate discrimination; the number, spacing, and order of light intensities presented in the measurement series; general attitude adopted by S; and extent to which S is given knowledge of the correctness of his response. Analysis of the findings leads to a listing of recommended procedures for determining visual thresholds.

T. R 9

1900
Blackwell, H.R. THE INFLUENCE OF DATA COLLECTION PROCEDURES UPON PSYCHOPHYSICAL MEASUREMENT OF TWO SENSORY FUNCTIONS. J. exp. Psychol., Nov. 1952, 44(5), 306-315. (Vision Research Lab., University of Michigan, Ann Arbor, Mich.).

This study investigated to what extent differences between thresholds obtained with 2 psychophysical procedures depend upon each of 2 stimulus variables. The Ss were required to discriminate brightness differences with the stimulus size and the brightness of the background field varied among experimental sessions. The only difference between the 2 procedures studied was the response used to indicate the presence of discrimination. In one case, phenomenal report was employed; in the other, forced choice was employed. The stimuli were ordered into groups of 20 in succession having the same magnitude. It was shown that Ss exhibited an invalid mode of response, termed positive channelization, when phenomenal report was used. This response tendency consists of spuriously increasing the frequency of "yes" responses toward the end of a group of 20 stimuli of the same magnitude, providing the stimuli elicit more than 50% "yes" responses. It is concluded that the procedure employed to measure thresholds can distort functional relations studied by psychophysical methods. It is concluded further that the use of phenomenal report with grouped stimuli can lead to invalid data. This combination of psychophysical procedures has been specifically advocated by the proponents of the neural quantum theory. The question arises to what extent invalid modes of response arising from the use of this psychophysical procedure have led to spurious evidence for the neural quantum theory.

1901
Blockley, W.V. & Taylor, C.L. HUMAN TOLERANCE LIMITS FOR EXTREME HEAT. ASHVE J. Section, Heating, Piping & Air Conditioning, May 1949, 111-116. (University of California).

Reported are the results of 21 human exposures to air temperatures ranging from 140 to 240°F. To investigate man's ability to tolerate extreme heat, Ss were subjected to these heat ranges in an experimental heat chamber. Clothing was standardized and consisted of close-fitting wool and cotton one-piece union suit, 0.080 in. thick, with loose-fitting felt duffel socks on the feet. The environments have been specified in terms of air and wall temperatures, air movement, and vapor pressure. Physiological measurements included skin, rectal and expired air temperatures, heart rate and body weight losses. Skin temperature rises during exposure and heart rate increases. Blood pressure changes show individual difference with systolic pressure rising during exposure in all cases. Exhaled air temperature responds rapidly to the heat load. An index of physiological strain was derived and the relationships between air temperature, exposure and this index of strain were displayed graphically. (HEIAS)

1902
Polzano, J.H., Alvis, E.J., & Daffner, G.J. SUBMARINE ESCAPE TRAINING EXPERIENCE. Naval & Surgery Proj. NM-002 015.08.03, Rep. 264, May 1955, 28pp. U.S.N. Medical Research Laboratory, Naval Submarine Base, New London, Conn.

1902
This report presents the results of an extensive study of submarine escape training directed towards evaluating the relation between method of escape and incidence of personnel casualties. A total of 185,000 simulated escapes were made during the period of study. Two methods of escape were utilized: (1) escape using the Submarine Escape Appliance (Mann Lung) and (2) escape without any respiratory device (free escape). An analysis of the number and types of escapes and the associated casualties is presented along with a discussion of the role of phase of training, type of casualty (e.g., decompression sickness, aerotitis, emphysema, etc.), and other factors. Conclusions are drawn concerning the fatality rate in free escape vs. that in using the Submarine Escape Appliance. T. R 3

1903
Electronics Research Laboratories, Columbia University. PROJECT LION: SIMULATION STUDY. Contract AF 30(635)-2815, Proj. 4506, Progress Rep. P-1/128, Task IV, 45360, Feb. 1955, 39pp. RADC, Griffiss AFB, Rome, N.Y. (Columbia University Engineering Center).

1903
This report is primarily concerned with the system design of the multi-target radar simulator and specification of the problems associated with its implementation. A detailed description of the system is presented and discussed in terms of the design operation, and problems associated with such components of the system as controlled search, coincidence inversion, and a 2.5 mc dynamic binary counter.

1904
Pike, B.W. ELEMENTARY PRINCIPLES OF ELECTRICITY AS APPLIED TO ACCIDENT PREVENTION. NTS-1868, Jan. 1957, 16pp. USN Ordnance Test Station, China Lake, Calif.

1904
To explain electricity in easily understood terms for personnel who operate electrical equipment and who must therefore be aware of electrical hazards, simple definitions and explanations are given of such terms as conductors, free electron, potential-difference. Electrical shock, heat, arc or spark, and electro-mechanical force hazards are discussed. Safety precautions and methods are included in two appendices.

1905
Bowers, W.H. AN APPRAISAL OF WORKER CHARACTERISTICS AS RELATED TO AGE. J. appl. Psychol., Oct., 1952, 36, 296-300. (The Ohio State Univ. Development Fund.)

1905
This study attempts an appraisal of the comparative performance of industrial workers of different age groups fulfilling a variety of functions in a large organization, and an analysis of the factors involved. Utilizing personnel records and appraisals from a variety of sources on 3,162 workers of both sexes and ranging in age from 18-76 yrs, the data was reduced to meaningful evaluatory categories such as efficiency, accuracy, cooperativeness, etc., and treated according to age groups. The results are discussed in terms of differentiation between age groups, individual differences within such groups, and the relationship between change of traits and increasing age.

1906

Sage, L.C. & Knapp, S.S. AIRPORT LIGHTING SYSTEMS TESTING KIT. Contract AF 33(400) 29099. Proj. 6061. WDC 70 55 326. June 1955. 43pp. WPA Engineering Lab., Wright-Patterson AFB, Ohio.

1911

Carr, W.J., & Gerner, W.R. THE MAXIMUM PRECISION OF READING FINE SCALES. *J. Psychol.*, 1932, 34, 85-94. Contract NS-ori-164, T.O. 1, Rep. 164-1-130, Proj. Design, WH 784-008, ONR, Naval Eng. Lab., Systems Coordination Div. (Johns Hopkins Univ.)

1906

To develop kits containing instruments for acceptance and preventive maintenance testing and trouble shooting for airport lighting systems, visits were made to over thirty special equipment laboratories, Air Force bases, commercial airports, manufacturers of equipment, and specialists in the field. An analysis was made of airport lighting systems - the components, causes of failures, testing required, and the characteristics of effective testing kits. Recommendations were made for a kit of instruments and a procedure for conducting tests on new installations for acceptance, periodic preventive maintenance testing, and trouble shooting when failures occur. The kit contains commercially available instruments and equipment.

1911

To study some factors affecting the accuracy of reading fine scales, 15 subjects estimated to the nearest 1/200 the position of a pointer set between two unnumbered markers of a linear scale. Experimental variables were size of interval (0.5 to 2.0 millimeters in 15 steps), marker and pointer widths (0.1, 0.2, 0.4 millimeters). The discrepancies between estimated and true positions were converted to relative and absolute errors for analysis. Maximum accuracy as related to size of interval, width of pointer, and width of markers and the manner in which these factors influence interpolation habits is discussed.

G. R. 6

1909
Carnett, R. INDIVIDUAL DIFFERENCES IN HEARING FOR SPEECH. *Ann. Otol., Rhin., Laryng.*, June 1946, 55, 233-267.

Individual differences in relative acuity for speech reception stimuli and for pure tones were investigated from several points of view. The purpose was to clarify the incidence and significance of these individual differences as they were observed among hard of hearing patients reaching a military program for Aural Rehabilitation. To this end statistical studies were made and analysis of individual case studies employed. A number of statistical studies were made to assess the influence of: a) pattern of pure tone loss; b) duration of hearing loss; c) type of hearing loss; and d) acoustic trauma on difference scores. As a general conclusion, several variables produce systematic shifts in difference scores. A specific conclusion concerning each variable is given. The latter half of the paper is devoted to an analysis of case histories and to clinical interpretation of discrepancies between acuity for speech and for pure tones.

1912

Chapman, A. A COMPARATIVE STUDY OF FIVE TESTS OF COLOR VISION. *J. opt. Soc. Amer.*, July, 1945, 30, 626-649. (Johns Hopkins Univ., Dept. of Psychol., Baltimore, Md.)

1912

To evaluate five pseudo-isochromatic tests of color vision (American Optical Company, Ithaca, New York; Boston, and Easton-Kodak) in terms of their efficiency for detecting color vision deficiencies, 120 men were given these tests and compared with the Royal Canadian Navy Color Test (coloration). Each pseudo-isochromatic test was evaluated by comparing the results with the known classification: 66 normal and 34 color deficient. A plate by plate analysis was made and a further study of the legibility of the numbers used in the plates was made. The effects of visual acuity and age on test performance are evaluated.

1913

Chapman, A. THE DARK ADAPTATION OF THE COLOR ANOMALOUS REARED WITH LIGHTS OF DIFFERENT WAYS. *J. gen. Physiol.*, May, 1947, 30, 423-437. (Johns Hopkins Univ., Dept. of Psychol.)

1913

To study the course of dark adaptation of the color anomalous, determinations of minimum light thresholds were made over a period of 45 minutes following a pre-adaptation period. Four color normal, three deuteranopic (centeranomalous), and four protanopic (protanomalous) subjects were studied. Measurements were made with red, reddish orange, yellow, green, violet, and white test lights. Dark adaptation curves are analyzed and a theoretical explanation advanced to account for the findings in terms of the known sensitivity characteristics of the normal and color-anomalous eye.

G. 219.

1910

Carpenter, C.R. REQUIREMENTS OF RESEARCH ON INSTRUCTIONAL FILMS. *Hollywood Quart.*, Spring 1948, III(3), 262-266. (Pennsylvania State College, State College, Penn.)

1910

This article discusses the following seven requirements for research to improve the effectiveness of instructional films: applying what is already known, dealing with definable variables, making simple and precise experimental designs, developing measurement techniques to evaluate learning, acquiring adequate resources, obtaining cooperation between research and production personnel, and providing for field testing of instructional films.

1914

Chapman, A. DIAGNOSING TYPES OF COLOR DEFICIENCY BY MEANS OF PSEUDO-ISOTHERMATIC TESTS. *J. opt. Soc. Amer.*, March, 1949, 39, 240-249. (Johns Hopkins Univ., Dept. of Psychol.)

1914

To evaluate several pseudo-isochromatic tests for their usefulness in classifying types of color deficiencies, 34 color deficient men (selected by previous testing) were tested on the diagnostic plates of the Ishihara, Heyworth, and Boston color test. Each of the men was examined further with a Konica and Lomb visual spectrophotometer to determine his limit of visibility in the long wave-length (red) end of the spectrum. Test results and the spectrophotometric measurements were evaluated for their ability to differentiate two kinds of color deficient individuals (protano or deuterano).

T. 9.111.

1915

Chapman, S. RELATIONSHIPS BETWEEN AGE, VISUAL ACUITY AND COLOR VISION. *Human Biol.*, 1950, 22, 30 pp. Contract NS-405-166, T.O. 1, Ser. 166-1-103, GPO, Special Devices Center, Systems Res. Proj., Fort Washington, Pa., U.S. (Johns Hopkins Univ.)

1916

To study relationships among age, visual acuity and color vision, 574 visitors to the Baltimore Occupational Exhibition were tested with a new visual acuity test chart and five pseudo-isochromatic tests of color vision (Danzon and Dillingham, 1948; Dillingham, American Optical Company, author's own test). The distance for all testing was 32 inches and the illumination thirty foot candles. The visitors ranged from seven to 77 years of age. The results are analyzed by correlational procedures and discussed in terms of the effect of age on visual acuity and color vision. 7,511,890.

1916

Chapman, S. VISION. *Ann. Rev. Physiol.*, 1949, 10, 133-152. (Johns Hopkins Univ., Dept. of Psychol.)

1916

This review of literature on vision covers the period from September, 1944 through June, 1947. The topics covered are: reviews and bibliographies, physiology of vision—photoreception and electro-physiology of the retina, color vision, color blindness, luminosity functions of the eye, and effects of smoking, visual accommodation and testing—general tests, color vision and color blindness, dark adaptation, night vision, and stereoscopic vision. R275.

1917

Chapman, S., Rouse, R.O., & Schachter, S. THE EFFECT OF INTER-SENSORY STIMULATION ON DARK ADAPTATION AND NIGHT VISION. *J. exp. Psychol.*, Aug., 1949, 22, 425-437. (Johns Hopkins Univ.)

Reported are 3 experiments conducted to test Russian claims that inter-sensory stimulation and light muscular exercise significantly improved light adaptation.

In the first experiment, six Ss were tested with a Hecht-Shlaer adaptometer on 11 consecutive days. Experimental treatments consisted of swilling oil of wintergreen, listening to a 1000-cycle tone, and performing light muscular exercise on a bicycle ergometer. Control and experimental dark-adaptation sessions were varied systematically from day to day. In the second experiment, five Ss were tested on five consecutive days with the Luckiesh-Hess Low-Contrast Test-chart. The stimuli used here were a loud and soft tone and a heavy and light pressure applied to the back of the hand. The third experiment measured the effects of similar stimuli on form discrimination at very low illumination levels. The results of all experiments are completely negative. None of the stimuli used in this experiment either facilitated or inhibited dark adaptation, contrast sensitivity, or form discrimination at low illuminations. R 21

1918

Crouch, C.L. THE RELATION BETWEEN ILLUMINATION AND VISION. *Illuminating Engineering*, Nov., 1945, 42, 747-764.

1919

To answer the question "How much light is enough for reading?", basic studies on the relation between illumination and vision (particularly visual acuity) are reviewed in terms of the factors into which the engineer has divided the visual task—size, contrast, time, and brightness. Further effects of age, sub-normal vision, and glare are discussed. Specifications for illumination levels for some tasks are given. 7,511,890.

1920

Elfred, K.X., & Kyrasie, D.T. NOISE CHARACTERISTICS OF AIR FORCE TURBOJET AIRCRAFT. Proj. 7210, Task 71705, NADC Tech. Note 56-280, Dec. 1956, 31pp. Aero Medical Lab., NADC, 1200, Wright-Patterson AFB, Dayton, Ohio.

1920

This report presents a summary of the noise characteristics of all operational Air Force turbojet aircraft to be used in establishing zones within which maintenance and other personnel must wear personal protective devices to avoid the risk of permanent hearing damage. The noise characteristics for each aircraft include: (1) a plot of over-all sound pressure level along the angle of maximum noise radiation versus distance from the aircraft engine exhaust; (2) contours of equal sound pressure level; and (3) over-all levels at maintenance positions. Directions are included for using the data. Generalized noise characteristics are included to simplify evaluation of maintenance operations which involve more than one type of aircraft. T. O. R 5

1921

Crook, M.M. PRINTED MATERIALS, MAPS, AND CHARTS. From Human Factors in Undersea Warfare, 1949, 61-76. National Research Council, Washington, D.C. (Tufts University, Medford, Mass.)

1921

This report is a reprint of Chapter Two from Human Factors in Undersea Warfare. A review of representative research on the following topics is presented: general factors of typography; illumination and fatigue in normal reading, with reference to methodological problems; perception of type at a distance; legibility of numerals; tables and graphs; and problems of the use of maps and charts. Possible areas of further research are suggested. R 60

1922

Craik, K.J.M. INSTRUMENT LIGHTING FOR NIGHT USE. EPRC 342, July 1941, 11pp. Flying Personnel Research Committee, London, England.

1922

To evaluate instrument panel lighting system for night use by pilots, the time to read a 3-3/4 inch dial to a mean accuracy of two percent was measured under varying illumination levels; the time to pick up a stationary silhouette in an unknown position at five feet after reading the instruments is also taken as a measure of effect on dark adaptation. Variables investigated were: style and size of lettering, graduations, methods of illumination (white or colored floodlighting, concealed indirect or ring lighting, fluorescent, and radio-active joint). Specifications of a proposed lighting system are given. G. 1

1923

Crawford, S.H. VISUAL ADAPTATION IN RELATION TO BRIEF CONDITONING STIMULI. *Proc. Roy. Soc., Ser. B*, 1947, 134, 283-303.

1923

This paper reports a number of experiments, carried out during wartime, investigating factors influencing dark adaptation. Threshold measurements were made of changes in adaptation before and after a conditioning stimulus was applied. After removal of a relatively brief conditioning stimulus other measurements were made to study the effects of removal of test field contrast, superimposed steady background, area of test field, use of equivalent background transformation, individual differences, color and intensity of conditioning stimulus, spatial and temporal patterning of conditioning stimulus, and the use of natural objects for test stimulus.

T.F.I.29.

1924

Davy, E. SOME RECENT ENGINEERING ASPECTS OF THE PORTABLE FLAME THROWER GUN (U). Proj. 4-08-02-019-01, Chemical Warfare Lab. Rep. 2104, April 1957, 20pp. USA Chemical Warfare Lab., Chemical Corps Research and Development Command, Army Chemical Center, MD.

1924

To study positioning of hand controls on the portable flame thrower gun, two handgrip dynamometers were used to represent controls. Amount of pressure that could be exerted on each was used as an index of optimal positioning. Factors studied were: (1) displacement positions (four horizontal, two vertical, and three lateral); (2) hand position in operation of trigger (grip) control (horizontal with palm up or down and vertical); (3) separation of handgrip components (5.5, 6.5, and 7.5 centimeters); and (4) dynamogenic effect of left hand pressures (0 to 40 kilograms) on maximum right hand pressure. Findings are discussed in relation to equipment design.

T. I. R 3

1925

Chapanis, A. L'ADAPTATION DE LA MACHINE A L'HOMME: L'ETUDE DES RELATIONS HOMME-MACHINE. (ADAPTING THE MACHINE TO MAN: THE STUDY OF MAN-MACHINE RELATIONSHIPS). *Revue de Psychologie Appliquee*, 1956, 6(4), 213-234. (prepared under contract NS-01-166, Task Order I, The Johns Hopkins University).

1926

This paper defines the field of engineering psychology and presents reasons for its present state of development. Illustrations of some kinds of experimental and theoretical research in this field are given together with the way in which the results are put to use in practical situations. Contributions of the engineering psychologist to methods of industrial research and man-machine systems design are discussed.

T. I. G. R 13

1926

Davis, R.C. AN INTEGRATOR AND ACCESSORY APPARATUS FOR RECORDING ACTION POTENTIALS. *Amer. J. Psychol.*, Jan. 1948, 61, 100-104. (Indiana University, Bloomington, Ind.).

An integrator which will show the variation of action potential over short intervals of time is described. Additional characteristics are the ability to handle output of a push-pull circuit and produce a record having a direct linear relationship to the total action potential in a period. 2 variations of this integrating circuit are described; each of which has its advantages.

R 3

1927

Davis, R.C. MOTOR EFFECTS OF STRONG AUDITORY STIMULI. *Amer. Psychol.*, June 1948, 48(1), 257-275. (Indiana University, Bloomington, Ind.).

To study possible motor responses to sensory stimuli 2 experiments were conducted in which muscular action potential, under both forearm, under loud stimulation was recorded. The 50 being instructed to do nothing in response to the stimuli. An increment in action potential over the immediate pre-stimulus level was considered to be a response. The following results were obtained: a) The stimuli produced 2 responses, called a and b, since 2 parts of the overall response curve have different functional relations; b) Both a and b responses are closely related to the state of tension existing just before the delivery of the stimulus; c) Latency, relative to stimulus intensity, and course of adaptation differed for a and b responses. These responses are probably related to some previously studied by other methods, but a complete theory must await more information. (JH145)

1927

R 13

1929

Carls, E., Melnik, R. & Smith, E.C. DIMENSIONAL ANALYSIS OF MOTION: I. EFFECTS OF LATERALITY AND MOVEMENT DIRECTION. *Amer. Psychol.*, Oct. 1961, 36(5), 363-366. (University of South Dakota, Vermillion, S.D.).

1929

In a study of differences in manual actions between right- and left-handed subjects, the Universal Motion Analyzer was used to analyze the directional movement patterns of 32 right-handed and 32 left-handed subjects. Results are presented and discussed in terms of the differences between right- and left-handed subjects with regard to manipulation time and travel time.

1930

Tidwell, J., & Sutton, J.H. FATIGUE, AN INTRODUCTION TO A CONCEPT. Prepared under Contract NS-01-126801, Aug. 1954, 32pp. San Diego State College.

1930

This report discusses the concept of fatigue primarily in terms of the various means used to measure the effects of prolonged activity: performance changes, physiological changes, and attitude changes. The methodology used in each case is presented briefly; limitations of each are pointed out. Causes of fatigue are treated under the general topics of: (1) physical environment (illumination, atmosphere temperature and humidity, ventilation, noise), and (2) psychological environment (morale, monotony, boredom, emotion, rest pauses, and work methods).

1931
 DeBolt, E.F. CONVIN MONOGRAPH ON SUBMARINE MEDICINE. March 1949, 14p. Bureau of Medicine & Surgery, Res. Div.

Presented here is an abridged version of a monograph on submarine medicine translated from the original German monograph. The contents of the report is based on the work of the staff of the German Submarine Medical Research Institute. Topics dealt with in the report were: the medical service in the submarines; man and environment in the submarines; content of O_2 and CO_2 in the submarine air; chemical climatology of the toxic substances in the air of the submarines; absorption of CO_2 in water; carbon monoxide on submarines; the regulation of the blood circulation of man on submarines; adaptation to increased CO_2 concentrations in the inhaled air; the influence of service on submarines on the Auditory Organ; the nervous syndrome of submariners.

R 0

1932
 Correll, H.W. FLARE-OUT CONTROL FOR LANDING. GPO, Wash., March 1954, 31pp. NSAF Institute of Technology, Wright-Patterson AFB, Ohio.

1932
 This report describes a flare-out system which was developed to provide a blind landing system. The flare-out computer was simulated with a G-4 type aircraft on a Reeves Analog Computer using a pilot as the error sensing element. The results of the study are discussed and suggestions made for investigating the applicability of the system under actual flight test conditions.

T. R 4

1934
 American Power Jet Co. ADVANCED METHODS OF CARGO HANDLING, EXTERIOR MODIFICATIONS. Contract DA 44-177-TC-242, Rep. 128-3, Jan. 1955, 124pp. American Power Jet Co., Transportation Research and Development Command, Fort Eustis, Va.

1934
 This report presents a series of specific equipment recommendations for improvements in the cargo handling process within the range of port and beach cargo loading, discharge, and clearance. The recommendations are intended for immediate implementation (as of 1955) without major changes in facilities. Each recommendation is evaluated and justified on its own merits and each change is thoroughly described in terms of problem area, impact on operation, required development costs, and its impact on Transportation Corps operations. Recommendations cover the range of loose cargo, unitized pallets, containers, vehicles, and heavy lifts.

T. I. R 22

1935
 Duntley, S.Q. THE VISIBILITY OF DISTANT OBJECTS. J. Opt. Soc. Amer. 1948, 38, 237-243. (MIT)

1935
 This report presents monographic visibility charts constructed on laboratory data of contrast thresholds for the human eye combined with photometric data of the luminance of the object, its background, and the optical state of the atmosphere. The charts permit prediction of the visibility of objects by unaided vision or with perfect binoculars along either horizontal or inclined paths of sight for any set of prevailing weather conditions.

G.R.3.

1936
 Dvork, A. A ONE-HAND KEYBOARD FOR ONE-HANDERS. Handicap, April 1950, 3pp. (University of Washington, Seattle, Wash.).

1935
 A simplified typewriter keyboard for one-hand operation (one for the left and one for the right) is described. In designing the keyboard, the data from an earlier investigation of typewriting was used so that those keys used for 96.5 percent of all ordinary typing can be reached by extended reaches of the first and fourth fingers without the hand leaving the "Guide Position." Procedures for securing the machine or for converting a standard machine are given. In addition, critical comments are made on the standard keyboard.

I.

1937
 Dvork, A. THERE IS A BETTER TYPEWRITER KEYBOARD. Nat. Res. Econ. Comm., Dec. 1943, 11-12, 51-52, 66.

1937
 The article discusses a simplified typewriter keyboard design. A history of keyboard design and criticism of inadequacies of the standard keyboard are included. Relevant variables in typing are discussed, such as finger movements, keys assigned to fingers and typing errors. Illustrations accompany the discussion. A comparison of the new keyboard and the standard keyboard is made in terms of economy in learning time, operating efficiency, retaining standard keyboard typists, and cost. Summaries of newspaper articles on the topic are included.

T. G. I. R 4

1939
 Kennedy, J.L., & Travis, R.C. PREDICTION OF SPEED OF PERFORMANCE BY MUSCLE ACTION POTENTIALS. Contract NSori 58, ONR, Special Devices Center, Tufts College, Medford, Mass.

Described is an electronic counting technique in recording data on frequency of muscle action potential. The task described was to respond to an occasionally presented stimulus (simultaneous flash of light and sound of a buzzer) by pressing a key as quickly as possible. The presentation of the stimulus, occurrence of response frequency of action potentials from surface electrodes placed over the supraspinal muscles, low-frequency potentials from the same suborbital electrodes, and muscle action potential rate from electrodes on the hand were all recorded on a Grass ink-writing oscillograph. At a point in the task, the subject knocked on the door of the experimental room. The stimulus before the knock elicited no response but the knock produced a "startle" reaction with the immediate resumption of muscle spike activity, low-frequency activity, and a pressing of the response key in the absence of a stimuli. It was felt that this arrangement would permit versatility in studying a variety of muscle contraction problems under a variety of conditions of effort and work. It is also felt that these techniques may make it possible automatically to warn personnel engaged in monotonous tasks, such as truck driving, before dangerous conditions of inattentiveness and approaching sleep occur.

1940
 San Diego State College Foundation. BIBLIOGRAPHY - COMPARISON AND INTERACTION AMONG SENSORY INPUT CHANNELS. Contract Nonr-1268(01), March 1955, 17pp. San Diego State College Foundation.

1940
 This is a bibliography on the comparison and interaction among sensory input channels. Primary sources are journals published between 1934-1954 with a few references to book chapters. Some foreign language references are included in the 245 titles.

R 245

1961
Fitts, P.M. PSYCHOLOGY AND AIRCRAFT DESIGN: A STUDY OF FACTORS PERTAINING TO SAFETY. Mechanical Engineering, Feb., 1967, 135-141. NAC, Aero Medical Laboratory.

This first part of this report is on a study conducted to determine some of the difficulties experienced by pilots in using existing equipment. Pilots were asked a series of standard questions that required the Ss only to give an accurate description of their past experiences in flying. These questions dealt with experiences in taking off, flying in instrument weather, landing, mistakes in interpreting instruments, mistakes in using controls, description of experiences or procedures which required the S to be "most on the ball." Each pilot was asked for any "pet peeves" about the cockpit. The reports indicated that many of the incidence of accidents and near-accidents could be reduced by designing new equipment in relation to the psychological capacities and human limitations of the user. The second part of the paper reports a selected group of experiments in the field of psychological engineering. These experiments were conducted on Army Air Force pilots and investigated display problems including: a) the design of clock dials for reading in the military time system; b) design characteristics that would reduce errors in the use of air-navigation plotters; c) factors affecting the legibility of aircraft instrument dials; d) a comparison of 4 types of artificial-horizon indicators. Several studies were concerned with control problems. One of these studies examined human motor abilities related to control design and another dealt with the accuracy and consistency with which pilots can apply specified pressures to stick, wheel, and rudder controls. These represent only a small contribution to the improvement of aviation equipment and more research is strongly recommended.

R 0

1964
Flanagan, J.C. METHODOLOGY IN PSYCHOLOGY. Psychometrika, 1962, 12, No. 4. U. Pittsburgh, Amer. Institute for Research, Pittsburgh, Penn.

This paper considers the problem of methodology in scientific research in the field of psychology. Some of the basic considerations that are considered as essential to sound methodology in psychology are set forth. These include: a) defining and formulating problems; b) conditions and controls; c) observing and perceiving; d) recording and communicating; e) sampling; f) analyzing data; and g) interpreting results. Examples of the application of this methodology is presented and includes the application to job analysis, studies of the learning process and in problems of clinical psychology.

R 0

1965
Forbes, T.M. STREET AND HIGHWAY TRAFFIC. Transportation, c1969, pp 325-335.

Psychological studies which have contributed toward the solution of highway traffic problems are surveyed. Studies of driver characteristics are examined. Analyses of accident data with respect to age and experience, appreciation of hazards, and driver attitudes are presented. Next, studies of the motor coordination and skill involved in driving and other evidence of driver abilities are summarized, and a theory of accident causation is presented. The second half of this paper looks at driver and pedestrian education, traffic regulation and enforcement, and traffic engineering. Not all of the large number of studies and reports in the field are treated, but emphasis is given to the more recent and better controlled studies. (EIAS)

R 6

1966
Ford, A., Rigler, D., & Dugan, Genevieve, E. POINT CENTERING OF SIGNALS ON AN AREA. J. appl Psychol., 1950, 35, 429-433. (Lehigh University, Bethlehem, Penn.).

Of concern here is the precision with which signals, consisting of white spots or patches can be located or "checked" on a dark field, such as that of a radar scope. Signals can be located by a superimposed cursor which actuates a remotely controlled indicator. Reported is an investigation designed to handle the human error problem of how accurately the operator sets the cursor on the signal on "pip." It was found that Ss tended to wobble around the near center on both the artificial signals and the reproduction of the natural signal. The best reduction rates for hand movements in relation to cursor movement was close to 2:1. It was also found that centering signals on an area by means of a pantograph-controlled cursor is about 3 times as accurate as the location of such signals by scale reading methods. The use of a palm rest resulted in slightly superior scores in center and was preferred by the Ss. The limits of visual perception account for less than 1/2 of the range of errors. Skill and precision attitude may account for the remainder. It was found that a cursor surrounded by rings like a "bull's eye" reduced the tendency to drift around actual center.

R 9

1967
Nichol, R.J., Hoffmann-Heyden, A.E., & Chamer, S.A. SOME ASPECTS OF THE PERFORMANCE OF RADAR/PLOTTING BOARD SYSTEMS. AFMTC-TN-56-51, Tech. Note 20, June 1960, 37pp. Air Force Missile Test Center, Patrick AFB, Fla.

1967
This report investigates characteristics of radar/planning board chart information for a selected mission by comparing plotted data from four different radars tracking a common target. Only data in the horizontal (X,Y) plane were considered, while analysis of altitude data was omitted for technical reasons. Apparent errors between plotted data and random errors of data sets are calculated for numerical magnitude, and statements of relative accuracy of plots are related to the resolution of the plots.

T. G.

1949
Garner, W.R. THE ACCURACY OF COUNTING REPEATED SHORT TONES. *J. exp. Psychol.*, 1951, 41, 319-326. Contract NSori 166, Proj. NR 704 001, Rep. 166 I 122. ONR, Special Devices Center, Johns Hopkins University, Baltimore, Md.

This experiment was designed to determine the accuracy with which Ss can count the number of short tones in a temporal series as a function of the repetition rate of the tones and the total number of tones in a series. The Ss were presented a series of short 1000 cps tones and was required to count the total number of short tones. Rates of 4, 6, 8, 10 and 12 per sec. were used, with numbers from 1 to 20. Tone durations of 5 and 40 msec., and intensities of 55 and 95 db SPL were also used. The results indicate that there are no differences in counting accuracy due to either duration or intensity of each tone. The accuracy of counting is a function of both number of tones and repetition rates. The data show, that as the number of tones and repetition rate increased and accuracy decreased, the Ss underestimate the number of tones in a series. It is also shown that individuals differ markedly in their ability to count tones. Randomizing the repetition has a statistically significant but practically unimportant effect on counting accuracy.
R 2

1950
Garner, W.R., & Merthensamer, M. SOME EFFECTS OF INTERAURAL PHASE DIFFERENCES ON THE PERCEPTION OF PURE TONES. *J. acoust. soc. Amer.*, 1951, 23, 664-667. Contract NSori 166, Proj. NR 704 001, Rep. 166 I 131. ONR, Special Devices Center, Johns Hopkins Univ., Psychol. Lab.

Fifty-four naive observers were asked to report whether they could hear a difference between two successive tones which differed only in respect to which ear was leading in phase angle. They were not given specific suggestions to listen for a particular effect, but were later asked what they had heard. Two intensities, eight frequencies, and seven phase leads were used. The major conclusions from the results are: a) all observers heard differences due to phase and identified the differences as localization, although for most the localization was in terms of which ear was stimulated rather than in terms of apparent localization of a sound source; b) pitch and loudness differences also occurred, but cannot be explained on the assumption that only one ear was effectively stimulated; c) measures of phase-difference thresholds, upper frequency limits, and time-difference thresholds show approximately the same results as are obtained with other methods.
R 7

1951
Garner, W.R. HEARING. *Annual Review of Psychology*, 1952, 111, 85-124. Contract NS ori 166, Proj. NR 704 001, Rep. 166 I 132. ONR, Special Devices Center, Johns Hopkins Univ., Psychol. Lab., Baltimore, Md.

Presented is a review of the literature on hearing covering the pertinent material up to May 1951. The major areas handled by the review are: Electrophysiology of the Cochlea; Audiometry; Loudness and Masking; Auditory Fatigue and Deafness; Short Duration Auditory Fatigue; Measurement of Neural Fatigue; Loudness Recruitment; Pitch; Localization of Sound; Binaural Interaction in the Nervous System; Hearing of Speech; Frequency Selectivity in the Nervous System and Auditory Theory.
R 87

1952
Garner, W.R. & Hake, H.W. THE AMOUNT OF INFORMATION IN ABSOLUTE JUDGMENTS. *JHU Rep.* 166 I 137, 1951. Reprint 22 52, Nov. 1951, 14pp. *Ind Research Lab.*, Washington, D.C. (Johns Hopkins University).

1952
This paper demonstrates that a measure of the amount of information is useful for the analysis of data obtained by absolute judgments. Equations for calculating this measure are derived and possible interpretations discussed. The contingency coefficient is shown to have some of the same properties as the amount of information. The problem of selection of the stimuli for maximum information transmission is discussed and a technique for constructing the needed scale of equal discriminability is described.
T. G. I. R 8

1954
Garner, W.R., & Gebhard, J.W. MACHINE DIALS AND SCALES. *Machine Design*, 1949, Aug. 999. Contract NS-ori-166, Rep. 166-I-8-6. ONR, Special Devices Center, Johns Hopkins Univ., Psychol. Lab.

1954
This paper presents guides to the design of machine dials and scales for quick and accurate reading based on findings of experimental research in the area. The various ways dials and scales are used, e.g., direct reading, directional reading, and quantitative reading, are discussed. The spacing and numbering system of dial markers is discussed and a nomograph permitting reading percentages of correct readings to an interval is given. Other topics include kinds of scales and dials, use of counters and combination instruments, arrangement of dials, and miscellaneous design problems.
G, I, 310.

1953
Garner, W.R. SOME STATISTICAL ASPECTS OF HALF-LOUDNESS JUDGMENTS. *J. acoust. soc. Amer.*, 1952, 24, 153-157. Contract NS ori 166, Proj. NR 704 001, Rep. 166 I 139. ONR, Special Devices Center, Johns Hopkins Univ., Psychol. Lab.

Half-loudness adjustments have been obtained from 18 observers at 10 intensity levels from 10 to 100 db. Adjustments were made with two methods. An analysis of variance of the attenuation scores necessary for half-loudness showed: a) Intensity accounted for a quarter of the variance. This variance indicates the extent to which the attenuation necessary for half-loudness varies with different intensities. b) Consistent differences between observers accounted for 35 percent of the variance, indicating that some observers consistently require much greater or less attenuation for half-loudness than others. c) One-tenth of the variance was a result of the fact that the shape of the half-loudness function with respect to intensity was different for different observers. d) The error variance, caused by repeated adjustments by the same observer at the same intensity and with the same method, was 22 percent of the total. e) Other variances were practically insignificant. The average half-loudness function differs markedly from previously reported results. It is suggested that this discrepancy, as well as the large differences between individuals, is largely a result of the fact that observers have difficulty establishing the correct fractional value, and thus are extremely susceptible to indirect suggestion. A means of avoiding this problem of a nonvital fraction is suggested.
R 7

1955
Gurner, W.A., C. Miller, G.A. THE MASKED THRESHOLD OF PURE TONES AS A FUNCTION OF DURATION.
J. acoust. Soc. Am., 1947, 17, 291-303. Contract OMAr 624. Mass. Psycho-Acoustic Lab.

The relation between auditory sensitivity and the duration of a pure tone was measured using 4 St. 4. different frequencies (500, 570, 1000, and 1500 cps) and 8 different levels of intensity (2.5, 25, 50, 100, 500, 1000, and 2000 msec.) were used. Because of the difficulties involved in measuring the threshold of hearing in the quiet, with any degree of precision and reliability, the masked threshold was determined with a white-noise masking spectrum. The following results were obtained: a) The ear integrates acoustic energy linearly up to 200 msec., for when the duration is decreased by a factor of 10, sensitivity is decreased by 10 db; b) For durations longer than 200 msec., the change in sensitivity is slight, and acoustic integration may be considered complete at approximately 1-sec. The hypothesis that the auditory system integrates acoustic energy linearly, if the zero intensity is reported as that intensity which is effectively zero for the ear, was tested. The data substantiate the hypothesis fairly well. Crofters' statistical hypothesis was also tested, and the data fit that hypothesis as well as they fit the previous hypothesis. Mathematical relationships between the 2 hypotheses are shown such that if the data fit on hypothesis, they must of necessity fit the other.

1957
Graham, C.E., Riggs, L.A., Mueller, C.G., & Solomon, R.L. PRECISION OF STEREOSCOPIC SETTINGS AS INFLUENCED BY DISTANCE OF TARGET FROM A FIDUCIAL LINE. J. Psychol., 1949, 27, 203-207. Contract OMAr-1039. OSRD, Brown Univ.; and Contract NSom-271, Proj. NRI42-404. OSR, Columbia Univ.

1957
To study the way in which stereoscopic threshold settings are influenced by the nearness of the target to a reference fiducial line, five subjects made settings on two types of reticle patterns (single vertical line at different distances to the left of center, and vertical line along the diameter with a "break"). The target (stationary airplane silhouette, slightly below center) was adjusted to the same apparent distance as the reticle lines. The geometric mean average deviation of the settings is plotted as a function of distance of target from reticle line. Comparison is made between the two types of reticle patterns used.

G.I.33

1958
Gambrell, L.M., King, R.E., Stanton, C.I. & Gaffney, G.K. SYSTEMS ENGINEERING RELATING TO COMMUNICATIONS FACILITIES FOR THE COMMON SYSTEM OF AIR TRAFFIC CONTROL. FINAL REPORT TASK A PART 3 VOLUME 2 DESCRIPTION OF PROVISION DISPLAY FOR DEMONSTRATION OF SEMI-AUTOMATIC AIR TRAFFIC CONTROL DATA COMMUNICATION SYSTEM. Contract DA 36 039 SC 64567, Dec. 1955, 141pp. Bell Telephone Laboratories, Inc., New York, N.Y.

1958
An earlier report in this study of air traffic control described means by which existing equipments and known techniques could be integrated into a semi-automatic system of communications terminating in a dynamic display, both symbolic and pictorial, of the information needed for controlling air traffic. This report describes a demonstration of the dynamic nature of the end product of the first stage of the proposed system. The pictures used are appended.

I.

1959
Graham, C.E. SOME FACTORS THAT LIMIT VISION. Monthly Research Report of the Office of Naval Research, 1961, Sept., 16-25. OSR, Washington, D.C.

1959
This paper discusses five visual functions (threshold sensitivity, differential sensitivity, acuity, depth discrimination, and monocular movement parallax) and the parameters which influence them, such as stimulus area, duration, wavelength, retinal position, and the degree of dark and light adaptation. Generalizations concerning the limiting conditions of vision are presented.

G.322.

1960
Graham, C.E., Baker, Katherine E., Nacht, Marcus, & Lloyd, V.V. FACTORS INFLUENCING THRESHOLDS FOR MONOCULAR MOVEMENT PARALLAX. J. exp. Psychol., 1960, 59, 205-223. (Columbia Univ., Psychol. Lab.)

1960
To explore factors influencing thresholds for monocular movement parallax (subjects stationary, while objects in space move), 10 practiced subjects made distance settings of two needles, one above the other, moving at constant and equal speeds back and forth across an illuminated field. Variables were: (1) differences in size of moving objects, (2) intensity of illumination, (3) rate of movement, and (4) axis of movement. The data consist of variability measures of threshold settings and are analyzed as functions of the variables tested. A theoretical discussion is given of the geometry of the situation and of the results in relation to space perception cues.

T.P.136.

1961
Gray, J.S., & Prevette, P. FLUORESCENT LIGHT VERSUS DAYLIGHT. J. appl. Psychol., 1960, 34, 235-236.

1961
To study the effect on vision of fluorescent illumination as compared with daylight, 50 subjects read (8-point type) continuously for two hours under both conditions (20 footcandles). Visual functions (acuity, stereopsis, lateral and vertical phorias) were measured with the American Optical Company's Sight-screener before, midway, and after each period. Data are presented as mean changes in scores from daylight to fluorescent light and compared for the two types of light.

T. R 4.

1962
Whitcher, H. RESPIRATORY PATTERNS AT DIFFERENT WORK RATES: THEIR CORRELATION WITH BREATH HOLDING TIMES AND MASKING TIMES. Porton Tech. Paper 499, Aug. 1955, 13pp. Chemical Defence Experimental Establishment, Directorate of Chemical Defence Research and Development, Ministry of Supply, London, England.

1962
This experiment was undertaken to provide an empirical basis for evaluating the procedures used at the beginning of a gas alert. The respiratory patterns of 18 men and 9 women were determined when they were required to stop breathing for as long as possible. They each wore an oro-nasal mask connected to spirometer. The subjects stepped up and down a 20 inch step at a rate of 7.5, 15 or 30 times per minute. The initial tidal air and minute volume, the volume of air inhaled immediately following the signal to stop breathing, the maximum breath holding time, the volume of involuntary respiration during breath holding, the volume and duration of the minimal intervening gasps, and the terminal tidal air and minute volume were recorded.

T. R 8

1963

Valentine, G. DYNAMIC ANALYSIS-EMERGENCY
ESCAPE SYSTEMS. Rep. 451, June 1956, approx.
200pp. Stanley Aviation Corp., 2506 Dallas
Street, Denver, Colo.

1963

To appraise several configurations of emergency escape devices (ejected seat or seat capsule), the following characteristics for each were determined for ejection at 500 knots EAS at sea level and 4000 feet altitude: trajectory to fall; spiral and cross-body acceleration; velocity and altitude versus time. Also determined were thrust requirements for upward ejection at maximum g and minimum altitudes and low altitude escape limitations for critical configurations. The devices evaluated included upward seat, downward seat and seat capsule in three variations each: forward facing, aft facing, and with added mass.

G. B. 11

1966

Harrison, M.W. VISIBILITY OF CATHODE-RAY
TUBE SCREENS: SEARCH TIME AS A FUNCTION OF
SIGNAL STRENGTH. J. Psychol., 1960, 23, 247-
250. Contract NSG-1-101, Proj. NR-704-001,
Rep. 106-1-101. ONR, Special Devices Center,
Johns Hopkins Univ.

1966

To study search time as a function of signal strength, three subjects located the target (small pip) displayed on the Plan Position Indicator of a Cathode-Ray Tube (CRT) of optimum screen brightness. Eight signal voltages were used: 0.2, 0.4, 0.6, 0.8, 1.0, 1.2 and 1.4 decibels above threshold. Search time is given in seconds and analyzed in relation to signal voltage.

J. B. 11

1964
Gulbert, A. & Taylor, G.L. RADIATION AREA OF THE HUMAN BODY. J. Anal. Psychol., July, 1952,
2, 24-37. (Engineering Dept., University of California, Los Angeles, Calif.).

A method for determining directly the area of that part of the body surface which takes part in radiation exchange with the surround is described, together with results obtained for three subjects of divergent body shape and for four different body postures. The analytical basis of the method is developed from the concept of the local shape factor integrated over all space, permitting, by use of the reciprocity theorem, an evaluation of the equivalent total projected area, defined as the radiation area. The experimental procedure involves the photographing of the human subject at a fixed distance in excess of 15 ft., from 32 viewing angles chosen to sample effectively the surface of a hemisphere described about the sagittal plane as equator. The planimetered areas from each photograph, representing projections of the body, are plotted as functions of two angles which define the viewing position, and by a graphical integration procedure the total area "seen" by the whole of the surround is obtained. Data were obtained by this method for the nude radiation area of an "average" young man, whose body dimensions closely approximate those of the Air Force median cadet. In four distinct postures described as erect, semi-erect, seated and crouched. For the erect and seated postures, data were also obtained for a heavy and a light individual. The influence of clothing was evaluated for the average man in the erect posture, with limited additional observations in the other three postures. While the radiation area is a function of posture, as expected, no evidence for a relationship with body type was found. The results are best expressed in the form of a factor expressing radiation area as a proportion of the total body surface area as given by the Dubois formula. The average values of this radiation area factor for nude subjects in the four postures from erect to crouched are 0.77, 0.72, 0.70 and 0.65, respectively.

A. 15

1957

Maciulek, J.A. CIRCULATORY REFLEX ACTIVITY
AS A G-PROTECTIVE DEVICE. Proj. 7216, WADC
TR-55-1, Jan. 1955, 5pp. Wright Air Development
Center, ARDC, Wright-Patterson AFB, Ohio.

1957

To investigate the increase in human tolerance to positive acceleration afforded by circulatory reflex activity, the response on the human centrifuge of seven seated subjects to positive accelerations of normal rapid onset (1.0 g/second) was compared with their tolerance in time having 0.07 to 0.1 g/second rate of onset. The responses recorded were intermediate visual symptoms (lights dim) and blackout. The application of the findings to ferrying and bomber operation is discussed.

M. B. 10

1965

Kelley, Rita M., & Chaponis, A. ON THE NUMBER OF ABSOLUTELY IDENTIFIABLE SPECTRAL HUES.
J. opt. soc. Amer., 1951, 41, 1057-1058.
Contract NSG-1-101, Proj. NR-784-001, Rep.
106-1-134. ONR, Special Devices Center,
Johns Hopkins Univ.

1965

To investigate the number of absolutely identifiable spectral hues, subjects (normal color vision) observed a test spot and identified the color by number. Familiarization and practice procedures of number identification preceded the judgment test. A 17-hue series, primarily selected from wavelengths separated from each other by an equal number of just noticeable differences, was judged first then reduced to a 15-hue, 12-hue, and 10-hue series. The percent total judgments of correct identifications are presented and related to findings from other similar studies.

T. R. 3.

1965

Harris, J.D. AUDITORY ACUITY IN SEVERE AERO-OTITIS MEDIA. J. Acoust. Soc. Amer., Oct. 1945,
17(2), 139-143. (USN Submarine Base, New London, Conn.).
39 No. 4 ears and 40 No. 0 ears, measured on a 5-point otoscopy scale, were given a 6-octave audiogram before and after a 50 lb. dry pressure test. Comparing the No. 4 ears with their pre-pressure state or with a control group, it was clear that sound transmission was not greatly affected. In view of the data reported and in the absence of evidence to the contrary, the hypothesis is put forth that the pathological condition of the structures of the ear in acute aero-otitis media does not of itself bring about greatly lowered acuity. Differences between the acuity data in barotrauma presented here and that reported by the Air Forces are discussed. (HEAS)

1974

Hardy, J.R., Wolff, H.G., & Goodell, Helen. STUDIES ON PAIN: DISCRIMINATION OF DIFFERENCES IN INTENSITY OF PAIN STIMULUS AS A BASIS OF A SCALE OF PAIN INTENSITY. J. Clin. Investigation, 1947, 26, 1132-1138. (N.Y. Hospital, Russell Sage Institute of Pathol., and Cornell Univ. Med. College, Depts. Physiol., Med., and Psychiatry.)

1974

This study presents data on just noticeable differences in estimation of painful stimuli obtained by inducing pain in the skin with thermal radiation. The Weber ratio for pain is computed for stimulus intensities ranging between 225 and 1100 milliwatts/cm². On the basis of these data a psychophysical scale of pain intensity is proposed, the unit of which is called a "dol".
F.T.M15.

1975

Hardy, J.R., Wolff, H.G., & Goodell, Helen. THE PAIN THRESHOLD IN MAN. Research Publications of the Assoc. for Research in Nervous and Mental Disease, 1945, 23, 1-15. (N.Y. Hospital, Russell Sage Institute of Pathol., and Cornell Univ. Med. College, Depts. Med., Psychiatry.)

1975

This short review of some experimental and clinical findings concerning the pain threshold in man includes discussion of the following topics: definition of pain perception; description of experimental apparatus and procedures; individual differences in pain threshold; differences between pain threshold and "alarm" reaction threshold; spatial summation in pain; factors that alter the pain threshold.
I. R. 16

1976

Harris, J.D. GROUP AUDIOMETRY. J. acoust. soc. Amer., 1945, 17, 73-76. (Medical Research Lab., New London, Conn.)

Described is a group test of auditory acuity which makes use of commonly available apparatus. Two sources of sound were used: a beat-frequency oscillator with provision for intensity control and a Western Electric 68 audiometer. These were coupled through potentiometers respectively to 12 Baldwin magnetic resonant phones and to 12 Permoflux ANB-H-1A dynamic non-resonant phones. In the testing procedure, each S is provided with a headphone, pencil and answer blank. A tone of the desired frequency at an intensity of 30 db above threshold is presented in either 1, 2 or 3 short spurts of about 1/2 sec duration and separated by about 1/4 sec interval. The S is required to indicate presence, absence, or number of spurts heard. A descending and ascending series in steps of 5 db is given. Reliability is only slightly less than that of a careful individual examination. The techniques which produce highest reliability are described and validity is satisfactory in terms of duration from results of an individual test. The test is simple to take and several checks on malinger are provided which make group audiometry practical with population not highly selected for age or intelligence.
R. 2.

1978

Cronbach, L.J. INFORMATION THEORY FOR PSYCHOMETRIC ANALYSIS. Contract N60r1-07146, Proj. Nr 150-121, Final Rep., Sept. 1955, 6pp. College of Education, University of Illinois.

1973

This is a summary report of an exploration of the possibilities of a more comprehensive measurement theory to guide the design of psychological tests, choice of tests for practical problems, and interpretation of test data. Phases I and II consider information theory and utility theory as tools for psychometric problems. Phase III discusses the application of one aspect of decision theory (sequential analysis) to personnel testing. Questions of evaluation are treated only at the philosophical level.
R. 6

1979

Dahn, T.M. MEASUREMENT OF WINDSHIELD DEVIATION AND DISTORTION. Rep. 10342, 31pp. Lockheed Aircraft Corp., Burbank, Calif.

1979

To develop a method of measuring optical distortion in windshields (aircraft) that is simple in operation, does not require much inspection time, can be used by an inspector with limited training, and provides a numerical result without computation on part of the inspector, double exposure photographs were analyzed for evidence of defects. An adequate method was developed for measuring distortion, as well as deviation, through use of a distortion gauge. The validity of the method was established by analysis and demonstrated in actual operation. The gauge and method of using it are described.

1980

Nelson, H. ADAPTATION-LEVEL AS A BASIS FOR A QUANTITATIVE THEORY OF FRAMES OF REFERENCE. Psychol. Rev., 1948, 55, 297-313. (Bryn Mawr College)

1950

To develop a concrete, quantitative approach to "frames of reference", "norms", and related phenomena, the concept of adaptation-level (originating in visual studies of constancy, contrast, adaptation, and color conversion) is defined in terms of the position of the "neutral point" and its determination of the structure of the behavioral field. The mathematical formulation of the theory is developed and agreement between calculated and observed values for various functions are studied. Specific implications of the theory in the field of social behavior are discussed.
T.P26.

1981

Nelson, H. VISION. Annual Review Psychol., 1982, 33, 85-84. (U. Texas, Dept. Psychol.)

1981

This report summarizes studies in vision published during 1950 and early 1951. Topics covered: general--books, summaries, apparatus, demonstrations; dimensional processes--stimulus coordinates, dimensions of vision; psychophysical methods and measurements; basic processes and mechanisms--dark adaptation, quantum considerations, chemistry of vision, critical fusion frequency, color discrimination, color blindness, color theory; spatial discriminations--acuity and legibility, figural after-effects, size constancy, distance and depth; complex visual functions--efficiency and comfort, equilibrium and vision.
T.R120.

1962
Helson, H., & Michels, F.C. THE EFFECT OF CHROMATIC ADAPTATION ON ACHROMATICITY. *J. opt. soc. Amer.*, 1948, **38**, 1025-1032. (Fryn Kew College)

1967
Stevens, S.S. ON THE PSYCHOPHYSICAL LAW. *Psychol. Rev.*, 1957, **64**(3), 153-181. (Prepared under Contract N00018-66(15), Psychoacoustic Lab. Harvard University).

1962
To determine the effect of chromatic adaptation on achromaticity, the tristimulus values of a small (foveal) spot, appearing achromatic to the eye adapted to a uniform chromatic background, were obtained. From two to five luminances (8.63 to 0.004 apparent footcandles) were used for both background and spot for the various colors. The data from three observers are summarized and presented on an I.C.I. plot. An empirical formula which expresses the effect of adaptation as a function of the tristimulus values of the background and achromatic spot is presented. T.C.B.

1964
Herget, C.M., & Hardy, J.D. TEMPERATURE SENSATION: THE SPATIAL SUMMATION OF HEAT. *Amer. J. Physiol.*, 1942, **135**, 428-459. (N.Y. Hospital, Russell Sage Institute Pathol., and Cornell Univ. Med. Sch., Dept. Med.)

1964
The influence of spatial summation in determining the threshold for the sensation of heat was studied by determining the threshold for heat as a function of area. Data were derived from two trained observers, using a radiation technique. These results are compared with similar data for perception of warmth and cold as a basis for evaluating the theory that the sensation of heat results from a simultaneous stimulation of warmth and cold receptors. T.F.M.

1965
Herget, C.M., Granath, L.P., & Hardy, J.D. WARMTH SENSE IN RELATION TO THE AREA OF SKIN STIMULATED. *Amer. J. Physiol.*, 1941, **135**, 20-26. (Russell Sage Institute Pathol., N. Y. Hosp., and Cornell Univ., Dept. Med.)

1965
This paper presents data on spatial summation in the perception of warmth with the use of supraliminal stimuli. A radiation technique was employed in which light fell on the blackened forehead of the subject. Three experimental methods were used: fusion frequency for intermittent warmth stimulation; subjective evaluation of intensity of heat with area of stimulation varied; and determination of the size of the area giving a sensation just recognizably larger than that of a given area. F.R.S.

1966
Hirsh, I.J. BINAURAL HEARING AIDS: A REVIEW OF SOME EXPERIMENTS. *J. Speech Hearing Disorders*, 1950, **15**, 114-123. Contract N5ori 76, Proj. NR 142 201, Rep. PNR 84, ONR, Harvard Univ., Psycho-Acoustic Lab., Cambridge, Mass.

This paper considers available data that is pertinent and has implications for the advisability, design, and use of binaural hearing aids. Aspects of the problems involve the question of whether or not 2 ears are really better than one, and if there are advantages which are desirable for hard-of-hearing listeners, how can they be preserved or enhanced in the hearing aid? Topics considered in relation to these questions are: absolute threshold, differential thresholds, masking, loudness, and localization and intelligibility. The usual monaural hearing aid does not permit the listener to hear separately acoustic sources that may be separated in space. What is needed is a device that will permit him to localize. It is suggested that a stereophonic hearing aid which will have to separate microphones and simulate 2 ears will be far more beneficial. Although there are some problems from the engineering and cosmetic aspect, these could be overcome. Studies to validate this preliminary outline are required before making further conclusions or generalizations. (HEIAS) R 21

1967
This paper attempts to show that there is a general psychophysical law relating subjective magnitude to stimulus magnitude and the form of this law is a power function. Two general classes of perceptual continua are distinguished: Class I or "quantitative", and Class II or "qualitative" continua. Four kinds of direct methods for constructing ratio scales are described and experimental data from Class I continua are presented to show that equal stimulus ratios tend to produce equal subjective ratios. It is pointed out that Fechner's logarithmic law is not found in experiment because the resolving power (just noticeable difference) is not constant in psychological units but is roughly proportional to psychological magnitude. G. R. 75

1968
Hirsh, I.J., Davis, H., Silverman, S.R., Reynolds, E.L., et al. DEVELOPMENT OF MATERIALS FOR SPEECH AUDIOMETRY. *J. Speech and Hearing Disorders*, Sept. 1962, **12**(3), 321-337. (Central Institute for the Deaf, St. Louis, Mo.)

3 new recorded tests for the hearing of speech have been described. Tests W-1, W-2 and W-22 have been constructed to take the place of recorded versions of PAT Auditory Tests 14 and 9 and the PB-lists published by Egan respectively. 2 novel techniques have been introduced: a) The use of magnetic tape recording has permitted the construction of several versions of word orders of a given test list in which all occurrences of a test item in the several versions are physically identical; b) The criterion of phonetic balance in W-22 and the criterion of familiarity of test items in both tests have been more rigidly followed, resulting in easier, more homogeneous lists, but with a more limited vocabulary. Preliminary results have been presented in which the intelligibility for these new tests is shown as a function of intensity. Furthermore, a relation between intelligibility for these new tests and their analogous predecessors has been established. The authors' recommendation for the clinical adoption of these tests is tentative, pending the accumulation of results on larger groups of listeners in both clinical and laboratory situations. R 15

- 1989
Hirsh, I.J., Rosenblith, W.A., & Ward, W.D. THE MASKING OF CLICKS BY PURE TONES AND BANDS OF NOISE. *J. Acoust. Soc. Amer.*, 1950, 22, 631-637. Contract NSR-176, Proj. Nr 142 201. Rep. PNR 95, ONR, Harvard Univ., Psycho-Acoustic Lab., Cambridge, Mass.
- Pure tones and various bands of noise were used to mask impulsive acoustic stimuli (clicks) that were produced by electrical square pulses through a moving-coil type earphone. Results indicate that it is difficult to generalize about the masking of clicks by pure tones from observations on only a few observers because of sizeable individual differences. The masking of clicks by noise, however, is related unambiguously to the intensity and the spectral distribution of the noise. Both pure tones and narrow bands of noise provide maximum masking in the region between 1000 and 3000 cps. Generally speaking, noise is a more efficient masker of clicks than are single pure tones. Although the present measurements were made with masking frequencies below 6500 cps, there is some preliminary evidence to suggest that the audibility of certain clicks in noise is markedly dependent on frequencies above 6500 cps. The linear (slope) relation between the masking of speech or pure tones by noise and the intensity of the noise does not apply here. Rather a trimodal function indicates that the masking of unfiltered clicks by "pinkish-white" noise does not change over a 30-db range of moderate intensities. Below and above this range masking increases with the intensity of noise, sometimes at a slope greater than one.
- 1990
Hirsh, I.J. & Ward, W.D. RECOVERY OF THE AUDITORY THRESHOLD AFTER STRONG ACOUSTIC STIMULATION. *J. Acoust. Soc. Amer.*, 1952, 24, 131-141. Contract NSR-176, Proj. Nr 142 201. Rep. PNR 121. (Psycho-Acoustic Lab., ONR, Harvard University, Cambridge, Mass.).
- After an ear is exposed to an intense sound, the absolute threshold for many sounds is raised, usually temporarily. The subject of these experiments is the manner in which the absolute threshold recovers to its normal value after such stimulation. These experiments involve exposure for several minutes to intensities of 100-200 db sound pressure level (SPL) with a consequent fatigue that recovers about 10 min. after the cessation of the exposure. The first problem investigated was the recovery of absolute threshold for brief acoustic clicks after stimulation by different pure tones at SPL of 120 db for 3 min. Also investigated was the effect on the click threshold of a broad-spectrum noise at a level of 120 db. Next, the recovery of the threshold for pure tones and band noises was investigated as was the threshold for white noise (160 to 6600 cps). It was found that recovery from such auditory fatigue is not a simple monotonic process. Rather, these experiments show that under certain conditions the threshold first recovers to an approximately normal value about 1 min. after the cessation of the exposure but then rises again to a higher value that reaches a maximum at about 2 min. after exposure. This biphasic recovery curve, with its characteristic "bounce" is found when the exposure involves sound pressure levels between 100 and 120 db and durations of the order of several minutes.
- 1991
Oliver, H.C. LIGHT TRANSMISSION AND HAZE REQUIREMENTS FOR TRANSPARENT ENCLOSURES. Proj. 7157, WADC TR-55-55, April 1955, 4pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.
- To establish limits of light transmission and haze values for aircraft transparencies and visors based upon visibility requirements for aircraft pilotage, transparency samples varying in both these qualities were tested under a range of illumination corresponding to the range from daylight to darkest night conditions. Visual contrast thresholds were compared with values obtained from unobstructed vision. Ranges of light transmission and haze values were then established to define (1) limits which are highly desirable, (2) values acceptable if other factors take precedence, and (3) minimum values that can be tolerated. Further reduction of light transmission induced by the angle of incidence of sloping windshields and its effect upon night visibility are evaluated. T. R. 1
- 1992
Crossman, E.R.F.W. PERCEPTION STUDY: A COMPLEMENT TO MOTION STUDY. April 1955, 7pp. Dept. of Engineering Production, University of Birmingham, Medical Research Council, Cambridge, England.
- This paper outlines a method of work study analysis whereby intangible control factors (sensory and mental) may be detected, classified, recorded, and, in some cases, measured. A new chart form is presented with a set of five symbols representing these perceptual factors (plan, initiate, control, end, and check), columns for recording sensory activity, and columns for recording the motor activity (therbligs). The use of this Sensor-factor Process Chart is illustrated with a card sorting task. Data obtained from observations of a process in a shoe factory are given and discussed. Present techniques in work study, laboratory studies of skilled performance, and the application of information theory to this problem are discussed.
- 1993
Mills, G.J. NOISE LEVEL MEASUREMENTS IN VISCOUNT AIRCRAFT 601. Engng. Rep. 6-3-18, Dec. 1954, 22pp. Trans-Canada Air Lines, Winnipeg, Canada.
- To determine acceptability of noise levels in the cabin of the Trans-Canada Airlines Viscount, over-all and octave band noise levels were measured at eight positions in the cabin during flight. With the microphone at the head level of a seated passenger an over-all reading and eight octave level readings at each of three cruising conditions (13,600, 13,300, and 12,000 rotations per minute) were taken. These data were compared with recommended levels. Measurements were also made of the intensity of external noise radiated from the aircraft when on the ground to determine the quietest method of approaching a passenger terminal.
- 1994
Hurvich, L.M., & Jameson, Dorothea. A PSYCHOPHYSICAL STUDY OF WHITE. III. ADAPTATION AS VARIANT. *J. Opt. Soc. Amer.*, 1951, 41, 787-801. (Eastman Kodak Co., Color Control Div.)
- To provide a psychophysical definition of white (see accessions 1995, 2000), the threshold luminance required to evoke an absolute sensation of white was measured for three practiced observers with the eye in controlled states of adaptation (various color temperatures of adapting stimulus from 2842 to 10,000 degrees Kelvin; two different luminances of adapting stimulus, five and fifteen millilamberts) with stimulus range of color temperatures from 2842 to 10,000 degrees Kelvin. Threshold data are analyzed as a function of adaptive states. Results are discussed and analyzed in relation to classical concepts of visual color theory. T.G.R38.

1995

Harvish, L.M., & Jameson, Dorothea. A PSYCHOPHYSICAL STUDY OF WHITE. I. NEUTRAL ADAPTATION. J. opt. soc. Amer., 1951, 41, 521-527. (Eastman Kodak Co., Color Control Div.)

1995

To provide a psychophysical definition of white (see also accessions 2000, 1994), the threshold luminance required to evoke an absolute white sensation was measured with the eye in a neutral state (ten minutes in the dark) on three practiced observers for various color temperatures of test stimulus from 2842 to 10,000 degrees Kelvin, dark surround, 11.7 degree test field, and one-second stimulus duration. Data are shown as white threshold contours relating color temperature and luminance. The concept of white as used to describe properties of light, of objects, and of sensations is analyzed. Practical and theoretical implications of the findings are discussed.

G,I,R25.

1996

Ireland, P.H. A COMPARISON OF CRITICAL FLICKER FREQUENCIES UNDER CONDITIONS OF MONOCULAR AND BINOCULAR STIMULATION. J. exp. Psychol., 1950, 40, 282-286. (Fordham U.)

1996

To compare critical flicker frequencies for monocular and binocular stimulation, Wherrington's 1906 experiment was repeated with a high precision electronic flicker apparatus (see 1997). Threshold measurements were made on 24 subjects under four conditions of stimulation, (1) monocular flicker dominant eye, (2) for non-dominant eye, (3) binocular flicker out-of-phase, and (4) binocular flicker in-phase. Threshold data (frequencies) are analyzed statistically for differences among the conditions of stimulation. Implications of the results for visual theory are discussed.

T,R3.

1997

Ireland, P.H. AN ELECTRONIC FLICKER APPARATUS FOR MONOCULAR AND BINOCULAR STIMULATION. J. Psychol., 1950, 29, 183-193. (Fordham Univ., Dept. Psychol.)

1997

This report describes a high precision electronic flicker apparatus constructed in a manner that would permit stimulation of conjugate areas of the retina. It is described as noiseless in operation; its frequency variable over a range of twenty to sixty cycles per second; and with two light sources flashing either in synchrony or 180 degrees out-of-phase with one another. Calibration procedures are described, tolerances given, and construction details diagrammed.

I,R4.

1998

Jackman, K.R. GREATER COMFORT FOR THE AIRLINE PASSENGER. Aero Digest, Nov. 1948, 42-47. (Consolidated Vultee Aircraft Corporation.)

This paper presents a digest of a slide talk presented at the Institute of Aeronautical Sciences Annual Meeting, 27 January 1948. This paper discusses aircraft seating. The discussion is narrowed to apply to passenger seating in adjustable or reclining-type chairs. Data from studies of automobile seating, studies of cushioning, and riding fatigue studies are covered.

R 6

1999

Fox, H.C., Scott, W.D., Kirchner, W.K., & Mahoney, T.A. SELECTED ANNOTATED BIBLIOGRAPHY ON LEADERSHIP AND EXECUTIVE DEVELOPMENT. Contract 18(600)-323, Proj. 7730, Tech. Rep. 55-67, Task 77356, Dec. 1955, 70pp. Office Education Research Lab., AFPPRC, ANDC, Maxwell AFB, Ala.

1999

This bibliography on leadership and executive development represents an extensive searching of journal literature through 1958. Aspects of the subjects which are covered are: summaries of literature, criteria of leadership, characteristics of leaders, executive jobs, selection of executives, and training and development of executives. Annotations of 296 items (401 in all) containing objective research material are provided.

R 421

2000

Jameson, Dorothea & Harvish, L. M. A PSYCHOPHYSICAL STUDY OF WHITE. II. NEUTRAL ADAPTATION. AREA AND DURATION AS VARIANTS. J. opt. soc. Amer., 1951, 41, 528-536. (Eastman Kodak Company, Rochester, N.Y.)

2000

To provide a psychophysical definition of white (see accessions 1995, 1994), the threshold luminance required to evoke an absolute white sensation was measured for three practiced observers with the eye in a neutral state of adaptation (ten minutes in the dark) for various color temperatures from 2842 to 10,000 degrees Kelvin. Five angular sizes of test field (2.0 to 45.8 degrees subtended at eye) and two exposure durations (one and five seconds) were used. The threshold data are analyzed as functions of stimulus area, duration and color temperature. Sources of inter-observer differences are discussed.

T,G,R17.

1001
Jeffress, L.A. Blodgett, H.C., & Beathelme, G.N. THE MARKING OF TONES BY WHITE NOISE AS A FUNCTION OF THE INTERVALAL PHASES OF BOTH COMPONENTS. I, 500 CYCLES. J. ACoust. Soc. AMER. 1941; 24: 823-827. On ships has. devel. Control No. 3287. (U. Texas, Marine Research Lab. and Dept. of Psychology, Austin, Texas)

Work by Hawkins, Hirsh, Licklider, Stevens, Webster and others has shown the so-called "detectable reduction" in masking which occurs when the interaural phase of either the signal or the noise is reversed, or when the interaural phase of the signal is shifted by various amounts. The present paper extends this work by shifting the interaural phases of the masking component of the noise and of the tone by various amounts between $+180^\circ$ and -180° , and also by shifting the noise timing by amounts up to 4.0 milliseconds. The interaural phases of both the noise and the 500-mc. tone signal are therefore parameters of this study. The results are in agreement with those already published, but there is additional large reduction in threshold even when the noise and the tone differ in their interaural phase position by amounts less than 180° . They also show a periodic fall and rise of the masked threshold as the interaural phase difference for the noise is varied. Finally, they show the importance of interaural correlation in determining the extent to which the binocular threshold will be less than the monaural.

2502
Zischberg, K., Izard, C.E. & Hollander, E.P. MIDDLE
CATEGORY ("7"). RESPONSE: RELIABILITY AND RELATIONSHIP
TO PERSONALITY AND INTELLIGENCE VARIABLES. ONE Proj.
NR 154 FROTH, Proj. Rep. NR 001 077 01 01, June 1953,
19pp. USN School of Aviation Medicine, Naval Air
Station, Fla.

To investigate the middle-category ("7") response on personality test items with respect to its reliability and relationship to personality and intelligence, three Guilford-Martin inventories were administered to 344 Naval Aviation cadets. Bernreuter tests were also available for 277 of the subjects. Personality trait scores on the Guilford-Martin tests, intelligence test scores, and years of schooling were used as independent variables. The number of "7" answers for each personality test provided four scores which were then correlated with each other and with each of the other variables. The findings are discussed in relation to possible scoring adjustments on personality tests.

I. R. 19

2003-
Packard, J.M., Graettinger, J.S. & Graybiel, A.
TEN YEAR FOLLOW-UP STUDY OF THE PHYSICAL STATUS
OF 1000 AVIATORS: ANALYSIS OF THE ELECTROCARDIO-
GRAMS. Proj. NM 001-057.05.03, June 1953, 13pp.
[US] School of Aviation Medicine, Naval Air Station,
Fla.

2033 The electrocardiograms of 1000 healthy aviators aged 20-30 were analyzed in 1940-42. After ten years, a follow-up study of the group was made. Re-examinations were made on 70 per cent of the group and their electrocardiograms analyzed. The effect of heart rate, age, weight, and blood pressure is discussed. Two cases of the Wolff-Parkinson-White syndrome, two instances of complete right bundle branch block, and one instance of complete left bundle branch block are discussed briefly. I. G. I. R 16

20004
Mizus, J.T. & Groszfel, A. NERVOUS EFFECTS ATTRI-
BUTABLE TO THE STRUCTURAL CHANGES FOLLOWING CRYSTAL-
LINE IMPROVEMENT IN POLY. PROP. NO 608 609 61 36.
May 1968, 12pp. US School of Aviation Medicine,
Naval Air Station, Fla.

2204 It has been established that angular acceleration is a sufficient stimulus for the semicircular canals. Whether a given canal may respond to rotation in either direction in its own plane was studied by exposing five unilaterally labyrinthectomized, female subjects to clockwise and counterclockwise rotations at speeds of one to ten revolutions per minute. The duration of the caloric labyrinthine and of sensations of apparent bodily rotation following cessation of rotation were used as indices of vestibular function.

C. E. IS

2006
Miller, W.C., & Greene, J.E. AN ANALYSIS OF
THE SCORING SYSTEM FOR THE 5-4 FINE CONTROL
PERFORMANCE TEST. Contract AF 15(600)-1206.
Proj. 7729, Task 37303, Res. Rep. AFFPC-X-
57-129, Aug. 1957, 18pp. Maintenance Lab.,
AFFPC, AFSC, Lowry AFB, Colo. (University
of Denver).

The report describes the contents of a scoring system for a series of performance tests for measuring the proficiency of mechanics on the 2nd Fire Control System. Data from two experiments which employed the scoring system were analyzed by correlational and analysis of variance techniques to determine the inter-reliability and reliability of this type of performance testing and scoring procedure.

2008 Johnson, D.M. A SYSTEMATIC TREATMENT OF JUDGMENT. *Psychol. Bull.*, 1945, 42, 193-224. (University of Illinois, Urbana, Ill.).

This paper considers the topic of judgment in terms of its meaning in psychology. The orientation of the paper is to organize the literature in judgment describing some of the methods in present use, the assumptions commonly made, and summarizing, in general terms, some of the achievements already at hand. The first section discusses the independent variable of judgment which includes simple judgments which can be classified on the basis of a) characteristics of the stimulus objects which are to be judged; b) perceptual judgments; c) affective judgments; d) abstract judgments. Complex judgments, judgments which are made in respect to some general criterion, fall into this category. The second section of the paper considers dependent variables of judgment. These judgments are relative and they are expressed in relation to alternative categories of response or in relation to response alternatives. Included in this category are the response scale and time of judgment. Also discussed are individual differences in judgment in terms of cultural background, personality, etc.

R 116.

2008
Johns
(Univ

2000

Jones, F.J. A TEST OF THE VALIDITY OF THE
HISSEY METHOD OF OLFACTOMETRY. *Ann. N.Y. Acad. Sci.*, 1933, 35, 91-95. Contract 2200-
27511. *Calif. Univ. Coll.*

2005

Olfactory thresholds were obtained for 16 subjects
using three levels of concentration of each of two
substances - acetone and methyl acetate. Thresholds
were obtained employing the Hissey blast-injection
method of olfactometry and the results employed to
answer the question of whether the blast-injection
threshold depends upon the sensitivity of the receptors
or upon the aerodynamics of the nose.

2006

Jones, F.J., & Jones, Margaret E. *THE
THEORY OF OLFACTORY: A CRITICAL REVIEW.*
J. Psychol., 1934, 22, 207-211. Contract
2200-27511, Proj. 2200-27511. *Calif. Univ. Coll.*

2010

This review of the literature on olfaction pro-
vides a comprehensive coverage of theoretical and
experimental studies for the period 1937-1952. These
are classified and evaluated, together with relevant
older studies, within seven groups: radiation and
vibration theories; mechanical theories; stimulus
pattern theories; chemical theories; steric theories;
and phase-boundary theories.

R 138

2011

US Office of Armed Forces Information & Education &
George Washington University. MEDICAL OFFICERS' OPINIONS
ON PROFESSIONAL AND PERSONAL PROBLEMS OF ARMY SERVICE.
US Dept. of Defense Rep. 137 & MEMO Rep. 52 3, July
1953, 150pp. US Office of Armed Forces Information &
Education, Dept. of Defense, Washington, D.C. & Human
Resources Research Office, George Washington University,
Washington, D.C.

2011

This report presents the results of an Army-wide
survey of Medical Corps officers concerning their atti-
tudes about military services and professional problems
within the Medical Corps. Questionnaires were sent to a
selected sample of 2,399 officers in mid-May 1952; 1,797
questionnaires were returned and form the basis of this
analysis. The issues covered are: factual information on
the officers; problems of professional and personal ad-
justment; attitudes towards assignments; interests in
special assignments; promotion and classification; inter-
est in future Army service; residencies, internships,
and special training in Medical Corps; medical care and
personnel management; and comparisons of regular and re-
serve officers.

1.

2012

Kahler, W.H., & Holdhart, J.J. PLANNING
QUALITY LIGHTING FOR SCHOOLS. *Front. Rev.*
Vision for Schools. 1949. 3pp. *Westing-*
house Electric Corp., Lighting Div., Engle-
wood Park, Cleveland, Ohio.

2012

This report discussed methods of attaining
"quality" lighting for schoolrooms--freedom from harsh
shadows, prevention of direct and reflected glare,
and uniformity of lighting. Brightness distributions
and brightness ratios between luminaire and adjacent
surfaces are given for several different types of
lighting systems. Ceiling versus suspended mountings
and two rows of four-lamp installations versus three
rows of two-lamp units are discussed. Recommendations
for adequate lighting systems are made.

T,G,I

2013

Katz, B. THE SCRIPTOCHROMOGRAPH. *Quart. J. Exper.*
Psychol., Oct. 1948, 1(2), 53-54. (Department of
Psychology, University of Stockholm, Sweden).

2013

This article describes the scriptochromograph, an ap-
paratus that can be used to analyze accurately the time
sequence of writing. The writing is produced electros-
tically on chemically prepared paper. A steel rod, con-
nected to a direct-current source with a thin flexible
wire conductor, is used for writing. The manner in which
the apparatus is used is discussed. It is suggested that
other types of manual movements could also be investi-
gated with the scriptochromograph.

2014

Kellogg, W.H. THE LEARNING CURVE FOR FLYING AN AIRPLANE.
J. Appl. Psychol., Oct. 1948, 33(5), 435-441. (Indiana
University, Bloomington, Ind.).

2014

To study the characteristics of progress in learn-
ing to fly, a device was developed that gave simulta-
neous continuous graphic records of elevator, elevator,
and rudder control movements in a Piper Cub Trainer.
Ten students flew a series of standard ten-min. courses
for record during training. Immediately after each
record course, the instructor flew the same course for
record. The successive ratios of student control move-
ment to instructor control movement are plotted to give
learning curves. Discussion covers characteristics of
the learning curves and potentialities of the metho-
dology.

T. I. R 1

2015

Kelly, J.C., & Steer, H.D. REVISED CONCEPT OF RATE. *J. Speech Hearing Disorders*, 1949, 14,
222-226. Contract 2200-27511, Proj. 2200-27511, Tech. Rep. 130-100-2-16. *Calif. Univ. Coll.*

This study attempted to ascertain whether the traditional method of measuring speech
rate was useful for most speech study purposes. An analysis of sentence rates of the
extempore speech of college students enrolled in a public speaking course was made. The
speech of each of 24 Ss was recorded while the members of the class judged the rate of the
speaker on a 5-point scale ranging from slow to very fast. The measurements made were:
a) The audience judgment of the rate; b) Speech syllable duration which was the total
phonated time of the sentence divided by the number of syllables in the sentence; c) Percent
of the sentence; d) Over-all rate, the number of words spoken in the total elapsed time of
the speech converted into words per minute; and e) Sentence rate which was the same estimate
as over-all rate except that the measurement was made of the sentence. It was concluded
that extempore speech is extremely variable in rate, ranging from 125 to 328 words per
min. on the average. Over-all rate fails to reveal this variability. Over-all rate
fails to reveal the true talking rate. It appears that the sentence-by-sentence analysis
method would come closer to revealing the true speaking rate as well as the true variability
of rate. It is probable that the sentence rate method of describing extempore speech
is more highly related to audience judgment than is over-all rate of speaking.

R 5

2016 Kennedy, J.L., & Travis, R.C. PREDICTION AND CONTROL OF ALERTNESS. II. CONTINUOUS TRACKING. *J. Gen. Psychol.*, 1949, 51, 203-210. Contract NS-1-56. ONR, Naval Aviation Center, Tufts College, Medford, Mass.

This study was designed to gather data on a new electronic accumulator which is a physiological indicator which may accurately predict the alertness status of a S. The S was required to operate continuously a hand control in a unidimensional tracking task. A warning light was placed 25 degrees peripherally from the main visuomotor task and reaction time was measured to the onset of the red warning light along with a continuous record of adequacy of tracking performance. The light was turned on automatically at various levels of muscle potential level by varying the gain of the accumulator. Thus, a large number of reaction times at various tension levels could be obtained in a 2 hr. experimental session. It was found that different levels of electroencephalographic activity were significantly related to muscle potential output. The lower the muscle spike emission, in general, the slower the reaction time and the poorer the tracking score. Reaction time and tracking score were significantly related as measures of performance. Great variability in the range and average tension level between individuals throughout the experimental period was found.

2017 Hophart, H.C., & Mason, J.M. ACUITY DIFFERENCES BETWEEN THE TWO EYES AND JOB PERFORMANCE. *J. Appl. Psychol.*, 1950, 34, 423-428. (Purdue U., Occup. Research Center)

2018 To investigate the relation between certain visual skills and job performance, Ortho-Rotor visual acuity scores of 5600 employees on 92 different industrial jobs were obtained. High and low criterion groups were formed on the basis of various measures of job performance. Better eye acuity, near and far, and acuity differences between the two eyes, near and far, were analyzed statistically in terms of their relations to the probability of satisfactory job performance. The applicability of the findings for selection practices is discussed.

G.M.12.

2019 Kimble, G.A. EVIDENCE FOR THE ROLE OF MOTIVATION IN DETERMINING THE AMOUNT OF REMINISCENCE IN PURSUIT ROTOR LEARNING. *J. exp. Psychol.*, 1950, 40, 248-253. (Brown University).

2020 To investigate the effects of massed vs. spaced practice on motor learning, 36 Ss. were given 25 practice trials of 50 sec. each on a pursuit rotor. Half had cycles of five trials (with ten-sec. pauses between trials) and a six-min. rest period; half had a 60-sec. rest period after every trial. Subjects worked in pairs and had knowledge of both their results and their partner's. Results (mean time on target per trial) are plotted as learning curves and are analyzed for implications for characteristics of reactive and conditioned inhibition and effects of motivation on reminiscence.

T. G. R. 4

2021 Kimble, G.A. A FURTHER ANALYSIS OF THE VARIABLES IN CYCLICAL MOTOR LEARNING. *J. Gen. Psychol.*, June 1949, 25(3), 332-337. (Brown University, Providence, R.I.).

2022 In this paper, the author reviews the data from earlier studies on cyclical motor learning. The data from separate studies are here tabulated and plotted together and are analyzed for the light they shed on the relative importance and the interrelationships of such and rest variables in motor learning.

T. G. R. 3

2023 Kimble, G.A. PERFORMANCE AND REMINISCENCE IN MOTOR LEARNING AS A FUNCTION OF THE DEGREE OF DISTRIBUTION OF PRACTICE. *J. Gen. Psychol.*, Aug. 1949, 25(4), 500-510. (Brown University, Providence, R.I.).

2024 This study investigates the effects of distributing practice in motor learning. The task (printing the alphabet upside down from right to left) was practiced for 21 30-second trials by five groups of 15 to 45 Ss. Intertrial rest periods varied from 0 to 30 seconds. All but the 30-second group had a two-minute rest period between trials 20 and 21. Mean scores (scoring method unspecified) for each trial are studied as a function of rest interval and trial number. Reminiscence (gain between trials 20 and 21) is calculated. Results are discussed regarding theory of reactive and conditioned inhibition.

T. G. R. 8

2025 Kimble, G.A. & Horenstein, Betty E. REMINISCENCE IN MOTOR LEARNING AS A FUNCTION OF LENGTH OF INTERPOLATED REST. *J. Gen. Psychol.*, June 1949, 25(3), 239-244. (Brown University, Providence, R.I.).

2026 This study investigated reminiscence in motor learning as a function of the duration of interpolated rests. Sixty-three male college students performed 12 50-second practice trials on a pursuit rotor with ten-second intertrial intervals, except that between trials 10 and 11 the interval was varied from 10 to 1200 seconds for different groups. The gain in mean scores for trials 11 and 12 over scores for trial 10 are analyzed as a function of length of rest (period between trials 10 and 11) and are related to Hull's theory of the time-decay of inhibition.

G. R. 2

2027 Kimble, G.A. & Bilodeau, E.N. WORK AND REST AS VARIABLES IN CYCLICAL MOTOR LEARNING. *J. Gen. Psychol.*, April 1949, 22(2), 150-157. (Brown University, Providence, R.I.).

2028 In this study of the effects of rest and work on motor learning, 96 college students were given 30-sec. practice on the Minnesota Rate of Manipulation Test (turning over blocks and refitting them in a form board). Each of four groups had a different combination of 10- or 30-sec. work periods and 10- or 30-sec. rest periods. Results (number of blocks turned per trial) are analyzed as a function of work and practice distribution, and the relative importance of these two variables in motor learning is discussed.

T. G. R. 9

2029 Kuntz, J.E., & Sleight, R.B. EFFECT OF TARGET BRIGHTNESS ON "NORMAL" AND "SUBNORMAL" VISUAL ACUITY. *J. Appl. Psychol.*, 1949, 33, 83-91. Contract NS-ORI-186, Proj. NS-734-001, Rep. 166-1-57. ONR, Special Devices Center, Johns Hopkins Univ. (Purdue U., Div. Educ. & Appl. Psychol.)

2030 To determine the effect of "sub-normal" acuity on the acuity-brightness function, two groups of subjects (assigned on basis of test performance into normal and sub-normal acuity groups), located checkerboard targets at six levels of target brightness from 3.6 to 1000 footlamberts. Decimal acuity scores were derived from the test scores and analyzed statistically for differences between groups and illumination levels. Implications of findings for illumination standards and for selection and placement policies are noted.

T.G.I.R.3.

2028
Lewis, D. & Shepherd, A.E. DEVICES FOR STUDYING ASSOCIATIVE INTERFERENCE IN MOTORIC PERFORMANCE. I. THE MODIFIED MASHBURN APPARATUS. *J. Psychol.*, 1950, 22, 33-46. (Department of Psychology, State University of Iowa, Iowa City, Iowa).

2029
This report describes modifications made in the Mashburn apparatus for studying associative interference and gives some data obtained with the device. The Mashburn, requiring matching of signal lights by manipulation of simulated altimeter, rubber, and elevator controls, was modified to permit reversing and interchanging display-control relationships and recording of errors. Eleven male college students trained five days, then had five days training with reversed controls, and finally rehearsed the original task for five days. Control groups (also 50 each) had no training or unchanged training during the middle five days. Learning curves are analyzed for interference effects.
G. I. R 5

2030
Licklider, J.C.R. & Webster, J.C. THE DISCOMFORTABILITY OF INTERMITTENT PHASE RELATIONS IN THE COMPONENT TONES. *J. Acoust. Soc. Amer.*, March 1950, 22(2), 191-195. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass. & USN Electronics Lab., San Diego, Calif.).

2031
The effect of varying the interaural phase relations in the simplest of complex waves (two superposed sine waves of equal amplitudes) on binaural hearing was investigated. A two-component tone was presented binaurally and the interaural phase difference of one of the components was switched alternately from 0 to 180 degrees. The effect of the phase reversal upon the listener's subjective experience and the frequency dependence of the effect were described.
T. G. I. R 14

2032
Licklider, J.C.R., Webster, J.C., & Madson, J.M. ON THE FREQUENCY LIMITS OF BINAURAL BEATS. *J. Acoust. Soc. Amer.*, 1950, 22, 468-473. Contract NSC-176, Proj. NR 142 201, Rep. PNR 87. (Harvard Univ., Psycho-Acoustic Lab., and U.S. Navy Electronics Lab., San Diego, Calif.).

The report describes measurements of the frequency limits of binaural beats and outlines a theory of binaural beats based on synchronous discharges in the two auditory nerves. Two sine waves of frequencies f_1 (fixed) and f_2 (variable) were fed separately to the two ears; and the difference $\Delta f = |f_1 - f_2|$ that merited the disappearance of the fluctuating loudness or roughness that is characteristic of binaural beats was determined. Δf was maximal (approximately 35 cps) for frequencies in the neighborhood of 400 cps. Binaural beats were heard above 1000 cps, but careful attention was required and Δf was small. The shape of the curve relating Δf to f_1 provides an explanation for the fact that determinations of the upper frequency limit of binaural beats have not been in agreement: the upper frequency limit depends markedly on Δf . The theory, given to account for the fact that Δf is smaller both at low and at high frequencies than it is near 400 cps combines elements of the Hill-Nashvsky theory of the excitation of neurons with elements of Mavor's volley theory. At low frequencies neurons can discharge in some degree of synchrony with the stimulus wave form, yet fail to coincide within the time interval necessary for synaptic summation. At high frequencies the neurons must take turns discharging, and relatively few can participate in any given volley. At intermediate frequencies, however, each neuron participates in many volleys and the neurons participating in each volley fire almost simultaneously. The result is that at intermediate frequencies synchrony is relatively precise in each afferent pathway and, when the two afferent streams join in a common neural center, beats appear.
R 15

2033
USN Physiological Psychology Branch. BIBLIOGRAPHIES OF TECHNICAL REPORTS FROM RESEARCH PROJECTS: CUMULATIVE TO 31 DECEMBER 1951, 27pp. USN Physiological Psychology Branch, ONR, Washington, D.C.

This paper provides an unannotated bibliography of technical reports from research projects of the Physiological Psychology Branch of the Office of Naval Research. It is cumulative to 31 December 1951. The reports are grouped by project.
R 363

2034
National Advisory Committee for Aeronautics. LIST OF NACA REPORTS 1947-1951. 18pp. National Advisory Committee for Aeronautics, Washington, D.C.

Presented is a numerical list of the reports of the National Advisory Committee for Aeronautics, prepared as of Sept. 1953. The price of the reports is included and these reports can be purchased from the Superintendent of Documents, Washington, D.C. They are divided into 5 segments according to the year of the reports, starting with the 33rd annual report in 1947 to the 37th annual report in 1951. A total of 156 reports is included in the list.
R 196

2035
Mallister, Dorothy E. FACILITATION AND INTERFERENCE AS A FUNCTION OF RATE OF LEARNING. *Ann. N.Y. Acad. Sci.*, April 1950, 25, 220-232. (State University of Iowa, Iowa City, Iowa).

2036
To study facilitation and interference in motor learning, the Ten-Hand Coordinator was modified to allow reversal of controls and of number and direction of errors. Male college students (64) were trained to a standard performance criterion; half then had interpolated practice with reversed controls; then all rehearsed for 40 trials. One experimental and one control group (10-11 Ss each) had 30 additional trials before interpolated practice. Time-on-target, number of trials, number of errors, and persistence of errors are analyzed regarding effects of level of learning and overlearning on retroactive facilitation and interference.
T. G. R 5

2037
Mallister, Dorothy E. & Lewis, D. FACILITATION AND INTERFERENCE IN PERFORMANCE ON THE MODIFIED MASHBURN APPARATUS: II. THE EFFECTS OF VARYING THE AMOUNT OF INTERPOLATED LEARNING. *J. Gen. Psychol.*, May 1951, 41(5), 356-363. (State University of Iowa, Iowa City, Iowa).

2038
To study facilitation and interference in motor learning, 12 groups of 8-11 Ss practiced on the Mashburn Apparatus (requiring matching of signal lights by manipulation of simulated altimeter, rubber, and elevator controls), modified to permit reversal of controls. Original learning varied from 10-50 trials; rehearsing on the same task was for 10 trials, and between these sessions there was a period varying from 10 to 50 trials of interpolated learning with reversed controls. Mean number of matches and of errors are examined and discussed regarding effects of varying amounts of original and interpolated learning on the initial stages of rehearsing.
T. G. R 1

2040 Head, L.C. APPLICATION OF HUMAN ENGINEERING TO FLIGHT PROBLEMS. J. AVIAT. Med., 1946, 19, 45-51.

Reviewed are some of the principles of human engineering which are available for application to flight problems. Also presented is an outline of the research program being conducted by the Human Engineering Section of the Special Devices Center of the Office of Naval Research. Some general principles of human engineering which can be applied to the pilot's relationship to the machine which he directs, can be broken down into 3 categories: a) the display; b) the layout and controls. Some of the principles concern the necessity of certain display elements and whether the information offered is complete and direct. Another principle is whether the information can be provided by auditory or visual warning systems. In the case of conventional signals, standardization of the equipment layout among different aircraft would be beneficial. Equipment controls should be placed so that the pilot may retain as much comfort as possible. The controls should also be easily distinguished. Thus, proper coding would reduce the possibility of error. Some projects in human engineering currently being conducted include the measurement of the effectiveness and ease of interpolation of aircraft instrument and panel arrangement, a job analysis and time and motion survey of pilot performance in multi-engine aircraft, and a handbook of applied psychophysiological functions which will aid in designing equipment in terms of the man who use it. (HFIAS)

R 9

2038 NEPARIAND, R.A.; EVANS, J.W.; & HAJERLIN, M.M. OPHTHALMIC ASPECTS OF ACUTE OXYGEN DEFICIENCY. Arch. Ophthalmol., 1941, 25, 888-915. (Harvard University, Cambridge, Mass.; & Long Island College of Medicine, Brooklyn, N.Y.).

Reviewed are the physiological effects of oxygen deprivation and the psychological changes associated with anoxia. Specific attention is given to the alterations in visual function due to anoxia specifically in relation to visual sensitivity including light sense and dark adaptation; differential sensitivity; visual acuity; visual fields; peripheral and central color vision; after-images; flicker fusion frequency; intraocular tension; extraocular muscles; accommodation and convergence; and coordinated ocular movements. Several conclusions are arrived at including the need to repeat a number of the studies with a standard apparatus designed to record more accurately. Some of these studies should be conducted on both normal subjects and patients suffering from various ocular anomalies. Many of the studies discussed suggest that the basis for theories should be broader in regard to the nature of certain visual functions. (HFIAS)

R 65

2041 Head, L.C.; & WOLF, C.K. J.W. HUMAN ENGINEERING: THE STUDY OF THE HUMAN FACTOR IN MACHINE DESIGN. Sci. Eng. Med., 1952, 25, 372-379. (Institute for Applied Experimental Psychology, Tufts College, Medford, Mass.).

This paper attempts to summarize some recent efforts aimed at solving the problem of the human factor in machine design. A historical account of work conducted in this vein was presented and indicated the role of time and motion studies, management engineering, and study of individual differences. During World War II it became evident that the human being could be the factor that prevented an engineering device from performing to its full specifications, and it was realized that complete equipment must be designed with built-in human factor considerations. One approach to the error of human engineering is that we are studying man as he is, or as part of, a servomechanism. In considering a single man-machine system, it is found that the design problems encountered can be categorized as either display problem or control problems. A great deal of research has been directed toward displays and the design and layout of the work place. A considerable amount of work has been directed towards human motor and perceptual skills. This has been done to attain a better understanding of how the operator does in fact operate.

R 14

2043 Ornstein, G.W. ANNOTATED BIBLIOGRAPHY OF PUBLICATIONS ACCOMPLISHED BY OR UNDER THE DIRECTION OF THE BASIC PILOT RESEARCH LABORATORY, JANUARY 1951-JANUARY 1955. Proj. 7716, Tech. Memo. OL-57-12, Oct. 1957, 31pp. Operator Lab., AFTRC, ARDC, Randolph AFB, Tex.

2043

This report presents an annotated reference to each publication accomplished by or under the direction of personnel of the Basic Pilot Research Laboratory through January 1955. In-service research papers are grouped by task: (1) development of objective methods of recording pilot performance, (2) development of proficiency measures for flight instructors, (3) evaluation of a P-1 flight simulator for pilot training, (4) evaluation of a revised pilot training program, and (5) evaluation of the light plane as a pre-primary selection and training device; a general category is included. Contract reports are arranged alphabetically.

R 60

2044

Miller, G.A. & Heise, G.A. THE TRILL THRESHOLD. *J. Acoust. Soc. Amer.*, 1950, 22, 537-538. Contract W5ori 76, Proj. NR 142 201, Rep. PMR 51. *Ann.*, Harvard University, Psycho-Acoustic Lab., Cambridge, Mass.

If 2 tones of different frequencies are alternated successively 5 times per sec., when the difference in frequency is small the alternation sounds like a continuous up-and-down movement of the pitch; when the difference in frequency is large the alternation sounds like 2 isolated interrupted tones. The transition point between these 2 perceptual organizations is called the trill threshold. The trill threshold was measured as a function of frequency for 14 Ss. S was presented with 2 tones in the following sequence: tone A for 30 sec., then tone A decayed 60 db and tone B built up during the next 20 sec., tone B for 30 sec., then B decayed 60 db and A grew for 20 sec., etc. S heard the sound binaurally at approximately 70 db. One frequency remained fixed while S varied the frequency of the second above or below the trill threshold. Each S made 2 judgments with the variable tone above the fixed tone and 2 with the variable tone below the fixed tone. The trill threshold is given for a frequency range of 100 to 7000 cps. It was noted that the trill threshold does not follow the same function as the differential threshold.

R 5

2045

Miller, H.K. AN EXPLORATORY STUDY OF LINEAR INTERPOLATION. *J. Appl. Psychol.*, 1940, 24, 367-370. (Lahigh, U.)

2046

To explore individual differences in ability to make linear interpolations, 21 subjects of differing ages and occupations visually interpolated five interval sizes (one to ten millimeters) each size having 324 problems. Problems were randomly arranged in six different patterns, each pattern with an equal number of interpolated positions, one through nine. Subjects varied under instructions for accuracy with no time limit. Analysis is made of the number of errors with respect to size interval and interpolated pattern. Note is taken of age and occupational influence on performance.

T, I, R1C.

2046

USA Ballistic Research Labs. A BIBLIOGRAPHY OF TECHNIQUES FOR THE SMOOTHING OR ADJUSTMENT OF DATA. Proj. T83 0838, Tech. Note 571, Dec. 1951. 7pp. *USA Ballistic Research Labs.*, Aberdeen Proving Ground, Md.

Presented is a bibliography consisting of 100 references pertinent to the techniques for the smoothing or adjustment of data. This bibliography grew out of the first phase of a study designed to examine the techniques of removing errors of an unsystematic nature from the measurement of physical quantities.

R 100

2047

DeGough, R.A., Skandera, D., & Keller, J.R. EJECTION SEAT TRAINING IN THE STRATEGIC AIR COMMAND. Tech. Memo. OL-TM-57-16, Oct. 1957, 50pp. *Operator Lab.*, AFPMRC, ARDC, Randolph AFB, Tex.

2047

To investigate ejection seat training in the Strategic Air Command (SAC), a survey was conducted on four SAC bases. Performance tests by aircrew members on their ejection seat procedures (on an ejection seat trainer) were conducted; questionnaires pertaining to the pilot's previous experience in jet aircraft, quantity and quality of training for ejection, and opinions as to what should be included in training were obtained; and interviews with individuals responsible for training, reviews of their programs, and inspections of their equipment were made. The results were analyzed in terms of (1) requirements for ejection seat training, (2) current status of training, and (3) desirable modifications in equipment and procedures.

I, R 11

2048

Moore, P., & Spencer, D.E. LIGHT DISTRIBUTIONS IN ROOMS. *J. Franklin Inst.*, 1946, 242, 111-141. (M.I.T. and Tufts College)

2049

As an aid to the lighting engineer, equations for heliopic (generalized brightness) distributions in artificially lighted rooms are developed by means of integral-equation theory, taking into account the infinitude of light reflections among the various surfaces. Tables covering the usual range of variables encountered in room lighting are presented for use.

T, G, I, R14

2049

Moore, P., & Spencer, D.E. A STUDY OF PHOTOMETRIC NOMENCLATURE. *J. Opt. Soc. Amer.*, 1946, 36, 666-676. (M.I.T. and Tufts College)

2049

This report presents a study of photometric nomenclature. Concepts of radiometry, photometry, colorimetry of four systems are compared: C.I.E. system of 1931 (Commission Internationale de l'Eclairage), I.E.S. system of 1941 (Illuminating Engineering Society), the D.E.S. system of 1941 (Colorimetry Committee of the Optical Society of America) and a system proposed by the authors. Evaluations are made in terms of exactness, generality, simplicity, and internationality.

T, R13.

2050
Horgan, C.T., Garner, V.R. & Galambos, R. PITCH AND INTENSITY. *J. Acoust. Soc. Amer.*, 1951, 23, 658-663. Contract W5ori 166, Proj. NR 784 001, Rep. 166-1112. *Special Devices Center*, ONR, Johns Hopkins University, Baltimore, Md.

This paper presents data for changes of pitch with intensity for 18 ears, for frequencies from 125 cps to 8000 cps, and for intensities up to a loudness level of approximately 100 db. 2 methods were used to measure pitch-intensity changes. In the first method, the intensity of the standard tone was constant at 40 db (intensity level). In the second method, the standard tone was always 10 db in intensity below the comparison tone. No significant differences were found between data from the 2 methods and the data was pooled. The data made it clear that there is no one function relating pitch to intensity at a particular frequency. Different ears have different functions and they are not entirely consistent with each other either in magnitude or the directions of pitch changes with intensity. What rules there are seem to be purely statistical. That is, the relations of pitch to intensity must be stated in terms of statistical parameters of a population of ears. However, it can be concluded that most observers show very small changes (less than 2%) of pitch with intensity. In general, as intensity is increased, pitch falls at low frequencies and rises at high frequencies.

R 6

2051

Moskowitz, S.H., & Gellhard, J.W. THE POKKING AFTER-IMAGE ON SCREENS OF CATHODE-RAY TUBES. *Amer. J. Psychol.*, 1951, 64, 308-330. Contract No. 61-158, Proj. NE-704-001, Rep. 100-1-116. ONR, Special Devices Center, Johns Hopkins Univ.

2052

To investigate the Pokking after-image involved by the sweep moving across cathode-ray tubes, two observers made threshold determinations for the disappearance of the image at low and at high intensities of retinal illumination. Two types of tube screens were used: P-11 phosphor. Threshold measures of Pokking after-image were translated into values of retinal illumination; these data are analyzed as a function of retinal illumination. Discussion relates the findings to earlier studies of the phenomenon and to the practical problem of radar. T.G.I.110.

2053

Mieser, H., & Wendt, H.W. GRUPPENVERSUCH ZUR BESTIMMUNG DER KRITISCHEN VERSCHWELZUNG-FREQUENZ BEIM BINOKULAREN SEHEN: ANSCHLIESSENDE UNTER KOFFEIN UND NACH NORMALER TAGESARBEIT. *Arch. exper. Path. u. Pharmacol.*, 1951, 214, 29-37. (Universität Marburg, Institut für Psychologie)

2054

This study attempts to determine changes in binocular fusion frequency of 12 subjects, following administration of caffeine and during the course of a normal workday. Utilizing a group technique, the subjects were asked to observe the stimuli and indicate the beginning of fusion by pressing a knob and its actual occurrence by releasing the knob. Results are discussed in terms of the group and individual differences in performance following caffeine and differences in morning and afternoon performance without the drug. I.R.15.

2055

Electronics Training Working Group. REPORT AND RECOMMENDATIONS ON ELECTRONICS MAINTENANCE TRAINING RESEARCH AND DEVELOPMENT. RTD-EL 200/15, July, 1952, 6pp. Electronics Training Working Group, Joint Panel on Training and Training Devices, Research and Development Board, Washington, D.C.

2056

This report on electronics maintenance training and research development is organized around statements of problems and recommended research in the areas of personnel, equipment, and training aids.

2057

Nesberg, L.S., & Smith, K.U. MEASUREMENT OF A COMPLEX PSYCHOMOTOR PERFORMANCE BY MEANS OF A PRINTED TEST. *J. appl. Psychol.*, Oct. 1950, 4(5), 309-312. (University of Wisconsin, Madison, Wisc.).

2058

This report concerns duplication of the Vector Complex Reactometer, a reaction time apparatus for determination of aircraft pilot aptitude by printed form called the Motor Decision Test. With the reactometer, the S turned a series of switches relative to the changing position and duration of three lights whose alteration pattern is predefined. The printed test utilizes an item design of different shaded forms which simulate light position and switch arrangement, duplicating all stimuli configurations of the Reactometer. Results are analyzed in terms of correlation of performance and printed test, amount and significance of transfer, sex differences, and standardization of the printed form. T. I.

2059

Christ, W.D. SIMPLE AUDITORY REACTION TIME IN AGED ADULTS. *J. Psychol.*, 1953, 35, 236-244. (Moosehaven Research Lab., Grange Park, Fla.).

2060

To investigate the relation of age to simple auditory reaction time and reaction time variability, 141 subjects at three different age levels (15-39, 40-59, 60-79 years) were presented with the finger reaction time test under conditions attempting to control fatigue, motivation, mental set, etc. Results are presented and discussed with regard to differences between groups and intrasubject variations as a function of physiological decrements attributable to aging. T.G.105.

2061

This paper attempted to determine how airplane control systems may be designed to provide the pilot with optimal sensory information by means of pressure cues obtained from operating the stick and rudder. 4 questions which are applicable to all airplanes, regardless of speed, were examined: a) what are the maximum forces that may be exerted by a human pilot? b) what delays may be expected as a consequence of the pilot's reaction time? c) where should controls be placed and how should they move for most efficient manipulation by the pilot? d) what gradient of stick forces will provide the pilot with optimum pressure cues? The published information relevant to these questions was examined and jet-plane pilots were interviewed. Human capacities for aircraft control were evaluated as were the psychological aspects of handling qualities of the control stick and rudder. Discussed are some recommendations for aircraft control systems. (HEIAS) R 30

2062

Orlansky, J. PSYCHOLOGICAL ASPECTS OF STICK AND RUDDER CONTROLS IN AIRCRAFT. *Aeronautical Engineering Rev.*, 1949, 8, 1-10. (Dunlap, Morris and Associates, Inc.).

2063

Pascal, G.R. THE EFFECT OF RELAXATION UPON RECALL. *Amer. J. Psychol.*, Jan. 1949, 62(1), 32-47. (Brown University, Providence, R.I.).

2064

For an investigation of the effect of relaxation on recall, 12-16 Ss were presented with 1-10 learning trials for 18 nonsense syllables. Recall was tested immediately and after interpolation intervals of reading, aloud varying from 2-48 hours. Control Ss were tested for recall under normal tension (seated in a chair). Experimental Ss were given five minutes of instructions on relaxation before recall and were tested lying on a couch. Differences in recall between experimental and control groups are analyzed as a function of number of trials and duration of interpolated activity. T. G. I.

2059
Paffmann, C. AIRCRAFT LANDINGS WITHOUT BINOCULAR CUES: A STUDY BASED UPON OBSERVATIONS MADE IN FLIGHT. *Amer. J. Psychol.*, July 1948, 61(3), 323-334. (Brown University, Providence, R.I.).

2059
To study the effect of binocular vision on aircraft landings, seven experienced and one relatively inexperienced pilot performed a number of landing maneuvers (simple and standardized precision landing maneuvers with the nasal fields occluded; landings were repeated wearing goggles with the peripheral fields occluded. Observations of changes in landing performance from normal conditions and subjective reports from the pilots are analyzed in terms of differential effects of eliminating and restricting binocular cues.
T. G. I. R 4

2061
Pinson, E. A. & Chapen, A. VISUAL FACTORS IN THE DESIGN OF MILITARY AIRCRAFT. *J. AVAL.* *Med.*, April 1946, 17(2), 115-122. (USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio).

The job of flying is more dependent on vision than on any other of man's senses. The AAF has established elaborate procedures to select aircrew personnel with excellent vision. However, these advantages are lost if the aircraft is not so designed as to enable the aircrew members to make effective use of their eyes. A number of studies have been undertaken by the AAF to provide a set of recommendations to aircraft designers regarding the ways in which these standards of high visibility may be maintained. 2 groups of studies on a) fields of view from fighter aircraft and b) design (optical quality) of transparent panels are summarized. With respect to fields of view, the most important problem is poor forward and downward visibility. With respect to the optical quality of transparent panels, the problem is refraction. Refraction is highly dependent not only on the optical quality of a transparent panel, but also on the angle of incidence at which it is used. The problem is exemplified by the fact that in some aircraft deviation errors contributed more to the error in line-sighting of guns than all other factors combined.
R 10

2062
Fried, W. R. DOPPLER NAVIGATION SYSTEMS - PRINCIPLES AND PRACTICE. Proj. 4430, Task 44142, WADC TN-57 175, Dec. 1957, 90pp. (USAF Weapons Guidance Lab., Wright-Patterson AFB, Ohio).

2062
This paper discusses basic principles and technical characteristics of a doppler navigation system and its three major components: doppler radar (principles of operation and major components), computer (present position, and course and distance computers), and heading reference (Gyro-Magnetic compass, Astro compass, Earth Rate Directional Reference). It seeks to sort out, organize, and report the most meaningful facts published about the system and its performance. Three of the appendices provide a compilation of the operational and physical characteristics of typical doppler navigation systems, doppler radars (used as a velocity measure, as such, and as the Velocity sensor in a self-contained navigation system), dead reckoning computers and heading references. T. G. I. R 59

2064
Pollack, I. ON THE MEASUREMENT OF THE LOUDNESS OF SPEECH. *J. Acoust. Soc. Amer.*, 1952, 24, 323-324. Contract NS01 76. (Psycho-Acoustic Lab., ONR, Harvard University, Cambridge, Mass.).

Reported are the results of 3 experimental procedures for setting up loudness scales for speech signals. The procedures used were: a) monaural-binaural equal-loudness matchings in which listeners adjusted a speech signal heard in both ears until it was equal in loudness to a speech signal heard in one ear alone; b) fractionation and multiplication in which listeners adjusted a speech signal to a sound "half as loud" or "twice as loud" as a standard speech signal; c) equal-loudness match against a 1000-cycle tone in which listeners adjusted a speech signal until its loudness was equal to that of a 1000-cycle tone (or which a loudness scale is available). The results indicate that the data of the half-loudness and the twice loudness judgments are in close agreement but they differ greatly from the monaural-binaural data. This contrasts with the relatively good agreement obtained when either a pure tone or a white noise is used. The large change in intensity needed to reduce speech to a level that sounds half as loud to the listener may be the result of a constancy effect analogous to the well-known effect of "size-constancy" in vision. A loudness scale for speech based on available data was also presented. (NEIAS)
R 5

2063
Pollack, I. THE LOUDNESS OF BANDS OF NOISE. *J. Acoust. Soc. Amer.*, 1952, 24, 531-538. Contract NS01 76, Proj. NR142 201, Rep. PMR 126. (Psycho-Acoustic Lab., ONR, Harvard University, Cambridge, Mass.).

Studied was the contribution to the loudness of noise made by various frequency bands covering a wide range of noise level. Two basic operations were performed: a) a wide band of white noise (60 to 5800 cps) of uniform spectrum level was divided into narrower bands by passing the electrical signal through a series of sharp cut-off filters; and b) the loudness of the filtered noise band was determined by having listeners adjust the sound level of the band so that it sounded equal in loudness to a white noise at a reference level. 4 filtering operations were performed on the white noise. In series A, the narrower bands were obtained at about the same width (250 mHz), but with different center frequencies; series B the high frequencies of white noise were eliminated and in series C the low frequencies were eliminated. Series D the lower and upper frequencies were removed so that the noise was divided into bands of different widths but with about the same center frequency. The following relations emerged: a) at threshold, it is slightly more effective to concentrate the noise spectrum over a narrow frequency range for which the ear is maximally sensitive than to spread the noise frequencies over a wide range; b) over a wide extent of intermediate loudness levels, it is more effective to spread the noise frequencies over a wide range than to concentrate the noise frequencies into a narrow range; c) at extremely high loudness levels, as compared with intermediate levels, there is relatively less advantage in spreading the noise over a wide frequency range.
R 10

2065 Pollock, I. ON THE MEASUREMENT OF THE LOUDNESS OF WHITE NOISE. Acoust. Soc. Amer., 1951, 21, 654-657. Contract NSORI 76, Proj. N142 201, Rep. PMR 120. (Psycho-Acoustic Lab., GM, Harvard University, Cambridge, Mass.)

Scales of loudness for complex sounds have usually been obtained by determining the equal-loudness relation between the complex under investigation and a sound for which a scale of loudness is already available, e.g., a pure tone of 1000 cps. It is possible, however, to determine scales of loudness for complex sounds without appeal to pure tones or without extrapolation from pure-tone data. This was done in the present experiment. Loudness measurements were carried out by several independent procedures for 1000 cps tone and white noise. The procedures used were: a) loudness-ratio determinations; b) one-ear vs. two-ear loudness matches; c) equal loudness matches between heterophonic signals. Agreement among the different procedures was high, indicating a high degree of internal consistency among the several methods of determining loudness scales. A suggested scale of loudness for white noise, based upon data from the present experiment and from previous work, is presented.

R 20

2069 Foster, R.B., & Hooper, F.P. COST-EFFECTIVENESS ANALYSIS FOR STRATEGIC DECISIONS. General 131, 526, AMEL, Nov. 1955, 3, 482-493. Report from "Symposium on Problems and Methods in Military Operations Research at the meeting of the Society in Los Angeles, Calif., Aug. 1955". (Stanford Research Institute & Johns Hopkins University, Baltimore, Md.)

The concept of "feasibility" and the development of a measure of the feasibility constraint are discussed. A model which adapts methods of cost-effectiveness analysis, within this constraint, is developed for making strategic decisions. The basic form of the model is: a) everything is presented in a framework of time; b) all solutions are constrained at the outset by determinations of what is feasible over time; and this constraint is expressed in terms of schedules of availabilities; c) effectiveness at successive points of time is estimated as well as the rates of expenditure needed to achieve this effectiveness; and both functions of time are presented simultaneously, over the specified range. Thus, the decision-maker can evaluate the payoff or the effectiveness that he can achieve at all points in the time period, and the costs that he must incur therefore. This is a brute-force method. We move in a circle of requirements, availabilities, effectiveness, and cost, in which the interaction is taken into account by the method of successive approximation. The past, static cost-effectiveness analysis affords data for a quick first approximation of total requirements; these are scheduled on the basis of the feasibility study and yield most precise cost and effectiveness estimates on the basis of which successive refinements in the requirements and availabilities data are made. Also, familiar difficulties of dynamic analysis are present--systems do not stand still while they are being studied.

R 2

2066 Chang, S.H., & Wilen, J. SPEECH ANALYSIS. FINAL SCIENTIFIC REPORT. Contract AF 19(604) 2198, AFRC TR 58 107, Feb. 1958, 36pp. Electronics Research Lab., Northeastern University, Boston, Mass.

This report summarizes the studies performed under a research contract directed toward the specification of important parameters in speech-band compression systems. In Chapter I the present status of the Formoder (Formant-Moment Recorder) is described. The Formoder is an experimental speech-band compression system which makes use of from five to seven narrow-band parametric channels to convey the information of speech. The principle assumptions, the instrumentation and some results of this approach are discussed. In Chapter II a study of the automatic identification of turbulent sounds is described. Experimental results which lead to the possible separation of unvoiced stops and fricatives are reported.

T. G. I.

2070 Gaughran, G.R.L., & Dempster, W.T. FORCE ANALYSIS OF HORIZONTAL TWO-HANDED PUSHES AND PULLS IN THE SAGITTAL PLANE. Eng. Biol., Feb. 1956, 28, 67-92. (University of Michigan)

In an investigation of the mechanical factors operant in the exertion by the body of pushes and pulls with the hand, a nude subject exerted a push or pull in the midsagittal plane while placed symmetrically in a seat (without foot or back rest). The testing apparatus was so constructed as to permit recording the subject's posture at maximum force exertion; the maximum horizontal reaction forces at seat and hand grip; and the vertical forces upon the seat. In a subsequent test a foot rest and back rest were utilized. The results of three subjects performing ten repetitions of 6 push and 6 pull postures are discussed in terms of the relative distribution, magnitude, and variability of forces evidenced under each experimental condition. T. G. I. R 23

2068 Reed, J.D. FACTORS INFLUENCING ROTARY PERFORMANCE. J. Psychol., 1949, 28, 65-92. Contract N5 ori 166, Rep. 166 1 5.0. Special Devices Center, ONR, Johns Hopkins University, Baltimore, Md.

A light crank equipped with a counter was used to measure the maximal rate of turning under various conditions. The measure of rotation rate was taken by recording the number of turns in 5 sec. 4 Ss. were used and each spent more than 1200.5-sec. periods of rotary work under a variety of conditions. Frequent rest periods and alternation of hands were both used to prevent fatigue. The apparatus allowed variation in radius, braking force, position and orientation of crank. Of these, the first two are by far the most important. They are interrelated in that increasing the braking force not only results in slower turning but also that the smaller radii are more greatly affected than the larger. The radius which gives maximal angular velocity under conditions of no load is shorter than that which gives maximal velocity when a braking force is applied. Thus, the maximum radius may shift from 2 to 3 cm as the braking force which must be overcome is increased from 0 to 1000 gms. Not only is the performance related intimately to the physical properties of the crank, radius, and torque, but also to certain properties of the subjects. The preferred hand is almost uniformly superior to the non-preferred hand. It shows this superiority in a higher rate at all radii and also by the fact that the maximal performance is obtained at shorter radii. The performances of the two hands of a subject are correlated at each radius, but the shorter radii are less highly correlated than the longer radii. With respect to fatigue, the two hands show comparable effects in the rapid decline of performance as fatigue progresses; they differ in the degree of this decline with the preferred hand showing the greater loss. For both hands the effects of fatigue are more immediate at the shorter radii and less rapid at the longer radii.

R 5.

2071
Riggs, L.A., Mueller, C.G., Graham, C.H., & Note, P.A. PHOTOGRAPHIC MEASUREMENTS OF ATMOSPHERIC BOIL. J. opt. soc. Amer., 1947, 37, 415-420. (OSMP, Brown Univ.)

2071
To study the effects of optical shimmer or boil upon the quality of telescopic images, instantaneous photographs were taken of a black-and-white target located outdoors at a distance of several hundred meters from a camera under various conditions of atmosphere. In each experiment, 30 or more successive exposures were made and the amount of image distortion which could be attributed to shimmer or boil was measured. The implications of the findings for users of telescopes and rangefinders are discussed.
G.I.R.

2072
Gogel, W.C., Hartman, B.O., & Harker, G.S. THE RETINAL SIZE OF A FAMILIAR OBJECT AS A DETERMINER OF APPARENT DISTANCE. Proj. 6-95-20-001, Rep. 235, May 1956, 25pp. AHRL, Fort Knox, Ky.

2072
To determine whether the retinal size of a familiar object can act as a determiner of its apparent absolute distance, four retinal sizes of a playing card were presented one at a time in an otherwise dark field of view. The subjects (80) threw darts, in a parallel alley, to the apparent distance of the card. In a following similar series, several cues to distance were available to the subjects. Results from this full-cue situation were used to convert throw distance to apparent distance. Scores for the first presentation in the reduced-cue situation were analyzed for evidence that absolute distance perception is a function of retinal size. Subsequent scores were studied as relative distance judgments.
T. G. I. R. 6

2073
Riggs, L. A., Berry, R. N., & Wagner, M. A COMPARISON OF ELECTRICAL AND PSYCHOPHYSICAL DETERMINATIONS OF THE SPECTRAL SENSITIVITY OF THE HUMAN EYE. J. opt. soc. Amer., 1949, 39, 427-436. Contract N7onr-358, Proj. NR-141-359, ONR, Brown University.

2073
To compare electrical and psychophysical determinations of the spectral sensitivity of the human eye, data were obtained (for the light-adapted and for the dark-adapted eye) on five observers, using the same set of filtered light stimuli of various dominant wave lengths. Electrical thresholds were measured by use of an electrode mounted on contact lens; intensity of stimulation necessary at each wavelength to arouse a response of a given magnitude was calculated. Psychophysical thresholds were obtained by conventional low-brightness matching and flicker photometry at high levels. Resultant photopic and scotopic sensitivity curves are compared for agreement with standard curves for this function.
T.G.I.R.16.

2074
Riggs, L.A., Note, P.A., Mueller, C.G., & Graham, C.H. TWO DEVICES FOR EVALUATING STEREOSCOPIC RETICULE-PATTERNS. Amer. J. Psychol., 1948, 4, 545-552.

2074
This report describes two devices (developed during the period from 1941 to 1945) for simulating the optical and mechanical features of stereoscopic range-finders. Each is designed to present the operator with a moving target and a stationary reticle and with the necessary controls to bring the target into coincidence or equality of stereoscopic depth with the reticle. One device employs black-line or opaque reticles and the other has bright-line or illuminated reticles. The optical and mechanical systems of both are described with illustrative diagrams.
I.

2075
Russell, R.V. THE EFFECTS OF MILD ANOXIA ON SIMPLE PSYCHOMOTOR AND MENTAL SKILLS. Psychol., 1948, 38, 178-187. (University of Pittsburgh, Psychology Dept., Pittsburgh, Penn.)

A study on the effects of mild anoxia on 3 simple psychomotor and mental skills is reported. The skills studied were: finger dexterity, arm-hand coordination and simple addition. A total of 244 Ss were used, 67 in the finger dexterity group (43 experimental, 24 control), 81 in the arm-hand coordination group (50 experimental, 31 control), 96 in the simple addition group (48 experimental, 48 control). Sub-groups were equated for initial level of performance on the skill in question. The experimental sub-group in each case was subjected to mild anoxia, while the control sub-group was tested always under normal oxygen conditions. The mild anoxia was induced by reducing the barometric pressure in a high-altitude chamber. Time under anoxia was held constant at 35 min., since the study was concerned with the short-duration effects of the anoxic conditions. It was found that: a) a decrement in level of performance appeared immediately after the introduction of mild anoxia; b) following an initial decrement in level of performance rapid adjustment occurred as the time under mild anoxia increased; c) in addition to the adjustment process there occurred improvement with continued practice under the anoxic conditions.
R 15

2076
Rosenblith, W.A., Galambos, A. & Hirsch, I.J. THE EFFECT OF EXPOSURE TO LOUD TONES UPON ANIMAL AND HUMAN RESPONSES TO ACOUSTIC CLICKS. Science, 1950, 51, 569-571. Contract NSC-176, Proj. NR 142 201, Rep. PMR 83, ONR, (Harvard University, Cambridge, Mass.)

This study was designed to investigate what happens to the human threshold for clicks after exposure to loud tones. Observers were exposed to pure tones of different frequencies, intensities, and duration, and then were presented to a group of 4 clicks every 3 sec. The 4 clicks within each group were at different intensities separated by steps of 4 db. The number of clicks the observer reported provided an estimate of his threshold. It was found that the threshold for clicks is raised by about 10 db after exposure to certain tones (e.g., 250 and 500 c for 2 or 3 min at 130 db sound pressure level). The ear recovers rapidly and is normal after about 40 sec., a time not unlike that required for the ear's neural response to return to normal. After this recovery, however, the threshold goes up again by slightly less than 10 db, and there follows a long recovery period whose duration depends upon the frequency and duration of the exposure tone.
R 3

2077
Husley, L.B. & Stear, R.A. FUNCTIONAL SPECIFICATIONS FOR A VOICE COMMUNICATIONS TRAINING DEVICE. Contract NADA 104, Proj. 20 F 8, SEC TR 104 2 48, Feb. 1956, 21pp.
NSA Special Systems Center, Fort Monmouth, N.J. (Purdue University, Lafayette, Ind.).

2077
A voice communications training device that includes a tape loop recorder-reproducer, a signal/wave meter, and a rate meter, and that can be used in individual or in group instruction, is described. Included in the report are suggested procedures for the training period and scripts for lectures on loudness and on clearance by instructions.
L. R. 15

2080
Hartman, R.A. & Mathewson, J.L. "HEAT" A SPECIAL PURPOSE COMPUTER FOR STUDIES IN THE HUMAN CONTROL OF CHURCH EQUIPMENT. Proj. 6 95 20 000, Subcontract NADA S 1, NADA, Rep. 236, April 1956, 21pp. NSA Medical Research Lab., Fort Monmouth, N.J. (Battelle Memorial Institute, Columbus, Ohio).

2080
This report describes a special-purpose computer that is designed to study human performance in controlling complex equipment and systems. The instrument is a research tool featuring a considerable amount of automation. It generates target courses, displays them, receives and displays response signals, computes "error", and feeds the error signal to clocks, counters and graphic recorders, all on a predetermined schedule. Circuit diagrams and functional descriptions of the computer comprise the bulk of the report.
T. I. R 2

2079
Schlossberg H. A NOTE ON DEPTH PERCEPTION, SIZE CONSTANCY, AND RELATED TOPICS.
Psychol. Rev., 1950, 57, 314-317. (Brown U.)

2079
This note uses a simple geometric equation as a basis for accounting upon the results of various experiments in visual perception of size and distance, including the Ames demonstrations (that direct physiological cues such as disparity and accommodation are relatively less important in determining depth perception than are factors of knowledge, true or assumed, of size of stimulus object, etc.). More traditional experiments are also related to the equation developed. The "unconscious inferences" concept of Helmholtz is discussed in this relation.
I, R10.

2080
Schlossberg H. A PROBABILITY FORMULATION OF THE HUNTER-SIGLER EFFECT. J. exp. Psychol., 1946, 30, 155-167. (Brown U.)

2080
The "Hunter and Sigler Effect" described here is that excessively larger amounts of light are necessary to yield fifty percent correct reports as the number of stimuli is increased from one to six. A formula for predicting this function is developed, based on the assumption that the perception of each stimulus (dot) is an individual event, so that the probability of seeing two dots is less than the probability of seeing either alone. Predicted values are compared with observed values and the theoretical implications discussed.
T.O, R15.

2081
Mauch, H.A. GARMENT, VENTILATING, TYPE MA-2. Proj. 6330, WADC TR-55-10, Nov. 1955, 3pp.
Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

2081
This is a functional evaluation report in which data from previous developmental tests and evaluations of ventilating garments (Type MA-2 and MA-1) are presented. These garments are specialized clothing items designed to maintain aircrew personnel performance under extreme conditions of heat and cold. Type MA-2 is an outgrowth of laboratory and functional tests of MA-1. Tentative standard status classification has been assigned, subject to review, for procurement in quantity for complete functional evaluation.
R 3

2083
Peececk, L.J., Harper, R.A. & Pitt, C.H. A FIELD STUDY OF RIFLE AIMING STEADINESS AND SERIAL REACTION PERFORMANCE AS AFFECTED BY THERMAL STRESS AND ACTIVITY. Proj. 6 95 20 601, Sep. 23, April 1956, 2pp. MA, ANNA, Fort Monmouth, N.J.

Rifle aiming steadiness and serial reaction performance were investigated under conditions of heat and cold stress. It was found that short duration activity under cold stress resulted in an increase in horizontal tremor, and that a 2-hour forced march in low ambient temperature resulted in increased tremor in both horizontal and vertical dimensions. Heat stress appeared to cause no changes in rifle aiming steadiness. The serial reaction test was not sensitive to heat or cold stress.
R. 3

2084
Ritchie, M.L. INTEGRATED INSTRUMENTS: A DRAG INDICATOR. Contract AF 33(616) 1000, Proj. 6190 71573, WADC TR 55 423, Dec. 1955, 5pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois, Evanston, Illinois).

This report attempts to present a rationale for developing integrated instruments or panels for aircraft because of the space requirements of the aircraft. The drag indicator is used as an example of an integrated system. The drag indicator is designed to gather in instrument information which is conventionally displayed in no systematic relation: a) indicator speed, b) wheel position, c) flap position, d) position of other elements, and e) placards denoting the critical operational speed for each controlled member which extends to the slipstream. The proposed drag indicator consists of an indicated air speed scale associated with display of drag elements. (MEAS)
R. 0

2086

Watson-Matt, R. (Ed.). **OPERATIONAL ASPECTS OF MARINE RADAR. A SUMMARY OF PAPERS.** *J. Inst. Marit.*, April 1949, 2(7), 9-198. (Institute of Navigation, London, England)

Listed are aspects that determine the effectiveness of marine radar and the benefits obtainable for marine radar. Included in the first category are: the operational features of the set itself, the accuracy and clarity of the operating instructions, the position of the set in the ship, operating policy, maintenance policy, aspects of the observer and of the calculated charts, radar reflectors and buoys, and the international collision regulations. The operational yields or benefits include: the heavy saved, the casualties saved, and time saved.

2087

Sedgwick, R.G., & Green, R.L. **FURTHER STUDIES IN THE RELATIONSHIP BETWEEN HETEROPHORIA AND PRISM VERGENCE.** *Am. J. Ophthalmol.*, 1961, 51, 688-694. Proj. No. 784-001, Rep. 144-1-144. ONR, Special Devices Center, Johns Hopkins Univ., B.I.

2087

To study the relations between heterophoria and prism vergence, measurements were made of refractive errors of both eyes for 15 males and 21 females (mean point convergence, heterophoria at twenty feet and 13 inches, prism convergence and divergence at both distances). Apparent prism vergence measurements were converted to true vergence measures by using the heterophoria readings at the same testing distances as a correction factor. The data is studied by correlational procedures and application is made to clinical practice. T, 34.

2089

Shepherd, A.H. & Lewis, D. **DEVICES FOR STUDYING ASSOCIATIVE INTERFERENCE IN PSYCHOMOTOR PERFORMANCE. II. THE MODIFIED TWO-HAND COORDINATOR.** *J. Psychol.*, 1950, 23, 53-66. (Department of Psychology, State University of Iowa, Iowa City, Iowa).

2089

This report gives details for modifying the Two-Hand Coordinator (a pursuit test where the follower is moved by turning two cranks, one for each of the rectangular components of horizontal motion). Modifications permit reversal of display-control movement relations and automatic recording of errors in direction of cranking. Sample results are given involving three groups of 8-9 Ss each who practiced with one set of display-control relations, had interpolated practice with reversed controls, and relearned the original task. Learning curves are plotted and discussed regarding the research potential of the device. G. I. R. 6

2090

Sleight, R.B., & Austin, T.R. **THE HORIZONTAL-VERTICAL ILLUSION IN PLANE GEOMETRIC FIGURES.** *J. Psychol.*, 1952, 33, 279-287. Contract NS-ORI-166, Proj. NR-784-001, Rep. 144-1-144. ONR, Special Devices Center, Johns Hopkins Univ.

2090

To determine whether the classical statement of the horizontal-vertical illusion (that the vertical is perceptually longer than the horizontal) is descriptive of judgments of plane geometric figures, two series of figures (one-inch square and five rectangles with major dimension graduated by 1/32 inch steps; a circle and ellipses with same specifications) were presented to eight subjects who determined whether the major dimension was vertically or horizontally oriented. Two exposure times (1/10 and one second) were used. The error data are analyzed for both group and individual performance and discussed in relation to earlier literature. T, G, R6.

2091

Sloan, Louise L. **MEASUREMENT OF VISUAL ACUITY.** *Arch. Ophthalmol.*, 1961, 65, 704-723. Contract NS-ORI-166. ONR, Johns Hopkins Univ.

2091

To investigate the relative merits of different test objects and procedures used to measure visual acuity, a critical review of pertinent literature was made with emphasis upon selection and screening needs of industry and military services. The following points are considered: (1) selection of test object, (2) specification of range and graduation of sizes of test objects, (3) standardization of illumination and brightness contrast between object and background, and (4) effects of distance on test results. Areas for further experimental investigations are indicated. T, G, I, R4, 3.

2092

Sloan, Louise L. **THE THRESHOLD GRADIENTS OF THE RODS AND THE CONES: IN THE DARK-ADAPTED AND IN THE PARTIALLY LIGHT-ADAPTED EYE.** *Am. J. Ophthalmol.*, 1960, 50, 1077-1086. Contract NS-ORI-166. ONR, Johns Hopkins Univ.

2092

To study the variation in retinal sensitivity to light (horizontal meridian), threshold measurements were made on one subject during adaptation to darkness and to a low brightness level (0.7 millilamberts) after previous high brightness adaptation, at a series of 20 locations (20 degrees from fovea, nasal field; 90 degrees, temporal field). The decrease in effective diameter of pupil from center to periphery was determined by photography and used as a correction factor.

2093

Sloan, Louise L., & Altman, Adelaide. **ANISEIKONIA AND THE HOWARD-DOLMAN TEST.** *J. Opt. Soc. Amer.*, 1955, 45, 475-478. (Johns Hopkins Hospital and Univ.)

2093

To study the effects of aniseikonic errors on the moving-rod type of depth perception test, two subjects wore lenses which produced artificial aniseikonia and made settings on a Howard-Dolman apparatus (modified to eliminate monocular depth cues) immediately and after seven days of wearing the lenses. Direct measurement of errors on a space ellinometer was also made. An analysis of the errors on the rod test, on the ellinometer, and predicted by theory is made and the suitability of the moving-rod test for measuring depth perception is discussed. T, G, I, R12.

2094

Smith, M.W. **OLDER WORKERS' EFFICIENCY IN JOBS OF VARIOUS TYPES.** *Personnel J.*, 1953, 32, 19-23. (Ohio State Univ.)

2094

To study the relation of age to industrial efficiency (e.g., job knowledge, accuracy, ability to learn, etc.) and personality variables (e.g., cooperativeness, dependability, attendance, etc.), 903 men, ranging from 18 to 76 years, and divided into three work groups--skilled, unskilled, and clerical--were rated on each variable on the basis of supervisors' evaluations. Results are discussed in terms of change of traits as a function of aging with emphasis upon evaluation of the older worker. A brief summary of the records of those aged 70 or more is presented, as well as suggestions for compensatory means of dealing with functional loss due to age. T, R6.

2096
Klein, Lucius L., Rutland, W.M., & Altman,
Adelaide. COMPARISON OF THREE TYPES OF TEST
TABLES FOR THE MEASUREMENT OF VISUAL ACUITY.
Quart. J. Psychol., 1955, 8, 4-10. Com-
pact size 31097. 220, Johns Hopkins Univ.

2097
As part of an extended study in the development
of a simple, reliable, visual acuity test suitable for
use in industry or by military services for selection
and classification of personnel, three test objects
(standard Orthe-Rater checkerboard, Landolt ring,
selected group of ten letters) were compared by mea-
suring the acuity of 215 eyes having varying degrees
and types of astigmatism. Additional data for two sub-
jects with various degrees of artificial astigmatism
were obtained and photographic studies of the effect
of blurring the image of the test objects were made.
Analyses of these data are made in terms of the most
useful test object.
G.T.I. 20.

2098
Dempster, W.T. THE ANTHROPOMETRY OF BODY ACTION. Ann. N.Y. Acad. Sci., Nov. 1955, 63, 559-
585. WDC & ONR contracts. University of Michigan, Ann Arbor, Michigan.
Considered here is the human body its design and its dynamic action. It is believed
that understanding and investigations based on dynamic measurements will lead to greater
human comfort, efficiency, convenience, and safety. This report is broken down in terms of
the following topics: Bone Functions in Body Mechanics, The Body Link System, A Plan of Body
Linkages, Links and Dynamic Aspects of the Body Joints in Relation to Link Movement, Range
of Joint Movement, The Relative Orientation of Adjacent Joints, The Body Force System, Measur-
ing the Dynamic Individual, Characteristics of the Skilled or Repetitive Performance, Work-
Space Problems, Variability in Purposeful Behavior, and The Study Sample for Measurement. It
must proceed on an understanding of the nature of body kinematics and the importance of forces
in relation to posture and movement. (MEIAS)
R 39

2097
Egan, J.P. & Wiener, F.M. ON THE INTELLIGIBILITY OF
BANDS OF SPEECH IN NOISE. J. acoust. Soc. Amer.,
Oct. 1946, 18(2), 435-441. (Harvard University).

2097
To determine some of the relations between intelli-
gibility provided by a voice communication system used
in the presence of noise and the frequency band of
speech passed by the system, articulation tests (six
listeners, two trained talkers and lists of nonsense
syllables) were conducted on thirteen systems having
bandwidths ranging from one-half octave to the entire
range of speech frequencies. Two spectra of masking
noise and a wide range of speech-to-noise ratios were
used. For each band-pass system a relation between
syllable articulation and level of received speech was
obtained. From these gain functions, families of equal
articulation contours were derived.
G. R 4

2098
Steggerda, M., & Petty, Christine E. AN ANTHROMETRIC STUDY OF NEGRO AND WHITE COLLEGE WOMEN.
Res. Quart., 1940, 11, 110-118.

Presented are figures indicating similarities and differences in the physical features
of Negro and White females. Sampled were 100 girls from the physical education classes
at Tuskegee Institute. These girls, averaging 20.05 ± .13 years in age, were compared to
an equivalent sample of white girls enrolled at Smith College. The data indicates that these
two samples were alike in vocalization, eye, height, weight, and chest measurement. In all
other body proportions measured there was some significant difference between the races.
The most obvious differences were: a) all linear appendages of the Negroes are larger than
in the Whites; b) the span in Negroes is nearly 10% percent of the stature; in Whites, it
is only 9.4 percent; c) Negroes have a longer lower arm in relation to the upper arm than
do the Whites; d) trunk length in Whites is greater than in Negroes; e) Negroes have longer
faces than Whites, their heads are more dolichcephalic, their noses broader, and their
ears more circular; f) the incidence of caries among these Negroes is 1/2 that of the Whites.
R 13.

2099
Steggerda, M., & Petty, Christine, E. BODY MEASUREMENTS ON 100 NEGRO MALES FROM TUSKEGEE
INSTITUTE. Res. Quart., 1942, 13, No. 3.

Reported are body measurements of 100 Negro males ranging from 16 to 23 years. The
sample, obtained from members of the physical education classes at Tuskegee College, was
felt to be a random sample of college males. The data obtained was compared to
data obtained by Herskovits on Howard University students and those by Metheny on Negro
students at the University of Iowa. The data shows that these Negro men are slightly taller
than the average of Negro men described in the earlier studies. The men have relatively
long arms and legs and a short trunk. Their heads are large and dolichcephalic.
R 18.

2102 Steggerda, M. STATURE OF SOUTH AMERICAN INDIANS. *Amer. J. Phys. Anthropol.* 1943, 1, 5-20. (Carnegie Institution of Washington).

The material presented in this paper concerns the names, locations, and stature of 82 South American Indian tribes. The data are presented in tables, according to regional areas, and also by height classes. It can be stated that the smallest Indians (below 160 cm) are located in the northwest and toward the central portion of South America. The next group (160 to 165 cm) live practically in the same area, but continue farther south along the western territory of the continent, which is now Chile. The third group (165 to 170 cm) is found along a narrow strip from northern Brazil and continues as far as the southernmost part of Argentina and the Archipelago. The only tribe of this tall group found in central Brazil is the Bororo, an isolated group of Indians.

2104 Egan, J.P. THE EFFECT OF NOISE IN ONE EAR UPON THE LOUDNESS OF SPEECH IN THE OTHER EAR. *J. Acoust. Soc. Amer.*, Jan. 1948, 20(1), 58-62. (Harvard University).

2104 This paper is concerned with the effect of loudness enhancement with binaural stimulation. One earphone was used to introduce speech at a constant intensity into one ear, and a second earphone was used to introduce a white noise into the other ear. The subject adjusted the intensity of one sample of speech to match the loudness with another sample of fixed intensity as they were presented alternately. Noise was introduced at various intensities into the opposite ear when one of the speech samples was present. The relation between loudness level of speech and sensation level of noise was determined. The effects of temporal order and repetition of stimuli were explored.

T. G. R. 4

2105 Stephens, A.L. CERTAIN SPECIAL FACTORS INVOLVED IN THE LAW OF EFFECT. *Abstracts of Doctoral Dissertations*, 1953, 64, 505-511. (Dept. of Psychology, Ohio State University, Columbus, Ohio).

2105 Two self-instructional testing devices were evaluated. A punchboard (where the pencil sank farther into the board on the correct than on the incorrect choice) and the Drum Tutor (giving a visual record of errors made in pressing answer keys) were used by over 1500 college students in tests varying from memory of nonsense syllables to tests on subject matter in psychology. Conditions included no knowledge of results, knowledge without opportunity to correct errors, and opportunity to repeat selections until successful. Median numbers right each trial were analyzed and discussed regarding usefulness of such devices in training and research.

T. R. 3

2106 Cochran, L.B., Gard, F.W. & Harworth, Mary. VARIATIONS IN HUMAN G TOLERANCE TO POSITIVE ACCELERATION. *NR 001 086.02.10*, Aug. 1954, 13pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

2106 This investigation concerns human tolerance to positive acceleration, and the relationship between rate of acceleration, G levels, and peak G to loss of peripheral vision, blackout, and unconsciousness. Groups of naval aviators, naval aviation cadets, students who had experienced blackouts, and miscellaneous personnel were subjected to successively increasing G loads on the human centrifuge until unconsciousness resulted. Analysis of the data includes variation in tolerance among individuals and groups, effect of living habits and physical condition on G tolerance, G stresses required for occurrence of symptoms, and the relationship between time required to attain a specified G level and the time of appearance of symptoms.

T. G. R. 4

2107 Thelen, H.A. (Princ. Investigator). METHODS FOR STUDYING WORK AND EMOTIONALITY IN GROUP OPERATION. Contract NMR 660(00), Proj. NR 170 176, 1954, 206pp. Human Dynamics Lab., University of Chicago, Chicago, Ill.

2107 Work and emotionality in group operations are investigated with the purposes of: development of a body of methods for studying interaction in groups; development of theoretical categories applicable to data from individuals, subgroups, groups; and formulation of principles of training. The basic methods are sequential analyses, Q-sort, and group situations test. Also included are development of the project and conceptual framework, diagnosis of group process through sequential analyses, predicting behavior in the group from the individual personality, and identification of subgroups and their functional interrelations. Results concern validity of methods, applicability of theory, and discussion of variables in the group situation.

T. G.

2108 Sloan, Louise L. COMPARISON OF THE NAGEL ANOMALOSCOPE AND A DICHOIC FILTER ANOMALOSCOPE. *J. Opt. Soc. Amer.*, 1950, 40, 41-47. Contract No. ONR-243, Proj. NR 142-526. ONR, Johns Hopkins Univ.

2108 To compare the Nagel Anomaloscope and a dichroic filter anomaloscope (Eastman Color Temperature Meter) for use in classifying color deficiencies, 103 color deficient subjects (identified by pseudo-isochromatic plates) and a group of color normal subjects were tested on both instruments. The test data are used to classify individuals according to type of color defects; classifications by the three types of tests are compared. Specific discussion of the usefulness of the dichroic filter anomaloscope is given.

T. R. 10

2109

Scorle, L.V. & Taylor, F.V. STUDIES OF TRACKING BEHAVIOR. I. RATE AND TIME CHARACTERISTICS OF SIMPLE CORRECTIVE MOVEMENTS. *J. exp. Psychol.*, 1948, 39, 615-631. (USN Research Lab., ONR, Washington, D.C.).

Using a simple test apparatus, Ss were required to make arm-hand corrective movements of 5 to 80 mm in extent. Measures of reaction time, response duration, maximum rate, and accuracy were analyzed as a function of direction and extent of movement, sensitivity of the control knob, friction, and inertia. The maximum and average rates of a movement increased approximately in linear fashion with increasing extent of movement. Reaction times were relatively independent of the distance to be moved. Rates were highest for movements from left to right. Operators tended to compensate for changes in sensitivity to produce nearly the same perceived result with respect to both rate and accuracy. Addition of inertia to the control knob caused the rates to decrease and precision to improve slightly, but additional friction resulted in higher speed and lower precision. (MEIAS)

R 4

2110

Underwood, B.J. STUDIES OF DISTRIBUTED PRACTICE. VII. THE INFLUENCE OF REST-INTERVAL ACTIVITY IN SERIAL LEARNING. *J. exp. Psychol.*, May 1952, 43(5), 329-340. (Northwestern University, Evanston, Ill.).

2110

The effect of color naming during rest intervals in distributed practice was investigated. Two groups of 36 college students each learned three lists of 14 nonsense syllables by naming the next word as each word was presented. Intertrial intervals were 2, 30, and 60 seconds. The 30- and 60-second intervals were occupied by color naming by one group, symbol cancellation by the other. Recall was tested 24 hours after original learning. Mean number of errors per trial were examined for influences of intertrial activity. Results were discussed in terms of a "response set" induced by color naming.

T. G. R 16

2111

Underwood, B.J. STUDIES OF DISTRIBUTED PRACTICE. VII. LEARNING AND RETENTION OF SERIAL NONSENSE LISTS AS A FUNCTION OF INTRALIST SIMILARITY. *J. exp. Psychol.*, Aug. 1952, 44(2), 80-87. (Northwestern University, Evanston, Ill.).

2111

This report describes three experiments on the effects of similarity of words within a list on learning the list. In each, 36 Ss learned three lists of 14 nonsense syllables until able to name each syllable upon seeing the preceding one. Intertrial rest periods were 2, 30, and 60 sec. for the three lists. Recall was tested after 24 hours. The lists used were of a different degree of intralist similarity in each experiment. Mean number of trials to learn, and percent recalled, are interpreted in terms of the Gibson theory of verbal learning.

T. G. R 11

2112

Alluisi, E.A., Muller, P.F., Jr. & Fitt, P.H. RATE OF HANDLING INFORMATION AND THE RATE OF INFORMATION PRESENTATION. Contract AF 33(616) 43, Proj. 5 (7-7192), WADC Tech. Note 55-745, Dec. 1955, 13pp. USAF Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

This experiment was designed to determine whether the rate of handling information in a forced-paced serial task is a function of: a) the rate of stimulus presentation; b) the uncertainty per stimulus; or c) the joint effect of these factors expressed as the rate of information presentation per se. The experiment involved 10 practiced Ss responding to Arabic numerals with motor (key-pressing) responses and with verbal responses. The independent variables were the rate at which the numerals were presented (1 to 3 per sec.) and the number of possible alternative numerals employed (2, 4, or 8). The results were as follows: For a given constant rate of information presentation, an increased rate of information transmission was obtained by increasing the number of possible alternative stimuli and decreasing the rate of stimulus presentation. There were significant decrements in the relative information transmission rate with increases in the rate of stimulus presentation, but no significant changes with increases in the number of possible alternative stimuli. The percentage omitted responses was relatively unaffected by increases in stimulus complexity at the lower rates of stimulus presentation, but was markedly increased by increases in stimulus complexity at the higher rates of stimulus presentation. In general, the results suggest that information is handled more efficiently the larger the set of alternative stimuli and responses. This finding may represent an interesting difference between animate and inanimate information-handling systems.

R 9

2113
Bradley, J.V. & Stump, M.E. MINIMUM ALLOWABLE DIMENSIONS FOR CONTROLS MOUNTED ON CONCENTRIC SHIFTS. Proj. 7182-71514, WADC Tech. Rep. 55-355, Dec. 1955, 41pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

A series of experiments was performed to determine the minimum allowable dimensions of circular, nondentent knobs mounted upon concentric shafts when frequent inadvertent operation of adjacent coaxial knobs cannot be tolerated. Both unshielded knobs and knobs whose front faces were shielded against inadvertent operation were investigated. A standard setting was used, and measures were taken of reach time, turning time and inadvertent touching of adjacent coaxial knobs. Manipulated variables were thickness, diameter and difference in diameter between the operated knob and the adjacent knobs. The conclusion was reached that if three knobs are to be concentrically ganged, and if the middle knob is about 2 in. in diameter, the diameter of the front knob should be at least 1 in. smaller, and that of the back knob 1 1/4 in. greater than that of the middle knob; b) the front and middle knobs should both be 3/4 in. thick but the back knob may be as thin as 1/4 in. These statements apply to both unshielded and shielded knobs. Statistically significant decrements in performance between adjacent experimental conditions were found when dimensions smaller than these were used. Comparisons between the panel space consumed by nonganged knobs and by concentrically ganged knobs indicated that panel space will seldom be saved by concentrically ganging knobs when the following conditions obtain: a) the knobs can be operated by application of moderate torque, b) the difference in diameter between concentrically mounted knobs is large enough to insure that their inadvertent operation will be infrequent, c) the diameter (1/2 in. to 1 in.) nonganged knobs are acceptable substitutes for the larger diameter concentrically ganged knobs.

R 4

2114

Caldwell, L.S. THE ACCURACY OF CONSTANT ANGULAR DISPLACEMENT OF THE ARM IN THE HORIZONTAL PLANE AS INFLUENCED BY THE DIRECTION AND LOCUS OF THE PRIMARY ADJUSTIVE MOVEMENT. Proj. 6 95 20 001. Rep. No. 233. April 1954. 16pp. NSA Medical Research Lab., Fort Monmouth, N.J.

The accuracy of 10° angular displacements of the arm was found to be a function of both the direction and locus of movement. Movements toward the side were most accurate in the side (50° - 90°) region, and movements toward the front were most accurate in the front (0° - 40°) region. (0° represents the intersection of the horizontal and medial planes passing through the shoulder joint and 90° represents the intersection of the horizontal and lateral planes.) Adjustments toward the side were more accurate than those toward the front.

R 3

2115

Carter, R.P. INTEGRATED HUMAN EFFORT. Presented at the Meeting of the IRE Bay Area Chapter, Nov. 29, 1955; 8pp. Stanford Research Institute, Stanford University.

2115

This paper is a general discussion of personnel management in industry and business. The content is wholly non-technical. A philosophy of personnel management is outlined and supported by arguments from common experience and analogies with electronic systems.

2119

Tinker, M.A. THE EFFECT OF INTENSITY OF ILLUMINATION UPON SPEED OF READING SIX-POINT ITALIC PRINT. AMER. J. Psychol., Oct. 1952, 65(4), 600-602. (University of Minnesota, Minneapolis, Minn.)

2119

To investigate the relation between level of illumination and speed of reading 6-point italic print, two equivalent forms of Tinker's "Speed of Reading Test" were prepared in 10-point Roman and 6-point italic types. Five groups (N=285) were tested on Form I (intensity of illumination—25 ft.-c.); one group was retested on Form II, same type and illumination, while the others were given Form II, 6-point italic, under levels of illumination of 1, 10, 25, or 100 ft.-c., respectively. Performance was measured in number of items completed in ten-minute period with the control group data used as correction in evaluating effects of illumination.

R 6

2116

Taylor, F.V., & Birmingham, H.P. STUDIES OF TRACKING BEHAVIOR. II. THE ACCELERATION PATTERN OF QUICK MANUAL CONNECTIVE RESPONSES. J. exp. Psychol., 1948, 28, 783-795. (Naval Research Lab., Radio Div., III; Psychol. Sect.)

Visual errors in the 2 horizontal directions and of 3 different sizes were produced instantaneously and presented in random order to 10 SS. the errors were corrected through the movement of a joy stick. The joy stick responses were analyzed electrically into time plots of position, rate, acceleration and the third derivative of acceleration (Δ acceleration). Since the control mechanism was nearly frictionless, it was possible to interpret the findings in regard to acceleration and Δ acceleration in terms of force applied by S to the joy stick. When interpreted in this way the following generalization emerged: a) As the visual error increases; (i) the S applies more force in the direction of motion and also more braking force; (ii) he applies and removes these forces at a greater rate; and (iii) he applies these forces over a slightly greater period of time; b) Throughout the course of any one motion, force varies continuously; c) The time relations of these corrective motions are such that it appears that once started, the motions run off without visual or kinesthetic guidance; d) The latter finding suggests that control in target tracking is an intermittent rather a continuous process.

R 9

2117

Taylor, H.L. & Brozek, J. EVALUATION OF FITNESS. Fed. Proc., 1944, 2, 216-222. (University of Minnesota, Minneapolis, Minn.)

The term "fitness" is generally used to cover 2 distinct fields. One deals with estimation of occupational work capacity, the other has for its goal the assessment of the ability to withstand physical and biological stresses. These fields overlap and are frequently confused. Tests of cardiovascular, respiratory and metabolic processes, motor performance, sensory and intellectual functions, and emotional state are reviewed to give a rounded picture of fitness of general character which is not closely related to a specific occupation. Particular emphasis is laid on the limitations of these procedures and on valid experimental design.

R 61

2118

Thurlow, W.R. BINAURAL INTERACTION AND THE PERCEPTION OF PITCH. J. exp. Psychol., 1943, 32, 17-36. (Princeton U.)

2118

To investigate the effects of binaural interaction upon pitch perception, a series of studies were made: (1) determination of the number of cycles by which a monaural tone had to be changed to sound the same in pitch as a binaural tone (loudness level 95 decibels, frequencies 200 and 400 cycles); (2) similar determinations for tones varying in frequencies from 120 to 4000 cycles (standard tone introduced in one ear and comparison tone in other ear, loudness level 95 decibels). Changes in frequency are analyzed and discussed in relation to the principle of maximal stimulation and the pitch-intensity function.

T,O,I,R27.

2120

Travis, R.C. MEASUREMENT OF ACCOMMODATION AND CONVERGENCE TIME AS PART OF A COMPLEX VISUAL ADJUSTMENT. J. exp. Psychol., 1948, 38, 398-403. (Tufts College)

2120

The speed of monocular and binocular accommodation and convergence was measured as part of a complex visual performance by use of a specially designed tachistoscope. Broken circles served as discriminating stimuli (both near and far distances) in alternating rectangular apertures in the tachistoscope. Fifty college students provided mean times, standard deviations, ranges and reliability coefficients for both eyes, each eye alone, near stimuli only, and far stimuli only. Four subjects were given intense training with the same procedure to study the effect of practice. Visual acuity, perceptual speed, and motor speed data were obtained to evaluate their contribution to the total performance. Results of these later phases of the study are analyzed.

2121
 Trumbull, R. THE RELIABILITY OF THE VER-
 HOFF TEST OF DEPTH PERCEPTION. J. J. J. J. J.
 1961, 22, 38-41. (Syracuse U.)

2121

To determine the reliability of the Verhoeff Stere-
 otest a test-retest study was conducted on 100 sub-
 jects. The Stereotest was held at a distance of two
 meters at eye-level against a dark background. Eight
 settings of the targets were judged; if errors were
 made, the subject moved to one meter, then to 1/2
 meter for further judgments. Four scoring methods
 were studied for relative reliability. Statistical
 analyses include test-retest correlations and mea-
 sures of dispersion. The administration of the test
 is discussed.
 T.R.S.

2122

Cohen, J. BINOCULAR DISPARITY AS A CODING
 DIMENSION FOR PICTORIAL INSTRUMENT AND RADAR
 DISPLAYS. Contract AF 18(600)-50, Proj. 7186,
 Tech. Rep. 55-393, Dec. 1956, 22pp. Aero
 Medical Laboratory, WADC, Wright-Patterson AFB,
 Ohio. (Antioch College).

2122

To determine the increments of binocular disparity
 angle which would result in equal discriminability of
 absolute depth judgments, 2 experiments were performed.
 The first experiment employed 19 subjects who recorded
 depth judgments on a continuous scale, whereas in the
 second 20 subjects recorded judgments in 11 discrete cate-
 gories. Twenty-two pairs of test slides with 4 disparate
 targets on each slide were presented in a stereoscope in
 both studies. The responses were coded by the method of
 a scale transformation which required normalizing the
 data and separating the response categories by equal
 standard deviation distances. The findings are discussed
 in terms of usefulness for a coding dimension in present
 three dimensional pictorial instrument and radar displays.
 O. I. R 24

2123
 Turnbull, W.M. PITCH DISCRIMINATION AS A FUNCTION OF TONAL DURATION. J. exp. Psychol., 1944,
 34, 302-316. (Princeton Univ., Princeton, N.J.)

Investigated was the relationship between pitch discrimination and stimulus duration. It
 was found that as the duration of tonal stimuli decreases, accuracy of pitch discrimination
 also decreases. For a tone of 1024 cycles at 60 db above threshold, the effect of stimulus
 duration on pitch discrimination is slight until the duration is reduced to 0.1 sec. There-
 after, accuracy of discrimination declines rapidly until it is reduced essentially to zero
 around 0.01 sec. For a tone of 8192 cycles at 60 db above threshold, pitch discrimination is
 noticeably blunted when one of the tones to be compared has a duration of less than 0.25 sec.
 and accuracy reaches a virtual zero when duration is reduced to approximately 0.02 sec. For
 a tone of 128 cycles presented at 60 db above threshold, accuracy of pitch discrimination
 decreases if the duration of one of the stimuli is reduced to less than 0.5 sec. The curve
 representing decrease in accuracy is thereafter less steep, as duration is reduced, then is
 true at 1024 or 8192 cycles; but the virtual zero point of discrimination accuracy is reached
 sooner, at about 0.03 sec. A decrease in stimulus intensity likewise produces a reduction
 in accuracy of pitch discrimination. This reduction is greater at relatively short durations.
 The data do not support the hypothesis that discriminability varies as the product of inten-
 sity in decibels and duration in seconds.
 R 14

2125

Vernon, W.D. SCALE AND PIAL READING. Rep.
 69. June 1946. 13pp. Medical Research
 Council, Applied Psychology Unit, Psychol.
 Lab., Cambridge, England.

2126

To investigate various factors influencing scale
 reading performance, a series of experiments were
 conducted wherein scales were presented and read as
 accurately or as quickly as possible. Variables were:
 (1) type of scale (horizontal or circular); (2) num-
 bering; (3) scale divisions; (4) length of pointer,
 and (5) series with some scale graduations versus
 series with varied graduations. The data are either
 error or speed scores and are analyzed to determine
 the effect of each variable on scale-reading performance.
 (This is a typewritten copy of a report with all figures
 omitted.)

2127

Verplank, W.S. VISUAL COMMUNICATION.
 Human Factors in Undersea Warfare. National
 Research Council, 1949. pp. 245-266.
 (Indiana U.)

2127

This is a reprint of Chapter 12 from Human Factors
 in Undersea Warfare. Types of visual communication
 systems are defined with the desirable properties of
 each; visual stimulus variables which might serve as
 basis for coded information--brightness, contrast,
 color, temporal patterning, shape, position, movement,
 numerosity, and spatial patterning--are listed; and
 the present status of visual systems--gesture, mirror
 signalling, signal flags, semaphore, sea dyes, pyro-
 techniques, television, sound spectrograph, radio tele-
 type, infra-red signals, radar, and instrument display--
 is discussed. The need for supplementary visual in-
 terior communications is stressed.
 R14

2129
 Vince, Margaret A. RAPID RESPONSE SEQUENCES AND THE PSYCHOLOGICAL REFRACTORY PERIOD. Brit.
 J. Psychol., 1949, 40, 23-40. A.P.U. 99. Medical Research Council, Unit of Applied Psychol-
 ogy, Univ. of Cambridge, England.

7 experiments investigating the psychological refractory period are presented. In the
 experimental task, where the average maximum free tapping rate was approximately 7 responses/
 sec., it was found when Ss were tapping in response to a clearly visible series of stimuli
 or groups of stimuli, that: a) when the stimuli were exposed singly and separately the maxi-
 mum rate of correct responses was approximately 2 per sec.; b) the response rate could be in-
 creased by grouping the stimuli; c) when the stimuli were presented as symbols requiring
 occasional responses, and the stimulus rate was higher than the maximum possible response rate,
 occasional breakdowns of response, or "blocks" occurred; d) Even when sets of stimulus
 symbols were exposed under conditions where Ss were not still occupied with responding to
 previous stimuli, and an extra stimulus symbol was interspersed during the response time to
 the group, similar breakdowns of response, or blocks occurred; e) These results also indicat-
 ed that inhibition caused by the appearance of further stimuli during the time Ss was still
 occupied with responding to the previous ones could either act on the succeeding stimuli or
 responses or could disrupt the response to the first set of stimuli; f) Evidence was also
 found that the breakdowns which occurred at high rates represented "blocks" in the sensory-
 motor system, rather than a simple limitation imposed by the maximum rate at which a limb
 could move; g) The response rate for single and grouped stimuli in these artificial, experi-
 mental tasks was found to be similar to the rate attained by some Ss in typing and telegraphy.
 R 7

2130

Mullis, G.L. FACTORS IN HUMAN VISUAL RESOLUTION. *J. opt. soc. Amer.*, 1943, 33, 487-505. (Bausch & Lomb Optical Co., Rochester, N.Y.).

The general topic of this paper is visual resolution in humans. More specifically, factors relating to visual resolution and types of visual resolution are dealt with. The paper includes a discussion of the visibility of lines and points under conditions wherein a bright figure is viewed on a dark background, and a dark figure is viewed on a bright background. Attention is rendered to both primary and secondary considerations which influence visual acuity. Short discussions of resolution of color on color, vernier and stereo-acuity, and the relationship of vernier and stereo-acuties, and explanations of the aforementioned processes are also included. (NEIAS; R 98)

2131

Wahrkamp, R. & Smith, K.U. DIMENSIONAL ANALYSIS OF MOTION: II. TRAVEL-DISTANCE EFFECTS. *J. gen. Psychol.*, June 1952, 36(3), 201-206. (University of Wisconsin, Madison, Wisc.).

2131

This article studied the extent to which travel and manipulative aspects of human manual motions vary as a function of the pattern of manipulation and the extent of travel in the movements. The manipulative patterns of switch-turning and pin-lifting were measured with variations in the travel distance of the motion. Forty-two college students performed on the Universal Motion Analyzer. The total time and manipulation time data were analyzed in terms of type of manipulation, distance of travel, and variations due to learning by analysis of variance. T. G. I. R 3

2133

Conway, A.L., High, W.S. & Wilson, R.C. FACTORS INFLUENCING ORGANIZATIONAL EFFECTIVENESS: VII. A SURVEY OF AIRCRAFT SUPERVISORS. Contract N60MR 23815, Tech. Rep. 10, 1954, 14pp. University of Southern California, Los Angeles, Calif.

2133

This study investigates characteristics of aircraft supervisors related to organizational effectiveness. Questionnaires consisting of 24 item-groups on topics such as communication, human relations, and responsibility were completed by supervisors of 24 departments. Organizational effectiveness of each department was determined by four criteria: number of produced items passing inspection, time spent reworking rejects, hours to complete work, and executive staff ratings. The questionnaire responses were numerically weighted and an overall department score obtained. The data were analyzed in terms of the epsilon coefficients between each item-group and the four criteria. The relationship between rating criteria, production rate, and human relationships is discussed. T. R 7

2134

Pigg, L.E. PSYCHOPHYSICS OF PERIPHERAL COLOR PERCEPTION IN RELATION TO METHODOLOGY. Ph.D. Dissertation, 1955, 104pp. Ohio State University, Columbus, Ohio.

2134

To compare two different methods of determining color fields, each of two subjects devoted 45 hours to observing colors peripherally, using each of the two methods: 1) conventional technique, in which the color of a stimulus, being moved from peripheral to central portions of the visual field, is identified, and 2) a modified method of constant stimuli, in which the stimulus was exposed briefly and the subject made a judgment as to its color. The colors, red, blue, and green, were matched for brightness and saturation and were presented in three different sizes each. The four cardinal meridians were studied using method (1), followed by method (2) and finally by method (1). The data were compared and the usefulness of the two methods discussed. T. G. I. R 43

2135

Within, H.A. FURTHER STUDIES OF PERCEPTION OF THE UPRIGHT WHEN THE DIRECTION OF THE FORCE ACTING ON THE BODY IS CHANGED. *J. exp. Psychol.*, 1952, 45, 9-20. (Brooklyn College).

2135

To investigate postural factors in perception of the upright, the subject was seated in a small enclosed room which was rotated about a circular track and chair could be tilted. Three conditions were investigated: (1) adjustment of room to upright, eyes open, (2) adjustment of chair, eyes open, and (3) adjustment of chair, eyes closed. Measurements (deviations, in degrees, of adjustments from true upright) were obtained for four rates of rotation (60 to 95 subjects). The data are analyzed and interpreted with respect to differential effects of visual factors and gravitational forces acting on the body in spatial orientation. Individual and sex differences are discussed. T.G.I.R7.

2135

Within, H.A. PERCEPTION OF THE UPRIGHT WHEN THE DIRECTION OF THE FORCE ACTING ON THE BODY IS CHANGED. *J. exp. Psychol.*, 1950, 42, 93-106. (Brooklyn College).

2136

To investigate postural factors in perception of the upright, 238 subjects were rotated (in a fully enclosed room) about a circular path, the effective force on the body thus shifted, and adjusted a rod on front wall to true vertical and horizontal with and without a visual field. Two speeds of rotation were used. Errors of adjustment (degrees) are analyzed and discussed in terms of the differential effects of postural factors (force of gravity) and visual factors in space orientation. Individual and sex differences in manner of establishing the upright are noted. T.G.I.R6.

2137

Within, H.A. SEX DIFFERENCES IN PERCEPTION. *Trans. N.Y. Acad. Sci.*, 1949, 12, 22-26.

2137

To examine the nature of sex differences in perception, a variety of perceptual situations were investigated using large numbers of men and women: (1) orientation in space, (2) perception of parts of a complex visual field, (3) bodily orientation, and (4) localization with visual and auditory cues. The findings are discussed in relation to differences in performance between men and women. A projected study of the origins of noted differences is described.

2138

Within, H.A., & Wapner, S. VISUAL FACTORS IN THE MAINTENANCE OF UPRIGHT POSTURE. *Amer. J. Psychol.*, 1950, 43, 31-50.

2138

To investigate some visual factors in maintenance of upright posture, the visual field was varied from a full view of a lighted room, limited to luminous cube in dark room, no view (blindfolded), and a rocking luminous cube in dark room. Body steadiness was measured for 36 men and 37 women under these conditions. The data, body sway in millimeters, are analyzed statistically and interpreted with respect to the progressive weakening structure of the visual field. Individual differences and sex differences are noted. T.G.I.R7.

2139 Wickin, H.A., Wepner, S., & Leventhal, T. SOUND LOCALIZATION WITH CONFLICTING VISUAL AND AUDITORY CUES. *J. Exp. Psychol.*, 1952, 41, 58-67. (Brooklyn College, N.Y.)

Investigated were the roles of visual and auditory cues in sound localization as well as individual differences in manner of integrating these cues. Each of the 37 Ss was required to locate the direction of a sound under conditions of conflicting visual and auditory cues. The visual indication of the source of sound remained fixed at a central position while the auditory indication was shifted to left and right by changing the relative lengths of the 2 tubes which carried the sound to S's ears. All Ss also received control trials in which the eyes were closed. Mean scores for the eyes-open trials were significantly higher than those for the eyes-closed trials indicating a naked difference in the perception of the direction of sound depending upon whether or not the origin of the source is seen. There was marked individual difference in performance particularly in the eyes-open trials and there was evidence that Ss remained stable in their perception. There were some differences between the sexes but these were not significant.

R 10

2140 Wolff, H.G., & Hardy, J.D. ON THE NATURE OF PAIN. *Physiol. Rev.*, 1947, 27, 187-199. (Cornell U. Med. College and N.Y. Hospital)

2140 This is a general review of the experimental and clinical literature on pain. Some of the topics considered are: concepts of pain; neural structures involved; qualities of pain; pain threshold; effects of analgesics; discrimination of intensity; spatial summation; cutaneous pain; deep pain; central pain.

R128.

2141 Wolff, G., & Steggerda, H. FEMALE-MALE INDEX OF BODY BUILD IN NEGROES AND WHITES: AN INTERPRETATION OF ANATOMICAL SEX DIFFERENCES. *Hum. Biol.*, 1943, 15, 127-152. (Carnegie Institution of Washington).

A sex ratio (female/male index) was computed for the most important body measurements and body indices on trunk, appendages, and head dimensions on a sample of Negroes and Dutch Whites. The Negro data were gathered at Tuskegee Institute, Alabama. The Ss (100 male and 100 female) were taken at random from the physical education classes and were of approximately the same age (average of 21.15 for males and 20.05 for females). They are not full-blood Negroes, but represent a hybrid population of Negro, Indian, and White with perhaps a predominance of Negro blood. They are, however, classified as typical American Negroes. The Dutch-White data used for comparison was from middle-aged parents, living in Holland, Michigan. The various index figures are presented for the purpose of better describing the finer differences in body build of the sexes. This was done by comparing the anthropometric findings with respect to sexual dimorphism for each item.

R 12

2145 Zegers, E.T. MONOCULAR MOVEMENT PARALLAX THRESHOLDS AS FUNCTIONS OF FIELD SIZE, FIELD POSITION, AND SPEED OF STIMULUS MOVEMENT. *J. Psychol.*, 1948, 28, 477-498. Contract N6onr-271, Proj. N1122-404. OER, Columbia U.

2145

To investigate factors influencing monocular movement parallax thresholds (subject stationary, objects moving in space), two subjects observed two needles, one above the other, moving back and forth in a plane perpendicular to the principal line of sight and judged whether the lower needle was in front of, behind, or directly in line with the upper needle. Variables tested: rate of movement of reference and comparison stimuli, size of field in which movement appears, amount of offset (instantaneous visual angle separation), and conditions of fixation. The threshold data are analyzed statistically with respect to these variables.

T.G.I. 122.

2146 Attneave, F. THE RELATIVE IMPORTANCE OF PARTS OF A CONTOUR. Proj. 509-019-0001, Res. Note PMHS-518, Nov. 1951, 15pp. USAF Human Resources Research Center, Lackland, AFB, San Antonio, Texas.

This study explores the possibility that the various parts of a contour do not have equal importance in determining its appearance. The technique used was to determine which points Ss would abstract from a closed line representing a contour when requested to arrange a number of dots into a pattern looking as much as possible like the outline figure. Each of the 8 Ss were given a booklet containing 16 different figures consisting of a closed, irregularly curved line. The Ss were instructed to draw a pattern of 10 dots which would resemble the figure and to place each dot of the pattern in its appropriate place on the contour itself. The results from 3 of the 16 figures were tabulated for each S. Ss showed a great deal of agreement in the points abstracted. It is difficult to state a physical variable for the principle of abstraction. An appropriate generalization might be that arithmetical maxima of curvature constitute the salient points of a contour; in other words, the most important segments of contour are those most different from a straight curve.

2148

Fitts, P.M., Marlowe, E., & Noble, M.E. THE INTERRELATIONS OF TASK VARIABLES IN CONTINUOUS PURSUIT TASKS: I. VISUAL-DISPLAY SCALE, ARM-CONTROL SCALE, AND TARGET FREQUENCY IN PURSUIT TRACKING. Contract AF 33(038) 10528, Proj. 509 020 0004, Res. Bull. 53 34, Sept. 1953, 66pp. USAF Human Resources Research Center, Air Research & Development Command, Lackland AFB, San Antonio, Texas.

The interrelations of visual-display scale, arm-control scale, and frequency of target motion in a continuous pursuit task were studied using a simple harmonic target motion presented in 1-dimension on a cathode-ray tube. A factorial design was used which consisted of 3 variations of each of the above variables. 3 male Ss were assigned at random to each of the resulting 27 experimental conditions. The quantitative measures obtained were: a) root mean square (RMS) error by 1-min. trials; b) time on target scores at ± 5 , ± 15 , and ± 30 tolerance. Graphic records were obtained of the problem, position of the control, acceleration of the control, and the error for selected blocks of trials. Both quantitative and qualitative data were characterized by large individual differences among Ss. Improvement in performance during the 18 1-min. trials was small as measured by the RMS error and the ± 5 , ± 30 time on target scores, but probably for very different reasons. Estimates of reliability based on the odd-even trials for all 81 Ss using adjusted scores that eliminated intercondition variance yielded coefficients ranging from .95 to .99 for each of the 4 quantitative measures. ANOVA utilizing all 4 criterion measures indicated that each of the 3 variables studied had significant effects and that frequency of target oscillation was the most important of the 3 variables studied.

R 16

2149

Slice, G.F., & Knoll, Dorothy M. A SIMPLE MEAN-DIFFERENCE TECHNIQUE FOR OBTAINING SCALES. Proj. 511 023 0002, Res. Bull. 53 36, Sept. 1953, 4pp. USAF Human Resources Research Center, Air Research & Development Command, Lackland AFB, San Antonio, Texas.

A simple technique has been proposed for obtaining scales from a pool of items which contains a number of a priori scales. The technique is based on an item-test, correlation approach to item selection, but it substitutes a mean-difference criterion for the customary correlation coefficient. It is further suggested that a good approximation to the biserial coefficient is obtained by dividing the obtained mean difference by the maximum possible mean difference for a particular item split. The technique appears to be especially useful when the number of items in the hypothesized scales is small and a quick check on the assignment of items to scales is desired.

R 3

2150

Fleishman, E.A. THE INFLUENCE OF FIXED VERSUS FREE HEAD POSITION ON THE PERCEPTION OF BODY POSITION. Proj. 509 020 0006, Res. Bull. 53 37, Oct. 1953, 16pp. USAF Human Resources Research Center, Lackland AFB, Tex.

2151

To investigate some factors in the perception of body position in the absence of a visual frame of reference, 90 subjects, whose head position was fixed, were displaced to various degrees of tilt and at various speeds of displacement in a tilting chair experiment. The task was to bring the chair back to upright after each displacement. Precision and constant error of judgment were analyzed for effect of speed, magnitude, and direction of displacement. These results were compared with those from an additional group of 90 subjects whose head position was not fixed.

G. R 1

2152

Reynolds, B. & Adams, J.A. PSYCHOMOTOR PERFORMANCE AS A FUNCTION OF INITIAL LEVEL OF ABILITY. Proj. 509 020 0002, Res. Bull. 53 39, Oct. 1953, 30pp. USAF Personnel & Motor Skills Research Lab., Lackland AFB, Tex.

2152

The effect of initial level of ability on psychomotor performance is investigated by dividing 960 Air Force basic trainees into massed and distributed practice groups and training them on a rotary pursuit task. Subjects were stratified into groups on the basis of total scores on the first five trials. Initial ability is analyzed in terms of performance curves, gain over rest, within-session loss, warm-up effect, and initial and final performance level.

T. G. R 14

2153
Clark, J.R., Fontaine, A.B., & Warren, C.E. THE GENERATION OF A CONTINUOUS RANDOM SIGNAL FOR USE IN HUMAN TRACKING STUDIES. Contract AF 33(038) 10528, Proj. 509 020 0004, Res. Bull. 53 40, Oct. 1953, 23pp. USAF Human Resources Research Center, Air Research & Development Command, Lackland AFB, San Antonio, Texas

Described is the construction and the characteristics of a device for producing a random signal for use in the study of human tracking. The signal output of the random function generator is a square wave with a maximum amplitude variation in the range of plus or minus 5 volts and containing frequencies in the approximate range of 0 to 10 cycles per sec. The function generator was designed specifically for use with the Two-Dimensional Electronic Pursuit Apparatus. A classification of target courses based on the qualitative and quantitative characteristics common to all courses is proposed. Also included in the report are the mathematical specifications of a signal generator of one of the classifications, the circuits required for the construction, the generator, and the experimental verification for its characteristics.

2155 Clark, J.R. & Warren, C.E. A PHOTOMETRIC CORRELATOR. Contract AF 33(038) 10628, Proj. 509 020 0004, Res. Bull. 53 42, Nov. 1953, 8pp. USAF Human Resources Research Center, Lackland AFB, Texas.

A Photometric Correlator is described which is capable of performing its prescribed computations with such precision that little, if any, error can be found in the graphic recordings of the correlations of certain known periodic test signals. There is, of course, an upper frequency limit which is estimated at 10 cps. This correlator has an integrating interval of 40 sec. (or less at the option of the operator) and is capable of computing correct correlations of signals which are made up entirely of frequency components which are harmonically related to the interval of integration. Other frequency components of the signals being correlated will contribute to the computed correlation, but these contributions are subject to errors which are generally quite small if the signal frequencies are high and quite large if the signal frequencies are low. Rather arbitrarily, a frequency of 6 cycles per min. might be chosen as a dividing line. The presence of frequencies in the computed correlation below this value is a definite indication that these same frequencies were present in the original signals, but the complete correlation cannot be considered accurate.

2157 Klare, G.R., Gustafson, L.M. & Mabry, J.E. THE READING INTERESTS OF AIRMEN DURING BASIC TRAINING. Contract AF 33(038) 25726, Proj. 507 011 0001, Res. Bull. 53 44, Nov. 1953, 10pp. USAF Human Resources Research Center, Lackland AFB, Texas. (University of Illinois, Urbana, Ill.).

2157 The results of an administration of a reading interest-check list to 398 Sampson Air Force Base basic airmen are presented in rank order from most to least interesting. The checklist contains 117 statements designed to cover the range of nonfiction reading interests. Limitations of the findings and ways in which they might be useful in training situations are pointed out. T. R 15

2158 Gibson, Eleanor J. A SURVEY OF RESEARCH ON IMPROVEMENT IN PERCEPTUAL JUDGMENTS AS A FUNCTION OF CONTROLLED PRACTICE AND TRAINING. Contract AF 33(038) 22373, Proj. 509 019 0003, Res. Bull. 53 45, Nov. 1953, 66pp. USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Texas.

2158 This review brings together experimental data dealing with the effects of training in improving all forms of perceptual judgments. The experiments cited cut across several sense modalities, but are largely confined to those employing human subjects. They are grouped according to the effects of practice on a) acuity, b) upper and lower thresholds, c) color discrimination, d) perception under conditions of impoverished stimulation, e) relative discrimination, and f) absolute judgment. F. R 206

2159 Brockaw, L.D. & Christal, R.E. AN ITERATIVE METHOD FOR ADJUSTMENT OF ERRONEOUS FACTOR LOADINGS. Proj. 503 001 0016, Res. Bull. 53 46, Dec. 1953, 31pp. USAF Human Resources Research Center, Lackland AFB, Texas.

2159 The development of a procedural modification of Wherry's technique for adjusting erroneous factor loadings is presented in this report. Application of this process to the rotated factors derived from a centroid solution adjusts the rotated loadings by maximizing the variance properly attributable to each factor for each test. It tends to eliminate errors originating in misestimation of communalities or occasioned by mechanical errors of graphic rotation. The type of study that would demand this procedure is discussed. T. R 1

2160 Arnoult, M.D. TRANSFER OF PREDIFFERENTIATION TRAINING IN SIMPLE AND MULTIPLE SHAPE DISCRIMINATION. Res. Bull. 53 48, Dec. 1953, 9pp. USAF Human Resources Research Center, Lackland AFB, Texas. (Reprinted from: J. exp. Psychol., June 1953, 45(6), 401-409).

2160 To investigate the effects of preliminary practice in differentiating stimuli on subsequent reaction to the stimuli, two experiments (250 and 190 basic airmen) were run. Each experiment involved pre-training of two subject groups, consisting of associating letters with five 2-dimensional nonsense shapes, with a control group having no pre-training. Final testing of all groups was discrimination between the learned shapes and a standard in one experiment, recognition of the learned shapes in the other. Response time and accuracy were discussed regarding implications for Gibson's pre-differentiation hypothesis. T. G. I. R 18

2161 Adams, J.A. THE PREDICTION OF PERFORMANCE AT ADVANCED STAGES OF TRAINING ON A COMPLEX PSYCHOMOTOR TASK. Proj. 509 020 0003, Res. Bull. 53 49, Dec. 1953, 44pp. USAF Human Resources Research Center, Lackland AFB, Texas.

2161 This study is an analysis of complex motor performance, done to investigate the prediction of performance at advanced stages of learning. One hundred ninety-seven basic airmen practiced for 64 trials (two days) on the Complex Coordination Test as a criterion measure. During a three-day period they also took six other complex coordination tests, 11 simple coordination, and 34 printed classification tests. The scores on all these tests and scores at selected stages of learning the criterion task were intercorrelated, and regression equations were established for predicting criterion performance at various stages of learning. T. G. R 7

2162 Adelson, M. A METHOD FOR STUDYING HUMAN TRACKING BEHAVIOR. Contract AF 33(038) 25726, Proj. 508 017 0001, Res. Bull. 53 50, Dec. 1953, 7pp. USAF Human Resources Research Center, Lackland AFB, Texas.

2162 This report describes a proposed apparatus and how it might be used in studying tracking. The apparatus would consist of a series of signal lights (lighting alternately and rapidly enough to appear to give continuous stimulus motion) and a parallel set of "tracking" lights to be matched with the stimuli by a stick control. Stimuli, response recording, and data analysis would all be handled by IBM equipment. Discussion includes possible application of device to predicting tracking performance and to the study of learning and transfer. R 1

2164

Korman, M.T. THE ROLE OF LANGUAGE IN BEHAVIOR. STABILITY CHARACTERISTICS OF THE SEMANTIC DIFFERENTIAL. Contract NS CSR:66216, Tech. Rep. 19, ca. 1957, 21pp. University of Minnesota.

2168

Deese, J., Lazarus, R.S. & Keenan, J. ANXIETY, ANXIETY REDUCTION, AND STRESS IN LEARNING. *J. exp. Psychol.*, July 1953, 46(1), 55-60. (Johns Hopkins University, Baltimore, Md.).

2164

To assess the notion of reliability (time-lapse stability) relevant to the use of the Semantic Differential in applied and experimental settings, and to provide data on effect of sampling variability, 30 subjects rated a single set of 20 concepts chosen at random from the original Atlas study (12,988: a semantic differential Atlas) once, then again after an interval of four weeks. Scale consistency, concept consistency, person consistency and factor-score consistency indices are presented in tables. Implications of the findings for use of the techniques with groups (for group averages) and for use with individuals are discussed.

T. G. I. R 9

2168

In a study of learning under stress, three groups of 30 college students learned a list of 12 nonsense syllables. One group (avoidance) received electric shocks for wrong or omitted responses, one (nonavoidance) received shocks at random for both right and wrong answers, the third (control) received no shock. Each group consisted of 15 high and 15 low scores on the Minne "neuroticism inventory." Learning curves were compared and discussed regarding theoretical implications for anxiety in learning. Incidental data were given for the intercorrelations of the Minne inventory, the Taylor anxiety scale, and the psychasthenia and hysteria scales of the MMPI.

T. G. R 8

2165

Fleishman, E.A. A MODIFIED ADMINISTRATION PROCEDURE FOR THE O'CONNOR FINGER DEXTERITY TEST. *J. appl. Psychol.*, 1953, 27, 191-194, Proj. 509 020 0003, Res. Bull. 53 53. USAF Human Resources Research Center, Lackland AFB, San Antonio, Texas.

The O'Connor Finger Dexterity Test was administered under time limit conditions to 3 groups of 100 Ss each. One group received the test for a 4-min. time limit condition, another for a 5-min. period, and a third for a 6-min. period. In another sample, 100 Ss were tested and retested 1 1/2 hrs. later under the standard work limit conditions. In an additional sample, 100 Ss were given the test under work limit conditions and retested 1 1/2 hrs. later under the 5-min. time limit condition. Means, standard deviations and test-retest reliabilities were computed for the various administrative procedures. Correlations between the time limit procedure (5-min.) and the full board and 1/2 load work limit procedures were .96 and .89 respectively. Reliabilities between .71 (time limit, 4-min.) and .86 (work limit full board) were obtained. These results indicate that although there is some loss in reliability under the time limit conditions, the reliabilities are probably adequate for group prediction, especially if the test is to be included in a larger battery. Preliminary norms for the modified administration conditions are presented.

R 16

2166

Fleishman, E.A. TESTING FOR PSYCHOMOTOR ABILITIES BY MEANS OF APPARATUS TESTS. *Psychol. Bull.*, 1953, 50, 241-262, Proj. 509 020 0003, Res. Bull. 53 54. USAF Human Resources Research Center, Perceptual & Motor Skills Research Lab., Lackland AFB, Texas.

The area of psychomotor (PM) skills research is examined from the viewpoint of aptitude test development. The historical background of PM test development is presented, problems attending their use are discussed and previous factor analyses in the area are summarized. It is concluded that a basic need is for extensive dimensional analyses of motor abilities which would reveal a more basic classification of factors than exists at present. Research of this nature has been fragmentary and limited to a small range of PM tasks. However, there is extensive agreement between studies on factors isolated and this research offers some starting points for more extensive dimensional analyses. Other sources of hypotheses concerning motor skill dimensions are job surveys and transfer studies. Methodological issues are reviewed in the second half of the paper. The value of job-sample tests vs. tests of basic abilities is questioned. Also questioned is the assumption that the abilities involved in complex PM tasks are qualitatively different from the abilities involved in factorially more simple tasks. The possibilities of paper-and-pencil tests and the role of motion picture presentation are discussed. Possible research on the quantification and measurement of "work methods" is pointed out. Finally, studies relative to the problem of selection vs. training with respect to motor skills are suggested.

R 42

2167

Noble, M.E., Fitts, P.M., & Marlowe, E. THE INTERRELATIONS OF TASK VARIABLES IN CONTINUOUS PURSUIT TASKS: II. VISUAL-DISPLAY SCALE, AIM-CONTROL SCALE, AND TARGET-FREQUENCY IN COMPENSATORY TRACKING. Contract AF 33(038) 10528, Proj. 509 020 0009, Res. Bull. 53 55, Dec. 1953, 29pp. USAF Human Resources Research Center, Air Research & Development Command, Lackland AFB, San Antonio, Texas.

The present investigation is the second of a series concerned with the interrelations of a) the sensitivity or amplitude characteristics of movements made in a target tracking task, b) the corresponding aspects of visually displayed information about various aspects of the task and c) the frequency and coherence of the target motion. The variables can be specified in terms of a control-scale factor (Sc), a visual-display-scale factor (Sd), and the target frequency (F). The problem motion was in the form of a simple harmonic pattern, a highly coherent stimulus sequence, and the information was displayed visually as a compensatory pursuit task on a cathode-ray tube. Each of the 7 Ss were given training until he reached a high and reasonably stable level of performance on each of the 8 conditions that result from the combination of 2 categories each of F, Sc, and Sd. 4 quantitative scores were obtained at the end of each 1-min. trial: a) error root-mean-square score, b) time on target score for a ± 5 , ± 15 , and $\pm 30\%$ error tolerance. Analyses of the quantitative scores indicate that tracking performance was significantly better for the lower (15 cpm) than for the higher (60 cpm) frequency of problem motion. Relative performance was also significantly better for the larger amplitude of control movement (Sc = 40") than for the smaller amplitude (Sc = 10"). For none of the measures of relative performance was the effect of display-scale factor significant.

R 7

2170

Ballance, E.L. ACQUISITION OF TWO LEVER-POSITIONING RESPONSES PRACTICED OVER PERIODS OF ALTERNATION. *J. exp. Psychol.*, July 1953, 46(1), 43-49. (USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.).

2170

Six groups of 48 basic trainees practiced for 48 trials making a match on a display panel by positioning an unseen lever. Unknown to the Ss, on alternate blocks of trials the correct lever position varied for five experimental groups. They had conditions that differed only in the number of trials per block (1, 2, 4, 6, or 8); the control group had the same task throughout. Results (positioning for each trial) were analyzed and discussed with regard to the characteristics of learning the alternating tasks.

G. I. R 3

2172

Attneave, F. PSYCHOLOGICAL PROBABILITY AS A FUNCTION OF EXPERIENCED FREQUENCY. Proj. 509 019 0004, Res. Bull. 53 60, Aug. 1953, 6pp. *USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.*

2172

To investigate the relation of psychological probabilities to their environmental counterparts, direct comparisons were made using letters of the alphabet. Numerical judgments of the relative frequency with which each letter of the alphabet occurs in English text were obtained from 90 subjects. Three additional groups (30 subjects each) attempted to guess fictitious letters in a pack of 100 cards with: (1) no bias given as to frequency, (2) bias for a uniform frequency, and (3) bias for English-text frequency. The data were analyzed by correlational procedures for degree of relationship and influence of environmental biases.

T. G. R 10

2174

Morris, Eugenia E. PERFORMANCE OF A MOTOR TASK AS A FUNCTION OF INTERPOLATION OF VARYING LENGTHS OF REST AT DIFFERENT POINTS IN ACQUISITION. *J. exp. Psychol.*, April 1953, 45(4), 260-264. (USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.).

2174

To study the effects of amount of rest and of point when rest is taken on motor learning, seven groups of 100 basic trainees had 32 minutes of practice on a modified Two-Hand Coordination Test. Three groups had a ten-minute rest, three a two-hour rest, after either 4, 16, or 28 minutes of practice; the control group had no rest. Mean time on target was plotted for each trial. Results were discussed regarding importance of point of interpolation and length of rest on motor learning.

T. G. I. 5

2175

Reynolds, B. & Adams, J.A. MOTOR PERFORMANCE AS A FUNCTION OF CLICK-REINFORCEMENT. *J. exp. Psychol.*, May 1953, 45(5), 215-220. (USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.).

2175

This study investigates the effect of click reinforcement on a rotary pursuit task. One hundred and ninety-eight basic trainee airmen were stratified for proficiency and randomly assigned to a control group or one of five experimental groups differentiated on the basis of time on target required for a click. The results include the effect of the click on performance, comparison of the different time on target requirements for reinforcement, and effect of the removal of the click. Several theoretical interpretations are considered.

T. G. R 7

2176

French, R.S. THE DISCRIMINATION OF DOT PATTERNS AS A FUNCTION OF NUMBER AND AVERAGE SEPARATION OF DOTS. *J. exp. Psychol.*, 1953, 46, 1-9. (USAF Human Resources Research Center, Lackland AFB, Tex.) (SMC Res. Bull. 53 64).

2176

To study pattern discrimination as a function of number of items and their separation, a series of 120 different patterns for each number of dots from two to seven were presented to 384 Ss. Each pattern appeared twice, pairs of presentations being either identical or differing only in slight displacement of one dot, and were judged as "same" or "different." Half of the subject groups were given reinforcement through knowledge of the correctness of their answer. Errors and latency data are analyzed and interpreted in terms of the variables. The learning data are discussed.

T. G. I. R 7

2178

Nystrom, C.O., Marin, R.E. & Grant, D.A. TRANSFER EFFECTS BETWEEN AUTOMATICALLY PACED AND SELF-PACED TRAINING SCHEDULES IN A PERCEPTUAL-MOTOR TASK. Contract AF 33(308) 23294, Proj. 512 024 0001, Res. Bull. 53 66, Dec. 1953, 18pp. *USAF Human Resources Research Center, Lackland AFB, Tex. (University of Wisconsin, Madison, Wisc.)*

2176

To investigate the relative value of self-paced versus automatically paced training in a perceptual-motor task, transfer effects between the two types of training schedules were studied. Subjects were given four 25-trial blocks of automatically paced or self-paced training on a task that called for a rapid succession of responses to temporally discrete visual stimulus patterns; then they were transferred to the opposite kind of pacing and given four more blocks of trials. Two control groups were used which continued for eight blocks of trials on one type of pacing. Transfer data were analyzed both graphically and by analysis of variance.

T. G. I. R 5

2180

Fleishman, E.A. & Hempel, W.E., Jr. CHANGES IN FACTOR STRUCTURE OF A COMPLEX PSYCHOMOTOR TEST AS A FUNCTION OF PRACTICE. Proj. 509 020 0003, Res. Bull. 53 68, Dec. 1953, 18pp. *USAF Human Resources Research Center, Lackland AFB, Tex.*

2180

To study changes in the factor structure of a psychomotor test during practice, 197 basic airmen were tested. Criterion measures were scores at eight different stages of 64 trials on the Complex Coordination Test. Test variables included 12 printed aptitude tests and six manual apparatus tests. The intercorrelations of these measures were factor-analyzed; factor structure was studied as a function of stage of practice; and the relative importance of motor versus nonmotor factors at early and late stages was investigated.

T. G. R 23

2181

Felton, W.W., Fritz, E. & Grier, G.W., Jr. COMMUNICATION MEASUREMENTS AT THE LANGLEY AIR FORCE BASE DURING NOVEMBER AND DECEMBER, 1951. Contract AF 18(600) 26, HRL Rep. 31, Nov. 1952, 85pp. *USAF Human Resources Research Lab., Bolling AFB, Washington, D.C. (The Franklin Institute, Philadelphia, Penn.)*

2181

A field study of the use of communication channels for terminal air traffic control at Langley Air Force Base is described. Measurements were made in a mobile laboratory equipped with communication receivers, magnetic tape recorders, and various time and number recorders on each of 20 days over a five-week period. Samples for analysis were drawn from periods representing both instrument and visual flight conditions. The messages were studied from the following points of view: factors that might limit maximum possible utilization of a channel; time characteristics and content of messages; and estimated amount and rate of transfer of information in landing operations.

T. G. I. R 6

2182

Myers, D.W. (Chm.). A STATISTICAL ANALYSIS OF NON-COMMERCIAL NON-AIR CARRIER ACCIDENTS - 1951. PART II OF IV PARTS. June 1952, 2pp. US Civil Aeronautics Board, Washington, D.C.

2190

Myers, D.W. (Chm.). A STATISTICAL ANALYSIS OF ACCIDENTS IN INSTRUCTIONAL NON-AIR CARRIER OPERATIONS - 1951. PART I OF IV PARTS. June 1952, 2pp. US Civil Aeronautics Board, Washington, D.C.

2182

Noncommercial flying (involves the personal use of an airplane either for pleasure or as a means of transportation in connection with a business) accident statistics for the year 1951 are presented. The analysis includes number of accidents and degree of injury, cause, operational phase in which accident occurred, emergency conditions, pilot hours and age, type of aircraft, and violations of the Civil Air Regulations. Separate tables are given for each of the followings: 1) pleasure flying, 2) personal transportation, 3) executive flying, and 4) others.

T.

2190

Instructional flying operations (that accomplished in supervised training, including primary and advanced dual and solo) accident statistics for the year 1951 are presented. The number of accidents, number of fatalities, primary causes, operation phase in which accident occurred, type of accident, emergency conditions, pilot experience and age, and violations of the Civil Air Regulations in Instructional Operations are given for each class of instruction.

T.

2186

Jones, E.I. & Bilodeau, E.A. RETENTION AND RELEARNING OF A COMPLEX PERCEPTUAL-MOTOR SKILL AFTER TEN MONTHS OF NO PRACTICE. Proj. 509 020 0007, Res. Bull. 53 17, June 1953, 14pp. USAF Human Resources Research Center, Lackland AFB, Tex.

2191

Bechtoldt, H.P., & Mager, R.P. STIMULUS PRESENTATION DEVICES FOR USE IN STUDIES OF DISCRIMINATION ABILITIES. Contract AF 33 (038)-13215, Proj. 509-080-0000, Res. Bull. 53-23, July 1953, 36pp. HRC, Air Research and Development Command, Perceptual and Motor Skills Research Lab., Lackland AFB, Texas. (State U. Iowa)

2186

As an indirect attack on the problem of retention of sight manipulation skills of the flexible gunner over a long interval of no practice, Ss had been given extensive training on the Pedestal Sight Manipulation Test ten months prior to the experiment reported here. Eight of the original Ss, none of whom had practiced on the test during the interim, were tested along with eight other Ss who had never practiced the test. Testing procedures and standards were duplicated from the original learning test. Five consecutive days of training were given with 40 minute periods each day. Original learning, relearning, and control (the eight new Ss) conditions were compared on all components of the task. Implications of the results for military planning were discussed.

T. G. R 8

2191

This report describes two devices used to measure aspects of human behavior (pacing of task and speed of reaction) in response to visually presented stimuli. With the tape reaction time unit sequences of stimuli, either paced or self-paced, can be presented and reaction time measured for each stimulus response. The projection time unit varies only in the "projection" feature and lack of self-paced aspect. The operating characteristics, procedures, and construction of the devices are given in detail.

T, I, R2.

2188

Behrck, H.P. PERCEPTUAL AND MOTOR SKILL RESEARCH IN GERMAN LABORATORIES: 1940-1952. Contract AF 33(038) 10528, Proj. 509 020 0004, Res. Bull. 53 20, USAF Human Resources Research Center, Air Research & Development Command, Lackland AFB, Texas. (Ohio Wesleyan; Delaware, Ohio & Ohio State University, Columbus, Ohio.).

This report derives from a trip to Europe by the author in the summer of 1952. The itinerary covered Western Germany, Austria, and a laboratory in Geneva, Switzerland. The present report covers the following items: a) General impressions from the 15 laboratories visited; b) Brief comments on each of the laboratories visited; c) Research emphasis and theoretical trends; d) Annotated references of reprints of 24 German articles filed at Ohio State University.

R 0

2189

Bilodeau, E.A. & Bechtoldt, J.H. ACQUISITION OF RESPONSE PROFICIENCY AS A FUNCTION OF ROUNDING ERROR IN INFORMATIVE FEEDBACK. Proj. 509-020 0007, Res. Bull. 53 21, July 1953, 11pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

2189

To study the effects of rounding errors in reported results on acquiring a motor skill, five groups of 80 basic airmen each made settings on a micrometer they could not see. The experimenter read each setting for each group but rounded the reading to a different degree for each group, the Ss attempted to correct their next setting on the basis of the reported previous setting. Setting errors and success frequency were interpreted in terms of sensitivity to feedback error and implications for control design.

T. G. R 2

2193

Thompson, M.E., Thompson, Jean P., & Busch, E.R. TESTS OF MOTOR ABILITY OR GROSS MUSCULAR COORDINATION. Contract AF 33(038) 22948, Proj. 509 020 0005, Res. Bull. 53 25, July 1953, 35pp. USAF Human Resources Research Center, Air Research & Development Command, Lackland AFB, Texas. (University of Arkansas, Fayetteville, Ark.).

The present review is primarily concerned with those tests which are currently being used with males of military age and which appear to measure, primarily, some aspect of gross muscular coordination. In terms of the conventional categories set up by the physical education writers, this has meant, in general, the inclusion of tests of motor educability, motor capacity, motor fitness, motor ability, and strength (where measured by some activity rather than by dynamometers); and the exclusion of endurance tests, specific skill or achievement tests, and cardiovascular tests of fitness. Evaluation is restricted to 9 tests proposed after 1925. However, in the interest of completeness, a number of early tests are briefly described and the early testing movement is outlined. Certain tests which have been developed and standardized primarily for use with high school boys, but which have been used to a limited extent with college men are included in an appendix. Other tests, less pertinent to the inquiry are indicated only in the bibliography.

R 255

2194

Bilodeau, E.A. THE EFFECTS OF FORCE VARIATIONS BEFORE REST ON RATE OF RESPONDING AFTER REST. Proj. 509 020 0002, Res. Bull. 53 26, Aug. 1953, 13pp. USAF Human Resources Research Center, Air Research & Development Command, Lackland AFB, Texas.

This study was designed to test the hypothesis that the force used in forepractice is irrelevant in later practice where force is held constant. Two levels of rest were used. However, these levels did not allow for full recovery from decremental effects of prior practice. Tested were 320 men on the manual crank. These Ss were divided into 8 groups which differed in load used for initial practice, duration of the single rest interval, and load used for final practice. The results indicated that at the force levels used: a) the particular force used before rest was of no consequence for rate of responding after a rest of brief duration, i.e., 30 sec.; b) the particular force used before a rest of relatively long duration (4 min.) contributed substantially to rate of responding after rest; c) after the long rest interval, the groups with the greater pre-rest load responded more slowly than the groups with a lesser pre-rest load when tested at two force levels. One possible account of the differential rest effect was presented.

R 2

2197

Zachert, Virginia, & Friedman, G. JOINT CONVERSION TABLES FOR AIR FORCE CLASSIFICATION TESTS AND ARMY CLASSIFICATION TESTS. Proj. 503 002 0002, Res. Bull. 53 29, Aug. 1953, 31pp. USAF Human Resources Research Center, Air Research & Development Command, Lackland AFB, Texas.

The purpose of this study was to derive conversion tables covering Army Classification Tests and related Air Force Classification Tests. These conversion tables can serve in 2 possible ways: a) Comparison and evaluation of the tests and test scores of one battery against the other; b) The development of a common classification battery, or core battery for all the armed services. The Air Force obtained data from approximately 1800 unselected basic airmen. The Army obtained data from 300 permanent party enlisted men. From the combined sample of approximately 2100, a stratified sample of 500, comprising 426 basic airmen and 74 soldiers, was selected in terms of Army Aptitude Area 1 scores. Equipercentile conversion tables are provided for 11 Air Force Classification Tests and 9 Army Classification Tests.

R-5

2198

Roby, T.B. & Forgays, D.G. A PROBLEM-SOLVING MODEL FOR ANALYSIS OF COMMUNICATION IN B-29 CREWS. Proj. 511 023 0001, Res. Bull. 53 30, Aug. 1953, 19pp. USAF Combat Crew Training Research Lab., Randolph AFB, Texas.

An electric model dealing with the relationship between communication and group behavior was presented together with some hypotheses on group efficiency. An attempt was made to show how to surmount initial difficulties in the application of this model to the measurement situation for which it was designed, i.e., interphone communication of B-29 crews in training. Finally, a brief discussion was appended relative to the major directions which subsequent work on the model are expected to follow: empirical validation, logical formalization, and generalization of scope.

R-9

2200

Walston, C.E. & Warren, C.E. ANALYSIS OF THE HUMAN OPERATOR IN A CLOSED-LOOP SYSTEM. Contract AF 33(038) 10528, Proj. 509 020 0004, Res. Bull. 53 32, Aug. 1953, 33pp. USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex. (Ohio State University).

2200

This report describes some of the results of an analytical study of the behavior of a human operator in a closed-loop control system. (See 3673 for full report) The results of the mathematical analysis are compared with data derived from several studies on an electronic pursuit apparatus for two types of tasks: simple following and compensatory.

R 4

2201

Attneave, F. TRANSFER AND INTERCORRELATION AMONG THREE PERCEPTUAL TASKS. Proj. 509 019 0001, Res. Note 51 9, Nov. 1951, 4pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

2201

To determine the degree to which practice on a perceptual task transfers to similar tasks, six groups (20 each) of subjects performed three tasks in one of six possible orders in immediate succession. Task A, matching a projected shape to one of thirty shapes appearing on answer sheet; Task B, matching shapes on a paper and pencil test (time limit); Task C, matching contours in jigsaw puzzle fashion (time limit). Mean scores are examined for evidence of transfer from task to task. The degree to which the tasks actually measured the same ability is studied by correlational technique.

T. R 1

2209 Simon, G.B. THE DEVELOPMENT AND TRYOUT OF A CHECK LIST OF OBSERVABLE BEHAVIORS IN PRE-FLIGHTING THE B-25. Proj. 507 012 0003, Tech. Rep. 53 7, Apr. 1953, 42pp. USAF Human Resources Research Center, Air Training & Development Command, Lackland AFB, Texas.

The research described in this Technical Report is part of a larger project directed towards development of procedures for assessing the efficiency of airplane and engine mechanics. Development of sound procedures of assessment is essential to the improvement of selection and classification devices and training procedures. Moreover, the development has operational implications through providing a prototype on which development of procedures for periodic check of maintenance activities may be based. Part I of this report describes the development of a check-list device designed for use in recording observations of B-25 maintenance activities. The steps followed in the development and revision of the form are described. Part II of the report describes results obtained during tryout of the revised version of this check list. During this tryout, B-25 mechanics at seven Air Force bases were observed during the pre-flighting maintenance check, and the observable maintenance activities which were carried out were noted by the observer on the check list. Although the primary purpose of this tryout was to determine whether field use of the check list was practicable, the data obtained provide interesting information regarding maintenance activities. For example, on the average these mechanics were observed to carry out about 70 per cent of the specific maintenance activities included on the check list and were clearly observed, on the average, to fail to carry out only about 4 per cent of these specific activities. There were, however, marked differences with respect to the completeness with which all maintenance activities on the check list actually were carried out. For example, in general less than 50 per cent of the items pertaining to "outside inspection" and "inspection for leaks" were checked. Marked differences among bases were evident.

R 7

2203 Kneill, Dorothy, & Forays, D.G. INTERRELATIONSHIPS OF CRITERIA OF COMBAT CREW PERFORMANCE IN THE B-29. Proj. 511-023 0001, Res. Note OCT 52 1, Dec. 1952, 19pp. USAF Human Resources Research Center, Air Training & Development Command, Lackland AFB, Texas.

Intercorrelations of 35 criteria of B-29 combat crew performance and 3 predictor variables were computed and factor-analyzed employing a modified multiple-group factor technique. Criterion measures used in the analysis include bombing and navigational accuracy scores, ground school grades, and instructor ratings of over-all effectiveness of crew members on training missions, as well as ratings of the flight coordination of various combinations of crew members. 8 factors were extracted and were related to simple structure. 5 of the factors appear to represent measures of over-all crew, sub-team, or individual in-flight effectiveness and/or coordination; 2 represent the ground school performance of 2 of the crew specialties, pilot and gunner; 1 factor includes crew means on 3 altitude scales. It is interesting to note that these last predictor variables form a factor independent of the criterion variables which they were designed to predict. The main impact of this analysis lies in its suggestion for reducing the number of criterion variables which need to be considered in future research on factors related to B-29 crew performances.

R 1

2210 Hahn, C.P. A SURVEY OF PERSONNEL AND TRAINING RESEARCH IN GOVERNMENT, BUSINESS, AND INDUSTRY. Contract AF 33 (038) 24602, Proj. 507 011 0001, Tech. Rep. 53 22, July 1953, 13pp. USAF Technical Training Research Lab., Chantrelle AFB, Ill. (American Institute for Research, Pittsburgh, Penn.).

2210 This report summarizes the findings of a survey of personnel and training research programs of government, business, and industry. The literature of professional psychological journals, house organs, trade journals, and management journals was searched and personnel directors of 60 selected organizations were interviewed. Discussion covers the following topics: personnel selection and classification, training programs, evaluation of employee performance, job evaluation, safety programs, and morale. The military implications of the results are discussed, and recommendations are made for further research.

R 2

2211 Parks, R.B., Wood, E.D. & Perkins, D.R. DEVELOPMENT OF THE FLEXIBLE GUNNERY PROFICIENCY EVALUATOR. Proj. 512 024 0001, Tech. Rep. 5323, July 1953, 14pp. USAF Armament Systems Training Research Lab., Lowry AFB, Colo.

2211 This report describes in detail the development for research purposes of the Flexible Gunner Proficiency Evaluator, a device controlling the track of a model target aircraft and recording the performance of Ss tracking and ranging on the target with the General Electric Pedestal Sight. Details are given on the various components and their calibration, and the performance of 30 Ss naive to the task is reported.

T. G. I.

2219 Bakan, P., Kappauf, W.E., & Payne, M.C. REVIEW OF PSYCHOLOGICAL RESEARCH BEARING ON RADAR-SCOPE INTERPRETATION IN ADC OPERATIONS. Contract AF 33(038)-25726, Proj. 506-061 0001, Tech. Rep. 53-26, Aug. 1953, 15pp. HRL, Air Research and Development Command, Aircraft Observer Training Research Lab., Mather AFB, Calif. (U. Ill.).

2219 This report reviews the findings of psychological research directed toward determining the most efficient utilization of existing equipment and personnel in radar-scope detection. Orientation is toward the Air Defense Command's need for target pickups at long range, speed in target reporting, and good "gross" accuracy on first reports. Recommendations are made for operations officer and scope operator with above assumptions in mind on factors in signal detection, signal search, target location reporting, prolonged scope operation, obtaining knowledge of site proficiency. Research needs are included.

R 4

2220 Matheny, W.G., Williams, A.C., Jr., Dougherty, Dora & Hasler, S.G. THE EFFECT OF VARYING CONTROL FORCES IN THE P-1 TRAINER UPON TRANSFER OF TRAINING TO THE T-6 AIRCRAFT. Contract AF 33(038) 25726, Proj. 508 017 0001, Task D, Tech. Rep. 53 31, Sept. 1953, 8pp. USAF Human Resources Research Center, Lackland AFB, Tex. (University of Illinois, Urbana, Ill.).

2220 To test the hypothesis that the amount of transfer of training from trainer to aircraft is affected by the fidelity with which control pressures are simulated, two groups of Ss were trained to criterion in the P-1 Link trainer and transferred to the T-6 aircraft. One group learned the maneuver of climbing and gliding in the trainer with the elevator control stick pressure close to that of the aircraft; the second group learned the same maneuver with pressures near zero. A third or control group practiced the maneuver only in the aircraft. The number of trials in the T-6 to achieve a specified standard of performance was analyzed for differences among the groups. Implications for flight trainers were indicated.

2222
Boyle, D.J. & Hagin, W.V. THE LIGHT PLANE AS A PRE-PRIMARY SELECTION AND TRAINING DEVICE: I. ANALYSIS OF OPERATIONAL DATA. Proj. 508 016 0004, Tech. Rep. 53 33, Oct. 1953, 61pp. USAF Pilot Training Research Lab., Goodfellow AFB, Tex.

2222
To evaluate the use of the light plane as a selection and training device, an experiment was run on flight training. Two groups (120 Air Force cadets in each) were trained to fly the T-6 aircraft. The experimental group was given 25 hours of flight training in a light (Aerona "Champion") aircraft before flight training in the T-6; the control group did not receive light plane training. The two groups are compared with regard to student attrition, achievement of solo flight, and number of accidents. Results are discussed regarding use of light planes in early phases of flight training.
T. G. I. R 3

2225
Swanson, R.A. THE RELATIVE EFFECTIVENESS OF TRAINING AIDS DESIGNED FOR USE IN MOTOR TASK DETACHMENTS. Proj. 7714, Task 77241, AFPTC TR 54 1, Feb. 1954, 14pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

2225
To investigate the relative effectiveness of several types of training devices when used in conjunction with a lecture presentation in the transitional training of skilled mechanics, six devices were selected for study: three types of mock-ups (operating, nonoperating, and cutaway), animated panels, charts, and symbolic diagrams. Different groups of skilled mechanics were given instruction on maintenance of three different systems of the B-47 aircraft. Each group was further divided into six subgroups, one for each type of training aid; the subgroups all heard the same lecture. The effectiveness of the training aids was evaluated on the basis of results from a test given immediately after instruction.
G. I. R 1

2226
Herman, I.L. & Church, S.A. ANALYSIS OF RADAR AIMING POINT IDENTIFICATION MOTION PICTURE GROUP TESTS. Proj. 7711, Task 77194, AFPTC TR 54 2, April 1954, 21pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

2226
A description and evaluation of motion picture radar aiming point tests are presented. Radar aiming point identification is an important component of the task of the aircraft observer bombardment. The present study is primarily concerned with 1) test reliability, item difficulty, and item discriminating power; 2) identification of test variance in terms of selected printed test variables in the Airman Classification Battery; 3) technical aspects of the test such as scoring and administration; and 4) discrimination between experienced and naive observers. The practical uses of the test are discussed.
I. I. R 8

2228
Gagne, R.M. & Bilodeau, E.A. THE EFFECT OF TARGET SIZE VARIATION ON SKILL ACQUISITION. Proj. 7707, Task 77130, AFPTC TR 54 5, April 1954, 16pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

2228
Two studies concerned with the effect of varying the limits of accuracy required in learning a motor skill were described. The device used was a modified standard rudder control test whose operation resembles that of certain airplane rudders. A signal light informed the S when he was "on target." Critical comparisons were made of performance scores accompanying shifts in both directions between the limits defined as wide and narrow targets.
T. G. R 5

2229
Gourley, N.V. PROTOTYPES OF PERSONAL BODY ARMOR FOR FLIGHT PERSONNEL. Proj. T-1181, Nov. 1956, 27pp. Marine Corps Equipment Board, Marine Corps Development Center, Quantico, Va.

2229
To evaluate in the field prototype personal body armor for flight personnel, the physical characteristics (particularly weight) were determined. The test items, accompanied by a user questionnaire, were assigned to aircrews of fighter, attack, helicopter, liaison and transport type aircraft. A static test using a subject, equipped with the test items and a parachute harness, suspended in the air from a frame was conducted to determine parachute bail-out compatibility and a buoyancy determination was made to determine the effects of the armor in water. Further testing was done on modified garments. Recommendations are included.
I.

2230
Bilodeau, Ina McD. PERFORMANCE OF AN EFFORTFUL TASK WITH VARIATION IN DURATION OF PRIOR PRACTICE AND ANTICIPATED DURATION OF PRESENT PRACTICE. J. exp. Psychol., Sept. 1953, 46(3), 146-153. (USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.).

2230
This is a report of a study on the effects of duration of past work and expected duration of present work on hand-cranking performance. Twelve groups, of 40 basic airmen each, had 0 sec., 30 sec., or 3 min. practice in turning a crank as fast as possible. Following a one-hour rest interval, all cranked for two min., but different groups were told that the period would be of different durations (10 sec., 30 sec., 3 min., or 5 min.). Final tracking rates are analyzed as a function of duration of initial practice and expected duration of practice.
G. R. 5

2231
Fitts, P.M. & Seeger, C.M. S-R COMPATIBILITY: SPATIAL CHARACTERISTICS OF STIMULUS AND RESPONSE CODES. J. exp. Psychol., Sept. 1953, 46(3), 199-210, AFPTC TR 54 8. (Ohio State University & USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

2231
To investigate the role of stimulus-response (S-R) compatibility in the transfer of information in a perceptual motor task, two experiments were conducted. In the first, nine matched S-R ensembles were studied in an eight-choice situation using groups of matched subjects. The results, analyzed in terms of reaction time, errors, and information lost, were related to the hypothesis that information transfer is a function of the matching of stimuli and response. To test the permanence of S-R compatibility effects, five subjects were trained for 32 days to make particular responses to particular stimuli. Differences in reaction time, movement time and frequency of errors were studied for their persistence over this period.
I. R 9

2232
McAllister, Dorothy E. THE EFFECTS OF VARIOUS KINDS OF RELEVANT VERBAL PRETRAINING ON SUBSEQUENT MOTOR PERFORMANCE. J. exp. Psychol., Nov. 1953, 46(5), 329-336. (State University of Iowa, Iowa City, Iowa).

2232
To investigate the effects of verbal pretraining on learning a motor task, 98 male college students learned six stimulus-response pairs. The stimuli were colors, and the responses were directions, expressed as either degree, clock, or direction analogues (irrelevant responses for control groups). Then Ss had 45 20-sec. trials on the Star Discriminator (a device requiring motion of a control handle from a central point into the proper radial channel in response to a signal color). Correct responses and errors in the early trials on the motor task are analyzed regarding the effects of the relevancy of the verbal pretraining.
T. G. R 12

2233

Reynolds, B. & Adams, J.A. EFFECT OF DISTRIBUTION AND SHIFT IN DISTRIBUTION OF PRACTICE WITHIN A SINGLE TRAINING SESSION. *J. exp. Psychol.*, Sept. 1953, 46(3), 137-145. (USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.).

2233

To study effects of shifting distribution of practice on learning a motor task, 2302 basic airmen had 30 30-sec. trials on the Rotary Pursuit Test. Some started with massed practice (10-sec. intertrial intervals), some with distributed (30-sec. intervals); a shift was made from one kind of practice to the other after different numbers of trials (4-26) for different groups (control groups had 30 trials with one kind of practice). Time on target is plotted for each trial for each group. Data are fitted to theoretically derived curves, and theoretical implications of results are discussed. G. R. 8

2234

Myrop, D.W. (Chm.). A STATISTICAL ANALYSIS OF COMMERCIAL NON-AIR CARRIER ACCIDENTS - 1951. PART III OF IV PARTS. June 1952, 23pp. US Civil Aeronautics Board, Washington, D.C.

2234

A statistical analysis of one category of non-air-carrier accidents (commercial) for the year 1951 is presented. Nonair carrier flying is defined as those operations in which the principal business is other than the carriage of persons or property from one place to another for hire. Commercial flying is that done for direct financial return. Accident statistics on primary causes, operational phase, type, pilot age and experience, emergency conditions, and violations are given for various classes of commercial flying. T.

2235

Fleishman, E.A. & Hempel, W.E., Jr. FACTORIAL ANALYSIS OF COMPLEX PSYCHOMOTOR PERFORMANCE. Proj. 7703, Task 77084, Res. Bull. AFPTC TR 54 12, April 1954, 18pp. USAF Skill Components Research Lab., Lackland AFB, Tex.

2235

This paper describes a factor analysis of data previously published through the School of Aviation Medicine and originally collected in 1947-1948 in a cooperative Air Force-Navy research project. A wide variety of both printed and apparatus tests were given at that time and from these data 16 apparatus and seven printed psychomotor test results were selected for analysis. The criterion of 'pilot success' (graduation or elimination from training school) was also included. The factors isolated are discussed in terms of the organization of abilities in the aptitude area of motor skill. T. R 15

2236

Roby, T.B. PREREQUISITES FOR PAIR-SCORES TO BE USED FOR ASSEMBLING SMALL WORK GROUPS. Proj. 7713, Task-77231, AFPTC TR 54 13, Dec. 1953, 17pp. USAF Crew Research Lab., Randolph AFB, Tex.

2236

It is shown that scores which express predicted compatibility between pairs of persons in small work groups, such as bomber crews, may have general usefulness for rational group assembly. The statistical prerequisites for such scores to be maximally useful for differential assignment to groups are stated. The dimensions along which persons in each of the separate classes should be ordered in order to meet these prerequisites are demonstrated. T. R 6

2240: Harris, J.D. & Rawnsley, Anita I. THE LOCUS OF SHORT DURATION AUDITORY FATIGUE OR 'ADAPTATION'. *J. exp. Psychol.*, Dec. 1953, 46(6), 457-461. (USN Medical Research Lab., New London, Conn.).

Auditory adaptation, defined as a reversible shift in threshold following very mild acoustic stimulation, was distinguished from true auditory fatigue by 4 criteria, one of which was the shape of the curve of recruitment. This experiment sought to throw light upon where in the auditory system, adaptation occurs. By the technique of simultaneous binaural loudness balancing between one normal ear and another ear undergoing a threshold shift as a result of a preceding adapting stimulus, it was possible to demonstrate an accelerated growth of loudness (recruitment) in the adapted ear. The intimate temporal relation between adaptation and recruitment, the latter distinctly allied to the organ of Corti, was thought to point to the peripheral organ, not the nervous system, as the site of the recently discovered phenomenon of auditory adaptation. R 24

2241

Ludvig, E. THE INFLUENCE OF DYNAMIC VISUAL ACUITY ON THE VISIBILITY OF STATIONARY OBJECTS VIEWED FROM AN AIRCRAFT FLYING AT CONSTANT ALTITUDE, VELOCITY AND DIRECTION. Contract Nonr-586(00), Proj. Designation NR-142-023, BuMed Proj. NM 001 075.01.03, Rep. 3, August 1953, 4pp. U.S. Naval School of Aviation Medicine, N.A.S., Pensacola, Fla.

2241

To examine the influence of dynamic visual acuity on the visibility of stationary objects (as on surface of earth viewed from aircraft in flight at constant altitude, direction, and velocity), a mathematical analysis is made, and an equation is derived expressing this relationship. The concept of ease of seeing (E) is advanced with efficiency of search expressed as an integral of E with respect to time. Altitudes, velocities, and patterns of search may be specified to make efficiency maximal. T. R 6

2242

Ludvig, E. PERCEPTION OF CONTOUR: I. INTRODUCTION. Contract Nonr-586(00), Proj. NR-142 023, Proj. NM 001 075.01.04, Rep. 4, Aug. 1953, 9pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

2242

To investigate the nature of the retinal stimulus effective in producing perception of edge (contour), two observers positioned a central fiducial dot over any observed edge on the stimulus (irregular white figure on black disc, rotating at rates above flicker fusion, illuminated by rectangular pattern of projected light of varied energy values). A method is described for computing the distal stimulus which, under the conditions of observation, results in desired proximal or retinal stimulus. The data are presented as units of relative retinal energy with respect to retinal distance. Theoretical considerations are discussed. T. G: I. R 18

2243
Ludwig, E. PERCEPTION OF CONTOUR: II. EFFECT OF RATE OF CHANGE OF RETINAL INTENSITY GRADIENT. Contract N70NR 316(00), Proj. NR 142 02, & Proj. NR 001 075.01.05, Sep. 5, Aug. 1953, 9pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

2243
This is one of a series of investigations into the nature of the retinal stimulus effective in producing the perception of an edge under certain simple conditions of photopic vision. A method is briefly described by means of which a distal stimulus is computed which, under the conditions of observation, will result in the desired or retinal stimulus. The observer can project a small fiducial dot of light onto the distal stimulus to indicate where an edge, break, contour, or discontinuity appears. Data from two observers are presented on the effect of rate of change of the retinal intensity gradient on contour perception.
G. R 11

2248
Gagne, R.M. & Foster, Harriet. A STUDY OF TRANSFER IN A MOTOR TASK WITH VARYING DISPLAY-CONTROL RELATIONSHIPS. Contract N70NR 316, Proj. 20 M 1A, Rep. 316 12, April 1948, 29pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn. & USN Medical Research Lab., New London Submarine Base, Conn.)

2248
This is a study of transfer of training in a visual-motor task as a function of changes in display-control relationships. About 120 Navy enlisted men were trained to move a lever in accordance with data contained in one quadrant of a circular dial. Then they were required to respond to the display in a different quadrant, with consequent change in the display-control relationship. Ss had knowledge of results. Results in terms of total time to complete correct movement in each trial, are discussed regarding inherent difficulty and transfer.
T. G. I. R 8

2249
Gagne, R.M., Baker, Katherine E. & Foster, Harriet. ON THE RELATION BETWEEN SIMILARITY AND TRANSFER OF TRAINING IN THE LEARNING OF DISCRIMINATIVE MOTOR TASKS. MOTOR SKILLS AND JOB EFFICIENCY. Contract N70NR 316, Proj. NR 783 003 & SDC Proj. 20 M 1A, SDC TR 316-1 5, July 1949, 48pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.)

2249
This report is a discussion of the rationale for, and the training implications of, an hypothesis concerning the expected kind and amount of transfer from one task to another as a function of stimulus and response similarities. Experimental data are not reported; rather, the need for experimental testing of the hypothesis and its corollaries is stressed.
T. G. R 30

2251
Nyrop, D.W. (Chau). A STATISTICAL ANALYSIS OF PUBLIC FLYING AND MISCELLANEOUS NON-AIR CARRIER ACCIDENTS - 1951. PART IV OF IV PARTS. June 1952, 9pp. US Civil Aeronautics Board, Washington, D.C.

2251
A statistical analysis of one category on nonair-carrier accidents (public and miscellaneous) for the year 1951 is presented. Public flying is defined as that conducted by federal, state, and municipal agencies; miscellaneous operations include such things as search and rescue, civil air patrol, hunting-trapping, fire-fighting, stolen aircraft, and suicides. Statistics concerning primary causes, operational phase, type, pilot age and experience, and emergency conditions are presented.
T.

2252
Garner, W.R., Saltzman, Dorothy C., & Saltzman, I.J. SOME DESIGN FACTORS AFFECTING THE SPEED OF IDENTIFICATION OF RANGE RINGS ON POLAR COORDINATE DISPLAYS. Contract NSORI-166, Proj. Designation NR 784-001, SDC Proj. 20 F 1, Tech. Rep. 166-X-05, Aug. 1946. 28pp. USN Special Devices Center, Johns Hopkins Univ., Psychol. Lab., Institute for Cooperative Research.

2252
To investigate some factors affecting speed of identifying range rings on a polar coordinate display, two procedures (projection and card sorting) were used with thirteen different patterns of range rings (varied as to number and pattern). Subjects identified the range of one marked ring in each presentation. The effect of motivation was observed for one card sorting group of subjects who were paid to serve but penalized by a reduction in money for each error. Time and error scores are analyzed and interpreted with respect to the effect of number of rings, patterns of rings, area of search, and motivation on efficiency of performance.
T.G.I.R.6.

2253
Deese, J. & Bowen, H.M. THE EFFECT OF TASK-INDUCED STRESS ON CODE LEARNING: PROVISIONAL REPORT. 166-1-121, Dec. 1950, 13pp. Psychological Lab., Johns Hopkins University, Baltimore, Md.

This experiment was designed to study the effects of stress induced by rapid pacing upon the learning of symbols from the International Morse Code by the method of anticipation. The stress was induced during the first test by presenting the symbols to the 72 Ss at a rate of one per 2 secs. A practice session followed, after which all Ss were given a test with the signals delivered at the rate of 1 per 2 secs. The effect of the rapid pacing was to impair performance, as measured in the number of signals guessed correctly. The degree of impairment appears to interact with the level of difficulty of the material. On the final test, however, there is no evidence of impairment due to stress during the first test. Actually there is a slight facilitating effect, significant at about the 5% level. A practice session intervened between these 2 tests, and it is suggested that the practice at the faster rate better prepared the Ss to cope with it on the final test. Thus, despite the impairing effects of the speed-stress, it does not impair and seems to facilitate Ss in subsequent performance at that speed.
R 3

2254
Gebhard, J.W. & Glickman, R.W. SOME PERCEPTUAL PROBLEMS IN THE DESIGN OF CODED SWITCHING KEYBOARDS. Contract NS ORI-166, Proj. NR 784 001, SDC Proj. 20 F 1, SDC TR 166-1 126, Oct. 1951, 12pp. USN Special Devices Center, Port Washington, N.Y. (Psychological Lab., Johns Hopkins University, Baltimore, Md.)

2254
To study some aspects of the design of coded switching keyboards (bank of keys used to control a machine process in which the keys themselves are a dynamic display of information relevant to the control process), a series of experiments were performed to study (1) selection of key design, (2) size of keyboard display, and (3) efficiency of complex assignment and time to make assignment. A general discussion of such keyboards and their practical applications is given.
T.G.I.

2255

Alexander, L.T. THE INFLUENCE OF FIGURE-GROUND RELATIONSHIPS IN BINOCULAR RIVALRY. J. exp. Psychol., 1951, 41, 376-381. Contract NS-crl-186, Proj. Designation NM-784-001, Rep. 164-I-127. ONR, Special Devices Center, Johns Hopkins Univ.

2275

To investigate the effect of figure-ground organization on binocular rivalry, five subjects viewed four stereograms having two characteristics of figure strength: greater and lesser figure contrast with ground, broken and continuous contours. The rate of alternation of each stereogram is presented and discussed in terms of theory of cortical saturation and depth perception.
T.G.I.R.

2256

Goadry, P.E. THE TRANSFER OF HABITUATION TO ROTATION WITH RESPECT TO THE DIRECTIONAL ASPECT OF THE VESTIBULAR REACTION. Contract NT-onr-434, Proj. Designation NR 143-456, Proj. NM 001 063.01.36, Rep. 35, Sept. 1955. 12pp. U.S. Naval School of Aviation Medicine, N.A.S., Pensacola, Fla.

2256

This is a study of the interaction of directionally opposite vestibular stimuli in influencing the transfer of habituation to rotation direction. Three groups of ten subjects received clockwise and counter-clockwise rotary tests of vestibular function before and after a habituation series of 34 clockwise rotation periods. The three groups differed in the rotation-time/rest-time ratios employed during the habituation series.
T.G.I.R.

2257

Fang, H.S., Hall, A.L., & Hwang, T.F. EFFECTS OF CARCHOLIN ON DARK ADAPTATION AND VISUAL PURPLE REGENERATION. Proj. NM 001 059.30.02, Dec. 1953. 3pp. U.S. Naval School of Aviation Medicine, N.A.S., Pensacola, Fla.

2257

To study the effects of carcholin on dark adaptation and visual purple regeneration, light sensitivity thresholds for two trained subjects were determined for varied dosages of carcholin (from 0.2 to 1.0 milligrams) at intervals from one to 49 hours in the dark. Visual purple concentration of toads was estimated by comparison of retinal colors with Garten's table and by a precise determination with an electric spectrophotometer after dosage of 1.0 cubic centimeter of 0.001 percent carcholin and ninety minutes in the dark. The relation between speed of visual purple regeneration and dark adaptability is discussed.
T.R.I.

2258

Fang, H.S., Hall, A.L., & Hwang, T.F. THE INFLUENCE OF PROLONGED STAY IN THE DARK ON FOVEAL DARK ADAPTABILITY. Proj. NM 001 059.30.01, Oct. 1953. 3pp. U.S. Naval School of Aviation Medicine, N.A.S., Pensacola, Fla.

2258

To investigate foveal (cone) dark adaptability over prolonged periods in the dark, light sensitivity thresholds for two subjects were determined for intervals of time over a period of ten hours in the dark. The data are given as relative stimulation intensities (log values) and relative sensitivity values. The findings are discussed in terms of present visual theory.
T.G.R.

2262

Maag, C.H. & Poe, A.C. A STUDY OF THE EFFECT OF OMISSION OF RADIO FLIGHT TRAINING DURING STAGE D UPON ADVANCED INSTRUMENT FLIGHT AND ADVANCED RADIO RANGE PROCEDURE PROFICIENCY. Proj. NM 001 054.23.02, July 1953. 14pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

2262

This is a study of the effects of omitting a portion of a flight training curriculum upon student performance in later phases of training. The grades and instructor opinions on the performance of 64 Naval Aviation students in advanced training who had earlier omitted training on radio range procedure were compared with similar criteria for 64 matched control Ss who had the training. The results are discussed regarding implications for future training.
T. I. R

2269

Andrews, B.G., Green, R.F. & Spragg, S.D.S. FACILITATION EFFECTS BETWEEN FOLLOWING AND COMPENSATORY TRACKING TASKS. Contract NCOMR 241, SDC TR 241 6 7, Aug. 1952, 8pp. USN Special Devices Center, Port Washington, N.Y. (University of Rochester, Rochester, N.Y.).

2269

To study transfer effects between following and compensatory types of tracking, 92 young men in military service had eight trials of one type of tracking, then changed for eight trials of the other. Tasks were the SAM Two-Hand Coordination Test (following) and the SAM Two-Hand Pursuit Test (compensatory). Starting task was different for each half of the subject group. Display-control relationships were also varied between "natural" and "unnatural." Mean time on target is plotted for each trial for the various conditions. Results are discussed in terms of facilitation relationships between the two types of tracking and effects of display-control relationship.
T. G. I. R

2276

U.S. Dept. of Commerce. SYMPOSIUM ON ELECTRONICS MAINTENANCE. PPT 202/4, 3-5, Aug. 1955, 214pp. U.S. Department of Commerce, Advisory Panel on Personnel & Training Research, Office of the Assistant Secretary of Defense Research & Development, Washington, D.C.

2276

This book is a collection of papers presented at a symposium on electronics maintenance attended by representatives of each of the Armed Services. Five principal topics are in 18 papers: job analysis, selection and classification of personnel, proficiency measurement, training, and group organization. Most of the papers are reviews of the literature and discussions of current progress; those on proficiency measurement report specific data.
T. G. I. R 63

2280

Reed, J.B. THE SPEED AND ACCURACY OF DISCRIMINATING DIFFERENCES IN SINGLE AND COMPOUND ASPECTS OF VISION. Contract NMR 131(01), SDC Human Engng. Rep. 131 1 4, Sept. 1952, 26pp. USN Special Devices Center, Port Washington, N.Y. (Psychophysical Research Unit, Mount Holyoke College, South Hadley, Mass.).

2280

To determine the speed and accuracy of discriminating symbols as a function of single or compound visual aspects, a first experiment required subjects to sort 12 packs of 64 cards (each having a symbol exhibiting one of two areas, hues, shapes, and brightnesses) on the basis of each of the six possible compounds. A second experiment required sorting on the basis of only one compound or of only one aspect. Group average sorting time per card and percentage error were calculated for each condition and analyzed with respect to the visual code used. Practice effects are noted.
T. G. R 2

2282

Kantz, J.E., & Sleight, R.B. LEGIBILITY OF NUMERALS: THE OPTIMAL RATIO OF HEIGHT TO WIDTH OF STROKE. *Am. J. Psychol.*, 1950, 63, 567-575. Contract NS-ORI-186, Proj. Designation NR 784-001, Rep. 166-1-106. ONR, Special Device Center, Johns Hopkins Univ. and Purdue Univ.

2282

To investigate some factors influencing the legibility of numerals, the maximal distance at which 14 subjects could read a series of numerals was determined. Variables were: midstroke height measurement for height/width ratios (six steps from 3.5/1 to 6.5/1), brightnesses (3, 10, 21 foot candles), contrast direction (black on white or reverse), and the ten digit forms. The data are evaluated by analysis of variance technique for the effect of the different variables. Specific numeral legibility is further analyzed by rank order. Discussion relates these data to findings from previous experiments. T.G.I.R.10.

2286

Carnap, R. & Bar-Hillel, Y. AN OUTLINE OF A THEORY OF SEMANTIC INFORMATION. *Tech. Rep. 247*, Oct. 1952, 49pp. Research Lab. of Electronics, Massachusetts Institute of Technology. (University of Chicago).

2286

In distinction to current Theory of Communication that treats amount of information as a measure of the statistical rarity of a message, a Theory of Semantic Information is outlined, in which the concept of information carried by a sentence within a given language system is treated as synonymous with the content of this sentence, normalized in a certain way. The concept of amount of semantic information is explicated by various measures of this content, all based on logical probability functions ranging over the contents. Various estimate functions of amount of information are investigated leading to generalized semantic correlates of the concepts and theorems of current communication theory. Research applications are suggested. R 5

2291
Henry, F.H. DISCRIMINATION OF THE DURATION OF A SOUND. *J. exp. Psychol.*, Dec. 1948, 38 (6), 734-743. (University of California, Berkeley, Calif.).

Listeners for discrimination of the duration of a sound ranging from 32 to 480 msec. were determined for 11 Ss. Stimulus intensity was varied from 20 to 80 db; pitch was varied from 125 to 2000 cycles. Somewhat more than 20,000 individual judgments were obtained. The average S could discriminate approximately 14% change in the duration of a 500 cycle tone of moderate intensity. Discrimination was only about half this good for the shortest duration studied; it was also poorer for faint sounds and low-pitched sounds. The effects of stimulus alteration were consistent with a theory that presumes an integration of stimulus intensity with respect to duration. Perception of differences in the duration of sound stimuli shorter than a half-second can be considered as fundamentally a discrimination of intensity differences. R 14

2293

Camp, R.T., Jr., Tolhurst, G.C. & Morill, S.M. THE INTELLIGIBILITY CHARACTERISTICS OF EARPHONES AND SMALL LOUSPEAKERS IN THE MARK II, MODEL O FULL PRESSURE SUIT HELMET UNDER VARIOUS ALTITUDE, PRESSURE, AND VENTILATION CONDITIONS. *Spec. Rep. 5614*, June 1958, 15pp. USN School of Aviation Medicine, Naval Air Station, Fla.

2293

To investigate the feasibility of replacing the earphones in a full pressure suit helmet (Mark II, Model O) with a loudspeaker system, intelligibility tests were performed on two types of transducers installed in the helmet. The tests were performed under various altitude, pressure and ventilation conditions on a trained observer wearing the full pressure suit and helmet. Speech levels, at which intelligibility thresholds for spondee words were obtained, were analyzed for both transducers under the various conditions. Other measurements taken were: level at which system starts distorting, sound pressure level of external ambient noise which results in an increase to noise level at ear, and the power rating of the amplifier driving the transducers. T. G. I.

2300
Mason, H.M. STUDIES IN SPEECH INTELLIGIBILITY: A PROGRAM OF WAR-TIME RESEARCH. THE EFFECT OF VERY LOUD SPEECH SIGNALS UPON INTELLIGIBILITY. *Speech Monographs*, 1946, XIII (2), 19-23. (Purdue University, Lafayette, Ind.).

To determine the effect of very loud speech signals upon intelligibility, four groups of listeners were presented with phonograph records containing mixtures of speech and noise at various levels of signal strength. The results were presented and discussed in terms of the relative intelligibility at various signal levels. The article also presented summaries of other studies pertinent to this problem. Cf. 2649, 2302, 2303, 2304, 2305.

2301

McKinsey, J.C.C. "BEST" STRATEGIES. *Res. Memo 286*, April 1950, 7pp. USAF, The Rand Corporation, 1700 Main Street, Santa Monica, Calif.

This paper considers special strategies, called "best" strategies, which have the special feature that, in addition to being optimum in the usual sense, they take advantage of the mistakes of one's opponent. It is shown here that in the case of finite games such best strategies always exist. Further, it can be shown that every strategy which is not best is dominated by a best strategy. R 0

2302

Brackett, J.P. STUDIES IN SPEECH INTELLIGIBILITY: A PROGRAM OF WAR-TIME RESEARCH. INTELLIGIBILITY RELATED TO PITCH. *Speech Monogr.*, 1946, XIII(2), 24-31. (Northwestern University, Evanston, Ill.).

This article reports a series of experiments dealing with the following aspects of the relationship between pitch and intelligibility: 1) the effect of pitch and related instruction upon intelligibility; 2) the effect of instruction on pitch; 3) the relationship of frequency to intelligibility; 4) the effect of noise on pitch; and 5) the effect of loudness on pitch of voice. Also included is a description of a method used to determine the pitch of voice. Cf. 2649, 2300, 2303, 2304, 2305.

T.

2303

Mason, H.M. STUDIES IN SPEECH INTELLIGIBILITY: A PROGRAM OF WAR-TIME RESEARCH. IMPROVEMENT OF LISTENER PERFORMANCE IN NOISE. *Speech Monogr.*, 1946, XIII(2), 41-46. (Purdue University, Lafayette, Ind.).

To determine whether training in Air Force communication courses improves proficiency in speaking or in listening, and to what extent this improvement is due to familiarization with test materials, 155 Air Force cadets underwent three kinds of training in communicating above airplane-type noise: 1) articulation tests with knowledge of results; 2) tests with the same voices as on pre- and post-tests; 3) tests with the same words as on pre- and post-tests. Articulation scores on the post-test are compared with those obtained by a control group that underwent no training. The relative effectiveness of handheld and throat microphones was also compared. Cf. 2649, 2300, 2302, 2304, 2305.

T.

2304

Drueger, G.L. STUDIES IN SPEECH INTELLIGIBILITY: A PROGRAM OF WAR-TIME RESEARCH. INTELLIGIBILITY RELATED TO ARTICULATION. *Speech Monogr.*, 1946, XIII(2), 50-53. (Purdue University, Lafayette, Ind.).

This article presents the results of four experiments designed to investigate the effects of training in articulation upon intelligibility. Some of the variables investigated were as follows: training only on final consonants; effects of throat and mask microphones; training in clear pronunciation with the hand-held microphone; the effects of articulation training on loudness level, and so forth. Cf. 2649, 2300, 2302, 2303, 2305.

T.

2305

Shoup, F.C. STUDIES IN SPEECH INTELLIGIBILITY: A PROGRAM OF WAR-TIME RESEARCH. TRAINING PROCEDURES. *Speech Monogr.*, 1946, XIII(2), 59-63. (General Motors Institute, Flint, Mich.).

A training program for voice communication in high-level noise is discussed. The training room, the role of the instructor, and the sequence of voice drills is described. Examples of the training materials are given. Cf. 2649, 2300, 2302, 2303, 2304.

T. I.

2307

Boynton, R.M., & Bush, W.R. LABORATORY STUDIES PERTAINING TO VISUAL AIR RECONNAISSANCE. Contract AF 33(616)-2565, Proj. 7157, Tech. Rep. 55-304, Part 1, Sept. 1955, 41pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (University of Rochester).

2307

This report deals with the first stages of a research program investigating problems of visual air reconnaissance. A preliminary investigation of the recognizability of various shaped figures as a function of brightness contrast and distance yielded 46 figures (rectilinear and curvilinear) for use in a study of factors in target recognition. Rectilinear figures, placed among an array of curvilinear forms (16, 32 or 64), were presented to nine subjects at distances from 20 to 60 feet, for exposure times of 3 to 24 seconds, at 75 millilamberts illumination and 100 percent contrast conditions. Percent correct responses were analyzed as functions of exposure time, number of forms, and distance. The effects of figure density, figure cluster, and learning were evaluated. T. O. I. R 5

2308

Kelly, K.L. & Judd, Deane B. THE ISCC-NBS METHOD OF DESIGNATING COLORS AND A DICTIONARY OF COLOR NAMES. NBS Circular 553, Nov. 1955, 158pp. U.S. Dept. of Commerce, National Bureau of Standards, Washington, D.C.

2308

This dictionary of color terms was compiled to assist the scientist, businessman, and layman to understand the different color vocabularies used in the fields of art, science, and industry. It records over 7500 individual color names in a manner that enables one to translate from one color vocabulary to another. A requirement of the method of designating colors outlined by the Inter-Society Color Council developed at the National Bureau of Standards is used. All notations were determined under conditions of average daylight illumination and normal viewing and are applied to all opaque, clear, cloudy, or fluorescent samples whether viewed by reflected or transmitted light and to microscopic structures.

I. R 61

2310

US Civil Aeronautics Administration. AIR MARKING. CAA Bull. 12, Rev. Aug. 1945, 41pp. US Civil Aeronautics Administration, US Department of Commerce, Washington, D.C.

2310

This article presents an extensive treatment of the following aspects of air markings: types of air markers, their legibility, construction, maintenance, etc. The article is well illustrated and offers specific recommendations concerning air marker design for optimal legibility, e.g., illumination levels, size, shape and spacing of letters, color combinations, etc.

T. I.

2311

Maywood, O.G., Jr. MILITARY DOCTRINE OF DECISION AND THE VON NEUMANN THEORY OF GAMES. March 1950, 7pp. USAF Mammill AFB, Air War College, Ala.

This document represents an investigation into the possible uses of the Von Neumann Theory of Games in military decision making. The theory itself is evaluated as well as the needs of the military along the lines of decision making. Procedures currently in use are discussed and conclusions are presented pertaining to the applicability of the theory to use by the military. (HEIAS)

R 19

2312

US National Bureau of Standards. SIZE MEASUREMENTS FOR MEN'S WORK TROUSERS. A RECORDED VOLUNTARY STANDARD OF THE TRADE. Commercial Standard 166-50, May 1950, 10pp. US National Bureau of Standards, Department of Commerce, Washington, D.C.

The purpose of this commercial standard is to provide standard methods of measuring and standard minimum measurements for men's work trousers for the guidance of producers, distributors, and users, in order to eliminate confusion resulting from a diversity of measurements and methods, and to provide a uniform basis for guaranteeing full size. The standard covers size designations, methods of measuring, and standard minimum measurements for men's work trousers. It also includes recommendations concerning shrinkage, and a recommended means of identification through labeling work trousers produced in conformity with this standard. The methods and measurements given herein are applicable to finished garments as delivered by the manufacturer.

2314

Raymond, D.L. & Moore, C.G. TEST PROGRAM FOR EVALUATION OF ARCTIC AND DESERT CAB ENCLOSURES. FINAL REPORT. Contract DA 44 009 ENG 1108, Proj. 8-50 02 001, June 1954, 42pp. Perfection Stove Company, Cleveland, Ohio.

The purpose of the study was the investigation and recommendation of optimum combinations of materials, accessories, and physical principles considered applicable to construction equipment cabs as designed specifically for operator's comfort, safety, and individual effectiveness in areas of climatic extremes. The conclusions expressed are in the form of a procurement description or general specification for a hypothetical construction equipment cab enclosure. Problems are listed which should be further analysed. (HEIAS)

2315

Mundel, M.E. & Lazarus, I.P. PREDETERMINED TIME STANDARDS IN THE ARMY ORDNANCE CORPS. J. Indust. Engng., Nov. 1954, 13-20.

2315

This paper describes the development and use of pre-determined time standards as a method for approximating the time required to perform manual jobs or the manual parts of jobs. The system was developed by collecting and analyzing a considerable series of time studies of industrial operations in terms of seven basic therbligs. Values are selected from resultant tables to synthesize the time for a job. Some results from the use of the system are presented and discussed.
T. G. I. R 5

2316

Mowbray, G.H., Gebhard, J.W., & Byham, C.L. SENSITIVITY TO CHANGES IN THE INTERRUPTION RATE OF WHITE NOISE. J. acoust. Soc. Amer., Jan. 1956, 28, 106-110. Contract NORD 7386, Rep. 366, April 1956. Bureau of Ordnance, U.S. Navy, & Applied Physics Laboratory, Johns Hopkins University.

2316

Difference limens were determined for the discrimination of changes in the frequency of auditory flutter at interruption rates of 1 to 320 ops. The stimuli were presented through binaural earphones at a sensation level of 50 db. The on-off ratio was .5. The method of adjustment (without bracketing) was used to determine the thresholds of four observers. The results are presented in terms of the absolute (Δf) and relative ($\Delta f/f$) difference limens as a function of the frequency. These findings are compared with those of previous investigators, and their relation to the difference limen for pitch is discussed.
T. G. I. R 9

2320

Solomon, L.N. RELIABILITY OF THE CONNOTATIVE ASSOCIATION TO PASSIVE SONAR SOUNDS USING A NEW STATISTICAL TEST OF CONSISTENCY. PO 16401, NE 121303 1 (NEL 181), Rep. 443, Nov. 1953. USN Electronics Lab., San Diego, Calif.

2320

This report studies descriptive terms characteristically used in sonar classification, and experimentally evaluates the consistency with which passive sonar sounds may be quantitatively rated on scales defined by polar-opposite adjectives. Sixteen male Ss rated four passive sonar sounds on 50, seven-point scales in a test-retest situation. The reliability of the scale value assigned by each S for each sound scale pair was evaluated statistically by a new consistency test in rating. Recommendations are made for further use of the rating technique, and improvement of classification and training procedures for sonar sound recognition and classification.
T. G. I. R 6

2321 Spilth, W., Curtis, J.F., & Webster, J.C. CUES THAT AID LISTENING TO ONE OF TWO SIMULTANEOUS VOICE MESSAGES. Rep. 446, Jan. 1954. 11pp. Nav. Electronics Laboratory, Bureau of Ships, Human Factors Div., San Diego, Calif.

A study was made of the effects of 4 variable listening aids on an operator's ability to answer one of two simultaneous voice messages. The variables considered were: a) horizontal spatial separation of the voice-message sources; b) visual cues in the form of "calling channels" indicator lights; c) frequency spectrum-shaping filters; and d) pull-down facilities for switching a selected channel to an earphone or loudspeaker near one ear. The study showed that when an operator must listen to a voice message which is overlapped by another, masking effect may be minimized by: a) separating the message sources by more than 10° in the horizontal plane; b) placing filters in the most-used circuits so that the aural frequency spectra passed by the circuits do not overlap more than is necessary to produce intelligible speech; c) employing jewel lights to indicate the channel calling, when channel identification is a major problem; and d) providing pull-down facilities for optional use by the operator.

2322 White, C.T. DESIGN OF A COLOR-MATCHING DOSIMETER. Rep. 451, Nov. 1953. 5pp. Nav. Electronics Lab., Bureau of Ships Lab., Human Factors Div., San Diego, Calif.

2322 To design a step-matching dosimeter for atomic radiation compatible with human visual capabilities, the self-indicating, color-matching dosimeters of the IN-56 (XN3)/PD type were evaluated. Changes in the color-matching procedures were designed to make the dosimeter suitable for tactical screening purposes, but not for accurate quantitative readings. The new design was evaluated by both field and laboratory tests. Recommendations and instructions for use are included.

2325 Harper, W.R. A RECOMMENDED DESIGN FOR A COMMUNICATOR'S DESK AND CHAIR. DRML Proj. 59, Rep. 59-5, H.R. 106, April 1955. 29pp. Defence Medical Research Labs., Defence Research Board, Toronto, Ontario, Canada.

2325 A review of the pertinent literature along with a survey of user's evaluations provided the basis for the author's assessment of an existing communicator's desk and chair. The primary aspects of such equipment, e.g., working areas, storage capacities, comfort, and so forth, are considered and a recommended design proposed to meet the requirements noted by users. Prototypes of the proposed equipment were constructed. Photographs of existing and proposed equipment are presented to illustrate the advantages of the proposed design.
T. I. R 6

2326 Held, R. SHIFTS IN PINAURAL LOCALIZATION AFTER PROLONGED EXPOSURES TO ATYPICAL COMBINATIONS OF STIMULI. AMST. J. Psychol., Dec. 1955, 58, 528-548. Contract N0001-70, Proj. NR 142-201, Rep. FNR-141. ONR & Harvard University, Psycho-Acoustic Lab. (Brandeis University).

2326 To study the role of experience in the ability to localize sound in space, two experiments were conducted. An electric phonophone, worn by three subjects, displaced the aural axis by 22° around vertical axis of head. Measurements of direction finding were made before and after seven hours of exposure to a normal environment. In the second experiment, the conditions of exposure were controlled to produce atypical combinations of stimuli that would accompany the motion of a listener with displaced aural axis. Six subjects went through eight one-hour sessions; direction finding was measured before, during and after each session. The data, angular difference between pre-exposure and post-exposure tests, were analyzed for directional shifts attributable to conditions of exposure. G. I. R 17

2334 US Occupational Analysis Branch. GUIDE FOR ANALYZING JOBS. ANALYST'S WORKBOOK. April 1950. 40pp. US Occupational Analysis Branch, Department of Labor, Washington, D.C.

This handbook contains, in outline form, the basic concepts of job analysis as conducted by the Employment Service. The first of 3 sections covers the information required for a clear, coherent picture of the work done. The second section deals with the skill involved. The factors discussed are: responsibility, job knowledge, mental application, and dexterity and accuracy. The third section is devoted to worker, physical, and training requirements of primary interest in placement work. Included are considerations selected to guide the analyst in the type of information which should be obtained in the course of the analysis. (HEIAS)

2335 Bartlett, F. RADAR DISPLAY RESEARCH AT THE RAF RADAR RESEARCH UNIT. FFRC 801. Aug. 1952. 4pp. Psychological Lab., Flying Personnel Research Committee, Cambridge, England.

2335 This report presents an analytical discussion (from the vantage point of several years research on radar displays) of the merits of approaching the problem of ascertaining the psychological factors involved in radar reading performance by two methods: 1) the use of a prototype or actual complex display, and 2) the use of a "reduced" or controlled display situation which can be advanced to a more fully realistic display step by step. Experimental results from both methods are used to illustrate the analysis.

2337 Poulton, E.C. TWO CHANNEL LISTENING. A.P.U. 166/53, 48. Aug. 1953. 7pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

3 experiments were conducted using 16 different is in each. Selecting information from 2 simultaneous sources of speech was evaluated in terms of omissions, in which 3 was generally unware) and mishearings, which were distributed independently. When relevant information was surrounded by irrelevant on the same channel, omissions exceeded mishearings. When it was surrounded by simultaneous irrelevant information on the other channel, mishearings predominated. Instructions to listen to both sources (distributed attention) gave more omissions than instructions to listen to one of them (restricted attention). This in turn gave more than instructions as to when and to what to listen (directed attention). Mishearings were independent of these instructions. Placing the speakers together increased both omissions and mishearings. Similarity of relevant material to irrelevant increased omissions; it also increased false selections, especially with the speakers together. When only one or neither source presented information continuously, omissions and mishearings were reduced, and none of these differences was significant. The results were discussed in terms of inattention and physical interference.

A. 6

2340 Christie, I.S., Luce, R.D. & Mary, J., Jr. COMMUNICATION AND LEARNING IN TASK-ORIENTED GROUPS. Contract DA36 039 SC 100, Proj. 3 99 10 022, Proj. 8 1028 J, Tech. Rep. 231, May 1952, 251pp. Research Lab. for Electronics, Massachusetts Institute of Technology, Cambridge, Mass.

2340 This study reports the theoretical and experimental developments of the Group Networks Laboratory, Massachusetts Institute of Technology. The report includes the discussion of task-oriented groups and relevant variables, description of experimental techniques, statistics of group performance, individual decision latency, effect of noise on group errors, and questionnaire attitudinal data. Also given are detailed descriptions of specific experiments, description of an electrical device used in communication experiments, human group interpretation of classical electrical network equations, and mathematical results on network topology and their experimental implications.

T. G. I. R 123

2341 USA Department of the Army. A GUIDE TO THE COMPILATION AND REVISION OF MAPS. Tech. Memo. 5 240, Sept. 1955, 167pp. USA Department of the Army, Washington, D.C.

2341 This manual provides a text on the techniques of map compilation and drafting for army personnel engaged in such activities. Topics covered include map projections and grids; the compilation and revision of maps from aerial photographs or map manuscripts; the preparation of mosaics, annotated photographs, hasty maps, and other map substitutes. A glossary of terms and definitions is included.

T. I. R 79

2343 Iock, R.N. THE PERCEPTION OF ELABORATION OF STEREO-SCOPIC PRESENTATIONS. Contract N6 ONR 27014, April 1955, 22pp. Princeton University.

2343 This study was designed to explore the perceptual processing of presentations consisting of exposures rapidly succeeding each other in time. Two viewing units allowed for the presentation of figures up to 18 squares of light and provided facilities for the introduction of figural content into the squares. Eight subjects were used; observation was free; observers were instructed to report what they saw and were questioned about unreported configurational aspects. The conditions were classified broadly as 1) basic three-square presentations, 2) figure-ground, and 3) sequence formation. The results are discussed under these headings.

T. R 36

2345 Flanagan, J.C., Lange, C., O'Hagan, Anne & Weisiegel, Mary. CRITICAL REQUIREMENTS FOR RESEARCH PERSONNEL A STUDY OF OBSERVED BEHAVIORS OF PERSONNEL IN RESEARCH LABORATORIES. March 1949, 66pp. American Institute for Research, Pittsburgh, Penn.

2345 The objective of this study was the identification and definition of the characteristics of effective scientific personnel and the development of a practical procedure for evaluating their success in carrying out their duties. Data were collected by means of the Critical Incident Technique. Descriptions were obtained of actual incidents of behavior that were deemed to be particularly effective or ineffective in performance of the job. A large and representative sample of 500 research workers supplied more than 2500 such incidents. A list of critical requirements was prepared from the incidents, using an inductive process. Giving a minimum of inference and judgment on the part of the investigators. An analytical study was made to check its applicability to workers in several fields.

T. G. R 30

2346 Parker, E.M. & Parker, D.B. TRIAL BY COMBAT. *Combat Forces J.*, May 1951, 1(10), 3-5.

2346 This paper presents a discussion of Operations Research as used and developed during World War II and as it is being used today to help solve national defense problems. Typical problems from the Air Force, Army, and Navy are listed and discussed briefly. The organization of the Operations Research Office (ORO) of the Defense Department is described and its current program of research is discussed.

2349 Henschke, U.K. & Mauch, H.A. CONTROL ACTION SIMULATOR. Rep. 696 110D, July 1949, 14pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

2349 This is a description of "...the principle, layout, dynamic behavior, and design of a Control Action Simulator," a device for mechanical simulation of control dynamics for use in investigating human control problems. Its major components are position and rate controls and a feedback. Its differential equation is given together with sample output functions for selected adjustments. A preliminary model is described and illustrated.

T. G. I. R 7

2350 Biel, W.C. & Brown, G.E., Jr. ESTIMATION OF AIRPLANE SPEED AND ANGLE OF APPROACH. FINAL REPORT. Contract N6ORI 189, Proj. NR 143-131, March 1949, 129pp. Denison University, Granville, Ohio. (USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio & Eastern Washington College of Education, Cheney, Wash.).

2350 To determine the accuracy with which observers can estimate airplane speed and angle of approach, twenty commissioned officers recorded their individual estimates for airplanes flown on straight and level courses which varied in speed, direction, altitude, and "minimum slant range" on different approaches. In addition, a series of speed estimations were made with knowledge of actual speeds given immediately after judgments, in an effort to improve such judgments. Statistical analyses of the data are made and the practical implications for gunnery training are discussed.

T.G.I.R.3.

2353

King, H.G. (Chm.). AIRCRAFT EMERGENCY EVACUATION. A METHOD FOR EVALUATING DEVICES, PROCEDURES, AND EXIT PROVISIONS. CAA Office of Aviation Safety, Department of Commerce, Washington, D.C. (CAA-CAS Subcommittee Working Group, Washington, D.C.).

2353

To develop a standard method of evaluating emergency escape devices, procedures, and exit designs for commercial and military aircraft and to compile descriptive and quantitative data sufficient to provide a basis for acceptance of new devices and procedures, a frame-by-frame analysis of high-speed motion picture records of simulated emergency evacuations was made. Untrained subjects were tested on several escape devices that are carried by civil air transport and military planes. I. I.

2357

Ford, A., & Getz, M.H. THE PERSPECTIVE ILLUSION IN RADAR SCOPE SCOPES. Contract W 28-099-ac-130, Tech. Rep. 1. June 1948. 12pp. USAF, Air Materiel Command, Watson Lab., Red Bank, N.J. (Lehigh U., Dept. of Psychol.).

2357

To investigate methods for overcoming the perspective illusion on GCA radar scopes (tendency to overestimate space at apex of sector scan and underestimate at open end when reading signal deflections above or below glide line), both artificially-drawn scope pictures and simulator presentation of photographic records from real GCA scopes taken at a landing field were used. Methods studied: (1) 100-foot reference lines on each side of glide path, (2) multiple lines every 25 feet with the 100-foot line heavier. Statistical analysis of error and time scores was made in terms of the methods, effects of training, and individual differences of observers. I. I.

2358

Ford, A., & Getz, M.H. TYPES OF ERRORS IN THE READING OF GCA SCALED SCOPES. Contract W 28-099-ac-130, Tech. Rep. 4. Aug. 1948. 18pp. USAF, Air Materiel Command, Watson Lab., Red Bank, N.J. (Lehigh U., Dept. of Psychol.).

2358

To investigate causes of error in reading elevation of GCA (Ground Control Approach) radar scope with reference to a coordinate scaling system (multiple set of horizontal parallel lines on either side of glide path with vertical range lines), 34 subjects made 9501 readings. Problems were artificially drawn scope pictures projected on screen or ultra-violet simulator projection of photographic history of plane approaches. Error data are analyzed and classified according to cause. Discussion relates errors to problems of scope scaling. T.G.I.R.2.

2359

Ford, A. PHOTOGRAPHIC SIMULATION FROM FIELD RADAR SCOPES. Contract W 28-099 AC 130, Tech. Rep. 2, June 1948, 26pp. USAF Air Materiel Command, Red Bank, N.J. (Lehigh University, Bethlehem, Penn.).

2359

This report reviews the development of a simulator for Ground Control Approach (GCA) radar for use in studying visual display problems of the instrument and for training purposes. Characteristics of good simulators are reviewed, with critical examination of various radar simulators. A detailed description of the camera used to make photographic sequences of field runs, and of the ultra-violet projection simulator is given. Optical problems of projection are reviewed. I.

2361

Eckstrand, G.A. CUE ATTENTION HABITS AS A FACTOR IN TRAINING. Contract AF 33(036) 154 74, USAF TR 6944, Aug. 1951, 12pp. USAF Area Medical Lab., Wright-Patterson AFB, Ohio.

2361

To investigate the importance of previously learned cue attention habits on later learning, three groups of 40 Se performed a series of tasks involving associating four response keys with four colored forms. Pretraining involved one of three conditions for each group: color, the relevant cue, form the relevant cue, both cues relevant. Standard training followed with both cues relevant. Each group was then divided into two subgroups, one tested with color only as a cue, the other with form only. Transfer and interference of earlier cue attention habits are deduced from number of trials required to learn test tasks. I. I. R 6

2367

US Air Force-Navy-Civil Aircraft Design Criteria Subcommittee. CLIMATIC AND ENVIRONMENTAL CRITERIA FOR AIRCRAFT DESIGN. AMC 22, June 1952, 65pp. US Air Force-Navy-Civil Aircraft Design Criteria Subcommittee, Munitions Board Aircraft Committee, Washington, D.C.

2367

This document presents a summary of information pertinent to the climatic and environmental factors to be considered in the design of aircraft. The information is presented under four major divisions: material composition of the atmosphere (e.g., snow, fog, frost, etc.), dynamic forces in the atmosphere (e.g., wind, lightning, etc.), solar influences in the atmosphere (e.g., radiation, temperature extremes, etc.), and factors dependent on atmospheric conditions for existence (e.g., biological agents, insects, etc.). Ample references and illustrations are included. T.G. I. R many

2368
Baker, A.W., Hughes, J.P. & Hinds, S., Jr. TRAINING AND REFERENCE MANUAL FOR JOB ANALYSIS. June 1944, 103pp. US Occupational Analysis and Industrial Services Div., Department of Labor, Washington, D.C.

The manual contains the principles and practices of job analysis which have proved their soundness in actual operations. In the first section, the general and specific applications of job analysis are discussed. Methods of analysis are discussed next. While presented through the medium of the job analysis schedule, the methods are sufficiently universal in application to form the basis for any job analysis program. Information supplementing the analysis schedules is discussed in a narrative report, and verification of analyses in the next 2 chapters. Job specifications and their relation to the work of the analyst are discussed. The last chapter provides those who study job analysis for the first time with an organized approach to their study. (NEIAS)

2370

Fryer, D.H. SOURCE BOOK ON THE APPLICATION OF RESEARCH TO GROUND TRAINING IN AVIATION. PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES. Contract WTCMR 383, Proj. NR 782 002, SDC Proj. 20 E 6, Tech. Rep. SDC 383-1-11 & RSH Prt., 126, May 1949, 79pp. USN Special Devices Center, Fort Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2370

This is a survey of literature on training research and the application of results to ground aviation training. Topics include study skills, curriculum, proficiency evaluation, validation of training procedures, student attrition, mass training, instructor training, training in perceptual ability (vision and speech-hearing), aircraft recognition training, kinesthetic (actor) training, and audio-visual aids.
T. R 56

2373

Atkinson, C.J. FOUR STUDIES ON SIDETONE. Contract DA 36 039 SC 42562, Suppl. Rep. 5, Oct. 1954, 32pp. State University of Iowa, Iowa City, Iowa.

2373

Four studies on the effects of sidetone are reported. The following topics are included: adaptation to delayed sidetone; effects on intelligibility of changes in sidetone delay and sidetone level; effects of various listening conditions on the sound pressure and duration of speech; effect on intelligibility of changes in the phase, spectrum, and level of the sidetone of the talker. The results from each study are analyzed statistically.
T. G, R 13

2375

Wendt, G.R. SOMESTHESIS AND THE CHEMICAL SENSES. Annual Rev. Psychol., 1952, III, 105-130. (U. Rochester)

2375

This review of research published during the year prior to June 1951 is principally concerned with the following areas: peripheral mechanisms of pain, pain scaling, effects of frontal lobotomy on pain, action of the muscle spindle, physiology and physics of the semi-circular canals and of the otolith organs, effects of various drugs on the vestibular system, and theory of the mechanisms of stimulation of smell and taste.
R 172

2378

Bellows, R.M. & Smode, A.F. A SURVEY OF ON-THE-JOB TRAINING PROCEDURES IN THE AIR DEFENSE COMMAND. AFRCRL TR 54 2, Jan. 1954, 44pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C.

2378

In a study of on-the-job training procedures in the Air Defense Command, 20 Fight-Interceptor and Aircraft Control and Warning units were visited at 13 installations. On the basis of interviews with personnel and administration of OJT check lists, existing inadequacies are determined and various recommendations for the improvement of the training program are made. These recommendations pertain to, e.g., training methods, training materials, proficiency measurement devices; and instructional personnel.
T.

2379

Tufts University, Medford, Mass. APPLICATION OF ELECTROPHYSIOLOGICAL TECHNIQUES TO HUMAN PERFORMANCE. THE READING ASSESSOR - THE ALERTNESS INDICATOR. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract NSCRI 58, Proj. NR 782 003, SDC Proj. 20 C 2 & 3, SDC TR 58 2 11, April 1950, 47pp. USN Special Devices Center, Fort Washington, N.Y.

2379

This report presents an historical summary of the research conducted in the development and application of the Reading Assessor and the Alertness Indicator. Previously unreported data on the Reading Assessor and Alertness Indicator projects is presented and includes the following: a study of reading comprehension in which instructions were written and subjects' responses consisted of manipulating dials, levers, etc., (the "baseball game test"); an analysis of responses recorded by the Alertness Indicator and reflecting the occurrence of unalertness; the results of field tests with the portable Alertness Indicator; etc.
T. G. I-R 17

2384

Moser, H.M. & Dreher, J.J. N-V ALTERNATE WORD INVESTIGATION. Contract AF18(600)316, Budget Sequence P670 122, AFRCRL TR 54 83 EF Proj. 519, Rep. 13, Sept. 1954, 22pp. Ohio State University Research Foundation.

2384

This report describes an investigation of alphabet words suitable for use for letters N and V. The present words (NECTAR-VICTOR) in the ICAO alphabet are frequently confused, accordingly several proposed alternates were given preliminary tests. Intelligibility testing of NOTAM, VAMPIRE, NECTAR, and VICTOR was conducted using both American and foreign speakers with a panel of trained listeners. Articulation and confusion scores were analyzed for all combinations. Field tests at steadily increasing noise levels were also made. Finally, further tests of N-V alternates were conducted. Recommendations are included.
T. R 1

2385

Moser, H.M., & Dreher, J.J. PHONEMIC CONFUSION VECTORS. Contract AF 18-600-316, Proj. 519, Rep. 14, AFRCRL TR-54-84, Sept. 1954, 18pp. Research Foundation, Ohio State University.

2385

This paper presents some first steps in evaluating the extent and nature of listener phoneme-confusion in dealing with small word ensembles. The standard and modified ICAO alphabet and the digits were evaluated by presenting to trained subjects (both foreign and American) a series of randomly varied three-letter code groups to which they responded by writing the appropriate letter. Analysis of the confusions led to a three-category division based on the vowel triangle. Further analysis between and within phoneme categories was made in an effort to show that confusions of words occur in consistent, predictable ways.
T. F

2386

Moser, H.M., Dreher, J.J., Patterson, R.E., & Adler, S. SENTENCE FORM AND INTELLIGIBILITY. (FLIGHT TRAFFIC INSTRUCTIONS). Contract AF 18(600)-316, Proj. 519, Rep. 15, AFRCRL TR-54-85, Sept. 1954, 24pp. Research Foundation, Ohio State University.

2386

To compare the efficiency of flight traffic instructions delivered in complete sentence form and in abbreviated form (telegraphese), two forms of a "typical" script were constructed routing five aircraft through a complete cycle of take-off, traffic and landing. Messages were based on analyses of actual control tower talk. Ten speakers (five nationalities) recorded each form of the "script"; listeners (300 Americans) heard the playback with light white noise masking (-5 decibel signal-to-noise ratio). Each listener was assigned two aircraft call numbers, one for each form of the script, and responded by writing the appropriate information on answer sheets. Intelligibility scores (percent correct) were studied by analysis of variance techniques for differences due to language and to speakers. T. R 3

2389
Crook, H.W., Hanson, J.A. & Weisz, A.
**LEGIBILITY OF TYPE AS A FUNCTION OF STROKE
WIDTH, LETTER WIDTH, AND LETTER SPACING
UNDER LOW ILLUMINATION.** Contracts AF W33-
038-aa-14856 and 33(616)-3018, WADC Tech.
Rep. 33-440, March 1954, 34pp. WADC, AFMPC,
Wright-Patterson AFB, Dayton, Ohio. (Tufts
College).

2389
To investigate factors affecting legibility (recognition of individual letters) of small type, 12 Ss performed on a letter crossout task and an oral reading task under low (red) and high illumination. Experimental type (capital and lower case) approximating six-point Gothic style were used to prepare materials varying in letter width, stroke width, and letter spacing. The data (speed and accuracy scores) are analyzed in terms of illumination and typographical variables. Application of the results to problems in the design of aeronautical charts and checklists is discussed.
T. G. I. R 5

2394
Moser, H.M. & Dreher, J.J. **NUMBER TELLING AND DIGIT
PRONUNCIATION.** Contract AF 18(600) 306, RF Proj. 519,
Rep. 7, Feb. 1954, 12pp. Ohio State University Research
Foundation, Columbus, Ohio.

2394
The first part of this study concerns the effectiveness of group and individual number-telling for two-digit numbers. Foreign and American panels were used and speakers comprised many nationalities. Results include comparisons of the methods and panels, effect of masking, and type of mistakes. The second part of the study compares the effectiveness of standard number pronunciation with the recommended variant pronunciation for the digits 3, 5, and 9. Listeners were American; speakers represented several nationalities. Results are expressed in terms of relative errors for each method.
T. G.

2398
Hoban, C.F., Jr. **SOME ASPECTS OF LEARNING FROM FILMS.
INCIDENTAL REPORT.** Rep. 2, June 1949, 24pp. Instructional Film Research Program, Pennsylvania State College, State College, Penn. (Catholic University of America, Washington, D.C.).

2398
This is a discussion of the symbolic nature of motion pictures and the principles that operate to facilitate or impede learning from films. The discussion of symbolism includes music and language, the richness of symbolic cues, and "double exposure" to instructional media. The discussion of the dynamics of learning covers context and novelty, feeling tone, "identification," and "closure." No experimental data given.
I.

2399
VanderWeer, A.W. **REPORT ON A 16MM MOTION PICTURE PRODUCTION CONFERENCE, 1948. INCIDENTAL REPORT.** Rep. 1, May 1949, 9pp. Instructional Film Research Program, Pennsylvania State College, State College, Penn.

2399
This is a report on the proceedings of the Calvin Company's annual workshop on 16mm. film production. Topics include: trends in the 16mm. industry, production speed, script writing, titles, animation, color films, editing, lighting, television, optical effects, music, sound, and the motion picture laboratory. No experimental data reported.

2403
Radio Corporation of America. **STUDY OF COMMUNICATION IN HIGH-LEVEL AMBIENT NOISE FIELDS.** Contract DA36-039 SC 64469, Rep. 3, Feb.-April 1955, 11pp. Radio Corporation of America, Camden, N.J.

2403
This is a progress report on a research contract to provide design information leading to significant improvements in Signal Corps voice communication systems used in high-level noise environments encountered in many armored vehicles and helicopters. Included in this report are: 1) a brief description of noise measurements and magnetic recordings of noise made in 15 vehicles with one complete set of data on the M-41 tank. 2) measurements of the characteristics of the interphone amplifier of the AM/VRC-7 and of the response of M-63-U headsets on a six cc coupler (standard Signal Corps equipment). Real-voice measurements are in progress.
G. I.

2404
Demaree, R.G., Crowder, M.A., Morrison, E.J. & Majesty, M.S. **PROFICIENCY OF Q-24 RADAR MECHANICS: I. PURPOSES, INSTRUMENTS, AND SAMPLE OF THE STUDY.** Proj. 7709, Task 7715, AFMPC TR 54 50, Nov. 1954, 58pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

2404
This report was designed to serve as a basic reference for a series of studies concerned with evaluating the proficiency of Q-24 radar mechanics (see 2407, 6289, 6290). The rationale and techniques of measurement and evaluation were presented along with a discussion of the characteristics of the particular sample of mechanics selected for study.
G. I. R 14

2407
Cornell, F.G., Demarin, Dora E., Saupe, J.L. & Crowder, M.A. **PROFICIENCY OF Q-24 RADAR MECHANICS: III. THE TAB TEST-A GROUP TEST OF TROUBLE-SHOOTING PROFICIENCY.** Contract AF 33(038) 13236, Proj. 7709, Task 7715, AFMPC TR 54 52, Nov. 1954, 28pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

2407
This is one of a series of studies concerned with the evaluation of the proficiency of Q-24 Radar Mechanics (see 2404, 6289, 6290). Specifically it deals with the development of the Tab Test, a device designed to measure trouble-shooting ability by requiring solutions to problems of the sort actually experienced in trouble-shooting electronic equipment. Scoring methods, reliability data, and potential applications of this test are discussed in detail.
T. I. R 4

2409
Greiner, T. **THE EFFECT OF A VASOCONSTRICTOR, METARAMINOL, ON HUMAN TOLERANCE TO ACCELERATION.** Proj. 7216-71712, WADC Tech. Rep. 56-575, Nov. 1956, 6pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

2409
To investigate the effect of drugs in producing tolerance to accelerative forces such as are met in combat flight conditions, positive head-to-foot acceleration was applied to eight trained subjects seated in the Air Force Human Centrifuge sufficient to extinguish central vision (blackout threshold). Two patterns of acceleration (rapid onset and gradual onset), anti-blackout suits (used only on three subjects), and the administration of metaraminol (one milligram per kilogram body weight) or a placebo were the conditions used for two test sessions. Blackout thresholds were plotted to show the degree of protection afforded by the drug, protective suit and gradual onset of acceleration.
G. R 12

2410
Lever, P.J.M. COLOUR TELEVISION AND THE MEASUREMENT OF LIGHT AND COLOUR. Radio Rep. No. 2335, April 1954, 16pp. Post Office Engineering Department, London, Eng.

2410
As an aid to the study of color television systems, a summary account is given of the principles used in the measurement of light and color and of the characteristics of human color vision. Specific topics covered include light and human vision, measurement of light, color and human vision, the measurement of color, color television and human vision (contrast sensitivity, visual acuity, flicker, choice of primary colors for television systems, individual color judgments) and color television (cameras, systems, system "gamma," transients in color television).
T. G. R 18

2411
Zwislocki, J. DESIGN AND TESTING OF EAR MUFFS. J. Acoust. Soc. Amer., Nov. 1955, 27(6), 1154-1163. (Psycho-Acoustic Lab., ORA, Harvard University, Cambridge, Mass.). (Rep. PMR 177)

Factors controlling the sound attenuation provided by earmuffs are analyzed on an upper limit is estimated of the attenuation that can be expected from simple earmuffs without sacrificing comfort. Further discussion concerns the best dimensions of the earmuff and what can be achieved by adding one or more Helmholtz resonators. The sound attenuation provided by 2 different earmuffs was determined on 8 Ss in 3 sessions with a Bekesy audiometer. The experimental procedure is described in detail and the results are analyzed statistically. Special attention has been paid to the changes in the listener's threshold of audibility with increasing experience.
R 7

2412
Stevens, S.S. THE MEASUREMENT OF LOUDNESS. J. Acoust. Soc. Amer., Sept. 1955, 27(5), 815-829. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

This paper reviews the available evidence (published and unpublished) on the relation between loudness and stimulus intensity. The evidence suggests that for the typical listener the loudness L of a 1000-cycle tone can be approximated by a power function of intensity I , of which the exponent is $\log 2$. The equation is: $L = kI^{0.3}$. Intensity here is assumed to be proportional to the square of the sound pressure. In terms of sones, where 1 sone is the loudness produced by a tone at 40 db above the standard reference level, the equation for loudness L as a function of the number of decibels N becomes: $\log L = 0.03N - 1.2$. Otherwise said, a loudness ratio of 2:1 is produced by a pair of stimuli that differ by 10db, and this relation appears to hold over the entire range of audible intensities. At low levels of intensity, the loudness of white noise grows more rapidly than the loudness of a 1000-cycle tone, but above the level of approximately 50 db the 2 loudnesses remain more nearly proportional. The suggestion is made that for all levels greater than 50 db the loudness of continuous noises may be calculated from the equation: $\log L = 0.03N + S$, where S is a spectrum parameter to be determined empirically.
R 26

2413
Alexander, S.J., Cotzin, M., Klee, J.B. & Wendt, G.R. STUDIES OF MOTION SICKNESS: XVI. THE EFFECTS UPON SICKNESS RATES OF WAVES OF VARIOUS FREQUENCIES BUT IDENTICAL ACCELERATION. J. exp. Psychol., Oct. 1947, 37(5), 440-447. (University of Rochester, Rochester, N.Y.).

Using the vertical accelerator this study was designed to discover how motion sickness rates were affected by wave frequency when the accelerations in the waves were held fixed. 120 Ss were exposed to frequencies of 13, 16, 22, and 32 cycles per min. acceleration was constant at 0.20 g. The respective amplitudes were 9', 5'4", 2'6", and 1'1". The obtained sickness rates were 37, 37, 10, and 7% going from the large slow wave to the small fast one. Corresponding sickness indices were 53, 47, 10, and 7. It is shown that some waves were 20 times as nauseating as others, per unit of energy. (HEIAS)
R 8

2414
Gibson, J.J. THE PERCEPTION OF VISUAL SURFACES. Amer. J. Psychol., July 1950, 63, 367-384. (Cornell University, Ithaca, N.Y.). (QMR)

In this paper, the author attempts a verification of hypothetical stimulus-correlates for texture, slant, and distance. 10 Ss made slant judgments of surfaces of upward and downward increase of texture density. It was found that the gradient of density and the property of optical slant are in psychophysical correspondence. The results suggest that the property of surface slant can be assigned a correlate in retinal stimulation and that perhaps other properties of the phenomenal environment can be similarly accounted for when an appropriate psychophysical method has been applied. A tentative list of phenomenal properties is suggested as composing the essential properties of the experience of a determinate surface. (HEIAS)

2417
Hackman, R.C. & Barr, N.L. THE EFFECT OF IPRAL SODIUM UPON LINK TRAINER PERFORMANCE. Proj. NM 001 056.06.03, Dec. 1954 (Vol. 12), 645-668. USN Medical Research Institute, Bethesda, Md.

The effects of 1.5 gr. and 3.0 gr. oral doses of ipral sodium on the psychomotor performance and circulatory physiology of 4 trained Ss were tested. Measures of performance were obtained while Ss flew a standard Baker pattern and solved a succession of radio range problems in the Link trainer. Measures of pulse rate, blood pressure, and critical flicker frequency were obtained before ingestion of ipral sodium or placebo, 25 minutes later, and after Ss had performed in the trainer. It is concluded that: a) The Link trainer as scored is sufficiently sensitive to reflect differences in performance, provided efficient statistical designs are used. b) Both increments and decrements in performance will occur in some Ss following ingestion of ipral sodium, and these will be consistent for a particular S. c) Both increases and decreases in variability of performance will be observed in some Ss following ingestion of ipral sodium, and these will be consistent for a particular S. d) Few, if any, objective physiological effects ascribable to ipral sodium will occur when single doses of 3.0 gr. or less are employed.

2418
Miller, R.B. A METHOD FOR DETERMINING HUMAN ENGINEERING DESIGN REQUIREMENTS FOR TRAINING EQUIPMENT. Contract AF 33(038) 22638, WADC TR 53 135, June 1953, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (American Institute for Research, Pittsburgh, Penn.).

2418
This report describes a procedure developed to determine the psychological requirements of training and training devices. It summarizes and integrates three earlier reports: Handbook on Training and Training Equipment Design, A Method for Man-Machine Task Analysis, and Human Engineering Design Schedule for Training Equipment. Two phases of the procedure are summarized: 1) a method for performing a behavioral analysis of man-machine tasks, and 2) the application of a human engineering design schedule to the planning or improvement of a training device.
R 5

2419
Miller, R.B. A METHOD FOR MAN-MACHINE TASK ANALYSIS. Contract AF 33(038) 226 38, WADC TR 53 137, June 1953, 60pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (American Institute for Research, Pittsburgh, Penn.).

2419
"This report describes a systematic procedure for making a task analysis of the operator's job in any man-machine system...." with special reference to analyses for the design and evaluation of training aids. The procedure is described in detail in outline form, with sample formats and a sample analysis given. I.

2420
Miller, R.B. HANDBOOK ON TRAINING AND TRAINING EQUIPMENT DESIGN. Contract AF 33(038) 22638, WADC TR 53 136, June 1953, 339pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (American Institute for Research, Pittsburgh, Penn.).

2420
This handbook assembles and integrates from the literature those principles of learning that are applicable to the design and use of training equipment. Topics include: an overview of human learning, the role of the instructor, the trainer as a demonstrator of principles, the use of knowledge of results, the problem of simulation, the problem of motivation, and preparing the specifications for a training device. G. R 600 (approx.).

2421
Crook, D.J., Hansen, J.A., McBride, Patricia L., & Wulfeck, J.W. A BIBLIOGRAPHY ON DARK ADAPTATION. July 1953. 27pp. Armed Forces-National Research Council Vision Committee Secretariat, Univ. of Mich., Ann Arbor, Mich. (Turk College)

2421
This is a bibliography of literature on dark adaptation. While the basic concern is with effects of exposure variables with emphasis on duration and intensity, other areas are included: theoretical material on course of dark adaptation which includes experimental data, characteristics of the subject which affect adaptation, and methodological studies. R417.

2423
Draeger, G.L. RELATIONSHIPS BETWEEN VOICE VARIABLES AND SPEECH INTELLIGIBILITY IN HIGH LEVEL NOISE. Speech Monographs, Nov. 1951, XVII(4), 1-7.

2423
This study investigates relationships between speech intelligibility in high level noise and several voice variables, such as syllable duration and speech intensity. Eighty-eight male undergraduates were selected on the basis of high or low speech intelligibility and were recorded reading test material under conditions of high level noise. After measurements of the voice variables, the recorded material was played to panels of listeners. Data analysis included comparison between speakers of inferior and superior intelligibility for each voice variable, correlations between all variables, and contribution of each variable to intelligibility. The results were extended to voice communication training. I. R 28

2424
Ward, Mary C. WING TIP PHOTOGRAPHIC METHOD OF ASSESSING AIR-TO-AIR GUNNERY RESULTS. NOTS 609, NAVORD Rep. 2003, Jan. 1953. 9pp. USN Aviation Ordnance Dept., Chira Lake, Calif.

2424
This report recommends and describes a method for evaluating photographically the angular miss of tracers fired at towed targets in aerial gunnery training. The method involves the use of two cameras mounted on the wing-tips of the attacking plane and the graphical analysis of the films. A comparison of this method with the conventional method is described and evaluated. G. I. R-1

2425
Sanderson, De Los, A. A-4 GUN-BOMB-ROCKET SIGHT TRAINER. Proj. 52 16, Nov. 1952, 15pp. USAF Aircraft Gunnery School, Scott AFB, Ill.

2425
This is a recommended design for a mock-up of the A-4 Gun-Bomb-Rocket Sight for use in training novice pilots. It consists of a mock-up fighter cockpit containing the instruments and controls of the A-4 GBR Sight as they are mounted in the F-86E. Description includes circuit diagrams and a parts list. I.

2427
Broadbent, D.E. (e) NOISE: ITS EFFECT ON BEHAVIOR. Royal Soc. Eth. J., Aug. 1955, 75, 541-545. A.P.U. 238/55. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

2427
This paper presents a discussion of noise and its effects on behavior. The need for precise evidence is reviewed and the evidence from laboratory and industrial studies concerning the effects of noise on long-term mental health, on communications and on working efficiency that does not involve hearing is reviewed. A theory that incorporates the known ways in which noise exerts its effects on laboratory tasks is explained and the need for field studies is discussed. R 14

2430
Woodhouse, M.C. LOUDNESS DISCRIMINATION AND THE RATE OF PRESENTATION OF STIMULI. A.P.U. 238/55, Sept. 1955, 13pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

2430
To investigate the effect of rate of presentation of stimuli on differential loudness discrimination, a practiced subject made judgments as to whether the second of each pair of stimuli was louder than the first. The stimuli were presented in quiet, against a background of random noise (from 53 to 70 decibels), and at varied rates (from 7 to 22 presentations per minute). Threshold measurements were determined for thirty untrained subjects with noise level at 60 decibels and at rates of 10 and 22 presentations per minute. Threshold data were analyzed as function of noise level and rate of presentation. An explanation is sought by reference to the literature of threshold phenomena. T. O. R 12

2431
Broadbent, D.E. THE BASS CUTTING OF FREQUENCY TRANSPOSED SPEECH. A.P.U. 223/56, April 1956, 12pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

2431
To study the effect of bass cutting on the intelligibility of frequency transposed speech, such as might be heard over a single side-band system (S.S.B.) with the receiver mistuned, four experiments were performed. Two types of material (phonetically balanced PB, word lists and spoken digits) were used with five degrees of transposition (-300, -200, 0, +200, +300 cycles) and three levels of bass cut (0, 440, 660 cycles per second). The listeners responded under conditions of (1) noise, (2) faint signal, (3) while carrying out a separate visual task requiring concentrated attention, and (4) listening to a restricted vocabulary (digits) and attending the visual task. Percent words heard correctly under these conditions were analyzed for differences attributable to mistuning and bass cutting. T.R 6

2432
Mellison, R. & Carmichael, L. APPARATUS FOR PRODUCING INTERMITTENT AUDIBLE PULSES. *J. exp. Psychol.*, Jan. 1940, 26(1), 129-131.

The apparatus here described makes it possible to control the onset and cessation of the stimulus, thus avoiding 'clicks' and other secondary stimuli sometimes produced by mechanical devices. It can also be used in timing any psychological performance, i.e. as a metronome with a wide frequency range and great adaptability. (MEIAS)

2435
Cloonan, T. EVALUATION OF THE GRID-MAP INTELLIGIBILITY TEST. Contract DA 18-108-CML-4037, June 1955, 18pp. Voice Communication Laboratory, Purdue University.

2433
Poulton, E.C. SIMULTANEOUS AND ALTERNATE LISTENING AND SPEAKING. *J. Acoust. Soc. Amer.*, Nov. 1955, 27, 1204-1207. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

2433
To determine the effect on intelligibility of simultaneous listening and speaking, 12 subjects repeated back a message as soon as they heard it. There were no gaps in the message so speaking was done while listening to more of the message. In an alternate condition, the message was repeated back during a 4.0 second pause between word groups. The materials were taken from Basic English, approximately 168 words in length, and presented at rates of 1.5, 2.0, 2.5 and 3.0 words per second. Subjects were given two training sessions. Percentage of words omitted or repeated incorrectly were analyzed as functions of presentation speed and compared for simultaneous and alternate listening and speaking conditions. G. R. 9

2434
Jorger, J.P., & Carhart, R.T. PRELIMINARY REPORT ON A METHOD FOR THE RAPID MEASUREMENT OF THRESHOLD SHIFT FOLLOWING HIGH-LEVEL ACOUSTIC STIMULATION. Rep. 55-64, Oct. 1955, 6pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Northwestern University).

2434
A test procedure is described which was designed to obtain a rapid measure of the temporary threshold shift following relatively short, high-level acoustic stimulation. Apparatus is described and circuit diagrams given. The test was administered to 68 normal ears and the experimental findings are reported. Implications for the problem of predicting noise susceptibility are discussed. T. O. I. R. 4

2435
Husson, G.S., & Otis, A.B. PHYSIOLOGICAL ADAPTATION TO CHRONIC HYPOXIA: B. RESTING PULMONARY VENTILATION. Rep. 55-76, Oct. 1955, 8pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Johns Hopkins University, Baltimore, Md.).

Resting ventilations were determined on patients with congenital heart disease. Of these 42 were chronically hypoxic, and 45 were noncyanotic. Comparisons were also made with the resting ventilation of normal Ss, altitude-acclimatized individuals, and patients chronically hypoxic from congenital heart disease, as determined by other investigators. The results indicate that, on an average, there is a significant increase in the resting ventilation of the chronically hypoxic patients above that of the nonhypoxic patients, but not as great an increase as shown by acclimatized individuals at altitude. Some of the possible implications and interpretations of these results, as well as those obtained by other investigators, are discussed. R. 12

2435
To evaluate the Grid-Map Intelligibility Test (GMIT, constructed from orthodox Army terminology plus a motor performance test) as a criterion of respiratory intelligibility, a simulated field test was conducted in a large army. Seven speakers wearing one of three Army respirators presented both the GMIT and a standardized Voice Communication Laboratory word test to 27 subjects, without amplification and in the presence of white noise. Intelligibility data were analyzed by analysis of variance for effects of tests, respirators, and speakers. Correlations were computed for the two test scores. The findings are discussed in relation to previous respirator studies. T. O. I. R. 3

2437
Thackray, R. SPEECH INTELLIGIBILITY CHARACTERISTICS OF ARMY RESPIRATORS. Contract DA 18-108-CML-4037, Rep. 13, May 1955, 14pp. Voice Communication Lab., Purdue University, Lafayette, Ind.
A large-scale experiment was conducted to determine the relative intelligibility characteristics of 3 Army respirators. The variables investigated in this design were: a) masks; b) talkers; and c) distance. Statistical analysis led to the following conclusions: a) The relative rankings of the 3 masks remained consistent at varying distances from the talker. b) The relative rankings of the 3 masks were not consistent when worn by different talkers. The factors responsible for this mask-talker interaction are as yet unknown, but are presently being investigated by this laboratory. c) A statistically significant difference was found between talkers. This indicates that individuals differ widely in their ability to communicate effectively through gas masks. d) Significant differences were found between the masks tested. When the masks are ranked from greatest to least intelligibility, the following order is obtained: a) E-13; b) M-9; and c) E-20. R. 2

2438

Naulty, H.W. STUDY OF FIRE-EMERGENCY CONTROL SYSTEM. Contract AF 18(600) 309, WADC Tech. Rep. 54-96, June 1954, 53pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).

This report describes the study and development of a fire emergency control system for multi-engine aircraft. Operation of a single control handle in the cockpit sets in motion all the functions necessary for fighting nacelle fires, including rapid engine shutdown and preparation for release of the fire extinguishing agent. An industry-wide survey was made to determine the correct operations for emergency engine shutdown. Based on the results of the survey, 2 typical sequencing control devices were developed, fabricated and mounted on individual demonstration panels. Special attention was given in the design to the simplification of the emergency control handle. One of these demonstration panels simulates a 4-engine piston-powered aircraft installation. The second panel simulates a 4-engine turbo-powered aircraft installation. These systems, along with wiring diagrams, etc., are described and shown by illustrations. The survey report, design evaluation, and a design manual for guidance in designing a fire emergency control system appear at appendices.

2439

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF THE ME-2 AIRSPEED MACH NUMBER INDICATOR. FINAL REPORT. Proj. AFG/TAT/149 A, Feb. 1955, 12pp. USAF Operational Test Center, Eglin AFB, Fla.

This investigation determined the operational suitability of the ME-2 airspeed-mach number indicator for use in high-performance fighter aircraft; accordingly, the production model and 4 modified models were tested. 6 pilots made evaluations in F-100A and F-86F type aircraft, and 9 pilots made evaluations in T-33 type aircraft during inclement weather or hooded flight. The results of the pilot questionnaires indicated 3 basic problems: clutter, readability, and mach readability. It was concluded that the production model and 3 of the modifications were not suitable, the fourth modification was suitable only as an interim measure, and the principle of 2 types of airspeed information on one instrument is desirable. (HEIAS)

2445

Bilodeau, E.A. RECENT EXPERIMENTS ON KNOWLEDGE OF RESULTS WITH PSYCHOMOTOR DEVICES. Proj. 7707, Task 77130, AFPMG TR 54-68, 1954, 13pp. USAF Skill Components Research Lab., Lackland AFB, Tex.

2445

This report reviews the results of recent experimental work on the effectiveness of giving the trainee knowledge of his results while training on psychomotor devices. Consistent findings are noted and interpreted, and their implications for the design of training equipment and training procedures are discussed. R 16

2450

Saldanha, E.L. AN INVESTIGATION INTO THE EFFECTS OF PROLONGED AND EXACTING VISUAL WORK. A.P.U. 243/55, Oct. 1955, 19pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

2450

To investigate the kind of changes in performance that take place as a result of prolonged and exacting visual work, a series of experiments were performed. The task, setting a Vernier Calliper Gauge to an accuracy of 0.001 inch, was performed by 33 trained subjects over two-hour periods. One group was given knowledge of accuracy and speed for each setting; another group worked without such knowledge; and a third worked for two periods, first without and then with knowledge of results. Eye-muscle balance and acuity tests were given before and after each work period. Error scores and number of settings were analyzed for effects of each successive 15-minute work period and knowledge of results. Implications for industrial work are discussed. T.G.R 9

2448

Hahn, C.P. THE IDENTIFICATION AND DESCRIPTION OF SOME CRITICAL AIRCREW JOB REQUIREMENTS. Contract AF 33(038) 10476, Proj. 21-29 014, Rep. 2, Feb. 1954, 40pp. USAF School of Aviation Medicine, Randolph Field, Tex.

This is the second step of a long-range research program designed to facilitate the analysis of aircrew specialties and classification of aircrew personnel. Specifically this study refined, by statistical means, the job elements and their component behaviors which were previously developed. 11 job elements involving ability factors were identified, and one additional element tentatively identified. 4 job elements involving non-ability factors concerning motives, temperament, and leadership also were identified. All these elements may be satisfactorily tested by paper and pencil tests. (HEIAS)

2449

Conrad, R. SELF-PACING PERFORMANCE AS A FUNCTION OF PERCEPTUAL LOAD. AFU 239/55, Oct. 1955, 5pp. Applied Psychology Research Unit, MRC, Cambridge, England.

2449

To study self-pacing performance under conditions of varying perceptual loads, 18 subjects performed a sensory-motor task under five load conditions (8, 10, 12, 14 and 16 pointers on the Multi-dial Display). The task required the subjects to judge in advance which channel (pointer) would provide the next signal and to respond accordingly; the interval between signals was near random. The task was self-paced (subjects controlled potentiometer driving the pointers) and knowledge of results (integrated score) was presented. Driving rates (signals per minute) and performance (correct responses, errors per minute, and integrated score) were analyzed as functions of perceptual load. T, R 10

2451 Bello, F. FITTING THE MACHINE TO THE MAN. *Forwards*, Nov. 1954, 134-137.

Men are imperfect operators of machines. Human engineers accept men as they are and try to design the machine so that the operator can function at his best. Application of human engineering to the manufacture of articles of at least intermediate complexity should prove profitable. A comprehensive human engineering study on deficiencies in the design of trucks and cars was well received and enthusiastically accepted by truck drivers. Human engineering gained momentum when 2 streams - 1 out of engineering and 1 from psychology - merged during the second World War. The military need for human engineering is as great today as ever. (HEIAS)

2452

Deuth, A.F. FINAL ENGINEERING REPORT ON INFORMAX. Contract AF33(038)17923, Proj. 1176, Rep. 1176 FR 10, Nov. 1953; 76pp. Human Laboratories, Inc., New York, N.Y.

2452

This final report summarizes work accomplished in a study of communication and typographical parameters of an Informax communication system. The concept of Informax is defined as "the process of maximizing the comprehension of received intelligence per unit of information transmitted through a noise-degraded electrical communications channel." Both parameters are studied in relation to their effect on the system perturbed by Gaussian noise in an attempt to determine an optimum set of parameters. G. I. R 6

2454

Hillmann, Beverly, Connolly, Katherine & Farnsworth, D. COLOR PERCEPTION OF SMALL STIMULI WITH CONTROL VISION. Proj. NM 002 014.09.02, Rep. 257, Oct. 1954, 21pp. USN Medical Research Lab., New London Submarine Base, Conn.

2454

To study perception of color of small stimuli with central vision, two observers with normal color vision compared small circular stimuli subtending 2, 3, 5, and 7 minutes of visual angle. Colors (63) in each of three areas of the C.I.E. chromaticity diagram for Munsell value were judged at 3.7 ft.-L brightness. The data were plotted on chromaticity diagrams and discussed with respect to confusion zones. Practical applications for situations where small colored detail must be accurately discriminated were noted. G. I. R 19

2456

Bowen, Jane M. THE STEREO WINDOW FOR 3-D VIEWING: A STUDY OF ITS OPTIMUM PATTERN AND POSITION IN SPACE. A.P.U. 244/55; Nov. 1955; 25pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

2456

To compare several patterns for a stereoscopic window which might be printed on a three-dimensional film and to determine its optimum apparent position in space, eleven patterns were examined (eight were black with variations on the inner edge and five were "textured"). The "break range" of fusion (distance between points at which fusion is lost as the two pictures converge and diverge) was the experimental measure determined on 70 subjects wearing polaroid lenses in a series of experiments. The best three designs were tested at varying positions in space between the viewer and the screen for the maximum "break range". The results are discussed in relation to the practical problem of viewing three-dimensional pictures.

T. I. R 5

2457 Brouha, L. & Bell, M. Virginia. RESEARCH ON INDUSTRIAL FATIGUE. *Rev. Canadiens de Biol.*, Aug. 1948, 7(3), 475-483. (Aluminum Company of Canada Ltd., Institute of Hygiene and Human Biology, Laval University, Quebec, Canada).

By using body temperature changes and heart rate recovery measurements it was shown that without adequate rest periods workers have a statistically highly significant increase of body temperature and heart rate during the later part of an 8 hour shift. When adequate rest periods are introduced, the total amount of work per shift remaining the same, the physiological stress is reduced to such an extent that body temperature and heart reaction remain practically at the same level throughout the entire shift.

2458 Brouha, L. FATIGUE--MEASURING AND REDUCING IT. *Advanced Management*, Jan. 1954, 9-19. Report from: "Society for Advancement of Management: Eighth Annual Time Study and Methods Conference, Spring 1953".

This is an analysis of the problems of fatigue -- what it is, what causes it, how it can be measured, and what can be done to reduce it. Muscular exertion is considered the main factor in fatigue. Pulse rate and body temperature measurements are examined as easy, inexpensive, and valid indices of physiological stress. These also are used to classify jobs according to fatigue stress. Effective methods for reducing fatigue are discussed: work load reduction, heat load reduction, rest period scheduling, worker team organization, and worker selection. (HEIAS)

R 23

2464

Gibbs, C.E., Brown, I.D., & Bilney, J.M. REACTION TIMES TO THE "FLASHING LIGHT" SIGNALS OF CARS. THE EFFECTS OF VARYING THE FREQUENCY AND THE DURATION OF THE FLASH. A.P.U. 245/55, March 1955; 9pp. Applied Psychology Research Unit, MRC, Cambridge, England.

2464

This study was designed to assess the effects of varying the frequency and the duration of flash of the "flashing light" signals of cars on human reaction times. Two flashing light systems, a United States commercial system and a trafficator system were compared in daytime and night tests with 12 subjects whose responses were recorded on a specially-designed electric apparatus. Two criteria of efficiency were employed: (1) speed of attraction from a central task and response to the signals; and (2) number of incorrect responses. A Latin Square design was employed and the results are discussed in terms of relative reaction times of each system and the implications for road safety.

T. G. R 3

2467.

Sloan, Louise L., & Habel, Adelaide. TESTS FOR COLOR DEFICIENCY BASED ON THE PSEUDO-ISOCROMATIC PRINCIPLE, A COMPARATIVE STUDY OF SEVERAL NEW TESTS. A.M.A. Arch. Ophthalmol., Feb. 1956, 55, 229-239. (CNR, The Johns Hopkins University).

2467

To make a comparative study of tests for color deficiency based on the pseudo-isochromatic principle, four such tests were chosen: (1) the Dvorine Plates, issued 1953, reprinted 1955; (2) new edition of the Ishihara plates, date not given; (3) the AO-HRR Test, developed by Hardy, Rand and Kittler, 1955; and (4) Twenty-Plate Test, composed of selected plates of high diagnostic efficiency from other tests. A group of 100 normal and 176 color-deficient individuals were given all tests under standard conditions; those with borderline scores were given additional tests of other types. Test scores were analyzed to show the efficiency of each test in classifying the subjects; responses to individual plates in each test were further analyzed. T. G. I. R 15

2468

Bakan, P. EFFECT OF SET AND WORK SPEED ON TIME ESTIMATION. Percept. Motor Skills, 1955, 5, 147-148. (Michigan State University).

2469

To determine whether a time-estimating set has any effect on subsequent estimations of time and to determine the relationship between speed of work and time estimation, two groups of 22 subjects worked at a number-searching task for a period of one hour. Only one group was told in advance that they would have to make an estimate of time spent on the task. Mean time-estimates (in minutes) were compared for differences due to prior knowledge of time-estimate requirement. Work speed data (number of two-digit numbers found during the hour) were combined for both groups and correlated with time estimates. The findings are discussed in relation to tension levels. R 2

2469 Senders, Virginia L. FURTHER ANALYSIS OF RESPONSE SEQUENCES IN THE SETTING OF A PSYCHOPHYSICAL EXPERIMENT. Amer. J. Psychol., April 1953, 66, 215-228. (Antioch College, Yellow Springs, Ohio).

This study investigated the patterning of responses for a large group of Ss (48) and the effects of several experimental conditions on response patterns. The principal findings were: a) the profound effect of instructions on the ratio of yes and no responses, with however, the differences between expected and obtained being statistically significant; b) the oscillation of S's responses throughout the series; c) the occurrence of response patterns; and d) the effect on response-ratios of instructions about stimulus-ratios and possibly the interaction of these with rest-period frequency. (HEIAS) R 8

2471

Control Instrument Company, Inc. FINAL DEVELOPMENT REPORT. DESIGN OF A FRESNEL LENS SYSTEM FOR AN OPTICAL GLIDE PATH INDICATOR. Contract HDAS 26 484F, DEV 2542, Dec. 1956, 58p. Control Instrument Company, Inc., Brooklyn, N.Y.

2471

To design and evaluate system performance of Fresnel Lens System for use as an optical glide path indicator, a simple model was constructed comprising five Fresnel Lenses each associated with a bank of four lamps. Criteria for optimum performance was attainment of a gradual and smooth transmission of the image on one set of lamps seen through its respective lens to that of the adjacent set. Data were plotted to show ray charts showing 1) effect of "bending" the lens; 2) effects of 180 inch radius lens, and 3) a composite chart showing best lamp setting when lamps are on or off axial position. Causes and remedies of certain distortions in the system are discussed, and recommendations for further studies, including field evaluations, are made. T. G. I.

2472 Brogan, F.A. A SIMPLIFIED TECHNIQUE FOR MEASURING THE AUDITORY INTENSITY DIFFERENCE-LIMEN. Proj. 21 27 001, Rep. 9, Nov. 1952, 9pp. USAF School of Aviation Medicine, Randolph Field, Tex.

An instrument is described which can be calibrated accurately so that error is less than 5%. The error that is present in this instrument is constant in percentage of the result. The operator is simple and direct; values of the difference-limen may be read directly from an attenuator if the dial plate is recalibrated in terms of the table showing difference-limen with associated values. With the exception of the low-frequency oscillator, all material used is normally available in any acoustics laboratory. R 5

2474

Chinn, H.I., Hyde, R.W. & Mitch, L.J. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIR-SICKNESS. TREATMENT BY INTRAMUSCULAR MEDICATION. Rep. 56-6, Nov. 1955, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

Scopolamine was administered to 58 aboard aircraft by nasal instillation (nose drops and spray) 15 to 20 min. after take-off. The incidence of vomiting from airsickness during the subsequent 40 to 45 min. was markedly reduced. Oral and sublingual administration under these conditions was ineffective. Considerable variations in the amount of drug instilled resulted when given by spray. The use of nose drops allowed more accurate medication. The significance of this mode of administration for treating motion sickness is discussed. R 2

2475

Dale, H.C.A. SEARCHING IN A STRUCTURED SYSTEM: A METHODOLOGICAL STUDY. APU 247/55, Nov. 1955, 17pp. Applied Psychology Research Unit, MRC, Cambridge, England.

2475

A methodological study that dealt with searching in a structured situation (in which all points encountered during search provide information about the correct direction) was carried out. The Ss, 12 naval men and 12 laboratory staff members, solved six problems that required the locating of a faulty "stage" in an electronic circuit. Deviations of the Ss' procedure from the optimal procedure were discussed. T. I. R 12

2476
Lewis, R.E.P. CONSISTENCY AND CAR DRIVING SKILL. A.P.U. 213/56, Sept. 1955, 11pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

2476
To consider whether consistency in performance between two tests separated by a six-week period is related to skill in driving, cornering trials were performed by three groups of drivers on a roadway without traffic. The comparisons were between 1) skilled police drivers, 2) skilled rally drivers who had been given no standard training, and 3) unskilled drivers. The measure of skill was vehicle acceleration and deceleration recorded photographically every five yards over a distance of 150 yards before and after each of four corners in the test runs. Scores of consistency were calculated for each subject over the six-week period and average scores for the three groups were compared.
T. G. I. R 7

2477
Bond, H.J. & Sleight, R.B. HUMAN FACTORS IN THE DESIGN OF DESERT EQUIPMENT. FINAL REPORT. Contract DA 36 034 ORD 1642, Projs. 595 20 001 & TBI 1000, Dec. 1954, 73pp. USA Aberdeen Proving Ground, Md. (Applied Psychology Corp., Washington, D.C.).

The relation of human performance to the operation of equipment under desert conditions has been examined through a survey of the literature. This survey has resulted in a number of conclusions which are of interest to those concerned with the design of military equipment and its use in the specialized environment of the desert. a) Deserts are areas in which severe environmental conditions adversely affect skilled human performance. The most prominent of these conditions are the extremes of heat and light. b) There is a paucity of specific information about the effects of these conditions on visual performance, audition, skilled motor performances and other behavioral responses to the operation of equipment. Data is now insufficient for the appropriate modification of military equipment for desert use. c) Specific studies are needed of the effects of desert conditions upon skilled human performance.
R 120 approx

2478
Lerner, H.D., Bond, H.J. & Sleight, R.B. THE RELATION OF TOXIC GASES TO EQUIPMENT DESIGN. FINAL REPORT. Contract DA 36 034 ORD 1638, Projs. 595 20 001 & TBI 1000, Dec. 1954, 169pp. USAF Aberdeen Proving Ground, Md. (Applied Psychology Corporation, Washington, D.C.).

Information in the literature concerning the occurrence and the effects of toxic gases during the use of light vehicles, tanks, and guns is summarized with implications for human engineering applications and research. Effects of carbon monoxide, ammonia, aldehydes, oxides of nitrogen, gasoline vapors, and carbon dioxide are discussed at some length; other gases are noted briefly. Modifications in the design and in the operation of equipment for the purpose of minimizing exposure to, or performance in the vicinity of toxic respirable substances are indicated. Problem areas requiring further research are outlined.
R 120 approx

2479
Irwin, I.A. A FOLLOW-UP STUDY OF A BRIEF INSTRUCTOR TRAINING COURSE IN METHODS OF CONDUCTING CRITIQUES. Proj. 7713, Task 77233, AFPTIC TR 54 46, 1954, 91pp. USAF Crew Research Lab., Lackland AFB, Tex.

2479
This investigation concerned the evaluation of the effectiveness of training aircrew instructors in methods of conducting critiques. Five critiques were analyzed and rated (by observers, by students, and by instructors) for each of 12 crews in B-29 combat crew training. Six crews had instructors who had been given five periods of instruction on conducting critiques, six control crews had instructors untrained in critique techniques. Critique ratings are compared to evaluate the effectiveness of training instructors, and are intercorrelated to evaluate the effectiveness of various techniques. Details of instructors' training seminar and sample critique rating forms are appended.
T. I. R 9

2480
Brown, R.H. & Niven, John I. THE RELATION BETWEEN THE FOVEAL INTENSITY THRESHOLD AND LENGTH OF AN ILLUMINATED SLIT. J. exp. Psychol., Dec. 1944, 34(6), 464-476. (Clark University, Worcester, Mass.).

We have described a method of determining accurately for the human fovea intensity thresholds of narrow illuminated slits for comparison with similarly obtained thresholds of circular areas. The threshold is high for short slits and decreases as the slit increases in length. The rate with which the threshold decreases is markedly less as a function of length of slit than as a function of diameter of illuminated circle. Astigmatic effects which might appear in the experiment actually do not influence the decrease of threshold with increase of slit length. Further decrease in width of the narrow slit apparently operates to increase the threshold uniformly, irrespective of length of slit. The results are interpreted quantitatively in terms of a spatial gradient of visual excitation.
R 7

2481
Broadbent, D.E. SOME CLINICAL IMPLICATIONS OF RECENT EXPERIMENTS ON THE PSYCHOLOGY OF HEARING. Proc. Royal Soc. Med., Nov. 1955, 48, 962-969. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

2481
This paper discusses some clinical implications of recent experiments in the psychology of hearing. The importance of bilateral hearing in complex auditory situations is discussed in relation to proper selection and fitting of hearing aids. Various features, such as auditory fatigue, perception of stimuli, and knowledge of results are discussed in relation to the testing hearing (audiogram) and assessment of results.
R 8

2482
Poulton, E.C. VISION AND THE MOTORIST. Med. Press, Nov. 1955, 234, No. 6078. A.P.U. 248/56. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

2482
This pamphlet selects certain visual aspects of driving and discusses them in the light of the findings of experimental psychology and physiology. The topics discussed are: glare at night, dazzle at night, estimation of distance at night, detection of objects at night, blinking, lapses of visual alertness, and visual hallucinations at night.
R 24

2485

Bradley, J.V., & Argenteanu, J. OPTIMUM KNOB DIAMETER. Proj. 7182-71514, Tech. Rep. 56-96, Nov. 1956, 17pp. Aero Medical Laboratory, WADC, Wright-Fatterson AFB, Ohio.

2485

To determine the relationship between knob diameter and operation time, 48 subjects reached to, grasped, and rotated knobs 125° so that a radial line on its face pointed to a 12 o'clock position within a tolerance of plus or minus one°. Knobs varied in diameter from 1/2 inch to 3 1/4 inches in 1/4 inch increments, were 1/2 inch thick with knurled edges. Two shaft frictions, corresponding to average torques of 81 and 176 inch grams were tested with different subject groups. The data (reach time, turning time for each diameter and friction) were analyzed for main effects and interactions by both parametric and distribution-free statistics. Turning time knob diameter curves are presented. Implications of low-level friction are discussed.

T. G. I. R.10

2486

Smith, M.H., Jr. & Long, W.F. ANALYSIS OF TRAINING CRITERIA FOR THE NAVIGATOR-BOMBARDIER. Proj. 21 06 001, Res. Bull. 50 2, Jan. 1950, 13pp. USAF Human Resources Research Center, Mather AFB, Calif.

2486

This is a study of the reliability of navigator-bombardier school grades and bombing accuracy records as adequate criteria of training and proficiency. Data on approximately 90 navigator-bombardier students was analyzed. The results were discussed in terms of the reliability of the various measures and in terms of the intercorrelations existing among the measures.

T.

2489

Carson, L.D., Miles, W.R., & Stevens, S.S. VISION, HEARING AND AERONAUTICAL DESIGN. Fed. Proc., 1945, 2, 2, 126-129. U.S.N., Medical Research Section, Bureau of Aeronautics, (Yale Univ. School of Medicine and Harvard University).

2489

This paper discusses problems of vision and hearing and their implications for aeronautical design. Optimal visibility through the structures of the plane for pilot, gunner, and crew, and for continuous visual check on the environment surrounding it in both day and night flying is considered the major visual problem. Intense ambient noise with its effect on hearing and communication is discussed with some design suggestions given.

2490

Goetz, M. AN APPLICATION OF A DYNAMIC-SIMULATION MODEL TO THE SOLUTION OF A SCHEDULING PROBLEM. 74pp. Tufts University.

2490

To explore the problem-solving potentialities of a dynamic-simulation model for problems of modern industry, specific scheduling and operating problems of a drapery plant were studied. The model was constructed to describe accurately the important interrelationships in the real system; representations of all components and the rules that governed them were used. Data were obtained for the plant running under thirty different sets of conditions and were analyzed in terms of optimum scheduling interval for various levels of activity and the value of one additional machine in factory assembly line. The utility of the method is discussed.

T. G. I. R.11

2494

Silvester, W.R. FEEDBACK, FILTERING AND REDUNDANCY IN COMMUNICATION TASKS. ca. 1953, 9pp. Tufts University.

2494

To study the filtering action of information in group communication, a controlled laboratory experiment was conducted. Three node networks (72 subjects in groups of three) were studied using various amounts of feedback under conditions of written messages and input to only one node with required output from a different node. In addition to performance measures (messages sent, time for problem solution, and the solution itself) all subjects responded to a pretest attitude questionnaire and a post-test interview. Indices were derived to express amount of redundancy and filtering and obtained scores compared to ideal performance. Personal characteristics of subjects were analyzed in relation to behavior.

T. G. I. R.16

2495. Black, J.W. THE INFORMATION OF SOUNDS AND PHONETIC DIGRAMS OF ONE- AND TWO-SYLLABLE WORDS. Joint Proj. Rep. W-001-064-01-22, May 1954, 11pp. USA School of Aviation Medicine, Pensacola Air Station, Fla. (Ohio State University, Columbus, Ohio).

Approximately 3500 common one- and two-syllable words were transcribed phonetically. The sequences of speech sounds were analyzed in terms of a) the probability of each sound, b) the conditional probability of each pair of sounds, and c) the joint probability of each digram. The maximum information (H) per symbol in an alphabet of 41 symbols (the number treated) would be 5.35 bits (log₂ 41). In the sample studied, the obtained values were 4.15-5.04 bits (E₁) and 3.35-4.21 bits per symbol (E₂). Some transitional probabilities reached 0.33. Among words of a particular length in syllables, the words of few sounds contained the highest information value per symbol. Digrams of greatest conditional and joint probabilities are enumerated in tables.

R.26

2496

Townsend, C.L. SPECIFICATIONS FOR MOTION-PICTURE FILMS, INTENDED FOR TELEVISION TRANSMISSION. J. Soc. Mot. Pict. Engrs., Aug. 1950, 55, 5-20. (National Broadcasting Co., Inc., New York, N.Y.).

2496

This article presents detailed information concerning specifications for the transmission of motion pictures by a television system. The problem is treated in terms of the transfer characteristic of iconoscopes, film characteristics, detail resolution, and scene content effects.

R.6

2498

Saw, M.B. BASIC PRINCIPLES OF STEREOPHONIC SOUND. J. Soc. Roy. Pict. Engrs., Nov. 1953, 51, 567-589.

Stereophonic sound has become of vital importance to industry. The subject has been studied for many years, but the published material is scattered. This paper summarizes the fundamental theory underlying stereophonic sound as far as it has been published, and gives examples of how the theory is employed in representative practical situations. Fundamental differences between ordinary binaural listening and stereophony are pointed out, as well as similarities. It is shown that much qualitative but little quantitative information has been reported. Factors which aid some stereophonic effects are shown to be detrimental to others, and methods of minimizing the undesirable conditions are suggested. Applications to recording are discussed.

R 48

2500

Neuer, R.H., & Bruker, J.J. RESEARCH ON THE LANGUAGE OF VOICE PROCEDURES--COMPARISON OF UNITED STATES-UNITED KINGDOM AND INTERNATIONAL CIVIL AVIATION ORGANIZATION PHONETIC ALPHABETS. Contract AF10(600)315, AF Proj. 519, Tech. Rep. 6, June 1953, 12pp. Ohio State University Research Foundation, Columbus, Ohio.

This study investigated 3 hypotheses regarding reception scores for phonetic-alphabet code groups: that there is no difference in these scores between a) standard and letter word methods of transmitting, b) repeat and letter word methods, and c) standard and repeat methods. 6 lists of 26 random 3-letter code groups were made up for both the US-UK and modified ICAO alphabets: 2 were read in standard fashion, 2 with complete repetition, and 2 by the letter-word method. 20 Ss with some listening and transcribing experience were used. Errors were compared by t tests. The repeat method was the most effective transmission technique. All hypotheses were rejected at least at the .05 level of confidence. (NEIAS)

2501

Young, R.W. A BRIEF GUIDE TO NOISE MEASUREMENT AND ANALYSIS. YEL Rep. 606, May 1955, 23pp. U.S. Naval Electronics Laboratory, San Diego, Calif.

2502

This is a brief guide prepared for the particular convenience of Ray users of sound-analyzing equipment. In Part I, elementary principles are reviewed, noise measurement terms defined, notes of a typical noise-analyzer system are described and then were explained, and single methods of plotting graphs for comparison and interpretation of results are given. Part II is concerned with the calibration of sound-measuring equipment and the mathematical background needed for this work. T. O. I. R 13

2502

Coleman, P.D. AUDITORY DISTANCE LOCALIZATION AND STIMULUS FAMILIARITY. Proj. 6 9C 20 001, Task T-1, Rep. 364, April 1959, 6pp. USA Medical Research Lab., Fort Knox, Ky.

2502

To investigate changes in performance in an auditory distance localization situation as a function of opportunity to become familiar with the characteristics of the stimulus, subjects were confronted with a column of 14 loudspeakers extending away in a median plane. The nearest speaker was five feet from subject and the others were at successive two-foot separations. Stimuli were one-second bursts of wide-band random noise with which the subjects were presumably unfamiliar. Subjects received 100 trials in identifying the loudspeaker that served as a sound source. Distance judgments and errors were analyzed for learning effects. T. G. R 6

2503

USA Human Engineering Lab. AN INTRODUCTION TO HUMAN ENGINEERING. Proj. TBI 1000, Tech. Memo 9, April 1954, 41pp. USA Human Engineering Lab., Aberdeen Proving Ground, Md.

This paper has presented, in a very general form, some of the facets which are considered as being important from the standpoint of more adequate consideration of the operator as a component in a man-machine system. It should again be emphasized that the technical information presented does not cover the entire field of human engineering, nor will it answer all the problems or be applicable to all items of material without qualification. It does, however, indicate the broad categories discussed during the conference by Dunlap and Associates, Inc. which should be considered when evaluating the design of many man-machine relationships. Much can be accomplished in terms of further improving the man-machine relationships in Ordnance materiel through the joint efforts of the human engineer and the Ordnance designer. It is not expected that a perfect relationship will be available. However, by receiving human engineering data in practical and useful form, the Ordnance designer can effect necessary compromises to allow for more efficient operation of the man-machine system. Although gaps exist in the present fund of human engineering data, much information is available which can be practically applied to the design of weapon systems. This, and new information, is being disseminated as rapidly as possible. Additional information can be obtained from, or gotten by, the human engineering unit or committee at the responsible design agency. It is suggested that utilization of human engineering personnel be made early in the development or modification of Ordnance materiel.

R 17

2504

Vardon, C.J. VISUAL FACTORS IN SIGHTING AT DIN LEVELS OF ILLUMINATION. I. LABORATORY STUDIES. J. Gen. Psychol., 1950, 42, 349-372. (Psychology Dept., Columbia University, New York, N.Y.). This investigation covered an analysis of the visual factors involved in rifle-sighting at din levels of illumination. Both the rear and front sights of the Garand and Springfield rifles were studied. The results indicate that: 1) the aperture type of rear sight is superior to the open or notch type when size is properly adjusted to illumination level; 2) the rear sight size must be increased as illumination decreases; 3) the optimum size of aperture is about 1/2 the pupil size; 4) the lowest illumination at which sighting can occur corresponds to about 30 min. after sunset on a clear day; 5) the sight characteristics for low illumination are: rear-closed 3.5 mm. aperture and front-flat faced post or head sight about 2.9 mm. wide with coating to provide high visibility. In addition some recommendations regarding current practice are included. (NEIAS)

R 8

2505 Ross, S. & Varden, C.J. VISUAL FACTORS IN SIGHTING AT DIM LEVELS OF ILLUMINATION. FIELD TESTS. J. gen. Psychol., 1950, 43 3-16. (Columbia University, New York, N.Y.).

The experiment reported here is a field test of modified (dim-illumination) sights on the regulation (standard) rifle. A group of 10 skilled marksmen who volunteered for the experiment were used as Ss. The tests were carried out at the Air Force Range, Camp Lejeune, North Carolina, on 11 April, 1946. Each S was provided with 2 rifles, identical except for the modified rear sight and the painted front sight. The Ss alternated in the firing of each rifle in a specified pattern, so that when odd-numbered Ss were firing the regulation rifle, even-numbered Ss fired the modified rifle. The Ss fired at 2 distances, 500 yds. and 200 yds. using dim-illumination targets (after Varden). 2 periods of firing were used: a mid-afternoon series (1425-1545) and an evening series (1705-1905). 12 relays of 8 shots were fired by each of the 10 Ss during the former period, and 23 relays of 8 shots during the latter period. An analysis of the data was made in terms of distribution of hits for 5 selected levels of illumination. These levels were: 1,000 millilamberts, above 100 millilamberts, above 10 millilamberts, above one millilambert, and below one millilambert. The results indicate that the "dim-illumination" sights yielded significantly greater accuracy at the level of illumination below one millilambert. At the higher levels of illumination, the regular sights are significantly superior.

2506 Allais, R.A. MEASURED VISUAL ACUITY AS A FUNCTION OF PHENOMENAL SIZE. Proj. 7106, Tech. Rep. 55-384, Oct. 1965, 14pp. NADC, Air Research and Development Command, Dayton Ohio.

2509 To test the notion that visual acuity may be better when the test object is made to appear larger though its objective size on the retina remains constant, 36 observers read a retinally projected visual acuity chart, in a daylight situation favorable to the operation of size constancy, at three convergences. An additional 36 observers read the same retinally projected chart under similar conditions but in a stimulus-reduced night situation so that phenomenal size remained constant. The results are analyzed, using Friedman's Chi-square test and Brandt's sign test for significance of difference between experimental conditions. The practical and clinical implications are discussed in the light of the statistical results.

2506 Connor, D.S. FLIGHT INVESTIGATION OF FLIGHT DIRECTOR SYSTEMS FOR LIGHT AIRCRAFT. R20 X 203 18, Tech. Note NCT 54 30, May 1954, 26pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

2506 This report concerns an investigation of improved flight information presentation for Army liaison aircraft that are required to engage in instrument flight. An installation of the Collins Integrated Flight System was investigated as representative of flight director systems. Pilots were required to fly a special flight pattern consisting of omnirange homing, radial interception, and low approaches on Instrument Low Approach System. Ground-tracked approaches were also made. Pilot opinion and accuracy of the recorded approaches were analyzed. A comparison was made with a light-weight automatic pilot and approach coupler.

2511 Black, J.W. A RELATIONSHIP BETWEEN SPEAKING AND LISTENING. Contract N7onr 22515, Proj. NR 145 993 & NM 001 104 500.54, Rep. 54, June 1955, 7pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

180 panels of 12 members each responded to Forms C and D of the multiple-choice intelligibility tests in round-robin administrations. Rank order correlations between the listening and speaking scores of members of the 180 panels ranged from .02 to .87. The median value was .21. Low positive correlations of this magnitude are common in applications of these tests and suggest that intelligibility in speaking and listening are not independent skills. However, as more sources of stratification among scores are isolated the likelihood increases that these indications do not reflect a valid relationship.

2507 Goodfellow, L.D. THE HUMAN ELEMENT IN PROBABILITY. J. gen. Psychol., 1940, 23, 201-205. (Northwestern University, Evanston, Ill.).

This paper attempts to show how subjective factors affect statistical techniques, the thesis here being that human judgments are not necessarily distributed according to the mathematical laws of probability. The important differences between physical chance and chance involving a psychological element are discussed and illustrated; the favoring of one of the alternatives offered, the alteration of a response due to a previous response, and the tendency to arrange responses in an asymmetrical order. (HEIAS)

2508 Gault, R.H. & Goodfellow, L.D. SOURCES OF ERROR IN PSYCHO-PHYSICAL MEASUREMENTS. J. gen. Psychol., 1940, 23, 197-200. (Northwestern University, Evanston, Ill.).

5 important sources of error and/or inconsistency in psychophysical measurements are discussed; the method of measurement itself, motivation and instructional set, suggestion, the experimenter, and muscle tension. Some examples are included as illustrations. (HEIAS)

2512

Charnell, R.C., Girden, E., Cuming, M.W. & Chan, G.S. TRAINING AND SUPERVISION OF CONTROLLERMEN. (HUMAN ENGINEERING SYSTEMS STUDIES). Contract N6onr 641, SDC Proj. 20 F-2, SDC TR 641 2-7, April 1950, 17pp. USN Special Devices Center, Port Washington, N.Y. (Dunlap & Associates, New York, N.Y.).

2513

This report presents recommendations, based on previous studies, for the training of controllermen. These recommendations deal with the supervision of controllermen during service at sea and the preparation of a qualifying examination for expert controllermen. Specific recommendations are also made regarding (1) hand allocation to controls; (2) standard times for simple problems; (3) standardization of orders; and (4) preparation of a manual of instructions. A summary and revision of earlier proposals for initial training in the Propulsion Cubicle is included.

T. I. R 4

2514

Bradley, J.V. & Stump, N.E. MINIMUM ALLOWABLE KNOB CROWDING. Proj. 7182-71514, Tech. Rep. 55-455, Dec. 1955, 21pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio.

Reach time, turning time and inadvertent touching of adjacent controls were measured while a standard setting was made with one of several closely spaced knobs. Variables manipulated were spacing between knobs, knob diameter and knob configuration. Performance improved rapidly with increasing distance between knob edges up to an interperipheral distance of 1 in., after which it continued to improve but at a much slower rate. For equal amounts of panel space consumed by several closely crowded knobs, 1/2 in. diameter knobs were more nearly error free than were the larger diameter knobs tested. For equal distances between knob edges, however, performance improved with increasing knob diameter. These results apply only to knobs capable of being operated by moderate torque. Gloves apparently had little effect upon speed of knob operation. It was found that the frequency with which a crowding knob is inadvertently touched is strongly affected by the angular position which it occupies with respect to the operated knob but is practically independent of the presence of other crowding knobs at the same distance from the operated knob.

R 9

2515

Brown, J.S., Melton, A.W. & Buel, J. THE S.A.M. ROTARY PURSUIT TEST, MODEL B WITH AND WITHOUT THE DIVIDED ATTENTION ATTACHMENT. Proj. 350, Rep. 1, Feb. 1946, 22pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

A modified form of the S.A.M. Rotary Pursuit Test is described in which new test units, styluses, and control units were substituted. The essential nature of the test remains unchanged, the S being required to manipulate a stylus so as to keep its point in contact with a round metal target rotating at 60 rpm. A Divided Attention Attachment for use with the S.A.M. also is described. This requires S to make differential manual reactions to a pair of signal lamps with one hand while manipulating the stylus with the other. Representative data on the S.A.M. alone and with the attachment are presented. For both conditions the test was found to have high reliability and moderate validity for selection of pilots. (HEIAS)

R 2

2517

Camp, R.T., Jr. THE EFFECT OF A DIVIDING NOISE MASK ON SPEECH RECEPTION. Contract N6onr 22525, Projs. NR 145 993 & NM 001-14 500.52, Rep. 52, May 1955, 13pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

The effect on speech reception of listeners receiving the identical full speech spectrum in both ears (diotic listening) was compared to the effect on speech reception of listeners receiving the high-frequency components above 1650 cps in one ear and the low-frequency components below 1650 cps in the other (dichotic listening) in the presence of 114 db of simulated aircraft noise. A comparison was also made of three headphone arrangements of speech spectra under the dichotic condition. In general, those listeners who listened dichotically earned better reception scores than those who listened diotically. Two of the three speech spectra under the dichotic condition yielded scores significantly different from each other.

R 8

2518

Coles, W.D. & Callaghan, E.E. INVESTIGATION OF FAR NOISE FIELD OF JETS. II. COMPARISON OF AIR JETS AND JET ENGINES. Tech. Note 3591, Jan. 1956, 19pp. National Advisory Committee for Aeronautics, Washington, D.C. (Lewis Flight Propulsion Lab., Cleveland, Ohio).

A comparison of the noise generation of air jets and turbojet engines has been made from data obtained under similar free-field conditions. At jet pressure ratios below or only slightly above that for choked flow, the over-all sound power is well represented by the Lighthill parameter, but the results obtained with the afterburning data are somewhat low. Application of a correction to the directional data using nozzle-area ratio and jet velocity ratio to the 8th power gave good correlation between air-jet and engine data. Air-jet and engine spectral data were dissimilar because of a dip in the engine noise spectrum, which was probably caused by a combination of ground-reflection effects and additions to portions of the spectrum by compressor and combustion noise.

R 9

2520

Deese, J. COMPLEXITY OF CONTOUR IN THE RECOGNITION OF VISUAL FORM. Contract AF 33 (039)-22642, Tech. Rep. 56-80, Feb. 1956, 22pp. WADC, Aero Medical Lab., Dayton, Ohio.

2521

To investigate the influence of complexity of contour of visually presented forms upon accuracy of recognition, Ss performed under two conditions: 1) simple and complex forms compared under different delays between presentation of sample form and the set from which it was to be identified, 2) the number of sample forms to be identified were 1, 10, or 25. The frequency of use of verbal "coding" as an aid to recognition was indicated. The data were errors of recognition and (for first condition) response times and were analyzed for differences among the forms. Practical implications were discussed.

T. G. I. R 9

2521

Adams, Marjorie M. INDEX TO AIR FORCE PERSONNEL AND TRAINING RESEARCH CENTER: 1955 TECHNICAL DOCUMENTARY REPORTS. Res. Rep. AFTRC-TN-55-04, Dec. 1955. 57pp. Headquarters, AFTRC, Lackland AFB, Tex.

2521

This bibliography identifies by publication serial number all of the technical reports released in 1955 by the Air Force Personnel and Training Research Center. Reports are cross indexed by author, subject, laboratory and project number. Abstracts are given of all unclassified reports.

2523

Skeen, J.R. COMPARISON OF THE OMNI BEARING INDICATOR AND THE RADIO MAGNETIC INDICATOR IN SHORT RANGE NAVIGATION. Contract N60R1 71(16), SPECDEVEN Proj. 20 L 1, Tech. Rep. SPECDEVEN 71-16 13, March 1955, 25pp. USN Special Devices Center, Port Washington, N.Y. (University of Illinois, Urbana, Ill.).

2523

To compare two short-range navigation instrument displays (the Radio Magnetic Indicator and the Omni Bearing Indicator) for accuracy of use by pilots in navigation, 16 experienced pilots were tested. Five navigation problems were flown by the pilots in a 1-Ch-1 Link trainer; one half of the subjects used one display, the other half used the other one. Performance was scored in five different ways and comparisons made between the two groups for each score.

T.

2524 Kennedy, J.L. & Travis, R.C. SURFACE ELECTRODES FOR RECORDING BIOELECTRIC POTENTIALS. Science, Aug. 1948, 108(2799), p183. (Tufts University, Medford, Mass.).

The electrodes described have the desirable characteristics of: maintenance of low-resistance contact for relatively long periods of time; relative freedom from artifacts of body movement, vibration, etc.; comfort in wearing; ease of application and removal; and durability and economy. (HEIAS)

2525

Payne, T.A. A STUDY OF THE MOVING PART, BEARING PRESENTATION, AND MAP DETAIL ON PICTORIAL AIR NAVIGATION DISPLAYS. Contract N60R1-71, Rep. 71-25-10, Nov. 1952, 28pp. ONR, SDC. (University of Illinois).

2525

To investigate some factors in the design of a pictorial instrument display which would provide the pilot with continuous information concerning the relationship in horizontal space of aircraft to ground points, 32 experienced pilots worked navigation problems using functional models of 1) aircraft movement and 2) map movement displays. Other variables tested: heading shown on aircraft symbols or omitted; map detail or no detail; portion of ground track to be flown drawn in or omitted; and aircraft symbol heading up or down on aircraft movement display. Data analyzed include time scores; number of involved problems; and control reversals. Implications for design were discussed.

T. I. R. 9

2526

Gerall, A.A., & Green, R.P. THE EFFECT UPON PERFORMANCE ON A FOLLOWING TRACKING TASK OF INTERCHANGING THE DIRECTION OF DISPLAY MOVEMENT CONTROLLED BY EACH HAND. Contract N60R-241, Proj. 20-M-1d, Tech. Rep. 241-6-24, Aug. 1955, 6pp. SDC, University of Rochester.

2526

To determine the effect upon performance of a following tracking task of interchanging the direction of display movement controlled by each hand, 112 subjects were assigned randomly to one of four groups and practiced for twelve one-minute periods under a specific arrangement of control-display relations. Five additional practice periods were given with reversed relationships. The data (mean time on target scores and error scores) were analyzed for degree of transfer of training as related to continuity relationships existing between controls (planes of rotation of control units parallel with planes of movement of target follower).

T. G. R. 1

2527 Green, R.F., Andreas, B.G., Norris, Eugenia B. & Spragg, S.D.S. THE EFFECTS OF CONTINUITY IN DISPLAY AND CONTROL MOVEMENT RELATIONSHIPS ON TWO-HAND TRACKING PERFORMANCE. Contract N60R-241, Proj. 20 M 1d, Tech. Rep. 241 6 12, Oct. 1953, 7pp. USN Special Devices Center, Port Washington, N.Y. (University of Rochester, Rochester, N.Y.).

This study was designed to discover the general principle to be used in placing controls that will permit the greatest accuracy in tracking. A SAM Two-Hand Coordination Test was used. 4 display-control arrangements were tested; performance was measured by time on target scores. The results indicate that the axes of the control and display should be parallel and their direction of movement the same. Actual location of control is not important, if it is easy to operate. (HEIAS)

2528

Weiss, B. & Green, R.F. THE EFFECTS OF INERTIA ON THE ACCURACY OF KNOB SETTINGS. Contract MONR 241, T.O. 6, Rep. SDC 241 6 9, Jan. 1953, 4pp. USN Special Devices Center, Port Washington, N.Y. (University of Rochester, Rochester, N.Y.).

This study examined the effects of inertia (fly wheel effect) on the accuracy of knob setting. The apparatus allowed for variation of the size of the dead zone and the amount of inertia. S was required to make 5 adjustments at each of 4 different dead zone angles, using 1 inertia value throughout. 7 values of inertia and 4 dead zone angles were tested: 40°, 60°, 120°, 160°. 105 Ss were used. Error was the difference in degrees between S's setting and the desired setting. Inertia values which ranged from approximately 0 to .245 slug. ft. were found to have no significant effect on setting accuracy; relative error decreased as size of dead zone increased. (MEIAS)

2529

Weiss, B. BUILDING "FEEL" INTO CONTROLS: THE EFFECT ON MOTOR PERFORMANCE OF DIFFERENT KINDS AND AMOUNTS OF FEEDBACK. Contract MONR 241, T.O. 6, Proj. 20 M 1d, Tech. Rep. 241 6 11, Oct. 1953, 20pp. USN Special Devices Center, Port Washington, N.Y. (University of Rochester, Rochester, N.Y.).

This study reports the effects of pressure changes and amount of movement on the operator's ability to control a display by means of an aircraft stick control. It was found that performance improves as the range of distance, e.g. control stick range, available to the operator increases. Also, pressure feedback has no apparent effect on performance when the operator is required to predict what a certain setting of the control will do to what is being controlled. (MEIAS)

2531

Bilger, R.C., Hanley, T.D. & Steer, M.D. A FURTHER INVESTIGATION OF THE RELATIONSHIPS BETWEEN VOICE VARIABLES AND SPEECH INTELLIGIBILITY IN HIGH LEVEL NOISE. Contract NCRI 104, Proj. 20 F 8, SDC TR 104 2 26, April 1955, 13pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

2531

The relationship between talker intelligibility in noise and several voice variables such as syllable intensity and syllable duration is investigated by recording speech samples with the introduction of high level noise. Eighty-eight male undergraduates were selected on the basis of their being highly intelligible or highly unintelligible speakers. After specification of the voice variable measures by intensity, pitch, and duration analysis, the criterion intelligibility was determined by listener panels. Multiple correlation techniques were used to determine the contribution of each voice variable to intelligibility. Implications for voice communication were discussed. T. G. R. 16

2532

Matheny, Beatrice J. HUMAN PERFORMANCE IN RADAR VECTORING. THE STUDY OF THE EFFECTS OF VARYING LOADS OF AIRCRAFT PIPS AND PIP SPEEDS UPON VECTORING PERFORMANCE IN AIR TRAFFIC CONTROL. Contract NCRI 7X(16), Proj. 20 L 1, SPECDEVEN TR 71 16 14, March 1955, 39pp. USN Special Devices Center, Port Washington, N.Y. (University of Illinois, Urbana, Ill.).

2532

This study is concerned with determining the effectiveness of air traffic controllers' performance in vectoring aircraft by means of radar. Utilizing a radar vectoring simulator, nine subjects were required to perform under varied conditions of load (i.e., three, six, and eight aircraft) and speed differences. The results are presented and discussed in terms of the effect of load and speed difference on each of the following aspects of performance: (1) vectoring the simulated aircraft; (2) alignment of aircraft on ILS; and (3) avoidance of collisions. Implications for training are specified and discussed.

2533

Silverstein, B., Bilger, R.C., Hanley, T.D. & Steer, M.D. THE RELATIVE INTELLIGIBILITY OF MALE AND FEMALE TALKERS. J. educ. Psychol., 1953, 7, 418-428. (Purdue University, Lafayette, Ind.), (SDC TR 104 2 20).

2533

This investigation determines the relative intelligibility of male and female talkers over the Portable Interphone Trainer in the presence of high level noise. Control and experimental groups were comprised of 138 male and female college students. The VCL 24-Word Multiple Choice Test was administered before and after a training period which stressed loudness and clear pronunciation in communication. The data was evaluated statistically in terms of relative intelligibility of untrained male and female speakers, differential effect of intelligibility training upon male and female speakers, and effect of the sex of the listening panel on speaker intelligibility. T, I, R 3

2537
White, C.T. POLARIZED LIGHT ILLUMINATION OF RADAR AND SONAR SPACES AND COMPARISON WITH LIMITED SPECTRUM METHODS. Rep. 669, Feb. 1956, 13pp. USN Electronics Lab., Bureau of Ships, San Diego, Calif.

This report has: a) described the cross-polarized lighting control system; b) compared this system with other proposed systems in regard to specific problems; and c) brought into critical focus some of the basic assumptions usually made about the lighting of radar rooms. It is concluded that there is no one lighting system which is best for all installations. Both types of lighting systems, area and localized, represent compromises with the ideal. Each type has advantages and disadvantages which should be taken into consideration before any decision is made as to which system to use in any specific case. It is recommended that full-scale experimental installations of the polarized-light system be evaluated in various types of operational units. R. 5

2540

Ludvig, E. & Miller, J.W. SOME EFFECTS OF TRAINING ON DYNAMIC VISUAL ACUITY. Contract MONR 586(00), Proj. NR 142 023, Proj. NM 001 075.01.06, Rep. 6, Sept. 1954, 12pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

2540

To determine the effect of practice on dynamic visual acuity, 200 unselected naval aviation cadets made 20 successive threshold judgments of movement. Test object (Landolt ring) moved with angular velocities of 20 degrees and 110 degrees per second. Ten subjects continued practice by making approximately 180 threshold judgments over a three-week period. Acuity data (minutes of arc) are analyzed for rate of improvement. Comparisons are made between the high and low group (20 each). A semi-empirical equation is given for the data. T, G, R 6.

2543

Schmidt, I. NEW TESTS FOR THE EXAMINATION AND TRAINING OF COLOR VISION. EVALUATION OF THE COLOR VISION MULTITESTER (SIGNAL LAMP) FOR AVIATION. Proj. 21-29-006, Rep. 4. June 1954. 10pp. USAF School of Aviation Medicine, Air Univ., Randolph Field, Texas.

2543

To evaluate the Color Vision Multitester (Signal Lamp) for use in classifying applicants for aviation training into two groups (pass and fail), 91 persons were given from three to six tests. The data are examined for types of errors committed, for learning and fatigue effects, and in comparison with results on other color vision tests (Ragel Anemoscope and Hardy-Rand-Rittler Charts). Recommendations for the use of this test and instructions for administration are given.

2.

2544

Smith, M.K. A METHODOLOGICAL STUDY OF SIZE-DISTANCE PERCEPTION. J. Psychol., 1953, 35, 143-153. (Dept. of Psychology, Princeton University, Princeton, N.J.).

2544

To investigate some methodological aspects of the problem of "size-constancy" in visual perception, two conditions of observation (binocular in an outdoor environment) were compared: 1) matching nearby comparison object with distant standard object, and 2) reverse of first procedure. The stimulus objects were white cubes (standard, two and four inches) comparison series varying from one-half to six inches, distances (16, 80, 32 feet), and six subjects. The data (size judgments with respect to distance) were analyzed and comparisons made between the two conditions of observation. Discussion was in terms of size-distance perception.

I. G. R 12

2545
Smith, M.K. SENSITIVITY TO APPARENT MOVEMENT IN DEPTH AS A FUNCTION OF STIMULUS DIMENSIONALITY. J. exp. Psychol., Feb. 1952, 42(2), 149-155. (Princeton University, Princeton, N.J.).

An experiment was carried out to determine whether the sensitivity to apparent movement in depth varied with the apparent tridimensionality of objects viewed monocularly and binocularly. An analysis of the variance of the results, supplemented by statements from the SS, indicated the following conclusions: a) No significant variance in reaction times was found to exist among the test objects used. Apparent tridimensionality of an object had no significant effect on the time it took S to respond to apparent movement in depth. This result was discussed from the standpoint of the effect of object properties on perception and an "entoptic" view of perception; b) Viewing condition (monocular and binocular) introduced significant variation in the data. The reaction times to movement were consistently faster for the binocular condition; c) An attempt was made to interpret the present results in light of other experimental results which indicate an effect on movement perception of such a factor as apparent dimensionality. In addition, an attempt was made to incorporate the results regarding the effect of viewing conditions with other pertinent binocular-monocular data; d) Although no significant interactions existed in the data, marked individual differences in reaction times to this kind of apparent movement were found.

R 8

2546

Shaw, W.J. THE EFFECT OF CONTINUED PERFORMANCE IN A TASK OF AIR TRAFFIC CONTROL. FPSC 883, Jan. 1954, 13pp. Flying Personnel Research Committee, London, England. (Applied Psychology Research Unit, MRC, Cambridge, England).

2546

To investigate the effect of the length of work period actually in use at an Air Traffic Control center on the performance of the controllers, three subjects were selected from among the regular controllers and were tested before and after watch spells over an eight-week period. The tests were based on a particular aspect of the controller's task which could be isolated and simulated on a synthetic control board. Performance was scored in terms of errors and time delays in solving the problems (aircraft clearances). The data were studied by analysis of variance for differences due to before- and after-watch tests.

I. 1.

2547

Swire, E.A. (Dir.). PLASTIC MATERIALS FOR VISION DEVICES. FINAL REPORT. Contract DA 20-089 ORD 36437, Proj. C 054, June 1954, 9pp. Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill.

2547

To determine methods for producing a plastic periscope with a resistance to abrasion approaching that of glass, three materials (silicon monoxide applied as a coating by vacuum deposit, an optically clear elastomer such as methyl polyacrylate, and a commercial abrasion-resistant plastic such as allyl diglycol carbonate) were investigated. Two types of periscopes were prepared from these materials, illustrating the feasibility of production.

I.

2548

Devos, D.B. THE USE OF DIRECT READING COUNTERS IN VISUAL DISPLAYS. Spec. Rep. Vol. II, No. 1. Dec. 1954. 10pp. Tufts College, Institute for Appl. Exper. Psychol., Medford 55, Mass.

2548

To formulate guiding principles concerning direct reading counter indicators to serve as an aid in determining whether or not a counter is appropriate for any particular function, the experimental literature was critically surveyed. The advantages and disadvantages of counters as contrasted with dials and scales as indicators are summarized in the form of recommendations.

R16.

2549

Head, L.C. HUMAN ENGINEERING. Proceedings, National Meeting, Institute of Radio Engineers, 1954, 29pp. Institute of Radio Engineers, New York, N.Y. (Tufts University, Medford, Mass.)

This paper illustrates and outlines the field of human engineering and attempts to show the relationship of this field to the theme of the symposium which is "engineering based on biological design". Human engineering is defined as engineering for human use, and is thus the applied province of both the engineering and biological sciences. The growth of human engineering is traced from its early beginnings through World War II. In developing equipment for human use various "biological design" characteristics must be considered. These characteristics include such basic factors as body dimensions, physiological processes, and resistance to atypical physical environments, as well as psychological factors such as stimulus detection, bodily mobility, learning, intellectual processes, and sensitivity to stress. Illustrations of each of these characteristics are given. The paper concludes with a comparison of men and machines in terms of their functional capacities.

R 26

2553

Peters, R.W. MESSAGE RECEPTION AS A FUNCTION OF THE TIME OF OCCURRENCE OF EXTRANEOUS MESSAGES. Contract N6ONR 22525, Proj. NR 145 993 & BuMed NM 001 064.01.33, Rep. 33, Nov. 1954, 24pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

The effect of extraneous messages upon the reception of voice messages was studied relative to the time of occurrence of the two messages and the content of the extraneous message. Criterion messages were either multiple-choice intelligibility test words or PB words. The extraneous message either immediately preceded or followed the primary message. The results indicated that the presence of a message either immediately preceding or following a primary message significantly interfered with reception. Extranous messages following primary messages were more damaging to reception than were preceding extraneous messages. The amount of interference varied depending upon the type of extraneous message.

R 15

2554

Tolhurst, G.C. SPEECH RECEPTION AND TEMPORARY HEARING LOSS AS A FUNCTION OF EXPOSURE TO HIGH-LEVEL NOISE. Contract N6ONR 22525, Proj. NR 145 993, BuMed Proj. NM 001 064.01.32, Rep. 32, Oct. 1954, 41pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

Pulse hearing test scores and multiple-choice word reception scores were obtained from 1402 Naval flight students in groups of approximately 18 per group as they experienced 2 hrs. of high-level noise. Each experimental session was divided into 3 time patterns of noise broken by one-minute periods of quiet. The word reception scores were obtained during the noise intervals and the pulse test scores during the quiet periods. The results indicate that increases in the noise level affected adversely word reception scores; changes in the spectrum of the "shaped" noise also affected scores but octave changes in the octave-band noise did not. Accumulative effects of time-in-noise did not seem to affect word reception; and pre and post-exposure hearing test scores were significantly different.

R 20

2555

Black, J.W. & Tolhurst, G.C. INTELLIGIBILITY AS RELATED TO THE PATH OF AIRBORNE SIDE-TONE. Contract N6ONR 22525, Proj. NR 145 993 & BuMed NM 001 064.01.34, Rep. 34, Nov. 1954, 8pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

Panels of 12 speakers read under pairs of experimental conditions that provided criterion intelligibility scores associated with different paths of the speaker's airborne side-tone. Differences between pairs of scores suggest that the speaker's guide in setting his level of normal speech in quiet is carried by the airborne channel.

2556

Tolhurst, G.C. THE EFFECT ON INTELLIGIBILITY SCORES OF SPECIFIC INSTRUCTIONS REGARDING TALKING. Contract N6ONR 225 25, Proj. NR 145 993, Proj. NM 001 064.01.35, Rep. 35, Nov. 1954, 6pp. USN School of Aviation Medicine, Pensacola Air Station, Fla. (Ohio State University Research Foundation, Columbus, Ohio).

2556

This study investigated the effect on speaker intelligibility of the following instructions: talk loudly, articulate precisely, and talk fast. One hundred forty-seven naval flight students served as speaker-listeners. Two forms of a multiple choice intelligibility test were administered. The first was given without special instruction to the speaker; the second test was taken while the speaker utilized one of the special instructions. A simple analysis of variance was performed on the intelligibility scores for the experimental conditions. The effectiveness of the instructions and how they affect intelligibility is considered. Also discussed are implications for the length of voice communication courses.

T. R 11

2559 DUNLAP, J.W. THE HUMAN ENGINEER: NEW ALLY FOR THE ELECTRICAL ENGINEER. Electrical Engineer, Ind., Feb. 1952, 6pp. (Dunlap and Associates, Stamford, Conn.).

This article deals with the interrelation of engineering with considerations of psychological and physiological behavior. The human component is first examined briefly. Some typical problem areas in this field are then discussed: equipment design, inspection, training, or learning, and maintenance. (METAS)

2560

Spence, K.W. PRELIMINARY REPORT ON FIXED GUNNERY SLIDE FILM DEFLECTION TRAINER (3-C-9). Contract NSORI 57, Proj. 20 B 1, Rep. 57 1 2, July 1945, 15pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

2560

This is a report on a preliminary investigation of the Fixed Gunnery Slide Film Deflection Trainer. Ten advanced graduate students in psychology were given preliminary instruction in the principles of fixed aerial gunnery and were then trained on one film and tested on a second. Proficiency, measured in "hits" resulting from squeezing a trigger switch, is analyzed as a function of amount of training and of time interval allowed for "firing." Introspective reports regarding cues employed in learning the task are analyzed. The accuracy of a photoelectric scoring system is evaluated.

T.

2561

Payne, T.A., Dougherty, D.J., Hasler, S.G., Skeen, J.R., et al. IMPROVING LANDING PERFORMANCE USING A CONTACT LANDING TRAINER. Contract NSORI 71(16), Proj. 20 L 1, SDC TR 71 16 11, March 1954, 32pp. USN Special Devices Center, Port Washington, N.Y. (University of Illinois, Urbana, Ill.).

2561

This study evaluated the 1-CA-2 Link trainer as a device for teaching approaches to landing. Two groups of six college students with no previous flying experience underwent basic flying training. The experimental group was given additional instruction in the Link trainer, with a perspective view of a runway projected on a screen in front of the trainer. The groups were compared with respect to number of trials and number of errors prior to achieving a standard level of proficiency on five measures of performance in approach and landing in an SHU aircraft.

T. I. R 5

2562

Matheny, W.G., Brunner, E.J., Nicklas, D.R. & Wilkerson, L.E. STUDY OF ARMY AVIATION TRAINING. Contract NSORI 07143, Proj. 20 H 3, SDC TR 71 43 1, Oct. 1953, 147pp. USN Special Devices Center, Port Washington, N.Y. (University of Illinois, Urbana, Ill.).

2562

A survey of the Army Aviation Training Program was conducted to determine whether the training curriculum provides adequate preparation for the operational task. The data were obtained through interviews with combat returnees and instructors, photographic records and accident records, and analyses of grades given students on each item in the syllabus. Students and instructors were required to rank items of the syllabus in order of difficulty. Recommendations for various classroom training aids and procedures were made for training in the fixed wing flight and ground school, in the rotary wing flight and ground school, of helicopter mechanics and pilots, and of flight observers.

T.

2563

Spilka, B., Bilger, R.C. & Steer, M.D. INTENSITY MONITORING PERFORMANCE AS A FUNCTION OF TRAINING. Contract NSORI 104, Proj. 20 F 8, SDC TR 104 2 31, Oct. 1954, 11pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

2563

To determine the effects of training on the monitoring of speech signals, ten Ss were required to monitor five samples of speech at five intensity levels. Half the Ss had had extensive experience in controlling signal intensities; half had had no training in monitoring. Differences between and within individuals and groups in the performance measure (Volume Unit meter settings) were evaluated statistically.

T. I. R 4

2564

Rock, R.T., Jr., Duva, J.S. & Murray, J.E. A STUDY OF LEARNING AND RETENTION FROM TELEVISION INSTRUCTION TRANSMITTED TO ARMY FIELD FORCE RESERVEVISTS. FINAL REPORT. Contract NSORI 47502, Proj. JR 781 007, SDC Proj. 20 E 5A, SDC TR 476 02 53, May 1951, 50pp. USN Special Devices Center, Port Washington, N.Y. (Fordham University, New York, N.Y.).

2564

In an evaluation of television as a medium for mass training, approximately 3000 Army Field Force Reservevists were required to view eight one-hour instructional programs on television. Amount of learning was measured by the difference between scores on a test administered immediately before and immediately after each program. Retention was measured also at intervals of 1, 2-4, and 5-6 weeks. Scores were analyzed with respect to the rank of the trainee and to instructional treatment. Results of a questionnaire survey of opinions on the programs were also presented.

T. G. R

2565

Hirsch, R.S. & Saul, E.V. ARMY MARKSMANSHIP AND GUNNERY TRAINING. I. TRAINING REQUIREMENTS FOR INDIVIDUAL WEAPONS. Contract NSORI 494(01), SDC TR 494 01 1, June 1952, 37pp. USN Special Devices Center, Port Washington, N.Y. (Tufts University, Medford, Mass.).

2565

This is a survey of training aids and procedures employed by the Army in tracking gunnery and marksmanship in individual weapons. Observations conducted at seven Army installations are tabulated for 11 weapons and are subsumed under the following headings: instructional topic, training aids actually employed and needed, appraisal of extrinsic motivation, factor of learning, (applications of basic principles), instructor-trainee ratio, differences between training and operational situations. Recommendations involving aids and procedures are made. General training policies (realism of objectives, etc.), human engineering problems (adequacy of design of weapons), and methods for the measurement of proficiency are discussed.

T. R 42.

2566

Horrocks, J.E., Bowlus, D.R. & Krug, R.G. LIGHT ANTI-AIRCRAFT TRACER OBSERVATION AND FIRE CONTROL WITH SPECIFIC REFERENCE TO THE TRAINING PROBLEM. Contract NSORI 495(01), HE Rep. SPECDEVEN 495 01 3, Aug. 1952, 58pp. Ohio State University, Columbus, Ohio.

2566

To investigate the human engineering requirements for the training of military personnel in antiaircraft tracer observation and fire control procedures for all standard light antiaircraft weapons, extensive job analyses were made of the tracer observation and fire control problem. A description and assessment of the existent light antiaircraft devices used in the training situation is presented along with recommendations concerning the development of a tracer observation and tracking trainer. The psychological factors involved in fire control and tracer observation are discussed in terms of learning, perceptual, and motor-coordination variables.

T. I. R 30

2567

Horrocks, J.E. & Fotheringham, W.C. STUDY OF TRAINING REQUIREMENTS FOR TANK TACTICAL TRAINING. Contract NSORI 495(07), Proj. 20 AR 1, SDC TR 495 07 1, April 1954, 81pp. USN Special Devices Center, Port Washington, N.Y. (Ohio State University Research Foundation, Columbus, Ohio).

2567

To determine the most effective training devices in the tactical training of tank leaders, the desirable tank platoon leaders' behavior and actual behaviors in combat were evaluated by 110 tank combat veterans. In addition, a job analysis of the MCE of tank platoon leader was made. The results are treated in terms of the implications of those behaviors which emerged as critical in effective tank tactical conduct for the development of criteria to evaluate the training devices currently utilized to facilitate such conduct.

T.

2568

Dooley, L.R., Campbell, J.W. & Channell, R.C. STUDY OF HELICOPTER FLIGHT AND TACTICS TRAINING. Contract N0NR 971(00), Proj. 20.A 15, SDC TR 971.0 1, Aug. 1953, 65pp. USN Special Devices Center, Port Washington, N.Y. (Dunlap & Associates, Stamford, Conn.).

2568

To estimate the areas in which helicopter flight and tactics training problems exist, a survey of the uses of helicopters by the fleet, the tasks helicopter pilots perform in such missions, and the program for training fleet helicopter pilots, was conducted by utilizing interviews, observations, student records, etc. The results were treated in terms of the major training problems, the operational requirements of helicopter pilots, and the tasks involved in Navy and Marine fleet operations. The particular functions for which training aids and devices might be utilized were treated in detail.

T. G. I.

2569 Black, J.W., Lightfoot, C. & Mitchell, J. THE EFFECT ON VOCAL FREQUENCY AND INTENSITY OF HEARING SUSTAINED TONES WHILE READING. Contract N70N 411, T.O. 1, (Proj. NR 782 004, Tech. Rep. 411.0 1 7, ca. 1949, 8pp. USN Special Devices Center, Port Washington, N.Y. (USN School of Aviation Medicine and Research, Pensacola Air Station, Fla.).

Pure tones, similar in frequency to fundamentals of voices, were heard by Ss at a constant intensity. An S read a nonsense syllable after 10-sec. exposure to a tone. The frequency of the tone was then changed and after a 10-sec. exposure the S read another syllable. This continued through 30 syllables. Each of 10 experimental frequencies was heard 3 times. The same vowel appeared in all of the syllables. Measurements of frequency and intensity of the read syllables were analyzed. Both vocal frequency and intensity increased as the frequency of the stimulus tone became higher. The procedure was repeated with the loudness level instead of the intensity of the stimulus tones held constant. The results were inconclusive.

2570

Black, J.W. EXPLORATORY STUDIES: THE RELATION BETWEEN 'UNCERTAINTY' AND VOCAL INTENSITY. (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract N70N 411, Proj. NR 782 004, SDC Proj. 20 K 2, SDC TR 411.1 6, June 1949, 11pp. USN Special Devices Center, Port Washington, N.Y. (USN School of Aviation Medicine, Pensacola Air Station, Fla.).

2570

Two experiments were presented which dealt with the problem of isolating those physical attributes of voice upon which a listener makes the judgment that a speaker is "uncertain" (in what he is saying). Subjects 1) heard words at different levels of intensity and responded by repeating and saying the opposites of the words, 2) heard digits and letters and repeated the symbols and solved problems, and 3) read symbols on a visual acuity chart. Results discussed the "uncertainty" evidenced in these tasks (auditory and visual) of grossly different levels of difficulty in terms of the relation between stimulus intensity and spoken response intensity.

T. R 3

2571

Bliger, R.C., Hanley, T.D. & Steer, H.D. THE RELATIVE EFFICIENCY OF MONAURAL VERSUS BINAURAL LISTENING IN VARIOUS LEVELS OF NOISE. Contract N0NR 104, Proj. 20 F 8, Tech. Rep. 104 2 40, April 1955, 11pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

To determine the relative effectiveness of monaural and binaural listening in various levels of ambient noise (55, 80, and 105 db), 13 normal hearing Ss were tested in 4 listening conditions: binaural with 2 phones in phase, binaural with 2 phones out of phase, monaural with unused ear covered with a dead phone, and monaural with unused ear exposed to ambient noise. Analysis of the data indicates that binaural conditions were superior to monaural and that differences among noise levels were consistently significant, although, at the highest noise level, the ear-exposed condition was most similar to both binaural conditions. In all 3 noise levels threshold variability remained relatively constant. (MFIAS)

R.3

2572 Asher, J.W., Hanley, T.D. & Steer, H.D. AN INVESTIGATION OF LISTENER ACCURACY IN AN ENVIRONMENT OF RELEVANT CONFLICTING VOICE SIGNALS. Contract N0NR 104, Proj. 20 F 8, Tech. Rep. 104 2 39, Dec. 1954, 20pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

The present investigation makes use of the general design of the CIC to test the influence of 4 situational aspects on the information conveying efficiency of the system. The 4 factors tested were the location of loudspeakers and the intensity levels at which the speakers operated, the position of the message source with respect to the bodily orientation of the listener, and the specific codeword which identified for the listener the message to which he was to respond. The major findings of this study can be summarized as follows: a) Spatial separation of loudspeakers resulted in higher listener scores than in the banded speaker position. b) Higher listener scores were obtained with a playback intensity level of 60 db than with a level of 75 or 90 db. c) There were significant differences in listener scores when the codeword identifying the messages differed. d) There were no significant differences in listener scores when the S's left or right shoulder was facing the speaker. However, when the S faces the speaker, listening scores are significantly improved.

2573

Shaffer, G.L., Bilger, R.C., Hanley, T.D. & Steer, M.D. THE RELATION BETWEEN DURATION OF EXPOSURE TO HIGH LEVEL NOISE AND LISTENER ACCURACY. Contract N6ori 104, Proj. 20 F 8, Tech. Rep. 104 2 38, Dec. 1954, 13pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

This study was designed to discover whether noise exposure results in impaired listening ability in a situation in which the individual remains in the noise environment and the listening test stimuli are presented at a constant level with respect to the noise level. 4 listening-in-noise tests were administered; between tests experimental Ss removed their headphones in the presence of the test noise, control Ss in quiet. Test periods were 55 min. and 3 hrs. 25 min. in length. The results, from 198 Ss, indicate that listener performance was not affected by exposure to noise between tests, performances were parallel from test to test and successive scores were significantly different only during the shorter test period. (HEIAS)

R 4

2574

Miller, I., Bilger, R.C., Hanley, T.D. & Steer, M.D. COMMUNICATION IN NOISE: SUCCESS RELATED TO THREE DEGREES OF EMPHASIS ON VERBAL CONTEXT. Contract N6ori 104, Proj. 20 F 8, Tech. Rep. 104 2 36, Dec. 1954, 11pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

The purpose of this experiment was to investigate what effect minimizing or emphasizing attention to an objective verbal context will have upon the intelligibility of spoken words when the amount of information and signal-to-noise ratio are held constant. In this study, the Ss were administered multiple-choice intelligibility tests under noise conditions by the following methods: a) The S checked the words heard from among four alternatives for each test item. b) The S whispered four alternatives before the test word was spoken. c) The S did not see the alternatives before the word was spoken by the experimenter. The data collected in this study indicate that listener scores are improved under the condition in which verbal context of the test items is stressed; on the other hand, listener scores are lessened under the condition in which the verbal context is minimized.

R 9

2575

Spilka, B., Hanley, T.D. & Steer, M.D. RELATIONSHIPS BETWEEN CERTAIN ASPECTS OF PERSONALITY AND SOME VOCAL EFFECTS OF DELAYED SPEECH FEEDBACK. Contract N6ori 104, Proj. 20 F 8, Tech. Rep. 104 2 37, Oct. 1954, 25pp. SDC, Purdue University, Lafayette, Ind.

The degree of relationship between certain personality traits: self-percept stability, schizoid tendencies, paranoid tendencies, and rigidity, and several speech variables: syllable duration, % phonation time, mean vocal intensity, and vocal intensity variance, was investigated. Stress upon the vocal process was produced by auditory feedback. 129 Ss were used. The results indicated that the amount of change occurring in vocal intensity variation due to delayed speech feedback appears to be most closely related to personality functioning. Increases in vocal intensity variation appear to be positively related to self-percept stability and paranoid tendencies and negatively related to rigidity. Decreases in vocal intensity variation appear to be positively related to schizoid forms of behavior.

R 27

2576

Spilka, B. SOME VOCAL EFFECTS OF DIFFERENT READING PASSAGES AND TIME DELAYS IN SPEECH FEEDBACK. Speech Hearing Disorders, 1954, 19, 37-47. Contract N6ori 104, Proj. 20 K 1, Tech. Rep. 104 2 32. ONR, SDC, (Purdue University, Lafayette, Ind.).

This study determined some vocal rate, duration and intensity correlates of the phenomenon delayed speech or side-tone feedback. Sample size, independence between delay-times, length and content of reading passages, and the duration of the delayed side-tone intervals were rigidly controlled. Each of 2 Ss read a selected passage (8 passages) under a given delay-time (8 delay-times). Results were recorded in terms of syllable duration, % phonation time, mean vocal intensity, and vocal intensity variance. Analysis of variance technique was used on these data. Under the delayed speech feedback conditions syllable duration, % phonation time, and vocal intensity were found to increase and vocal intensity variations to become greater. Another finding was the significant interaction between reading passage and delay-times. (HEIAS)

R 76

2577

Spilka, B., Bilger, R.C., Hanley, T.D. & Steer, M.D. THE RELATIONSHIP BETWEEN TALKER INTELLIGIBILITY AND MESSAGE FAMILIARITY. Contract N6ori 104, Proj. 20 F 8, Tech. Rep. 104 2 30, Oct. 1954, 5pp. SDC, Purdue University, Lafayette, Ind.

To determine the extent to which talker intelligibility in noise is related to the talker's familiarity with the message to be transmitted, 2 groups equated with respect to talker intelligibility were tested under different conditions designed to give the talkers differing degrees of familiarity with the message to be transmitted. One group merely heard the words they were to repeat, the second group received additional cues from multiple-choice answer sheets which provided aids in selecting and pronouncing the words. The data, from 92 Ss, indicate that the group given visual cues in addition to auditory cues achieved a significantly higher mean intelligibility score than the group who only heard the words to be transmitted.

R 2

2578
Wilson, D.K. SPEECH INTELLIGIBILITY RELATED TO MOTOR ACTIVITY IN HIGH LEVEL NOISE. *Speech Monogr.*, 1953, 22(4), 1-7.

2578
This investigation developed the Manual-Verbal Response tachistoscope which presents and measures a designated motor activity during word intelligibility testing. Also the relationship between intelligibility and concurrent motor activity in high level noise was studied. One hundred sixty-eight male college students were tested for speech intelligibility and assigned to control or experimental groups. The latter took the VCL intelligibility test while performing a motor task, and prior to the post-test received training in either speech intelligibility, motor performance, or intelligibility test taking. Results include comparison of test-retest score changes and reliability of the motor and intelligibility tests.
T. I. R 12

2579
Horrocks, J.E., Bowlus, D. & Krug, R.E. TRAINING 90MM AA GUN CREWS. Contract N6ONR 495(01), SDC TR 495 01-4, Sept. 1953, 63pp. *USN Special Devices Center*, Port Washington, N.Y. (Ohio State University Research Foundation, Columbus, Ohio).

2579
This report presents an extensive investigation of the training program for personnel of the 90MM antiaircraft gun and the M33 operator trainer. Utilizing an experimental training program, situational tests of proficiency, and comparative training techniques, the results of the investigation discuss such problems as the effects of integration of radar and gun training, knowledge of results, rewards, utilization of visual aids, learning by doing, etc., upon the trainee as well as an evaluation of the current aids and devices now used to facilitate training.

2581
Murnin, J.A. COMPARISON OF TRAINING MEDIA: TRANSFER OF PRINCIPLES INVOLVED IN AN MANIPULATIVE SKILL: OPERATION OF THE AIRCRAFT LOAD ADJUSTER SLIDE RULE. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 103, Sept. 1955, 36pp. *USN Special Devices Center*, Port Washington, N.Y. (Pennsylvania State University, Philadelphia, Penn.).

2581
This is a study of the relative effectiveness of the Multi-Engine Aircraft Weight-and-Balance training device to provide transfer of training of principles of aircraft weight and balance. Three methods of instruction (Weight-and-Balance Trainer, Model Transparency, and Individual Slide Rule methods) were compared by evaluating the post-training performances of 136 trainees of comparable intellectual ability on the Load Adjuster Slide Rule Test and the Principles of Balance Test. The results are discussed in terms of the comparative effectiveness of each of the three training techniques.
T. I. R 1

2583
Carmichael, L., Hogan, H.P. & Walter, A.A. AN EXPERIMENTAL STUDY OF THE EFFECT OF LANGUAGE ON THE REPRODUCTION OF VISUALLY PERCEIVED FORM. *J. exp. Psychol.*, Feb. 1952, XV(1), 43-86. (Brown University, Providence, R.I.).

2583
To study the effect of language on recall of visually perceived forms, 2 groups of subjects (45 and 38) were shown 12 relatively ambiguous stimulus figures and were asked to reproduce them following each presentation. Each group was given a different (but equally plausible) set of names for the figures. Presentation was repeated until all subjects drew a recognizable reproduction of each figure. Reproductions were rated for resemblance to the associated names, and a like figure named was computed for each word in each list. Results are discussed regarding the effect of the name given on the shape recalled and the theoretical implications.
T. I. RF

2584
Vris, T. A COMPARISON OF PRINCIPLES TRAINING AND SPECIFIC TRAINING USING SEVERAL TYPES OF TRAINING DEVICES. Contract N6ONR 269, Proj. 20 D 2, SDC TR 269 7 102, July 1955, 28pp. *USN Special Devices Center*, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2584
To define, demonstrate and test the efficiency of a generalizable learning technique, i.e., the teaching of principles, in contrast to a technique for specific tasks, 144 Ss were tested for response generalization of motor skills (involved in the operation of motion picture projectors) under various conditions of "specifics" versus "principles" training. The results are discussed in terms of the relative effectiveness of "principles" versus "specifics" training, the interaction between training and the particular training device used, and the relation of "principles" training to training devices.
T. I. R 5

2585
Edwards, A.L. APPLICATIONS OF RANKING IN FILM RESEARCH AND THE STATISTICAL ANALYSIS OF RANKS. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 59, Sept. 1955, 26pp. *USN Special Devices Center*, Port Washington, N.Y. (Instructional Film Research Program, Pennsylvania State University, State College, Penn.).

2585
This report describes ways of making statistical analyses of ranks with relation to the problems of evaluating training films. The following statistical concepts are discussed: rank difference coefficient, coefficient of concordance, reliability of a set of mean ranks, average intercorrelation of "m" sets of "n" ranks, analysis of a two-way classification, and test of significance for means of ranks. An application of the coefficient of concordance to film specialists' and naive Ss' ranking of films is discussed in terms of relative degree of agreement among each group and implications for rating by specialists as a device for evaluating training films.
T. R 8

2586
Radlow, R. THE RELATION OF SOME MEASURES OF ABILITY TO MEASURES OF LEARNING FROM SOUND MOTION PICTURES. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 58, Sept. 1955, 14pp. *USN Special Devices Center*, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2586
To determine the relationship of various mental abilities (i.e., verbal comprehension, reasoning, spatial orientation, perceptual speed, and spatial visualization) to learning from sound motion films, a group of Ss, tested for the various mental abilities, were shown two instructional films and evaluated for amount of learning. The results are discussed in terms of the particular mental abilities found to be characteristic of superior film learners.
T. R 3

2587
Greenhill, L.P. THE EVALUATION OF INSTRUCTIONAL FILMS BY A TRAINED PANEL USING A FILM ANALYSIS FORM. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 57, Sept. 1955, 68pp. *USN Special Devices Center*, Port Washington, N.Y. (Instructional Film Research Program, Pennsylvania State University, State College, Penn.).

2587
This is a report of the development and application of a training film appraisal form to be used for pre-production or pre-release evaluation of such films. Following development of an appraisal form for use by trained film production personnel, a complementary form for use by trainees was developed and a comparison made between the two forms by employing them on three instructional films. The results are discussed in terms of the degree of correspondence of prediction of effectiveness obtained with the two forms.
T. R 1

2588

Greenhill, L.P. THE RECORDING OF AUDIENCE REACTIONS BY INFRARED PHOTOGRAPHY. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 56, Sept. 1955, 11pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2588

This report describes the development and application of a means of detecting in a darkened room the reaction of trainees to instructional films. Utilizing a motion picture technique whereby infra-red photographs could be obtained, an audience's reactions to a film were recorded for a one-hour period. Recommendations are offered for the utilization of this technique to assess audience reaction to films.
I. R 9

2589

Fletcher, R.M. PROFILE ANALYSIS AND ITS EFFECT ON LEARNING WHEN USED TO SHORTEN RECORDED FILM COMMENTARIES. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 55, Aug. 1955, 26pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2589

In this study the profile technique (a method for production evaluation of training film scripts) was investigated in terms of its application to shortening instructional material. The commentaries of two films were shortened with and without the use of this technique. These versions along with an intact, complete version of the commentary were used with various groups of Ss. Amount of learning of material was measured by a multiple choice question test. The results are discussed in terms of the differences in degree of learning with each version of the commentaries.
T. G. I. R 8

2590

McNiven, M. THE EFFECTS ON LEARNING OF THE PERCEIVED USEFULNESS OF THE MATERIAL TO BE LEARNED. Contract N6ONR 269, SPECDEVEN Proj. 20 E 4, Tech. Rep. SPECDEVEN 269 7 54, Aug. 1955, 33pp. USN Special Devices Center, Port Washington, N.Y.

2590

To discover whether material that was perceived to be useful is learned better than material not so perceived, a rating form and an attitude scale were developed and tested on 473 senior high school subjects. Three instructional films (atomic energy, first aid, knowledge of car parts and construction) were selected as the learning task. Both temporal goal distance (need to use learning) and psychological goal distance (perceived usefulness of learning) were varied by means of varying instructions to the five groups of subjects. Analysis was based on attitude scale, ranking form, pre- and post-test scores, and intelligence test scores. Implications of the results for learning theory and for the construction of training films are discussed.
T.

2591

Grosslight, J.H. & McIntyre, C.J. EXPLORATORY STUDIES IN THE USE OF PICTURES AND SOUND FOR TEACHING FOREIGN LANGUAGE VOCABULARY. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 53, Aug. 1955, 57pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2591

To discover the value of still and motion pictures with and without sound for the learning of foreign languages, 409 Ss were shown various film versions of 20 Russian-English words (e.g., words alone with still pictures, with silent motion, etc.). In another aspect of the study, 538 Ss were given all possible variations of sound and film presentations and in addition the order of words was varied. The results are discussed in terms of those aspects of film presentation which appear to aid acquisition of a foreign language.
T. I.

2592

Carpenter, C.R. (Dir.). EVALUATION OF THE FILM: MILITARY POLICE SUPPORT IN EMERGENCIES (RIOT CONTROL) TF19 1701. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 52, Oct. 1954, 37pp. USN Special Devices Center, Port Washington, N.Y. (Instructional Film Research Program, Pennsylvania State University, State College, Penn.).

2592

To discover whether the training objectives of films can be attained through utilization of simpler and less expensive production methods, a comparison was made among three versions of a film: 1) the original motion picture, 2) a filmograph using staged action, and 3) a filmograph with certain scenes replaced by stock shots. The content of the films dealt with regulation of crowds (mobs, riots, etc.) and following presentations of each version to various groups of Army trainees, information and attitude tests were administered. The results are discussed in terms of the relative effect upon learning and attitudes of each type of film.
T. G.

2593

McIntyre, C.J. TRAINING FILM EVALUATION: FE254 - COLD WEATHER UNIFORMS. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 51, Aug. 1954, 14pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2593

To discover whether a humorous approach in a training film has greater teaching value than a film entailing the same instruction but presented in a straight-forward manner, 426 trainees were shown either one or two of three versions of the same film: 1) humorous, 2) humorous portions eliminated and titles substituted, and 3) substitution of blank film for humorous portions. Following the presentation each S was tested for amount of information and Ss presented with two versions rated their preference. The results are discussed in terms of the relative effect of each film upon amount of information learned.
T.

2594

VanderMeer, A.W. TRAINING FILM EVALUATION: COMPARISON BETWEEN TWO FILMS ON PERSONAL HYGIENE: TF8-155 AND TF8-1665. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 50, Oct. 1953, 27pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

2594

This study was designed to evaluate the teaching effectiveness of two films dealing with personal hygiene: 1) a film using a "singing commercial" approach and 2) a less costly film employing a more straight-forward instructional approach. One hundred and seventy-six recruits were shown either one of the two films and then given an information test. Behavioral measures (hand reaching, foot inspection, etc.) were also made before and after the film. The results are discussed in terms of the relative effect of each film upon acquisition of factual knowledge and change in personal hygiene practice.
T.

2596

Lefkowitz, E.F. THE VALIDITY OF PICTORIAL TESTS AND THEIR INTERACTION WITH AUDIO-VISUAL TEACHING METHODS. Contract N6ONR 269, Proj. 20 E 4, SPECDEVEN TR 269 7 49, Aug. 1955, 18pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2596

This is a study of pictorial tests to discover how accurately they should simulate the actual performance test in order to serve as a valid experimental means of testing the effectiveness of audio-visual teaching methods. The identification of nomenclature and function of the Mark IV 38-caliber projectile hoist was taught to a large group of Ss using two forms of pictorial displays: 1) black and white photographs, and 2) outline drawings. Results are discussed in terms of the conditions under which pictorial tests measure learning best and the relation between pictorial tests and pictorial teaching aids.
T. I. R 9

2597
Curtis, F.L. THE INFLUENCE OF PRACTICE ON THE DYNAMICS OF MUSCULAR TENSION. *Journal of Physical Education*, June 1949, 25(3), 344-411. (University of Missouri, Columbia, Mo.).

2597
To test the effect of muscular tension on motor performance, six groups of 32 subjects practiced for 30 trials on a modified Koehn pursuit motor while operating a dynamometer with the left hand. Tension to be maintained was different for each group (1/4, 1/2, 3/4 of maximum strength). Control (0) performed the pursuit task with no operating of left hand. Time on target for each trial is analyzed as a function of dynamometer tension, and results are compared with data on maintaining under tension. An hypothetical explanation of the results is discussed.
T. G. R 4

2600
VanderWeer, A.M. EFFECTS OF FILM-TYPING PRACTICE ON LEARNING FROM INSTRUCTIONAL FILMS. Contract NCOR 269, Proj. 20 E 4, Tech. Rep. 269 7 20, Nov. 1951, 10pp. *USE Special Services Center*, Port Washington, N.Y. (Instructional Film Research Program, Pennsylvania State College, State College, Penn.).

2600
To discover whether prior experience in viewing films on general science topics increases one's ability to learn from instructional films on general science, three groups of high school students previously instructed by one of three methods (1. a course of general science without film, 2. a course using 44 films exclusively, and 3. a course using 44 films plus study guides) were shown four new instructional films and evaluated for amount of factual and conceptual learning. The results are discussed in terms of learning gain as a function of previous film experience.
T. G. R 2

2601
Wenters, Marjorie S. EFFECTS OF SERIAL HYPERFILM ON SELF-LEARNING ACTIVITIES. (RAPID MASS LEARNING). Contract NCOR 269, Proj. 20 E 4, Tech. Rep. 269 7 22, July 1951, 10pp. *USE Special Services Center*, Port Washington, N.Y. (Instructional Film Research Program, Pennsylvania State College, State College, Penn.).

2601
To discover whether serial hyperfilm can be used to effect changes in the manner in which individuals regard themselves (and consequently improve an individual's personal adjustment), 267 women were pretested on a series of personality scales, approximately half of them were shown five serial hyperfilm films, and all of them were retested on the same personality scales. The results are discussed in terms of the changes reflected in both groups of subjects with additional information concerning the behavior of the low scorers (least well-adjusted women).
T.

2602
Harby, S.F. EVALUATION OF A PROCEDURE FOR USING DAYLIGHT PROJECTION FILM LOOPS IN TRAINING SKILLS. Contract NCOR 269, ME Rep. SDC 269 7 25, May 1952, 11pp. *USE Special Services Center*, Port Washington, N.Y. (Instructional Film Research Program, Pennsylvania State College, State College, Penn.).

2602
To discover whether teaching a skill (athletic) by using film loop demonstrations of the task projected in daylight is as effective as demonstrations by a live instructor and to investigate the effects of practice with and without coaching of the individual, 100 subjects were given a series of athletic skills to learn under varied conditions of mode of presentation, distribution of practice, interspersed of film with practice, and degree of coaching. The results are discussed in terms of the variables which appear most effective in facilitating the acquisition of simple perceptual-motor skills.
T. G. I. R 1

2603
Casper, C.R. (Ed.). A BIBLIOGRAPHY OF RESEARCH, UTILIZATION AND RESEARCH ON INSTRUCTIONAL FILMS. Contract NCOR 269, Proj. 20 E 4, SDC TR 269 7 40, Nov. 1952, 10pp. *USE Special Services Center*, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2603
This is an extensive bibliography of research studies on the production, use and evaluation of instructional films up to 1952. Some references are included which are indirectly related to instructional films, for example, articles and books deal with radio, music, learning theory, research methods, etc.

2604
Hurst, P.W. Jr. RELATIVE EFFECTIVENESS OF VISUAL DISCLOSURES TO KINESCOPE RECORDINGS AND TRAINING FILMS. Contract NCOR 269, Proj. 20 E 4, SUPPLEMENT TR 269 7 42, May 1952, 2pp. *USE Special Services Center*, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

2604
In a replication of a previous study, the investigators attempt to discover the relative effectiveness of the visual disclosures to kinescope recordings and training films. Twelve groups comprising a total of 631 subjects were given one of two instructions: 1) "This is a kinescope recording of a television program" or 2) "This is a training film". Subjects were shown one of five films and pre- and post-tested for amount of knowledge of content of the film. The results are discussed in terms of the degree of learning which occurred under each of the two types of instruction.
T. G. R 2

2605
Nelson, E.L. & VanderWeer, A.M. THE RELATIVE EFFECTIVENESS OF DIFFERENT COMMENTARIES IN AN ANIMATED FILM ON ELEMENTARY METEOROLOGY. Contract NCOR 269, Proj. 20 E 4, SUPPLEMENT TR 269 7 43, June 1952, 10pp. *USE Special Services Center*, Port Washington, N.Y. (Instructional Film Research Program, Pennsylvania State University, State College, Penn.).

2605
This is an investigation of the relation of the sound track of a training film to the instructional effect of that film. The sound track of a film on meteorology was modified by improving language intelligibility, increasing number of personal pronouns, shortening sentences, and so forth, so that four film versions, each emphasizing a different aspect of improvement, were obtained. Two hundred and ninety-one subjects were shown one of the four versions and pre- and post-tested for amount of training film content. The results are discussed in terms of degree of learning which occurred under each version of the sound track.
T. G. R 3

2606
Richardson, Bellows, Henry & Co., Inc., New York, N.Y. STUDIES IN NAVAL AIR BASIC TRAINING. CONTACT FLIGHT STATISTICAL SUPPLEMENT. Contract NCOR 38305, Proj. 20 A 6, SDC TR 383 5 2 Supplement, June 1952, 45pp. *USE Special Services Center*, Port Washington, N.Y.

2606
This is a statistical supplement (see Accession No. 2609) summarizing the data from the airborne recordings, briefings, and flight jacket studies. The tables give error frequencies on student performance and descriptions of the variables involved in the particular performance. The error analysis is used to show where important flying skills need to be taught more adequately.
T.

2497
Krug, R.P. AN APPROPRIATION OF RESEARCH FINDINGS TO TRAINING FLAM PROTECTION. Contract W300 249, Proj. 20 H 4, SOC 20 249 1-4, May 1952, 27pp. USN Special Services Center, Fort Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2498
This report describes the planning and production procedures followed in making a series of nine experimental films for teaching marksmanship with the M-1 rifle. The design of the films, the film specifications, the general requirements and procedures for developing the films, the results of a study of the target audience, and an analysis of the trials to be taught are some of the topics discussed in the report. 18 p.

2499
Kilgore, C.J. & Beck, R.L. ESTABLISHMENT OF GENERAL PRINCIPLES OF REPERCUSSION OF FILM. Contract W300 249, Proj. 20 H 4, SOC 20 249 1-4, May 1952, 27pp. USN Special Services Center, Fort Washington, N.Y. (Pennsylvania State University, University Park, Penn.).

2500
To study the effects of several methods of repeating film demonstrations upon the acquisition of a manual skill (marksmanship), 2500 naval recruits were used as Ss in five experiments employing repetition of instructional films under the following varied conditions: 1) constant and varied task presentation, 2) intervening and continuous practice, and 3) correct angle and level of reballastation. The results are discussed in terms of the relative effectiveness in teaching the marksmanship skill under the varied conditions of film demonstration and repetition. 1. 22

2501
Tomlinson, R.W., O'Malley, T.B. & Scholte, R. STUDY OF GUN CREW FLIGHT TRAINING. Contract W300 250, SOC Rep. 250 1-2, July 1952, 47pp. USN Special Services Center, Fort Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2502
To determine which aids and devices are appropriate to the basic flight training program and more specifically, the contract flight training aspect, the flight jackets of 60 students, briefing sessions of 100 students, and 500 airplane recordings of student training flights were investigated in terms of flying skills and learning procedures. In addition a flight observation study of training in various stages was conducted. The results of the investigation are discussed in terms of the problems inherent in the acquisition of correct flying skills. Recommendations for training procedures and aids are presented. 1. 1. 23

2610
Fryer, D.H., Feinberg, M.R. & Tomlinson, R.W. SPECIFIC RECOMMENDATIONS FOR NEW TRAINING AIDS AND DEVICES DEVELOPED AT THE MARINE SUPPLY SCHOOLS, CAMP LEJEUNE, NORTH CAROLINA. Contract W300 261, SOC Rep. 261 0-1, Supplement, May 1952, 30pp. USN Special Services Center, Fort Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2610
This is a supplement to a report which dealt with the determination of the training aid and device requirement of a military activity. It presents 56 specific recommendations for new training equipment requested by the Camp Lejeune Supply Schools. The recommendations are presented with information as to the course introduced to solve the training problem, and suggestions for the instruction of the device or aid.

2498
Richardson, Bellows, Henry & Co., Inc., New York, N.Y. FLAME PROTECTION RESEARCH. Contract W300 249, Proj. 20 H 4, SOC 20 249 1-4, May 1952, 27pp. USN Special Services Center, Fort Washington, N.Y.

2499
To test the validity of three training device evaluation procedures (a free answer, check-list, and factor rating procedure), the application of each procedure to a device was compared against a criterion of independent estimates of the overall merit of each device for its training purposes. The results are discussed in terms of the validity of the procedures. The development of a revised procedure is also discussed. 1.

2500
Harricks, J.E., Bowler, D. & Krug, R.E. TRAINING 90 MM AA GUN CREW. APPENDIX II - STATISTICAL ANALYSIS. Contract W300 250, Proj. 20 H 12, Tech. Rep. 495 01 4-2, Sept. 1953, 47pp. USN Special Services Center, Fort Washington, N.Y. (Ohio State University Research Foundation, Columbus, Ohio).

2501
This is an appendix which reports the basic data and the statistics of inference concerning the data of Human Engineering Report SpecDevGen 495-01-4 (Training 90 MM AA Gun Crew). (See Accession No. 2579).

2502
Harricks, J.E., Bowler, D. & Krug, R.E. TRAINING 90 MM AA GUN CREW. APPENDIX III - A RECOMMENDED PROGRAM FOR ADVANCED INDIVIDUAL TRAINING IN ANTIAIRCRAFT ARTILLERY. Contract W300 250, Proj. 20 H 12, Tech. Rep. 495 01 4-3, Sept. 1953, 47pp. USN Special Services Center, Fort Washington, N.Y. (Ohio State University Research Foundation, Columbus, Ohio).

2503
This is an appendix to Human Engineering Report SpecDevGen 495-01-4 (see Accession No. 2579), Training 90 MM AA Gun Crew, which presents a discussion and examples of application of some methods and principles which are recommended for consideration in the modification 90 MM AA training program. Some of the concepts dealt with are trainee orientation vs. equipment orientation, the problem of measuring performance, the integration of trainees in a training program, etc., as well as specific recommendations for crew training. 1.

2504
Harricks, J.E., Bowler, D. & Krug, R.E. TRAINING 90MM AA GUN CREW. APPENDIX I - HISTORY OF THE PROJECT. Contract W300 250, Proj. 20 H 12, Tech. Rep. 495 01 4-1, Sept. 1953, 47pp. USN Special Services Center, Fort Washington, N.Y. (Ohio State University Research Foundation, Columbus, Ohio).

2505
This is a technical appendix to Human Engineering Report SpecDevGen 495-01-4 (see Accession No. 2579), Training 90 MM AA Gun Crew, which presents a history of the project. The purposes, techniques, and research designs are presented.

2616
Harricks, J.E., Bowler, D. & Krug, R.E. TRAINING 90MM AA GUN CREW. APPENDIX IV - TRAINING AIDS AND DEVICES. Contract W300 250, Proj. 20 H 12, Tech. Rep. 495 01 4-4, Sept. 1953, 71pp. USN Special Services Center, Fort Washington, N.Y. (Ohio State University Research Foundation, Columbus, Ohio).

2616
This is a technical appendix to Human Engineering Report SpecDevGen 495-01-4 (see 2579) which deals with the training aids and devices utilized in training 90MM antiaircraft gun crews. Some of the aids and devices described are as follows: oval and plastic overlays, plastic mockups (e.g., leveling, indicator regulator, gunner's quadrant mockups), M33 operational control panel mockup, charts, fire and plotting boards, and recording forms. Recommendations concerning the use of additional training devices are presented. 1.

2618
Vossner, Barbara L. INDICATORS OF BEHAVIOR DECREMENT: EFFECTS OF STRESS AND DISPLAY-CONTROL RELATIONSHIPS ON AEROBIC DISCRIMINATION. Proj. DA 19 007 MD 22 (G.I. 19-52). Tech. Rep. 21, Feb. 1954, 74pp. DA Medical Research & Development Division, Office of the Surgeon General, University of Maryland, College Park, Md.).

To determine the effects of task-induced stress on sensorimotor performance, 35 performed a vigilance type task under speed-stress, display-control stress, and monetary conditions. Performance was measured in terms of: percent of display attended relative to stimulation; percent of correct responses; stability of response; and subjective evaluation of stressfulness. The data were analyzed by analysis of variance techniques and correlation. Performance decrement was described relative to amount and kind of stress, attentional emphasis and display position, and type of response in the task situation.
R 22

2619
Bradley, J.V. EFFECT OF GLOVES ON CONTROL OPERATION TIME. Proj. 7192-71514, WADC-TR-56-532, Nov. 1956, 11pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

2619
To investigate differences between bare-handed and gloved performance of instrument control operations, five types of controls (push buttons, toggle switches, knobs, horizontally and vertically operated levers) were operated at room temperature by 30 subjects. The hand was clothed as follows: no glove, wool glove, double glove, i.e., leather over wool. Each subject performed 33 times a sequence of operations in which each of the five controls on each of four panels was operated once (11 sequences for each glove condition). Operation times were measured and analyzed for differences due to wearing gloves, type of glove, and type of control. The findings are discussed in terms of the particular aspects of the apparatus used.
T. G. I. R 14

2620
Bovan, W., & Patton, R.W. SELECTED BIBLIOGRAPHY: FATIGUE, STRESS, BODILY CHANGE, AND BEHAVIOR. Contract AF 33(516)-3745, ORD Rep. 108, Dec. 1956, 50pp. Military Operations Research Engineering Division, Lockheed Aircraft Corporation, Marietta, Ga.

2620
This is a selected bibliography of papers in the general areas of fatigue, stress, bodily changes, and behavior. The period covered is 1946-1956. The selection of items was based upon the needs of an experimental investigation of aircrew fatigue associated with relatively long confinement within the flight station of an advanced design airplane. A topical index is provided for general papers and reviews, fatigue as an independent variable affecting performance, and as a dependent variable, and the physiology of fatigue and stress.
R 883

2621
Allison, H.C. & Webster, J.C. STUDY OF UTILIZATION OF FLEET-TYPE OPERATIONAL FLIGHT TRAINERS. Contract NOME 99902, Proj. 20 A 14, SPECIFICATION 999 2 2, March 1954, 34pp. USN Special Devices Center, Port Washington, N.Y. (The Psychological Corporation, New York, N.Y.).

2621
To provide information on the utilization and adequacy of design of operational flight trainers, a series of visits to fleet air training activities, controlled interviews with trainer instructors and pilots supplemented by a check list questionnaire were employed along with observations of the device under actual training conditions. The results are presented in terms of evaluation of specific trainers and the overall implications of operational flight trainers.
T. G. I. R 6

2622
Allison, H.C., Day, E. & Webster, J.C. EVALUATION OF THE USN OPERATIONAL FLIGHT TRAINERS. Contract NOME 99902, Proj. 20 A 9, SPECIFICATION 999 2 1, March 1954, 8pp. USN Special Devices Center, Port Washington, N.Y. (The Psychological Corporation, New York, N.Y.).

2622
This study presents an extensive evaluation of the USN Operational Flight Trainers. Two broad problem areas were investigated: 1) how much transfer of training can be obtained through the use of the trainer and 2) the development of improved utilization techniques. The evaluation was conducted primarily by comparing the trainer with other trainers while performance was measured against a "no-trainer" condition. The results are treated in terms of comparative flight proficiency exhibited by groups of subjects utilizing the various trainers.
T. G. I. R 8

2623
Edgerton, H.A. (Princ. Investigator). A STUDY OF THE UTILIZATION OF FOUR REPRESENTATIVE TRAINING DEVICES. Contract NOME 36307, Proj. 20 A 104, SDC TR-383 7 2, April 1952, 8pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2623
This study was designed to analyze the utilization of four representative training aids in Naval aviation electronics schools. Four methods of evaluation were used: 1) interview with students, 2) interview with instructors, 3) an observer's check list, and 4) a form constructed for the evaluation of training aids and devices. The results are discussed in terms of evaluation of the representative aids' effectiveness and the implications for changes in both design and use of these training devices to increase their effectiveness. Suggestions are made concerning methods by which instructors can improve their own utilization studies of training aids.
T. G. I. R 5

2624
Katzell, R.A., Thomson, K.F., Zalkind, S.S. & Gray, E.J. NAVY RECOGNITION TRAINING. Contract NOME 383 06, RE Rep. SPECIFICATION 383 6 2, July 1952, 50pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2624
In order to determine: 1) what must be recognized for combat efficiency; 2) the clues which men in combat actually employ in recognitions; and 3) the recommendations of combat veterans for improving recognition training, a survey of Naval combat requirements and training for direct sensory recognition was undertaken. The methods employed were: 1) examination of available relevant training material; 2) interviews with instructors; 3) interviews with combat experienced men; and 4) the judgment of the investigators. The results are discussed in terms of the relative importance of targets to men in various military service, clues to recognition of targets, and the Navy recognition training program.
T. G. I. R 35

2625

Richardson, Bellows, Henry & Co., Inc., New York, N.Y. STUDIES OF NAVAL AIR BASIC TRAINING FIXED GUNNERY PHASE, SUPPLEMENTARY REPORT. Contract NMR 9902, Proj. 20 A 13, SPECDEVEN TR 999 2 4, Feb. 1955, 9pp. USN Special Devices Center, Port Washington, N.Y.

2626

This is a supplementary report (see 2625) on the fixed gunnery phase of flight gunnery training. A comparison between students' and instructors' utilization of a problem rating sheet (reflecting both specific and general problem areas) is presented in terms of how each group tends to rank certain gunnery problems (e.g., recovery, endurance, etc.). An additional section is offered on criteria for grading students' fixed gunnery performance as well as data on the effect of wind on fixed gunnery runs.

T. R. 1

2627

Edgerton, H.A., Tomlinson, R.H., O'Malley, T.R. & Schmidt, E. STUDY OF BASIC FIXED GUNNERS. Contract NMR 9902, Proj. 20 A 13, Jan. 1952, 42pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2628

To determine what training aids might be appropriate to the basic fixed gunnery phase of flight training, the following methods of investigation were utilized: 1) student interviews; 2) instructor interviews; 3) problem rating sheets; 4) instructor's record of student errors; 5) instructor's record of student observations; 6) analysis of post-flight briefings; and 7) observations of flight instructor lectures. The results are discussed in terms of the difficulties encountered by students in fixed gunnery training and their assessment. Recommendations for the improvement of gunnery training and aids are included.

T. G. I. R 36

2629

Milcoxon, H.C. & Davy, E. FIDELITY OF SIMULATION IN OPERATIONAL FLIGHT TRAINERS. PART II: THE EFFECT OF VARIATIONS IN CONTROL LOADINGS ON THE TRAINING VALUE OF THE SNJ CFT. Contract NMR 9902, Proj. 20 L 4, Tech. Rep. SPECDEVEN 999 2 15, Jan. 1954, 8pp. USN Special Devices Center, Port Washington, N.Y.

2627

To determine whether variation in control loadings (amount of resistance stick and rudder control exert when manipulated) affect basic instrument training in the SNJ operational flight trainer, three groups of basic flight students (total of 108) were trained with control loadings identical with those of the SNJ aircraft or with control loadings 50 percent greater or 50 percent less than the standard values. Differences in proficiency among the groups in the synthetic trainer and in the aircraft, as measured on collective performance grading forms, are analyzed statistically.

T. R. 2

2628

Milcoxon, H.C. & Davy, E. FIDELITY OF SIMULATION IN OPERATIONAL FLIGHT TRAINERS. PART I: EFFECTIVENESS OF ROUGH AIR SIMULATION. Contract NMR 9902, Proj. 20 L 4, SPECDEVEN TR 999 2 34, Jan. 1954, 8pp. USN Special Devices Center, Port Washington, N.Y. (Psychological Corporation, New York, N.Y.).

2628

To investigate the effectiveness of rough air simulation (pitching and rolling movements of trainers) in basic instrument and radio range procedure training, 11 flight students received rough air during all syllabus periods in the SNJ CFT trainer, 26 CFT students received rough air during one basic instrument and one radio range procedure period, and 50 students received the latter treatment in the NavBTT trainer. Proficiency of these students in trainers and in air flight, measured on objective grading forms, is compared with that of 195 control Ss who had undergone no rough air simulation.

T. R. 2

2629

Carverfield, P.D. OBJECTIVE SCORING PROCEDURE FOR OPERATIONAL FLIGHT TRAINER PERFORMANCE. Contract NMR 9902, Proj. 20 A 13, SPECDEVEN TR 999 2 4, Feb. 1955, 9pp. USN Special Devices Center, Port Washington, N.Y. (Psychological Corporation, New York, N.Y.).

2629

An objective method of grading student performance in flight trainers, the Basic Instrument Check, is described in detail and is discussed with respect to its reliability and its validity in predicting pilot proficiency. Validity coefficients are based on the performance of 13 students. Reliability coefficients are based on the judgments of 50 observers.

T. R. 2 23

2630

Edgerton, H.A., Tomlinson, R.H., O'Malley, T.R. & Schmidt, E. ENGINEERING CONSIDERATIONS IN THE DESIGN OF THE INSTRUMENT STATION OF TRAINED OPERATIONAL FLIGHT TRAINERS. Contract NMR 1042(00), Proj. 20 F 72, SPEC DEV TR 1042 00 1, Aug. 1953, 47pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2630

Recommendations are presented for the design of the instructor's station in the Trained Operational Flight Trainer. The topics covered include the general layout of the station and the grouping of the instruments and controls within a panel. Specific recommendations with respect to such features as illumination, switch design, and labeling of instruments are made, also.

T. R. 2

2632

Melgand, J.E., Bishop, E.M. & Chantrell, R.C. A STUDY OF THE UTILIZATION AND DESIGN OF THE SPECIAL DEVICES CENTER MARK 18 MODEL 6 GUNSHOT TRAINER (DEVICE 3-A-428 PROTOTYPE). Contract NMR 1043(00), Proj. 20 F 74, SPECDEVEN TR 1043 00 2, Dec. 1953, 54pp. USN Special Devices Center, Port Washington, N.Y. (Rumlap & Associates, Inc., Stamford, Conn.).

2632

To determine the optimal conditions for the use of the Special Devices Center Mark 18 Model 6 Gunshot Trainer (Device 3-A-428), 27 trainees divided into five groups underwent training with the device with one of the following factors varied: amount of coaching, number of trials per session, intertrial interval, target size, and knowledge of results. Differences in time scores and accuracy of tracking and ranging obtained by the groups are assessed. Transfer of training to the operational situation is evaluated in terms of the gunnery proficiency of 24 air crewmen, six of whom had received training on the device.

T. G. I.

2633

McClurken, W.D., Benjamin, H., Drummond, H., Harap, H., et al. CBT TRAINING AID REQUIREMENTS, ARMY WIDE. Contract NMR 1257(01), Proj. 20 CC-1, SPECDEVEN TR 1257 1 1, no date, 163pp. USN Special Devices Center, Port Washington, N.Y. (George Peabody College for Teachers, Nashville, Tenn.).

2633

This study was carried out to determine training requirements in Chemical, Biological, and Radiological Warfare. On the basis of interview, conferences, field visits, and reviews of the literature, recommendations are made with respect to the specifications of training objectives, the assessment of the results of training, the self-evaluation of students, and the use of training aids and methods that stress "actual behavior."

2634
Gordon, N.B. STUDY OF CARRIER LANDING TRAINING. Contract NGR 1013(00), SDC IR 20 A 22 1, 12pp. Naval Air Station, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2634
In an analysis of the effectiveness of training in carrier landing, the following procedures were carried out: individual and group interviews with students and instructors, analysis of errors recorded by Landing Signal Officers, tracking and rating of flight problems by instructors and students, study of 35 successful and 38 unsuccessful flight students, and analysis of 1942 accidents in Carrier Qualifications. Recommendations pertain to training practices (e.g., amount of time spent in landing practice) and to training aids (e.g., a classroom demonstration) in carrier landing training are given.

2635
Hall, P.C., Jr. THE EFFECT OF GRILL BOXES OF PROTECTIVE (SCOPOLAMINE) ON VISUAL EFFICIENCY. Proj. 157, Rep. 1, June 1943, 3pp. U.S. School of Aviation Medicine, Randolph Field, Texas.

2636
Twenty-three individuals were studied with regard to the effects of various quantities of hyposine (scopolamine) on a quantitative test of near and distant vision. The effects are tabulated in terms of individual visual acuity scores two to three hours after administration of the drug. Recommendations having to do with use of the drug are offered.

2637
Miller, G.A., & Taylor, W.G. THE PERCEPTION OF REPEATED BURSTS OF NOISE. J. acoust. Soc. Amer., March 1948, 20(2), 171-182. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (GPR, Rep. PHR 43)

Noise interrupted at a steady rate has essentially the same spectrum over the range of frequencies transduced by the earphones as does continuous noise. The frequency corresponding to the rate of interruption is not intensified in the spectrum. Consequently, the ability of listeners to respond differentially to the rate of interruption cannot be explained on the basis of a simple resonance theory of hearing. The rate at which an interrupted noise becomes indistinguishable from a continuous noise depends upon the rate of interruption, the sound-time fraction, and the intensity of the noise. For a sound-time fraction of 0.5, the presence of interruptions can be detected at rates well above 1000 per sec. Differential sensitivity to changes in the rate of interruption (with a sound-time fraction of 0.5) is poor above 250 interruptions per sec. Also at these high rates the listener loses his ability to match the frequency of a pure tone to the rate of interruption. Presumably the ability to perceive interruptions in a random noise depends upon the synchronous firing of the fibers in the auditory nerve. This hypothesis is supported by the correspondence between auditory sensitivity to changes in the rate of interruption of a noise and the tactile sensitivity to changes in the frequency of a vibrating pressure applied to the skin.

R 10

2638
Sender, A.E. PROPOSED SIGHT FOR MULTIPLE CAL. .50 MACHINE GUN MOUNTS (DAVIS SIGHT). Proj. 15-4953, June 1954. Army Field Forces, Fort Bliss, Texas.

2638
To determine the suitability of the Davis Sight for use with Multiple Cal. .50 Machine Gun Mounts, M4 series, as a fire control system, tests were conducted to determine the physical characteristics, time needed for training, firing characteristics, and durability under road conditions. Results were compared with comparable tests on the standard Reflex Sight, M2, and recommendations are included.

T.I.

2640
Gilbert, E.S., Pearson, E.J.C., & Adkins, E. EVALUATION OF A CONTROLLABLE-BEAM RUNWAY LIGHT. Rep. 206, Jan 1954, 9pp. CMA, Technical Development and Evaluation Center, Indianapolis, Ind.

2640
To evaluate a new type of controllable-beam runway light designed to provide an approach to an ideal omnidirectional distribution, a complete experimental system was installed along the instrument field at General Mitchell Field, Milwaukee, Wisconsin. Flights were made along fixed paths under varying visibility conditions. The findings are analyzed in terms of actual as compared with predicted visibility of lights, for usefulness in guiding approaches. Photometric tests of a sample light were made.

T.I.M.

2641
Goddard, W.L., & Doe, T.E., Jr. TOLERANCE TIMES OF MEN WEARING INSULATED BOOTS. CPB Rep. 189, July 1952, 11pp. USA Office of the Quartermaster General, Climatic Research Lab., Lawrence, Mass.

6 Ss participated in laboratory studies designed to determine foot protection provided by insulated boots and felt boots at +5 F, insulated boots and felt boots at +20 F, and insulated boots and felt boots at -40 F. At +5 F, significantly greater protection was provided by the insulated boots, regardless of whether the socks were wet or dry. At -20 F, it was determined that the insulated boots, with dry socks, were definitely superior to the felt boots. The insulated boots, with wet socks, gave about the same protection as felt boots. The insulated boots, with dry socks, gave about the same protection as felt boots, with dry socks. At -40 F, tolerance times were about the same for men wearing either the insulated boots or felt boots when the socks were dry. Muliuks with dry socks gave better protection than did the insulated boots with wet socks.

T 7

2643
 Cheatham, P.G. VISUAL PERCEPTUAL LATENCY AS A FUNCTION OF SPREADING BRIGHTNESS AND CONTRAST SHAPES. *J. exp. Psychol.*, 1952, 43, 369-380. (U.S. Navy Electronics Laboratory)

2643
 To measure perceptual latency as a function of stimulus brightness and contour shape, the method of masking (brief instance stimulus presented at various intervals after longer task stimulus to ascertain the time interval which would yield perception of both stimuli) was used with four stimulus contour shapes (circle, square, diamond, triangle) and three brightnesses (0.0046, 0.046, 0.46 millilamberts). Latencies are analyzed statistically in terms of the variables; subjects' reports indicate a developmental period occurs before complete contour is perceived. T, G, I, R28.

2644
 Cheatham, P.G., & White, C.T. TEMPORAL NUMEROSITY: I. PERCEIVED NUMBER AS A FUNCTION OF FLASH NUMBER AND RATE. *J. exp. Psychol.*, 1952, 44, 447-451. (U.S. Navy Electronics Laboratory)

2644
 To investigate perceived number as a function of flash number and rate, four subjects were presented with groups of flashes (one to twenty), at rates from ten to thirty/second of constant duration and intensity (11 milliseconds, 1400 footlamberts) and reported number of flashes perceived. Numerosity reports are analyzed as functions of flash rate and exposure duration and discussed in relation to basic temporal aspects of vision. T, G, R6.

2645
 Cheatham, P.G., & White, C.T. TEMPORAL NUMEROSITY III AUDITORY PERCEPTION OF NUMBER. *J. exp. Psychol.*, 1954, 47, 425-428. (USN Electronics Laboratory, San Diego, Calif.).

The perceived number of auditory pulses as a function of the presented number was obtained for rates of 10/sec., 15/sec., and 30/sec. It was found that the plots of perceived number vs. presentation time for all 3 rates had approximately the same slope, which corresponded to a perceptual rate of about 10/sec. Since this was in basic agreement with visual results, it was concluded that a common temporal process in the central nervous system acts upon both modalities. R 6

2646
 Craig, F.W., Frankel, H., & Bievens, W.V. THE HEAT BALANCE OF MEN WEARING PROTECTIVE CLOTHING. Proj. 4 68 01 002, Rep. 332, Aug. 1952, 23pp. Chemical Corps Medical Laboratories, Md.

To describe the heat balance of men wearing permeable, semipermeable and impermeable clothing while engaged in moderate work temperate, hot-dry, and hot-humid conditions, 2 Ss walked a level treadmill at 2 mph at 100°F and 12% relative humidity (R.H.), 86°F and 75% R.H. and 84°F and 34% R.H., and at 3 mph at 75°F and 56% R.H. Metabolic rate, storage of heat in the body, and heat loss by evaporation were determined. The effect of semipermeable clothing on the heat balance is described by the clothed weight loss. The influence of a complete clothing assembly on heat loss can be described by 2 conductance terms. Heat storage rate was related to voluntary tolerance time and an index of physiological strain. The first approximation equation thus developed permits prediction of performance in terms of environment, grade of work, and clothing characteristics. R 19

2647
 Games, B.R., Lutz, C.C. & Vail, E.G. T-1 ALTITUDE SUIT EVALUATION IN THE F-86D FLIGHT SIMULATOR. WADC TR 54 170, April 1954, 13pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

2647
 This report is concerned with the use of the inflated T-1 altitude suit in the F-86 D Flight Simulator. Pilots wearing the T-1 suit flew a total of 45 hours in the F-86 simulator with the suit being inflated for 15 hours of this time. The results are presented and discussed in terms of the effect of the T-1 suit in both the inflated and uninflated condition upon flight performance, accessibility of controls, performance of a radar intercept problem, and so forth. Also considered are the implications for training in altitude suit operation.

2649
 Black, J.W. STUDIES IN SPEECH INTELLIGIBILITY: A PROGRAM OF WAR-TIME RESEARCH. THE ORIGIN AND NATURE OF THE STUDIES. Speech Monographs, 1946, XIII(2), 1-4. (Kenyon College, Gambier, Ohio).
 The author presents a brief summary of the results obtained in a series of investigations on speech intelligibility. The general aims and nature of the studies are described. Cf. 2300, 2302, 2303, 2304, 2305.

2651
Morsworthy, Mary E., Gaid, P.W., & Cochran, L.B. AN EVALUATION OF EXPERIMENTAL ANTI-BLACKOUT EQUIPMENT. Proj. NA 001 100 102, Rep. 4, Nov. 1955, 70pp. NAV School of Aviation Medicine, NAS, Pensacola, Fla.

An evaluation on the human centrifuge of experimental anti-blackout equipment which was designed to improve protection and comfort. The equipment which was tested did not afford a significantly greater amount of protection than the standard US Navy Anti-blackout equipment. The abdominal bladders, regardless of pressure system, which covered the larger area were more effective in increasing the protection. The optimum shape and pressure were not determined.

R. L.

2650
Brown, J.S., Knauft, E.B., & Rosenbaum, G. THE ACCURACY OF POSITIONING REACTIONS AS A FUNCTION OF THEIR DIRECTION AND EXTENT. AMER. J. PSYCHOL., 1948, 61, 167-182, SOC Contract NSR-57, Proj. 2, revision of Rep. 1. (State University of Iowa, Iowa City, Iowa).

24 Ss made positioning reactions of the right hand and arm after a 2.5 sec. visual presentation of 1 or 4 visual extents (0.6, 1.5, 16, or 40 cm.). The direction and plane of movement were varied giving 6 conditions: a) vertical plane; bottom to top; b) horizontal plane; from near to far (perpendicular to the body); c) horizontal plane; from center to right; d) vertical plane; top to bottom; e) horizontal plane; from far to near; f) horizontal plane; from right to center. All Ss were studied under all conditions and extents. The following results were obtained: a) there is a tendency to overshoot at the shorter distances and undershoot the longer distances under conditions e, b, c, and f; b) the percentage error is maximal at short distances and decreases with increasing distance; c) at comparable distance, movements away from the body exhibit smaller percentage errors than movements toward the body; d) the variability of positioning movements increases significantly with distance under all experimental conditions; e) the variability of positioning movements directed away from the body is greater than that of movements toward the body at distances of 16 and 40 cm. The relationship is reversed, however, for distances of 0.6 and 2.5 cm.

2652
Holland, J.D., & Lee, W.A. THE INFLUENCE OF MESSAGE DISTORTION AND MESSAGE FAMILIARITY: THE THIRD OF A SERIES OF REPORTS ON AUDITORY AND VISUAL MESSAGE PRESENTATION UNDER DISTRACTING TASK CONDITIONS. Contract W33(038) ac 21269, Proj. 7192, Tech. Rep. 34 287, April 1955, 20pp. WASA-ARDC, Aero Medical Laboratory, Wright-Patterson AFB, Dayton, Ohio. (University of Virginia, Charlottesville, Va.).

Broader generalization of earlier findings concerning the relative intelligibility of verbal messages presented aurally and visually was sought by investigation of two additional variables. These were: a) message presentation in distorted form, and b) previous familiarization with the message population. Both of these conditions apply widely in practical operations. Two closely related experiments were conducted to discover: a) the influence of a distracting task on the reception of distorted messages as related to sense channel of presentation, and b) the effectiveness of message familiarity in combating the lowered intelligibility of distorted messages, and the possible influence of sense channel in such an effect. The principal findings were the following: a) introduction of the distracting task significantly reduced the intelligibility of the visually presented messages, while leaving the auditory messages essentially unaffected; b) previous familiarization significantly increased the intelligibility of the distorted messages as presented through either sense channel; c) familiarization was significantly more effective when provided through the same sense channel as that through which the distorted form of the message was subsequently presented.

A 13

2654
Creelman, J.A. EVALUATION OF APPROACH TRAINING PROCEDURES. Proj. NA 001 109.107, Rep. 2, Oct. 1955, 14pp. NAV School of Aviation Medicine, Pensacola Air Station, Fla.

2654.
To evaluate the effectiveness of a contact approach trainer, three matched groups of 15 Ss each underwent one of three kinds of pre-flight instruction: 1) routine instruction only; 2) routine instruction plus demonstration and practice in error detection in the trainer; 3) same as 2), plus practice approaches in the trainer. The post-training proficiency of the groups was assessed by instructor ratings, number of practice landings required in pre-solo stages and number of satisfactory flight checks.

T. I. R 5

2656
Cookley, J.D., Pucigna, J.T., & Dunlap, J.W., Jr. HUMAN ENGINEERING REVIEW OF THE MANUAL TELEPHONE SWITCHBOARD SB-86/P AND THE CENTRAL OFFICE, TELEPHONE, MANUAL AN/TTC-5. Contract DA-36-039-SC-64647, DA Proj. 3-99-01-022, SC Proj. 2004A, June 1956, 45pp. Dunlap and Associates, Inc., Stamford, Conn.

2656
To evaluate, from a human engineering viewpoint, the design of the Manual Telephone Switchboard SB-86/P and the Central Office, Telephone Manual AN/TTC-5, the equipment and operating procedures were reviewed. A study of the requirements of the SB-86/P from both the operational and operator viewpoint was made with primary emphasis upon detectability of the line and operator signals and secondary emphasis on operator comfort, visibility, and operability of controls and indicators. The equipment was then evaluated against these requirements, and recommendations made for improved design. The second equipment, AN/TTC-5, was developed as a successor to SB-86/P and evaluated in the same manner.

1.

2658

Appely (see Applezweig), M.H. & Moeller, G. THE ROLE OF MOTIVATION IN PSYCHOLOGICAL STRESS. Contract Monr 556(02), Tech. Rep. 3, Proj. NR 172 228, Jan. '57, Spp. ONA, Connecticut College, New London, Conn.

Considered is the role of motivation in psychological stress with a lengthy discussion on the nature and definition of stress. It is proposed that a meaningful approach to an understanding of psychological stress is through an evaluation of individual motivation. Stress is conceived as an environment-person intersection, dependent upon both the situation and the person. Stress research concentrating on the environment alone might produce only deceptive generalities about what situation may be stressful to most people. (HEIAS) R 9

2659

Ames, A., Jr. & Proctor, C.A. ABERRATIONS OF THE EYE. Amer. J. physiol. Optics, 2(1), 3-37. (Dartmouth College, Hanover, N.H.).

Ordinarily the expression "aberrations of the eye" suggests the common defects of the refractive system which are encountered by the ophthalmologist or refractionist. They are myopia and hypermetropia and corneal astigmatism. Properly the expression includes not only the above mentioned defects but all the aberrations of the lens system of the eye, as spherical aberration, chromatic aberration, oblique astigmatism, or astigmatism of incidence, the chromatic error of magnification, coma, and distortion. This paper deals with the explanation and measurement of these latter characteristics of image formation. The apparatus used to measure these characteristics is described. Some preliminary measurements of these characteristics are given. (HEIAS)

R 4

2660

Ames, A., Jr. A NEW BASIS FOR CORRECTING REFRACTIVE ERRORS IN THE HUMAN EYE: VISUAL FACTORS AND COMBINATIONS INVOLVED IN THE SENSITIVITY TO BINOCULAR DISPARITY DIFFERENCES. April 1942, 6pp. Dartmouth College, Hanover, N.H.

The position of the image bundle relative to the retina can only be determined accurately by using the waist of a bundle formed by a light source of high intensity, as very slight forward and back movement of such a bundle is apparent. The dioptric condition cannot be as accurately measured with sources of weak contrast because they would appear equally sharp with large forward and back movement relative to the retina. However, determining the position of the waist of the bundle relative to the retina, in itself, does not indicate the nature of the correction necessary to give a subject good vision. In the first place, it is apparent that, if a subject has spherical aberration and a concentrated core back of the waist of the bundle, it would be a mistake to set the waist of the bundle back on the retina. On the other hand, if the subject had an irregular bundle, such as might result from irregular astigmatism, so that there was no concentrated core back of the waist of the bundle, he would have his best vision only if the waist of the bundle were put back on the retina. To properly correct a subject, therefore, it is necessary to know whether he has a regular bundle and a concentrated core back of its waist produced by spherical aberration. This could be ascertained by determining the depth of focus of a subject. A practical and easy way of doing this would be to put a target, consisting of small black letters on a white background, for example a Landolt C on the face of the targets on the refractive arm of the Ophthalmometer and to determine through how much movement the subject could distinguish small letters. By no other method than the above described can proper corrective refraction be given.

R 11

2663

Hawley, H.E. STUDY OF COMMUNICATION IN HIGH-LEVEL AMBIENT NOISE FIELDS. Contract DA 36 sc 54469, Rep. 1, ca. Oct. 1954, 11pp. DA, Radio Corporation of America, Camden, N.J.

The purpose of the present research is to provide design information leading to improvements in Signal Corps voice communication systems used in and between high-level noise environments, such as encountered in armored vehicles and helicopters. Noise spectra in 8 types of armored vehicles and 3 types of helicopters. No noise levels in excess of 128 db were found. Articulation tests were then conducted to evaluate the communication efficiency of present interphone equipment. Word articulation scores of approximately 20% were obtained. Using the noise spectra obtained, calculations were made of the articulation performance of a system composed of elements within the state of the art. These calculations indicated that 80% word articulation was attainable. Further tests determined that 60% intelligibility can be obtained by modifying existing equipment (AN/VRC-7). The noise levels encountered in armored vehicles and the speech levels used produced temporary hearing losses and presumably will produce some permanent hearing loss with continued exposure. (cf. HEIAS 6506 for a bibliography of speech communication in noise.)

R 0

2665

Bass, B.M., Gaier, E.L., & Flint, A.W. ATTEMPTED LEADERSHIP AS A FUNCTION OF MOTIVATION INTERACTING WITH AMOUNT OF CONTROL. Contract N7 NR 35609, Tech. Rep. 7, March 1956, 20pp. ONR, Louisiana State University.

2665

To examine the effects of motivation and amount of control in the tendency to attempt leadership in a group situation, 51 groups (5 subjects each) were studied on ten brief trials by means of metagalvanometry, involving individual and group rank order judgments before and after group discussion of items to be ranked. Groups varied in motivation to perform well (high, middle, low) as measured by pre-test questionnaires (validation studies are included in report). Amount of control was varied within the group by giving to some members power to reward or punish other members. Attempted leadership was defined as the total amount of time spent by the subject in talking in the initially leadership situations. The data were studied by analysis of variance techniques.

T. R 5

2666
USN Electronics Lab. LIST OF HUMAN FACTORS DIVISION REPORTS. Jan. 1956, 21pp. JAN
Electronics Lab., San Diego, Calif.

This is a list of the Human Factors' Division technical and scientific reports and memoranda published by the US Navy Electronics Laboratory since its establishment in 1946. Reports published in professional journals are not listed. The list is divided into two main parts--reports and technical memoranda. The latter are written primarily for internal use at the Laboratory with a restricted external distribution. (The earlier designation of the technical memorandum was "internal technical memorandum.")

2667
Alderson Research Laboratories. ANTHROPOMORPHIC TEST DUMMY - MARK III. ca. 1954, 11pp.
Alderson Research Laboratories, Inc., 10 East 38th St., New York 16, N.Y.

The Mark III Anthropomorphic Test Dummy was developed in response to the need for test subjects that would be human enough to give useful information in situations where live human subjects would be endangered. Such conditions are encountered frequently in blast-effect studies, aircraft and automotive safety research, ejection-seat tests, and the like. Mark III is finding wide application in these fields through its ability to respond like a man in test situations. New avenues of research can be explored when the machine shop is substituted for the hospital in the event that tests become too severe. Mark III was designed to reproduce human proportions, weight distribution, articulations, resilience, and other characteristics which determine the forces which would be imposed upon a man in a given system, the motions which he would make, and his terminal condition. It was not intended, however, that Mark III would duplicate the physical damage which would be inflicted upon a man in this process. This point of view was taken after consultation with many noted investigators in the field of high-acceleration and high-impact man-machine systems. It is predicated upon the fact that actual physiological response to test conditions is highly variable and must be treated statistically. Further, physical destruction of the test dummy introduces an artificial endpoint in the observed data and is costly and inconvenient as well. The proper application of Mark III is one in which physical data are recorded by visual observation, high-speed motion pictures, or instrumentation. These data are then reduced and compared with physiological information to give a forecast of the probable consequences to live human subjects.

2668
Lousks, R.S. LEGIBILITY OF AIRCRAFT INSTRUMENT DIALS: THE RELATIVE LEGIBILITY OF TACHOMETER DIALS. Proj. 265, Rep. 1, May 1944, 8pp. AAF, School of Aviation Medicine, Randolph Field, Texas.

2668
To obtain data which would provide specifications for optimum legibility of aircraft tachometer dials, various modifications of scale divisions (no, or, or four subdivision lines, two numeral sizes) were made on these dials. Twenty to forty practiced subjects read dial settings of exposure rates of 1.5 and 0.75 per second. Error scores were analyzed for differential effects of the design factors.

2669
Grant, D.A., & Kote, P.A. EFFECTS OF BRIEF FLASHES OF LIGHT UPON THE COURSE OF DARK ADAPTATION. J. exp. Psychol., 1940, 39, 610-616. (University of Wisconsin)

2669
To investigate the effect of series of short flashes of light upon the course of dark adaptation, threshold measurements were obtained between each of five series of five flashes of light over a forty-minute period. Two brightnesses, 1500 and 150 millilamberts, two durations, 1.0 and 0.1 second, and a no-flash control procedure were used. Data are analyzed as a function of the brightness and duration of the interspersed flashes. The findings are discussed in relation to previous work on dark adaptation.

2671
Adams, O.S. AIRCREW FATIGUE PROBLEMS DURING EXTENDED ENROUTE FLIGHT. PHASE I: PLANNING. Contract AF 33(616) 3745, Proj. 6335, Task 63614, ORD 122, WADC TR 57 510, May 1958, 26pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio. (Lockheed Aircraft Corporation, Marietta, Ga.).

2671
This reports the planning phase of a research program to identify and study problems that may be encountered in an aircrew weapon system which demands that a group of five operators be confined to a small area for 120 hours. A crew compartment and adjacent supporting rooms (biological laboratory) were built and are described and illustrated in detail. The experimental program to be used is described in detail and includes seven performance tasks selected to represent basic psychological functions of broad generality and which sampled relevant factors of performance necessary for carrying out aircrew duties. Multiple bioelectrical and biochemical measures will be taken, as will clinical and social psychological tests. Programming and recording instrumentation are explained in detail. Experimental schedules are given. I. R 129

2672
Baker, L.E. (Chm.). FOURTH ANNUAL ARMY HUMAN FACTORS ENGINEERING CONFERENCE. 9-11 SEPT. 1958. U.S. ARMY CHEMICAL CENTER, MARYLAND. USA Research Office, Office of the Chief of Research and Development, Washington, D.C.

2672
The major topics covered in these papers are: 1) human engineering and environmental criteria for equipment design, 2) chemical corps material development, ordnance design concepts and human factors in combat surveillance as related to mobile warfare, 3) performance as a function of environmental stresses and of subsistence requirements. An appendix of current activities at all Army Research and Development centers is included. I. G. I. R 150 (approx.)

2674

Simonsen, E., & Brozek, E. FLICKER FUSION FREQUENCY: BACKGROUND AND APPLICATIONS. Contract AF 33(038)-21914, Proj. 21-32-004, Rep. 2, June 1953, 26pp. USAF School of Aviation Medicine, Randolph Field, Tex.

2681

Howland, C.I. A "COMMUNICATION ANALYSIS" OF CONCEPT LEARNING. Psychol. Rev., 1952, 59, 461-472. (Yale University, New Haven, Conn.).

2674

This paper considers the methodology of flicker-fusion-frequency and its application to studies of physiological stress. The fundamental variables affecting this function are reviewed and the testing procedures and techniques discussed with a view to standardization. Physiological studies of anoxia, hyperventilation, nutritional stresses, fatigue effect of drugs and disease are discussed. The potential uses of the method in the field of aviation medicine is indicated.

R153.

2681

A theoretical analysis of concept learning is presented. The amount of information required to communicate the concept to a S by positive and negative instances is determined for a particular concept model when the total number of dimensions presented, number of relevant dimensions presented, number of values for each dimension, and number of values for relevant dimensions are varied.

I. R 6

2675

Smith, P.K. PRESENT STATUS OF DRUGS FOR USE IN MOTION SICKNESS WITH PARTICULAR REFERENCE TO AIRSICKNESS. Proj. 468, Rep. 1, June 1946, 14pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A survey was made of the present status of drugs for use in motion sickness. The survey covered parasympathetic drugs, CNS stimulants and depressants, vitamins, and drug combinations. The following conclusions were reached: a) of all the drugs that have so far been investigated only those of the atropine series are of consistently demonstrated value in the prevention of motion sickness; b) of the drugs of the atropine series, hyoscine is the most promising one so far studied because of its high degree of effectiveness and relative freedom from undesirable side effects; c) there is not sufficient evidence of the effectiveness of barbiturates to warrant their use for the prevention of motion sickness; d) there is some evidence that a thio-barbiturate, ethyl-18-methylthio-barbituric acid, is effective in motion sickness; e) none of the vitamins are of demonstrated value in motion sickness; f) none of the central nervous system stimulants are of demonstrated value in motion sickness.

R 56

2683
Hall, A.L. USE OF STANDARD NAVAL AVIATION OXYGEN EQUIPMENT UNDER WATER. Proj. Rep. NM 001 059-29-01, July 1952, 3pp. USN School of Aviation Medicine, Pensacola, Fla.

Various types of Naval Aviation oxygen equipment were taken underwater to a maximum depth of 65 feet by human subjects. All combinations of oxygen equipment operated satisfactorily under water except the H-2 bail-out oxygen cylinder. The 514 cu. in. oxygen cylinder furnished adequate oxygen for an average duration of 31 min. at a depth of 33 ft. Possible implications are made for aircrewmanship making forced landings on the water who are unable to abandon the airplane before it sinks.

R 2

2680

Moore, J.V., Saltz, E. & Hoehn, A.J. IMPROVING EQUIPMENT MAINTENANCE BY MEANS OF A PREPLANNING TECHNIQUE. Proj. 7714, Task 67002, AFPTIC TN 55 26, Sept. 1955, 11pp. USAF Training Aids Research Lab., Chanute AFB, Ill.

2680

This study investigates the effectiveness of a preplanning technique designed to improve trouble-shooting effectiveness. One hundred forty-five airman students in an electrical course were given trouble-shooting problems on a generator system mock-up. Half the men utilized the preplanning technique consisting of writing down all possible causes of the malfunction and outlining a checking procedure; half the men were controls. Control and preplanning groups were compared on number of check points, systematic and repetitive errors, correct location of the malfunction, and time required for correct location. A theoretical rationale of trouble-shooting behavior is included.

T, R 8

2684

Bartlett, M.R. THE DISCRIMINATION OF TWO SIMULTANEOUSLY PRESENTED BRIGHTNESSES. *J. exp. Psychol.*, 1942, 31(5), 380-392. (Brown University, Providence, R.I.).

The operations by which brightness discrimination thresholds are measured have been analyzed, and it is shown that brightness discrimination is a mixture of two ideal types of discrimination. The results of a brightness discrimination experiment of the second type are presented. In this experiment the liminal brightness difference for two adjacent areas exposed simultaneously to the dark-adapted fovea was determined as a function of the time of exposure and as a function of the brightness of the two areas. It was found that for any mean brightness, the difference threshold decreases with longer exposure of the areas; and for any given duration of exposure, the ratio $\Delta I/I$ increases as the brightness becomes very great.

R 11

2686

Levine, L., Hershkowitz, J. & Conner, F. REPORT OF INVESTIGATION OF CRITERIA FOR SETTING AIRBORNE NOISE LEVEL LIMITS IN SHIPBOARD SPACES. FINAL REPORT. Proj. 5280 4, Feb. 1953, 8pp. USN Material Lab., New York Naval Shipyard, Brooklyn, N.Y.

It has been proposed that good intelligibility should be obtained if the average speech level is higher than the speech interference (SIL) by at least 9 db. In order to test the correctness of the criteria on which this proposal was based, word articulation scores were obtained for various values of D (D=average speech level minus SIL) between 0 and 21 db, for each of 5 noise spectra. The results show a general agreement with the theory underlying the use of SILs. However, a value of D of 9 db did not correspond to a word articulation of 90% as expected. A value of 12 db for D seemed to correspond more closely to a 90% word articulation score. Although the results were insufficient to verify the method of SILs completely, sufficient data were obtained to indicate that the proposed criteria can be used for shipboard compartments where the noise spectra are of the continuous nature. (HEIAS)

R 6

2688

Comrey, A.L., High, M.S. & Wilson, R.C. FACTORS INFLUENCING ORGANIZATIONAL EFFECTIVENESS. VI. A SURVEY OF AIRCRAFT WORKERS. Contract N6 ONR 23815, Tech. Rep. 9, 1954, 14pp. University of Southern California. (University of California at Los Angeles & The University of Southern California).

2688

This is one of a series of studies designed to provide information about the variables related to organizational effectiveness. Questionnaires composed of groups of relatively homogeneous objective items were given to 213 workers, 244 supervisors, and 29 foremen at the California Division of the Lockheed Aircraft Corporation. The items were designed to measure different characteristics of the organization and its personnel. Criterion data (quality control and production measures and ratings by staff executives) were correlated with dimensions derived from the questionnaires. This report presents the analysis for worker level only.

T. R 6

2689

Armstrong, R.C. AERONAUTICAL CHARTS PREPARED FOR USE IN DAYLIGHT, UNDER WHITE, ULTRA-VIOLET, RED AND AMBER LIGHTS. Rep. ENG 49 698 18, Oct. 1943, 5pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

2689

To investigate the effect on night visual acuity of viewing all-purpose aeronautical charts under ultra-violet and red light, acuity was measured first after a 25-minute period of dark adaptation and following ten-second periods of map study under both types of light.

2694

Birnbaum, A.H., Annore, S.J., & Polanovich, D. J. PREDICTION OF SUCCESS IN RADIO REPAIR COURSES. DA Proj. 295-FC-030, Task 131, HRB Proj. B-6-131-11, Tech. Note 52, Dec. 1955, 9pp. DA Personnel Research Branch, Washington, D.C.

2694

To evaluate the effectiveness of the Army Classification Battery and of the various composites of these tests for predicting success in three Signal School Courses (Fixed Station Radio Repair, Radio Teletypewriter Repair, and Microwave Radio Equipment Repair), the scores for 1,019 enlisted men were compared with their final course grades. Validity coefficients were computed for each of the ten tests and for various composites or groupings of these tests.

T. R 1

2695 Blockley, W.V., McCutcheon, J.W. & Taylor, C.L. PREDICTION OF HUMAN TOLERANCE FOR HEAT IN AIRCRAFT: A DESIGN GUIDE. Contract AF 33(616) 32, R00 696 69, Tech. Rep. 53 346, May 1954, 50pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio.

This report represents a summarization of the present state of knowledge of man's response to the stress of hot environments, referred primarily to the aircraft situation. Included are the means to evaluate the net thermal effect of the diverse physical factors comprising the thermal environment of man, so that all combinations of these quantities may be compared on a common scale of reference. Graphical aids to computation are provided, permitting rapid calculation for standardized or typical conditions. The final expression of thermal effect is in terms of a time duration, arrived at by means of a general body parameter, rate of heat storage. Predictive estimates are provided both for safe tolerable duration of stress and for duration of unimpaired psychomotor performance as a function of body heat storage rate; both design limits are based on the minimum times which have been observed in experiments on normal healthy young men. A series of appendices is provided, which outlines the theoretical considerations and experimental data upon which the charts and procedures for tolerance prediction are based.

R 11

2696

Camp, B.H., & Moran, H.S. MULTIPLE SCATTERING OF LIGHT: VISIBILITY IN CLOUD AND FOG. Contract AF 33(616)-2262, H.C. R680-90 SA-10, and R681-193 10-9, Tech. Note 55, Sept. 1954, 52pp. Wesleyan University, Orford Laboratory, Windsor Locks, Conn.

2696

This report is a theoretical formulation of the visibility in cloud and fog, with particular emphasis on multiple scattering of light. Problems of visibility to which the theory is applied include: position of the sun, brightness of objects looking horizontally, upward from the ground and from high up in the fog, and downward from high up in the fog.

T,G,R2.

2697

Brooks, R.T. THE VARIATION OF CRITICAL FUSION FREQUENCY WITH BRIGHTNESS AT VARIOUS RETINAL LOCATIONS. J. opt. soc. Amer., 1951, 41, 1010-1016. Contract W6onr-271, T.O. 1; Proj. NR 142-404. ONR and Columbia Univ., Psychol. Lab.

2701

Connolly, Katherine T., & Paulson, Helen. REPORT ON GENERAL PURPOSE SUNGLASSES SUBMITTED BY SHIP'S STORE OFFICE. Proj. MX 002 014.08.04, Ver. Rep. 54-3, April 1954, 6pp. NEL, U.S. Naval Submarine Base, New London, Conn.

2697

To investigate the variation in critical fusion frequency with brightness for various retinal locations, threshold determinations were made by two experienced observers for brightnesses between -3 and $+3$ log millilamberts, a two degree test field of green light at the fovea and at 10, 20, 30, and 40 degrees in the periphery for both green and orange light. The data are studied in terms of the characteristics of the "cone" and "rod" branches of the various critical fusion frequency curves.

T,O,I,R13.

2701

To test sunglasses and evaluate their suitability for resale to Navy personnel, laboratory tests were made of visible percent transmission, lens size, percent purity (color), infra-red percent transmission, base curvature, refractive power, prismatic deviation, and surface qualities. Standard specifications were used to evaluate test results. A less stringent set of specifications was formulated for glasses of this type.

T,R.

2698 Castellano, C. COLOR SCHEMES FOR AIRCRAFT INTERIORS. Rep. WCADE S2 18 1, Oct. 1951, 17pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

This report presents a summary of a conference concerning the standard color schemes for cockpits, crew compartments, and passenger cabins of Air Force aircraft, held at Wright Air Development Center in 1951. The conference reached the following conclusions: a) standard color schemes are necessary for aircraft interiors for the operational efficiency of crew members and the comfort of crew members and passengers in aircraft; b) the color scheme for aircraft interiors decided upon by the conference is a satisfactory interim standard for use in Air Force aircraft until thorough studies and investigations can be conducted and finalized for ideal color schemes.

2700

Atkinson, C.J. SOME EFFECTS ON RATE AND ON RELATIVE SOUND PRESSURE LEVEL OF SPEECH PRODUCED BY ALTERING SIDETONE DELAY AND SIDETONE LEVEL. Contract DA-36-039 sc-42562, Proj. 3 99 12 022, Supplementary Rep. 3, June 1954, 32pp. DA, Laboratory Procurement Office, Fort Monmouth, N.J. (State University of Iowa, Iowa City, Iowa).

Two measures were simultaneously taken of speech produced under several conditions of sidetone. The measures were duration of speech and relative sound pressure of speech. The method of arriving at these measures was described. Averages of each condition of sidetone have been presented in tables. An analysis of the variance of the duration measures and an analysis of the variance of the sound pressure measures were presented. The discussion related the results of the analyses to the averages of the data in the tables. The results of duration (rate) measures may be summarized as follows: a) rate of speech is affected by the amount of sidetone delay, slower rate for longer sidetone delays up to .09 sec; b) rate of speech is affected by the sidetone level, higher sidetone level yields slower speech; c) there is a significant interaction effect for rate among sidetone level x sidetone delay measures. The results of the analysis of the sound pressure measures are: a) sound pressure of speech is affected by sidetone delay; the effect of a sidetone delay up to .09 sec. was to produce louder speech, greater sidetone delays did not change the sound pressure from the .09 sidetone delay overlap; b) sound pressure is highest when sidetone level is highest; c) the sound pressure measures show interaction effects for sidetone level by sidetone delay, sidetone level by talkers, and sidetone delay by talkers.

R 18

2700

Collins, H.R. METHODS OF INDICATING AIRCRAFT HEADING. RDO 694-31E, Tech. Note 52-65, Sept. 1952, 14pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

2703

Fry, G.A. DETERMINATION OF FUNDAMENTAL COLORS FROM CHROMATIC ADAPTATION DATA. EFFECT OF CHROMATIC ADAPTATION UPON NORMAL COLOR VISION. FINAL REPORT. Contract NONR-1066(00); Proj. NR 140 061, RF Proj. 537, Phase 3, March 1954, 9pp. Ohio State University Research Foundation, Columbus, Ohio.

2700

To study various design factors in heading indicators currently used in the United States Air Force, a survey of 192 pilots and cadets was made. A panel containing six indicators of different design was used in conjunction with a questionnaire to gather opinions on specific features: moving-pointer versus moving-card presentation, size of dial, design of pointer, scale markings and graduations, and letters versus numerals for cardinal headings. Summaries of the opinions are presented and implications for desirable design features for this instrument are indicated. Questionnaire is attached.

T.

2703

To determine the locations of the red, green, and violet fundamental stimuli on a mixture diagram, a series of experiments were made using a special chromatic adaptation procedure to match monochromatic stimuli with mixtures of various wave lengths. The data are plotted on mixture diagrams and the theoretical implications discussed.

G,I,R3.

2705

Di Toro, A.J., Cohen, M. & Schreiner, S.M. DEVELOPMENT OF NOISE SUPPRESSOR FOR SPEECH COMMUNICATION SYSTEMS. Contract AF 33(616) 705, Final Engineering Report, April 1952, 56pp. AGC, Signal Electronics Group, Griffiss AFB, Rome, N.Y.

The problem of improving signal-to-noise for the condition of speech signals in white noise is considered. It is found that an important statistical difference between speech and noise can be used to provide an improvement in signal-to-noise ratio. An experimental noise suppressor using this principle of noise suppression was built in order to determine its usefulness. This unit is described and although the circuitry is quite simple an improvement of approximately 20 db in signal-to-noise may be obtained. Various methods of measuring this improvement are described. Tests with other forms of noise other than stationary white noise showed that the noise suppressor still operated satisfactorily. In order to show that the operations performed on the signal did not decrease articulation, word tests were conducted. The degradation in articulation was found to be very slight. Because of the successful results obtained with this breadboard unit a miniature model was designed and built. Although time did not permit completing modifications to this unit the results indicate that compact units employing this principle can be built for use in speech communication systems.

R 11

2706

Feinstein, A. A NEW BASIC THEOREM OF INFORMATION THEORY. Tech. Rep. 282, June 1954, 28pp. Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.

A new theorem for noisy channels, similar to Shannon's in its general statement but giving sharper results, is formulated and proven. It is shown that the equivocation of the channel defined by the present theorem vanishes with increasing code length. A continuous channel is defined in a manner that permits the application of these results. Detailed proof of the equivalence of this definition and Shannon's is given in an appendix.

R 14

2707

Fitts, P.M. (Ed.). HUMAN ENGINEERING FOR AN EFFECTIVE AIR-NAVIGATION AND TRAFFIC-CONTROL SYSTEM. March 1951, 84pp. AGC, Committee on Aviation Psychology, Washington, D.C. (Ohio State University, Columbus, Ohio).

This report submits proposals for a long-range program of human engineering research on problems met in planning and designing equipment for an air-navigation and traffic-control system. The report begins with a brief analysis of the essential functions of the air-traffic-control problem. Next, is considered the question: Which of these functions should be performed by human operators and which by machine elements? Next, the status of knowledge concerning: a) the human operator as part of a communication system; b) visual information displays; c) problems of direct vision from aircraft and d) voice communication as related to air traffic control is systematically reviewed. The report ends with a discussion of the application of research findings. (MEIAS)

R 92

2710

Arctic, Desert, Tropic Information Center. GLOSSARY OF ARCTIC AND SUBARCTIC TERMS. Arctic Publication A 105, Sept., 1955, 90pp. Research Studies Institute, Air University, Maxwell AFB, Ala.

This glossary is a reference prepared primarily for personnel unfamiliar with the specialized vocabularies. This compilation of terms and their definitions is aimed not at any standardization, but rather at the understanding of the terms and their usage, although it is recognized that the use of this glossary will facilitate uniformity of word usage. More than 10,000 terms are included. (MEIAS)

2711

USAF Air Proving Ground Command. THE OPERATIONAL SUITABILITY TEST OF THE N-3 DEAD-RECKONING NAVIGATION TRAINER. FINAL REPORT. Proj. APG/SAS/173 A, Aug. 1954, 56pp. USAF Air Proving Ground Command, Eglin AFB, Fla.

2711

This report combines a detailed description of the N-3 Dead-Reckoning Navigation Trainer and presents results of tests of its operational suitability. These tests include tests of accuracy, simulated training missions, pre-flight inspections, and tests of calibration. The performance of the trainer is compared with that of the G-2 Trainer.

T: I.

2719 Ansbacher, H.L. DISTORTION IN THE PERCEPTION OF REAL MOVEMENT. J. exp. psychol., 1944, 31, (1), 1-23. (Brom University, Providence, R.I.).

A phenomenon has been presented which consists in the fact that an illuminated arc of 36°, rotating at less than fusion speed, and observed with fixed eyes, appears to shrink to a fraction of its actual length. This phenomenon is linked to related observations in the literature. Various aspects of the phenomenon were investigated, and it was found: a) the shrinkage is the greater, the greater the speed (within the limits of the present investigation) (Exp. I); b) the shrinkage is due to telescoping rather than to dropping out of the beginning or the end of the stimulus (Exp. II); c) a sine curve shrinks less than an arc (Exp. III); d) an angle side shrinks less than an arc (Exp. III); e) Gestalt laws are operative in the phenomenon (Exp. III). Greater shrinkage of the stimulus does not necessarily mean less shrinkage, a triangle tending to shrink more than one of its sides (Exp. IV). In the discussion, shrinkage was shown to be a function of the degree of overlap of retinal stimulation, provided the existence of visual pulsations is assumed. The assumption of pulsations is supported by the work of Bartley. A theory of visual pulsations would carry the Gestalt theory of motion perception one step further, namely, that stroboscopic motion perception is physiologically more elementary than 'real' motion perception. The duration of one pulsation was calculated from data of Exp. I to be 46-61 ms., and was compared to similar values previously found significant in the field of visual perception. Three additional experiments (V-VII) brought further evidence that shrinkage is actually a function of the degree of overlap of retinal stimulation during the assumed period of visual pulsation.

R 30

2726 Baldwin, A.W. DEVELOPMENT OF THE OPTICAL IMAGING OSCILLOSCOPE (OPTIMASCOPE). NRL Rep. 4436, Oct. 1954, 5pp. Naval Research Laboratory, Washington, D.C.

2726 This report describes the Optical Imaging Oscilloscope (Optimascope), a device which may be used to provide aircraft pilots with a radar tracking scope on which various optical images can be projected. A cathode ray tube was modified by installing a system of small plane mirrors in the neck of the tube without interference to normal operation, which may be used to project images optically or to photograph scope information or to do both simultaneously. Various uses for the scope are suggested.

2718

Ansbacher, H.L. & Mather, K. GROUP DIFFERENCES IN SIZE ESTIMATION. Psychometrika, 1945, 10(1), 37-56. (Brom University, Providence, R.I. & John Innes Horticultural Institution, Merton, London, England).

Fifty-two subjects differing in sex, age, education and domicile (rural or urban) were given the problem of judging the height of an upright board in a natural setting. A preliminary analysis was made on the basis of the simple initial ratio method, both for the original data in the feet and for original data converted to log units. Because the effects of interaction of the several variables made the results of this method inconclusive, the analysis of variance technique as described by Yates (1) for data where the four factors are not equally represented, was applied. This technique showed that, while together the four factors markedly affected judgment, sex had no significant individual effect, age had the largest individual effect but possibly a spurious one, education and domicile had surprisingly large individual effects, and the effect of the four factors may be regarded as simply additive. The relation of the findings to those of previous investigators is discussed. The authors regard as an important result of the analysis the evidence it offers in the design of further experiments, since it demonstrates the value of equal representation for all classes into which data are to be segregated.

R 11

2722 Muller, E.J. (Pres. Dir.). FLIGHT SIMULATOR UTILIZATION HANDBOOK. WADC Rep. 42, Aug. 1953, 227pp. WADC Human Factors Contract Research Lab., Bolling AFB, Washington, D.C.

2722 This is a comprehensive handbook on the utilization of flight simulators. Included are discussions on installation, maintenance, and checkout for malfunction and appropriateness of the simulator method of instruction, organization of the simulator section, and methods for studying the effectiveness of simulator training.

R 11

2723 Hertzberg, H.T.E., Daniels, G.S., & Churchill, E. ANTHROPOMETRY OF FLYING PERSONNEL--1950. Contract AF 18(600) 30, RDO 895-71, WADC Tech. Rep. 52 31, Sept. 1954, 134pp. WADC, Air Medical Laboratory, Dayton, Ohio.

Body size data for 132 measurements of over 4,000 Air Force flying personnel are presented. Organization of the survey is briefly discussed and the techniques of measurement are illustrated by photographs for the benefit of other anthropologists. Both diametral and surface measurements are included. Dimensions are given in both centimeters and inches. A description of the statistics and an explanation of their use are given with some discussion of certain statistical shortcuts employed in the reduction of the data. The tabulations include range, mean, standard deviation, coefficient of variation, and twenty-five selected values from the first to the ninety-ninth percentile. Means and standard deviation values for each dimension are also given for nine subgroups based on flight duties.

R 13

2727

Bartlett, F.C. INSTRUMENT CONTROLS AND DISPLAY—EFFICIENT HUMAN MANIPULATION. Rep. FPRC 565, Dec. 1943, 6pp. Flying Personnel Research Committee, London, England.

In this article, the problems of control and display are discussed. Those of control include: position, direction of movement, resistance to voluntary movement, speed of rotary hand and wrist movements, radius of winding handles, rate of movement from point to point, motor control and visual display, motor contrast and attachment, and attachment. Display problems include: lighting, size of retinal image, brightness-contrast, and shape of object. Auditory display problems also are mentioned. (JGAS)

2728

Bartlett, F.C. AN EVALUATION OF THE OFFICER CLASSIFICATION TEST AS A DEVICE FOR SELECTING OFFICER CANDIDATES FOR SUBMARINE SCHOOL. FINAL REPORT. Rep. FPRC 566 (Rev. 1943), 11pp. 67, July 1943. Naval Medical Research Lab., Naval Submarine Base, Groton, Conn.

2735

Naval Air Test Center. ILLUMINATED SIGN, MARK 20 MOD 5; TEST OF. Proj. TED No. FPRC 565, Letter Report 1, Final Report. Aug. 1954, 5pp. Naval Air Test Center, NAS, Patuxent River, Md.

2729

In this paper the different sections of the Officer Classification Test are evaluated in terms of a criterion of success in obtaining the duties of a submarine officer. Grades from two classes of 238 and 239 men respectively are used. The results are also analyzed in terms of the effect of submarine training received prior to entering officers training. A follow-up study is discussed.

2735

To evaluate two Illuminated Signs Mark 20 Mod 5, Types "A" and "B", tests of installation and functional suitability were made and compared with the standard sign in use (Mark 20 Mod 4). A comparison was made of the vibration characteristics causing reticle image blur, obstruction to forward visibility, and installation factors. Recommendations are included.

2732

Miller, S.A. & Nadar, W.C. ON THE MAXIMUM LIKELIHOOD ESTIMATE OF THE SHANNON-WIENER MEASURE OF INFORMATION. Contract AF-18(600) 322, Rep. AFRC TR 54-75, Aug. 1954, 22pp. AFRC, Air Research & Development Command, Bolling AFB, Washington, D.C.

The limiting form and the first two asymptotic moments of the sampling distribution of the maximum likelihood estimate of the Shannon-Wiener measure of amount of information per observation drawn from a multinomial distribution are determined. Also, approximations to the bias and the mean square error of the estimate are given.

2733

Reid, L.S. & Morse, W.H. THE INFLUENCE OF COMPLEX TASK VARIABLES ON THE RELATIVE EFFICIENCY OF AUDITORY AND VISUAL MESSAGE PRESENTATION. THE FOURTH OF A SERIES OF REPORTS ON AN EXPERIMENTAL ANALYSIS OF COMPLEX TASK PERFORMANCE. Contract W33(028) AC 21269, Proj. 7152, WADC TR 54-283, April 1955, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Virginia, Charlottesville, Va.).

Previous research on complex task performance has been aimed at an increased proficiency through the manipulation of certain task and operator variables. Among other findings, the results indicated that degree of practice on a patterned component and task complexity were significantly and independently related to total task proficiency, the former tending to increase proficiency, the latter to reduce it. The present study was an attempt to relate these results to those of the experiments comparing auditory and visual message presentation in which auditory presentation had been consistently demonstrated to be superior under conditions of a simultaneous distracting task. Basically, the experiment involved the comparison of auditory and visual message reception while the Ss were simultaneously engaged in performing a visual discrimination-motor task. Experimental variables were sense channel, presentation, message length, and amount of previous practice on the visual-motor task component whose stimuli occurred in a patterned sequence. Results were measured in terms of overall proficiency of message reception and task performance combined. Practice on the motor task improved this overall proficiency, having greater differential effect upon the longer messages combined with task than upon the shorter messages plus task. An original superiority of overall performance for the auditory presentation almost disappeared with increasing practice on the motor task. These results completely confirmed the predicted relationships based upon the previous research in both areas noted above.

R 5

2734

Naval Air Test Center. EVALUATION OF 3" SIZE LEAR MODEL 978-M ATTITUDE INDICATOR (MODIFIED SMALL SIZE B-1A). Proj. TED No. FTR AF-7375.5, Rep. 1, Final Report. Dec. 1954, 11pp. Naval Air Test Center, NAS, Patuxent River, Md.

2736

Oldfield, R.C. VISUAL SEARCH FOR AN INCONSPICUOUS OBJECT. FPRC 681. March 1947, 14pp. MRC, Flying Personnel Research Committee, Psychological Laboratory, Cambridge, Eng.

2734

To evaluate the presentation and service suitability of the Lear three-inch size Model 978-M (B-1A) attitude indicator along with a type K-4A control assembly and modified shock mount, bench tests were made with pitch and roll indications calibrated. Flight tests included check of precision errors in banked turns, aerobics such as loops and MAD tactics. Other flights employed standard jet all-weather tactics including night flights. Performance results and pilot preferences are discussed. Recommendations are included.

2736

To determine the coverage afforded by a regular pattern of eye fixations, the problem of visual search for an inconspicuous (small and near threshold) object are discussed. Using probability analysis and data in the literature, the variations of probability of seeing the object are calculated for various spacings of eye fixations, for different positions in the field, and for a line and an area. Linear and areal search are compared and search for ophorel objects discussed briefly. Further investigation is indicated.

2735

Pollack, I. EFFECTS OF HIGH PASS AND LOW PASS FILTERING ON THE INTELLIGIBILITY OF SPEECH IN NOISE. J. Acoust. Soc. Amer., May 1948, 20(3), 259-266. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (Rep. PNR 48)

The effect on intelligibility of eliminating either the high frequency speech sounds or the low frequency speech sounds was determined by standardized articulation testing procedures under the special circumstance of a background of white masking noise. In general, it was found that intelligibility increased as the frequency range and the intensity level of the speech signal were increased. Contours are presented which describe the interrelations among a) the frequency range of the speech signal, b) the intensity level of the speech signal, and c) articulation efficiency. For each of the experimental conditions, the articulation index -- a measure developed by the Bell Telephone Laboratories -- was computed. It was found that the scatter of the computed indices, when plotted against the scores actually obtained, was of the same order of magnitude as the intrinsic variability of typical articulation scores. It was found that the relative contribution of the various speech frequencies was not constant, but rather was a function of the intensity of the speech signal relative to the constant white noise masking signal. More specifically, as the intensity level of the speech signal was increased, the relative contribution to intelligibility of the higher speech frequencies increased.

R 10

2737

Powell, T.J. ACUTE MOTION SICKNESS INDUCED BY ANGULAR ACCELERATIONS. RPRC 865, Feb. 1954, 21pp. Medical Research Council, Flying Personnel Research Committee, Cambridge, England. (Royal Canadian Air Force, Ottawa, Ontario, Canada).

Motion sickness was investigated by placing the 5 in a barany chair in which the 110-120 Hz head was flexed on his chest and then extended. Motion sickness was produced in susceptible 5s with the motion sickness limited to the feeling of nausea. It was noted that a physiological response could be measured which would act as an end point rather than a nauseating feeling. Continuous physiological recordings were made to ascertain if certain measures may serve as an index to motion sickness. A questionnaire test for motion sickness was also devised that would correlate with susceptibility to motion sickness. The following 6 recordings of the test situation were made: revolution of the table, skin temperature, swallowing movements, onset of sweating, breathing rate and depth, arterial blood pressure, head movements, feeling of lateral tilting, feeling of closing-diving, feeling of turning, signal for nausea. It was found that acute motion sickness can be produced in susceptible subjects, seated in a barany chair, rotating at 16 rpm and flexing their heads in a controlled manner; there is a positive association between motion sickness susceptibility and test reaction ($p < 0.001$); there is a positive association between onset of sweating and onset of nausea ($p < 0.001$); in all subjects who were severely nauseated on the test procedure there was a secondary nausea lasting from 2 to 12 hours. (JGIM)

R 25

2740

Spitz, H. A TECHNIQUE FOR THE ANALYSIS OF THE BEHAVIOR OF A SYSTEM. App. Math. Statistics.

2743

This paper shows how the specification and analysis of these sequences may be applied to the description and evaluation of a given man-machine system. The concept of sequential analysis is extended and a modified procedure suitable of system description and evaluation is presented. The procedure is applied to two different kinds of system problems: a communication network and a hypothetical traffic system.

11-12

2742

Stratford, H. THE PHYSIOLOGICAL BASIS OF MOTION SICKNESS. Special Report. No. 1948, App. 1948. School of Aviation Medicine, Randolph Field, Tex.

2744

This paper outlines the phase shift that is encountered between the physical and physiological response cycles following long-distance flights in east-west or west-east directions. The causes of this shift are discussed and the implications for the efficiency of the individual are discussed at one length.

11-12

2742

Rawlins, J.S.P. DEVELOPMENT OF A FLYING HELMET AND OF A PROTECTIVE HELMET. RPRC 847, Aug. 1953. 19pp. Flying Personnel Research Committee, RAF Institute of Aviation Medicine.

2742

This report describes the development of a new (inner) flying helmet giving improved noise-exclusion (Type 2) and a new crash-protective helmet to be worn over it. A telephone, a connector for use with the ejection seat, and an oxygen mask attachment were also investigated in association with the helmet. The theory of protective helmets is discussed and experimental results of direct comparison of the impact-absorption of British and United States helmets are given.

2743

Faucett, R.E. THE EFFECT OF DRAMAMINE ON VISUAL AND AUDITORY ACUITY. Proj. NM 002 015.09.01, Rep. No. 222, April, 1953. 13pp. Medical Research Laboratory, U.S. Naval Submarine Base, Bureau of Medicine and Surgery, Navy Dept. New London.

2743

The effects of Dramamine on visual acuity, color perception, stereoscopic vision, flicker fusion, and auditory acuity was investigated. Each of fifty-eight subjects was tested under three experimental conditions: when taking Dramamine, when taking a placebo, and when no drug or placebo was being given. The differences between conditions are evaluated so that certain conclusions about the effect of Dramamine on visual efficiency can be stated.

2744

Carterette, E.C. LOUDNESS ADAPTATION FOR BANDS OF NOISE. J. Acoust. Soc. Amer., 1956, 28 (5), 865-871. Contract AF 18(600)-571, AFRCR-TH-55-57, Operational Applications Laboratory, AFRCR. (Indiana University).

2744

To determine the extent of adaptation to bands of noise as a function of their level, band width, and duration, two experiments were performed by the method of dichotic loudness balances. In the first experiment one ear of each of 36 listeners was exposed to a 100-5000 cps tone for 6 minutes during which they turned up the same noise in the opposite ear until it matched the adapting tone in loudness. The adapting tone was presented at 40, 70, 90, 100 and 105 db SPL. In the second experiment 12 subjects balanced the loudness of the following bands of noise--1280-1720, 1075-2600 and 100-4900 cps--presented at 50, 70 and 90 db SPL and of a 1500 cps tone at the same SPLs. The results are presented in terms of the diminution of loudness as a function of time and the SPL of the adapting stimulus. T. O. R 7

2745

Compton, C.R. LOGISTICS OF SOUND MOTION PICTURES FOR MILITARY TRAINING. Contract N60MR 269, SDC Rep. 269 7 31, Sept. 1952, 41pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

2746

This is a series of principles and rules for a training film program, derived from the research of the Instructional Film Research Program. Topics include: selecting the film as a training aid; planning, making film; training of film producing teams; pre-release testing, proving, evaluation and approval of films; the fallacy of one film; operations analysis; problems in utilization; and need for further research. The Program's publications are listed.
R 35

2747

Copewell, J.E. EFFECTS OF A STEREOSCOPIC SOUND MOTION PICTURE ON THE LEARNING OF A PERCEPTUAL-MOTOR TASK. Contract N60MR 269, Rep. 269 7 3 2, Sept. 1952, 13pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

2747

To ascertain whether the stereoscopic sound motion picture contributes significantly to the learning of a perceptual-motor task as compared to the conventional sound motion picture, three different experimental treatments were given to three equated groups. One group saw a stereoscopic film (wearing polaroid viewing spectacles). The other two groups saw the same film except that it was not stereoscopic; one of these groups wore the polaroid viewing spectacles. A performance test was given immediately following the film showing. Speed scores and percentage of subjects completing task successfully in a ten-minute period were analyzed for differences due to experimental treatment. Implications for use of training films are indicated.
T. G. I. R 1

2748

Stein, J.J. THE EFFECT OF A PRE-FILM TEST ON LEARNING FROM AN EDUCATIONAL SOUND MOTION PICTURE. Contract N60MR 269, Rep. SDC 269 7 35, Nov. 1952, 15pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

2748

To ascertain the effect of a pre-film test on learning from an educational sound motion picture, approximately 3500 United States Navy seamen recruits were tested. Pre-film tests were constructed to cover film content and were given to three different groups with no knowledge of results, with partial, and with complete knowledge of results. Following the film showing, an immediate and a delayed (one week) retention test were given. Several control groups were used: 1) took post tests only, 2) saw film once and took post tests, and 3) saw film twice and took post tests. The test data from two different films were analyzed for effect of pre-film test, knowledge of results, and content of pre-film test.
T. G. R 4

2749

Rubinstein, M.K. & Loeb, M. INTERACTION BETWEEN VISION AND AUDITION. Proj. No. 6-95-20-001, Rep. No. 151, July 1954, 14pp. Army Medical Research Lab., Office of the Surgeon General, Research and Development Division, Dept. of the Army.

2749

Visual acuity was determined during exposure to several levels of sound; auditory thresholds were measured during exposure to several levels of illumination. Results indicated that visual acuity is significantly impaired by auditory stimulation; auditory acuity is not influenced by visual stimuli.

2750

Loeb, M., Kane, W.H., Roberts, E.E. & Samelson, M.L. A FURTHER INVESTIGATION OF THE INFLUENCE OF WHOLE-BODY VIBRATION AND NOISE ON TENSION AND VISUAL ACUITY. Proj. No. 6-95-20-001, Rep. No. 163, Oct. 1954, 19pp. Dept. of the Army, Army Medical Research Lab., Office of the Surgeon General, Research and Development Division, Fort Knox, Kentucky.

2750

To determine the nature and extent of changes in visual acuity, manual tremor, and aiming tremor as affected by intense noise, and/or vibration, measurements were made on 15 subjects before, during, and after exposure to two amplitudes of sinusoidal vibration at three different frequencies (15, 25, 35 cycles per second), broad band noise (115 decibels), and a control condition (no vibration, no noise). The data are analyzed for differential effects in the three functions. In addition, threshold measurements of "annoying" and "barely tolerable" vibration (inches of amplitude of platform vibration) were determined. Further research is recommended.
T.G.II.

2751

Hartman, R.C. & Page, R.E. PERFORMANCE WITH LIGHT-WEIGHT GRENADES AS A FUNCTION OF WEIGHT AND DISTANCE. Proj. 6-95-20-001, Subtask AMEL S-1, MEDEL, Rep. 176, Feb. 1955, 73pp. USN Medical Research Lab., Fort Knox, Ky.

2751

To investigate the effect of weight and distance on weight throwing, five weights of grenades (from two to ten ounces) were thrown at targets located 15, 20, 30, and 35 yards from the subject. Five throws of each weight grenade at every distance were made by each of 12 subjects. Performance was measured by accuracy scores (radial distance from target center) and consistency of scores (dispersion of throw) and analyzed in terms of the weight and distance factors. Recommendations for design of light-weight hand grenades are included.
T. G. I. R 2

2752

Isaac, E.J. SYMBOLIC CODING FOR THE SIMULATION OF SYSTEMS ON DIGITAL COMPUTERS. Contract N60MR 49403, Rep. 1953-494-03-05, Dec. 1953, 97pp. Tufts University.

2752

The use of symbolic models for evaluating complex man-machine problems and the consequent use of digital computers for the needed computations are discussed in relation to the necessary complexity of the set of instructions for the computer. To overcome errors that occur when the code is written directly in the machine language, an easily understood artificial language is described which the coder can use for writing the set of instructions. Two methods for automatic translation are explained in some detail.

2753

Justus, G.M., Noble, H.A. & Gross, W.A. RANGE AND SPEED ESTIMATION. Proj. TT2-689, Third Report, Dates of Test: July 18 to July 28 1952, Oct. 1953, 40pp. Aberdeen Proving Ground, Md.

2753

To investigate accuracy of range and speed estimations of the untrained eye as affected by range and speed of target and use of binoculars, data were obtained from 800 ROTC cadets observing moving trucks as targets. Speed of operation varied from three to 27 miles per hour and ranges from 500 to 1650 yards. The error data were analyzed for speed and for unaided eye versus binoculars. The potential or systematic error for untrained observers is discussed in relation to training in tank gunnery.
T.G.I,RI.

2756 Kennedy, J.V. THE PARTIAL PRESSURE SUIT IN HIGH ALTITUDE ESCAPE. Report from "Conference on Problems of Emergency Escape in High-Speed Flight, 29-30 Sept. 1952, Wright-Patterson AFB, Dayton, Ohio". USAF Wright Air Development Center, Aero-Medical Lab., Wright-Patterson AFB, Ohio.

Described is the partial pressure suit and the physiological principles incorporated into its design. It is felt to have fulfilled the requirements for emergency protection at extreme altitudes and is the only practical altitude suit available for widespread use. However, there are some shortcomings: including: a) restricted visibility when inflated; b) requirement for other protective clothing; and c) uncertain windblast protection afforded by the helmet. Perfection and mass production of a different type altitude suit in the next 3-5 yrs. is unlikely; therefore, the partial pressure suit must be considered in any system of high altitude escape. The partial pressure suit may also eliminate the requirement for an e-escape capsule or pod, and in case of e-b'n pressurization. (HMAS)

2757 Belding, H.S., Minard, D., Wiebers, J.E., & Ross, J.W. HEAT STRESSES AND STRAINS OF SUMMER TRAINING AT THE MARINE CORPS RECRUIT DEPOT PARRIS ISLAND, SOUTH CAROLINA. Contract ONR 115-406, Rep. 1, Jan. 1956, 22pp. ONR, University of Pittsburgh.

2757 To study various problems resulting from conduct of military training in hot weather, a Heat Study Team spent four summer weeks at the Marine Recruit Training Depot, Parris Island, South Carolina. Observations were made on a squad of eight recruits. Physiological responses of these men were observed and their exposure to heat measured while they engaged in normal training activities and in standardized marches. Data on heat production, elevations of heart rate, rectal temperature and sweating are reported. Present provisions of the Parris Island Heat Directive were critically examined and suggested modifications made.
T. G. R 10

2760 Lee, D.H.K., Katin, J.G., Woodcock, A.H., Goddard, W.L., et al. STUDIES ON CLOTHING FOR HOT ENVIRONMENTS--DEATH VALLEY, 1950. PART I. EXPERIMENTS AND RESULTS. Rep. 178, June 1951, 70pp. Department of the Army, Office of the Quartermaster General, Environmental Protection Section, Washington, D.C.

In July and August, 1950, a group of scientists from the Research and Development Branch, QMC, with cooperation from the Quartermaster Board, conducted a series of experiments in Death Valley, California, to test principles of clothing design for protection against hot desert environment stresses. As a result of these experiments, the following conclusions were reached: a) Under the conditions experienced, both the operating efficiency and the physiological welfare of the individual may be jeopardized after less than 2 hours of moderate activity. b) Under these circumstances, almost any reduction of the heat load upon the individual is important. c) Foot ventilation, such as is obtained by air-permeable uppers, or ventilating insoles, keeps feet cooler. d) Thick socks are desirable. e) A cap was found to be a generally acceptable form of headgear; but this requires a large visor, adjustable headband, and a crown which stands away from the head. f) The use of a headcloth is very desirable, as a protection against solar radiation, hot winds, and dust; more work is required on the optimum form and method of use. g) There is need for body clothing for men working in the sun, at least up to an activity level equivalent to walking at 3 mph. h) There is an outstanding advantage to be gained from having the outer body clothing of loose design, with controllable ventilation openings at the neck, waist, wrists, and ankles. i) There is a definite requirement in the design of outer body clothing for a method of preventing the entry of sand when the wearer is crawling. j) Where other considerations indicate the need for fairly thick fabrics, there are no physiological objections to their use. k) There are, at present, no indications for controlling the use of underwear.

2761 Liebowitz, H.M. & Kaestner, N. THE EFFECT OF GRID LINES IN THE FIELD OF VIEW UPON PERCEPTION OF MOTION. Contract AF 18(600) 54, WADC TR 54 221, March 1954, 8pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

2761 To investigate the effects of reference stimuli in the field of view on perception of motion, the minimum discriminable target velocity was determined by eight untrained Ss for exposure durations of 1/4 and 16 sec., luminance values of .016 and 500 cd, both with and without vertical grid lines in the field of view. Threshold data are plotted as a function of practice for the various parameters and implications for perceptual training are discussed.
T. G. R 4

2762 Liebowitz, H.M. & Kaestner, N. THE EFFECT OF EXPOSURE TIME, INDIVIDUAL VARIABILITY, AND PRACTICE ON THE PRECISION OF VERNIER ADJUSTMENTS. Contract AF 18(600) 54, WADC TR 54 77, March 1954, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

2762 To investigate the precision of making vernier adjustments as affected by exposure time, individual variability, and practice, 32 untrained Ss made 80 adjustments (eight trials of ten adjustments) for short and unlimited exposure times and for bright and dim luminance levels. The data are analyzed for differences due to the variables investigated. Implications for visual displays are noted.
T. G. R 3

2763
Lund, D.W. EFFECTS OF POSITIVE G ON SUBJECTS STUDIED AT THE MAYO AND AIR MATERIEL COMMAND CENTRIFUGES. TSEA: 595 69, E.O. 695 67, Sept. 1946, 28pp. USAF Air Materiel Command, Aero Medical Lab., Wright-Patterson AFB, Ohio.

The responses of 12 Ss to positive acceleration on the Mayo and Air Materiel Command centrifuges were compared. The average G-tolerances of the group, appraised by assay using visual symptoms and equivalent ear pulse amplitude changes as end points was 0.5 and 0.9, respectively, lower on the Mayo than on the Air Materiel Command centrifuge. The basic pattern of the cardiovascular response was the same at both Laboratories. The sequence of the measured physiological events which occur in response to positive acceleration and, with one exception, the timing of these events, was repeated on the 2 centrifuges. The data suggest that the difference in G-tolerances observed on the 2 machines is more related to differences in psychological factors associated with exposure to G than to any physical differences between the 2 centrifuges. (HEIAS)

R 2

2764
Lutz, C.C. STANDARDIZATION OF ALTITUDE SUITS, TYPES T-1 AND S-2. Tech. Memo Rep. WARD 52 121, Nov. 1952 12pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio.

Summarized are the data concerning the development of the Air Force altitude suits, Type T-1 and S-2, for the purpose of standardizing this garment. An altitude pressure suit which consists of 3 main components: a pressure oxygen helmet, a counter-pressurizing garment, and an emergency oxygen cylinder and regulating assembly, has been developed. This complete assembly provides emergency protection against the effects of low barometric pressure, which occur in the event of loss of cabin pressurization extremely high altitudes. The development of the counter-pressure garment portion of the assembly, known as the partial-pressure suit and designated as Suit Altitude, Type T-1 and Type S-2 is fully described in the report. (HEIAS)

R 20

2765
Smith, P.K. EFFECTS OF SOME CENTRAL NERVOUS SYSTEM DEPRESSING DRUGS ON INTELLECTUAL AND PSYCHOMOTOR PERFORMANCE AT 18,000 FEET WITH AND WITHOUT SUPPLEMENTARY OXYGEN. Proj. 221, Rep. 1, Jan. 1944, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

To determine the effects of some CNS depressing drugs on intellectual and psychomotor performance at 18,000 ft. with and without supplementary oxygen, 93 Ss were given moderate doses of morphine sulfate, codeine phosphate, Demerol, or Army Motion Sickness Preventive. Ss were given an addition test, code substitution test, steadiness aiming test, and compensatory pursuit test. The tests were performed with added oxygen and after a period of anoxia varying from 15 to 45 min. It was found that: a) Morphine sulfate in 10 mg. doses given subcutaneously approximately one hr. before testing had no demonstrable effect on performance; b) Demerol in 100 mg. doses given by mouth approximately 2 hrs. before testing had no demonstrable effect, but the same dose given subcutaneously approximately an hr. before testing adversely affected performance; c) Codeine phosphate given in 130 mg. doses by mouth approximately 2 hrs. before testing had no demonstrable effect on performance; d) Army Motion Sickness Preventive given in 2 capsule doses by mouth had a small but not statistically significant effect on performance both with and without supplementary oxygen. R 3

2770
Smith, P.K. ATTEMPTS TO FIND A REMEDY SUPERIOR TO HYOSCINE FOR MOTION SICKNESS. Proj. 333, Rep. 1, Aug., 1945, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

This study was conducted to find a more suitable remedy for airsickness than hyoscine. The drugs tested were atropine sulfate in doses of 1.0 mg., Pavatrine in doses of 250 mg., hyoscine hydrobromide; and hyoscine hydrobromide in combination with prostigmine bromide, chlorobutanol, benzedrine sulfate, and V-12. The Ss were given a drug or placebo about 50 to 100 minutes before swinging on a swing of 14 ft. radius. The Ss were swung in a sitting position with their heads upright. They were observed for pallor, sweating and vomiting and questioned to determine the extent of nausea and dizziness after the test. Neither the atropine sulfate nor Pavatrine are superior to 0.75 mg. doses of hyoscine hydrobromide in preventing swinging sickness. Combinations of hyoscine and prostigmine bromide, of hyoscine and chlorotone and benzedrine or of hyoscine and V-12 were not superior to hyoscine alone for the prevention of swing sickness. (HEIAS)

R 12

2771
Smith, P.K. EFFECT OF PYRIDOXINE HYDROCHLORIDE ON SWING SICKNESS. Proj. 333, Rep. 2, Aug. 1945, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Doses of 100 and 200 mgn. of pyridoxine hydrochloride (PH) were tested for their effect on swing sickness. 33 Ss were given 100 mgn. of PH, 28 received 200 mgn. of PH, and 82 received lactose. 40 to 80 min. after receiving the drug, Ss were swung for 20 min. unless they vomited earlier. There were no significant differences in the incidence of vomiting in the 2 groups. (HEIAS)

R 4

2772
Thetford, P.E. & Guedry, F.E., Jr. JUDGMENT OF THE POSTURAL VERTICAL DURING EXPOSURE TO A MISLEADING VISUAL FRAMEWORK IN UNILATERALLY LABYRINTHECTOMIZED SUBJECTS. Contract N7onr 434, T.O. 1, Proj. NR-143 455, Proj. NM 001 063.01.27, Rep. 27, July 1952, 6pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

4 unilaterally labyrinthectomized human Ss made judgments of the postural vertical in the presence of a tilted visual framework. In general, the estimates of postural verticality were not displaced in the direction of the injured side. The tilted visual framework did not have unusual effects on the judgments rendered. Hence these Ss with one functional labyrinth did not demonstrate a less stable conception of verticality than previously observed 'normals.'

R 7

2773

Thorne, M.W. QUESTIONNAIRE ANALYSIS OF THE PROBLEM OF AIRSICKNESS AS IT IS MET WITH IN STATIONS IN THE CONTINENTAL UNITED STATES. Proj. 83, Rep. 1, Sept. 1942, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Reported is the analysis of a questionnaire concerning the subject of airsickness which was disseminated to Air Force stations throughout the continental United States to obtain information regarding the experience with airsickness of the Flight Surgeons at these various stations. 177 Air Force stations reported on the occurrence and other features of airsickness as it existed at the respective stations reporting. It was found that: the incidence of airsickness is greatest in primary flying training, the navigation school at Hondo and in casual passengers. At other stations airsickness has not been common. In the opinion of the Flight Surgeons reporting the contributing causes of airsickness are: (in order of prominence): a) apprehension, b) acrobatics, c) turbulent air, d) dietary factors, e) cabin odors and poor ventilation. The treatment of airsickness best suited in the opinion of those reporting is: a) psychological approaches, b) diet control, c) preflight sedation.

2774

Thorne, M.W. AUTONOMIC REACTIONS TO STARTLE: I. PHOTOELECTRIC PLETHYSMOGRAPH. Proj. 135, Rep. 1, Nov. 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The construction of a photoelectric capillary plethysmograph using a condenser coupled amplifier and inductor recorder is described. Its advantages include rugged construction, ease of operation, and availability for use in the low pressure chamber. Its usefulness is demonstrated as: a) A detector of some autonomic nervous system activities; and b) An adjunct in the study of capillary activity in various breathing mixtures. (MEIAS)

R 9

2776

Tobias, C.A. RADIATION HAZARDS IN HIGH ALTITUDE AVIATION. Proj. ADO 695 72, Tech. Rep. 52 119, May 1952, 36pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of California, Berkeley, Calif.)

A comprehensive review and summary is given of what is known today of the hazards of natural radiation at high altitudes. On the basis of existing physical data and biological knowledge, estimates were made of the dosage delivered by cosmic radiation at very high altitudes. It was concluded that even extensive high altitude flying would have very little effect on health and would constitute only a small hazard compared with other commonly accepted radiation dangers from artificial sources. Nevertheless, there is continued need for further physical investigations of the distribution of cosmic ray ionization, actual biological assays of their effects at high altitudes, and for ground level studies using artificial sources of radiations.

R 71

2778

Torndorf, J. AUDITORY PERCEPTION IN AIRCRAFT NOISE. Proj. 21 27 001, Rep. 1, Dec. 1951, 23pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The problem of communication in noise was explored from the listener's standpoint. In normal Ss perception of pure-tone and speech signals was measured at 6 intensity levels of simulated aircraft noise (conventional and jet types) under a variety of test conditions. Curves were established depicting levels of threshold and of comfortable listening for both pure-tone and speech, and that of optimum speech perception. They allow demonstration of the width of the useful auditory area in noise and of the operational level which offers the most satisfactory perception under each condition. Conclusions and specific recommendations are presented.

R 32

2779

Blackston, M.W., & Rabine, E.N. ELECTRONICS TROUBLESHOOTING TRAINER. Keesler 56-1, Final Proj. Rep., Feb. 1956, 28pp. Training Analysis and Development Division, 3380th Technical Training Group, Keesler AFB, Miss.

2779

This report describes the development and use of the Electronics Troubleshooting Trainer for training in the "split-half technique" in troubleshooting and the "developmental" approach to training. Several examples of the Trainer are given to illustrate levels of development from basic to advanced. Methods for using the Trainer, variations in form to satisfy different objectives, and evaluation possibilities are discussed.

2780

Weiss, R.A. VARIABILITY IN THE ENERGY COST OF SELECTED EXERCISES. Proj. 374, Rep. 1, Nov. 1945, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The oxygen consumption of 30 Ss was tested by a closed circuit metabolism apparatus during rest, exercise, and recovery. Each S was tested 3 times with each of 5 exercises to determine energy cost variability. In a comparison of 2 measures of energy expenditure, net oxygen consumption and energy cost in multiples of the resting metabolic rate (RMR), the latter was selected as more desirable because of greater independence from body size, and because it is expressed in units which are more easily understood. The measure of cost in RMR was found to have a high degree of reliability (0.86-0.90). There was a significant variation in cost in RMR between the 30 Ss for each of the 5 exercises studied in this investigation. Accordingly, cost in RMR obtained from testing one S cannot be used to predict accurately the cost for other Ss. Variation between Ss was not related to any of the anthropometric measurements studied in this investigation, since correlations between cost in RMR and various anthropometric measurements were found to be significant in only one instance, between length of arm and exercise C. For exercises to be ranked in the same order, according to cost in RMR, for nearly all Ss, the differences between the means of the exercises must exceed a certain minimum, which increases with an increase in strenuousness of the exercises. When the cost of the less strenuous of 2 exercises is between one and 10 RMR, the minimum differences at which the exercises are ranked in the same order for 95% of the Ss ranges from 0.99 to 6.97 RMR. For 99% of the Ss, this range will be from 2.00 to 10.50 RMR.

2784

White, C.S., Hume, Jane M., Armstrong, Elizabeth D. & Lundgren, K.T. HUMAN TOLERANCE TO ACUTE EXPOSURE TO SIX PERCENT CARBON DIOXIDE IN AIR AND IN OXYGEN. Contract AF33(035) 13244, Proj. 21 1402 0001, Rep. 1, March 1953, 13pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Human Ss in 50 experiments were exposed for 15 minutes to 6 percent CO₂ in air and in O₂ at a ground level altitude of 5,000 ft. Performance of a card-sorting test was not significantly influenced by breathing CO₂, although one of 31 Ss was unable to complete the experiment. Dyspnea, smell and taste sensations, headache, and sweating were the most common symptoms. The increase in expiratory minute volume was significantly greater in the CO₂ in air than in the CO₂ in O₂ group. The percentage of rise in tidal air was much greater than the percentage of increase in respiratory rate. The average rise in the alveolar pCO₂ determined during the 16th minute of inhaling CO₂ was 11 mm. Hg above the average of 32 mm. measured after 5 minutes of breathing air. The advisability of requiring air crew indoctrination in the effects of acute CO₂ inhalation was emphasized.

R 9

2785

Zeidner, J., Gordon, B.A. & Goldstein, L.G. DARK-ADAPTATION TIME FOR TESTING NIGHT-VISION ABILITY. Proj. 29562000, Tech. Res. Note 25, April 1954, 37pp. Department of the Army, Personnel Research Branch, Washington, D.C.

The objective of this study was to determine the optimal period of dark adaptation for the administration of mesopic (moonlight) tests. The interest was in the dark adaptation time required by a soldier who is taken from a well-lit waiting room, dark adapted in a more or less light-tight room, and examined with acuity targets administered at a mesopic brightness. The experiment used a pre-adaptation brightness of 753 millilamberts (11.88 log micromicrolamberts); the dark-adapting brightness was at the testing level itself--6.67 log micromicrolamberts. 100 examinees were tested binocularly on the Modified Landolt Ring and Chevron Contrast Mesopic test at varying intervals of dark adaptation. The last 20 examinees were retested 5 weeks later. The Landolt Test was developed as a measure of retinal resolution; the Chevron Test was developed as a measure of brightness-contrast sensitivity. Threshold values showed that almost complete (for practical purposes) dark adaptation to the 6.67 micromicrolamberts mesopic level was attained in 10 minutes. The test-retest reliability coefficients of acuity and of contrast sensitivity scores were, in general, slightly higher for the later intervals than for the initial periods of adaptation. There was evidence that, under carefully controlled conditions, 5 minutes of dark adaptation is sufficient for testing at mesopic brightness levels. However, for large-scale testing in the operational situation, 10 minutes of dark adaptation is a more careful choice. Mesopic visual acuity after 10 minutes of dark adaptation would be close to terminal acuity; small variation in adapting time would not critically affect scores.

R 5

2786

Spector, H., Peterson, M.S. & Friedemann, T.E. METHODS FOR EVALUATION OF NUTRITIONAL ADEQUACY AND STATUS--A SYMPOSIUM. Dec. 1954, 313pp. National Research Council, Advisory Board on Quartermaster Research and Development, Committee on Foods, Washington, D.C.

This report is a summary of a symposium on methods for evaluating nutritional adequacy and status held in 1954. The program was organized into the following general categories: a) evaluation of protein adequacy; b) evaluation of vitamin adequacy; c) evaluation of mineral adequacy; d) evaluation of military rations by animal experimentation; e) evaluation of nutritional status of populations; f) body composition. In these categories, existing methods were critically evaluated, and the need and possibilities for new methods emphasized. (HEIAS)

2787

Spector, H. & Peterson, M.S. NUTRITION UNDER CLIMATIC STRESS--A SYMPOSIUM. May 1954, 204pp. National Research Council, Advisory Board on Quartermaster Research and Development, Committee on Foods, Washington, D.C.

This is a report of a symposium on nutrition under climatic stress held in 1952. The program was organized into the following general categories: a) practical problems of service operations under climatic stress; b) physiological responses of men to heat and cold; c) animal experimentation; d) human experimentation. Concluding feature of the program was a summary of present knowledge and a survey of areas in which more research is needed. (HEIAS)

R 276

2789

Scobee, R.G. & Moss, H.L. A COMPARISON OF TESTS FOR HETEROPHORIA: EFFECT OF LIGHT AND DARK ON THE SCREEN-MADDOX ROD TEST. Proj. 375, Rep. 3, July 1945, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Lateral and vertical heterophoric determinations were made at a distance of 20 ft. on 60 Ss using the screen-Maddox rod test under 2 conditions: a) the testing room in complete darkness; and b) the testing room lighted with a 60-Watt, frosted Mazda bulb above S's head. No significant differences in the heterophoric measurements when made in a lighted room vs. a dark room were found. (HEIAS)

R 2

2790

Scobee, R.G., Green, E.L. & Moss, H.L. A COMPARISON OF TESTS FOR HETEROPHORIA: VARIATIONS IN THE SCREEN-MADDOX ROD TEST DUE TO OCULAR DOMINANCE, ROD COLOR, AND SCREENING. Proj. 375, Rep. 4, July 1945, 10pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A study was made of possible variations in heterophoria measurements made at testing distances of 20 ft. and 13 in. with the screen-Maddox rod test depending upon whether: a) screening is performed or not; b) the rod is placed before the dominant or non-dominant eye; c) a white or a red Maddox rod is used. Significant differences were found for condition -a- at both distances and regardless of conditions b and c. No differences were found due to condition -b-. Significant differences were found for condition -c- at 20 ft. but not at 13 in., regardless of conditions a and b. It was recommended that determination of the dominant eye should be dropped from the present AAF physical examination for flying. On the basis of these and other results, it was recommended that the screen-Maddox rod test be abandoned in favor of the Maddox rod alone. (HEIAS)

R 12

2793

Scobee, F.G. & Rowland, W.M. A FILTER FOR THE RED LENS TEST IN THE "64" EXAMINATION. Proj. 322, Rep. 1, Dec. 1944, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

This report attempts to specify a given red lens to be used in Form "64" of the examination for flying. The need for a standardized red lens is felt for 2 reasons: a) a standardization of the test is badly needed, and b) a number of perfectly normal individuals might be unjustly eliminated from flying by virtue of having seen 2 images when a dark red lens is used to perform this test. The primary purpose of the red lens in the present "64" examination is to enable the subject to identify accurately true and false images. The fact that a certain amount of fusion is disrupted by the difference in color of the images thus produced is, and should be, of secondary importance. There is no specified density for the red lens used in the test and, as a result, a wide variety of lenses are in use throughout the Army Air Forces. In view of this situation, the fact that a fairly dense red lens will produce diplopia in even the normal individual becomes extremely important. A satisfactory color for the test is the Polaroid Unicolor Red - XR12 or any lens of similar density. The adoption of this or a similar lens is strongly recommended since standardization of any and all portions of the "64" examination is highly desirable.

2795

Senturia, B.H. DETERMINATION OF AUDITORY ACUITY FOLLOWING VARIOUS PERIODS OF EXPOSURE IN THE ALTITUDE CHAMBER. Proj. 129, Rep. 1, March 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

3 of 8 members of the personnel of an altitude chamber who had been exposed to marked pressure changes over a period of 14 months, showed a maximum loss of 15 db of auditory acuity in some portion of the auditory spectrum. In the main, losses were confined to the frequencies 5792, 8192, and 11584 cps. No significant permanent loss of acuity occurred as a result of attacks of aerotitis or aero-otitis in 3 Ss. (HEIAS)

2796

Senturia, B.H. AUDITORY ACUITY OF AVIATION CADETS. Proj. 239, Rep. 1, May 1944, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Auditory acuity tests were performed on 500 enlisted trainees between the ages of 18 and 27 years (mean age 21.1 yrs.). 34% of right ears and 32% of left ears showed threshold curves which did not deviate more than 10 db below the audiometric zero-line from 1024 to 1584 cps. Tonal dips of 15 db or more occurred in 23% of right ears and 29% of left ears, prior to any recent exposure to aircraft noise. 49.2% of the Ss showed bilateral similarity of hearing types. Comparison of results of 5 examiners show some deviations but fairly uniform results are obtained.

R 18

2797

Senturia, B.H. A SURVEY OF AUDITORY ACUITY AMONG PILOTS AND ENLISTED TRAINEES. Proj. 171, Rep. 1, Sept. 1943, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Auditory acuity thresholds were obtained on 150 Students and Instructors (300 ears) who had 100-2500 logged hours and who were flying daily. These were compared with thresholds obtained from 100 Enlisted Trainees (200 ears) who had less than 25 logged hours and had no exposure to aircraft noise for the preceding 30 days. All audiograms were empirically divided into 4 types and 4 grades of losses according to the configuration of the threshold curve and the severity of the hearing loss. Only 23% of the Instructors and Students and 33% of the Trainees were found to have normal hearing over the entire range of frequencies tested. There is a significantly greater incidence of Type "I" (high-tone) deafness and a smaller number of normals among the Instructors than among the Trainees. A remarkably high incidence of Type "V" tonal gaps in the regions of 2896 and 4096 cps occurs among Trainees, prior to aircraft noise exposure. Attention is directed to the losses of auditory acuity which exist prior to aircraft noise exposure but which are frequently interpreted as occupational defects resulting from airplane noise.

R 6

2798

Senturia, B.H. THE EFFECT OF EXPOSURE TO AIRPLANE NOISE ON AUDITORY ACUITY. Proj. 205, Rep. 2, May 1944, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Audiograms were obtained on 64 enlisted trainees who had passed the flight physical, and who had no known exposure to aircraft noise in the preceding 30 days. Following the completion of approximately 135 hrs. of flying time (primary - 50 to 70 hrs. - and basic - 50 to 70 hrs. - pilot training), 19.5% of ears showed hearing losses greater than 10 db, at 1 or more of the frequencies tested. The greatest percentage of clinically significant losses occurred at the higher frequencies (2048 - 5792 cps). This should be interpreted in light of the fact that retests were made 2 - 8 hrs. after exposure to aircraft noise. (HEIAS)

R 3

2799

Senturia, B.H. THE EFFECT OF EXPOSURE TO AIRPLANE NOISE ON AUDITORY ACUITY. Proj. 205, Rep. 3, Aug. 1944, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

54 of the original 100 Ss examined at preflight successfully completed advanced pilot training. 40 of these Ss were then given audiometric retests following a period of freedom from noise of 24 hours or more ("rested" group). 14 Ss had 1/2 to 8 hours rest from aircraft noise prior to retest ("non-rested" group). Among the "rested" ears, mean hearing losses sustained during primary or basic pilot training were partially or completely recovered following advanced training. In striking contrast, the "non-rested" ears of the advanced group showed mean hearing losses which were widespread, involving the frequencies 1024 to 5792 cps inclusive. It may be concluded that hearing losses incurred during primary, basic, or advanced pilot training are, on the whole, temporary losses which are partially or completely recovered following 24 hours of rest.

R 8

2800

Smith, D.E. COMPARISON OF AUDITORY ACUITY OF FLYING PERSONNEL AND NON-FLYING PERSONNEL. Proj. 514, Rep. 1, July 1948, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Audiograms were obtained for 227 Ss with a mean flying experience of 1400 hrs. (range 100 - 4000) and for 211 Ss who had no flying experience except for occasional commercial transport flights. Ss without flight experience showed a high tone loss of 10 to 12 db vs. Ss with flight experience who showed a high tone loss of 17 db. Ss were between 20 - 30 yrs. of age. This difference in acuity was significant and indicates that the loss of high tones in flying personnel is not due simply to aging, but that there is an additional factor of acoustic trauma. (HEIAS)
R 17

2801

Smith, P.K. THE USE OF HONEY TO INCREASE ANOXIA TOLERANCE. Proj. 79, Rep. 1, June 1942, 14pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Using 28 Ss, a diet of honey and milk was compared with a sucrose and milk diet. The ratio of added carbohydrate was essentially the same in both diets: 56 gms. of honey vs. 40 gms. of cane sugar per pint of milk. Ss were given code tests and addition tests at ground level and at 10,000 ft. There was no significant difference between performance following a honey-milk diet vs. a sucrose-milk diet. However, performance on both these diets was superior to performance following a normal diet. (HEIAS)

2803

Smith, P.K. EFFECT OF SULFONAMIDE DRUGS ON ANOXIA TOLERANCE: EFFECTS OF PROPHYLACTIC DOSES OF SULFANILAMINE, SULFATHIAZOLE, SULFADIAZINE AND SULFAPYRAZINE. Proj. 76, Rep. 1, Feb. 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

18 Ss performed intellectual and psychomotor tests at simulated altitudes either with or without added oxygen and with a 4 gm. dose of sulfanilamide, sulfadiazine, sulfathiazole, sulfapyrazine, or a placebo. The doses were given 4 to 6 hrs. before testing. Sulfanilamide, both with and without supplemental oxygen, adversely affected performance on both types of tasks. Sulfadiazine, sulfathiazole, and sulfapyrazine had no measurable effect on performance. (HEIAS)

2804

Smith, P.K. EFFECT OF SULFONAMIDE DRUGS ON ANOXIA TOLERANCE: EFFECT OF THERAPEUTIC COURSES OF SULFATHIAZOLE AND SULFADIAZINE. Proj. 76, Rep. 2, Feb. 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Using 14 Ss, the effects of sulfonamide drugs on oxygen tolerance. Before the administration of the drug was begun, each S made 5 ascents in the high altitude chamber and took the psychomotor tests with and without supplementary oxygen. Ss were divided into 3 groups, 1 being given sulfadiazine, 1 sulfathiazole and 1 placebo. The doses were 1 gm. 4 times a day for 5 days. The ascent in the high altitude chamber was made about 1:30 P.M. on the fifth day the drug was given. Daily blood samples were taken and determinations made of the free and total sulfonamide, total hemoglobin, methemoglobin and sulfhemoglobin. Pulse rates were taken after approximately 30 to 40 min. without added oxygen at 10,000 ft. and then again 5 min. after the oxygen was turned on. About 5 days after the last dose of sulfonamide, the entire procedure was repeated this time with each S getting another sulfonamide or a placebo. No differences in performance between the Ss receiving different sulfonamides or a placebo was found. Sulfonamide blood levels after doses of sulfadiazine were 2 to 3 times as high as the levels found after similar doses of sulfathiazole. This was due to the smaller excretion of sulfadiazine. (HEIAS)

2805

Smith, P.K. EFFECTS OF MORPHINE AT HIGH ALTITUDE. Proj. 181, Rep. 1, Sept. 1943, 1p. USAF School of Aviation Medicine, Randolph Field, Tex.

To determine the effects of one-half grain doses of morphine tartrate at 38,000 feet, 6 individuals were taken to 38,000 feet and readings made at 15 minute intervals of their arterial saturation as revealed by the oximeter. They exercised at 10 minute intervals. After a period of rest pulse rates were observed and respiratory rates were obtained merely by observing the regulator diaphragm. This gave only rate with no indication as to depth, etc. One entire "Syrrette" containing one-half grain of morphine tartrate was then given and the Ss observed for one hour at 38,000 feet. The results indicated that morphine in doses of one-half grain of the tartrate given subcutaneously was well tolerated at 38,000 feet simulated altitude.

2806

Smith, P.K. THE EFFECTIVENESS OF SOME MOTION SICKNESS REMEDIES IN PREVENTING AIRSICKNESS IN NAVIGATION STUDENTS. Proj. 261, Rep. 2, Jan. 1945, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

274 navigation students were chosen who had been airsick 3 or more times regardless of the number of flights. They were then given 1 of the remedies, Army Motion Sickness Preventive (A), Royal Canadian Navy Seasickness Remedy (C), hyoscine (H), or a placebo of lactose (L), or nothing at all (O). All drugs were given in number 1 pink capsules. The order of administration was rotated in successive students so that approximately equal numbers would take the drug in each of the following sequences: ALCOH, LCOHA, COHAL, OHALC, and HALCO. The drugs were given 1/2 to 1 hr. before the flight began. The results indicated that Army Motion Sickness Preventive, Royal Canadian Navy Seasickness Remedy and hyoscine are all moderately effective in preventing airsickness. Some evidence was obtained that hyoscine was more effective than the Army Motion Sickness Preventive or the Royal Canadian Navy Seasickness Remedy. There was no evidence that the administration of placebos affects the incidence of seasickness. (HEIAS)

2807

Smith, P.J. USE OF HYOSCINE HYDROBROMIDE FOR THE PREVENTION OF AIRSICKNESS IN FLEXIBLE GUNNERY STUDENTS. Proj. 251, Rep. 3, Dec. 15-5, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

To study the effects of hyoscine hydrobromide (HM) on airsickness 560 Ss were given 3.75 mg. doses of HM and 479 were given a placebo (lactose). Assignment of HM was random. Ss (Jannille gunnery students) were given the drug immediately before a mission. A questionnaire, indicating 5 degrees of airsickness (none to extreme) was filled out by S immediately upon completion of the mission. The data was analyzed in 2 ways: a) incidence of airsickness of all degrees; and b) vomiting or extreme airsickness. Using the former criterion significantly fewer Ss became airsick following HM vs. a placebo. Using the latter criterion there was no difference between the numbers of Ss becoming airsick following HM vs. placebo. (MEIAS)

R 0

2808

Parant, G.N. & Whittingham, B.G.V. A SURVEY OF MEASUREMENTS OF FEET AND FOOT-WEAR OF ROYAL AIR FORCE PERSONNEL. F.P.R.C. & L. July 1952, 36pp. Medical Research Council, Flying Personnel Research Committee, Farnborough, Hants, England.

This report is concerned with a survey providing foot measurements of 200 men in the RAF (100 flying personnel and 100 ground staff) and measurements of the boots and shoes they were wearing. Comparisons are made between this series and one of 5566 United States soldiers, with the object of discovering how far data of the latter can be used in dealing with the sizing of new types of footwear for British Service communities. Following particulars of both surveys, topics treated are: a) the clinical examination of the feet of the RAF personnel; b) the accuracy of the measurements of feet and footwear; c) a reduction and comparison of the foot measurements of the 2 surveys; d) the measurements of footwear (RAF survey) and their relations to foot measurements; e) the grading of measurements for different sizes and fittings of footwear; f) the use of data for foot measurements in developing new footwear, with reference to the development of a flying boot.

R 1

2809

Peckard, J.M. TEN YEAR FOLLOW UP STUDY OF THE PHYSICAL STATUS OF 1000 AVIATORS. A STUDY OF THE DEATHS OCCURRING IN THE PAST TWELVE YEARS. Proj. MM 001 057-05-02, Nov. 1952, 10pp. USAF School of Aviation Medicine, Pensacola Air Station, Fla.

An analysis is presented of the deaths occurring over a 12 yr. period among 1056 white males all of whom were in the naval air training program at Pensacola, Florida from July 1940 to May 1941. Over 99% of this group have been traced. 220 of the 1056 Ss (21%) are now dead, and of this number 185 deaths occurred during World War II. The date and cause of death is known in all but one case. 192 deaths (87% of all deaths) were associated with aviation, 1/3 of them in aerial combat. The 27 non-aviation deaths included 16 in combat, 7 from disease, and 4 as a result of non-aviation injuries. Study of the mortality among the Ss when divided according to flight status reveals that the men who completed flight training only after difficulty during some phase of the program have a higher aggregate mortality (27%) than the better students and instructors (21%). The men who did not complete the training program have a significantly lower mortality (15%). When the Ss are divided according to military status during flight training, it is found that the officer students have a mortality of 32% which is more than double the mortality of 15% among the enlisted students. The cadets have a mortality of 20%. The death rates for our Ss still active in military aviation, for military pilots, for commercial pilots, and for non-flying military officers since 1945 are also examined. It is found that military aviators even in peace time have a death rate 5 times that of non-flying officers. Commercial pilots have a lower aviation accident death rate than military pilots but higher than the general population.

R 5

2810

Peugnet, H.B. MEASUREMENTS OF NOISE IN AIRCRAFT. Proj. 296, Rep. 1, Feb. 1945, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Noise levels were measured in the B-29, B-24, and B-17 airplanes. The principal emphasis was given to the B-29, as such measurements have not previously been reported. Low frequency noise in the B-29 at normal cruising speed was much less than in the B-24 and B-17. The average level at 4 B-29 positions was 96 db overall noise, as compared with about 110 db in the other 2 types. High frequency noise in the B-29 was from 20 to 30 db lower than in the B-24 and B-17, except when the flight compartment fans and defrosters were in operation. Flight compartment fans raised the noise level of the 1600-3200 cps band from 65 db to about 90 db. The high frequency hiss of the fans made speech communication very difficult. In the sound spectrum of the B-29, a noise peak of about 90 db intensity at the 150-300 and 200-400 cps bands was probably caused by inverters and generators. This "hum" did not seriously interfere with speech. Noise levels in the B-29 were approximately the same at low and high altitudes, except for the high frequency hiss of defrosters.

R 5

2811

Phillips, B.E. THE RELATIONSHIP BETWEEN CERTAIN ASPECTS OF PHYSICAL FITNESS AND SUCCESS IN PILOT TRAINING. Proj. 500 1, Rep. 1, June 1947, 65pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

2811

This is a report of a study conducted to determine the relationship between physical fitness as measured by three items of the Jump, Chin, Run Motor Test, and success in pilot training, as measured by successful completion of training through the Primary and Advanced levels. Other variables, height, weight, age, and Schneider Index, were used for purposes of comparison. The results on 5044 cadets are presented in terms of the relationships found among the variables and the implications of these findings for pilot training programs.

T. G. R 9

2812

Rose, H.V. STUDY OF ACCLIMATIZATION DURING A TWO-WEEK EXPOSURE TO MODERATE ALTITUDE (10,000 FEET). EFFECT OF ALTITUDE ADAPTATION ON NIGHT VISION AND OCULAR MUSCLE BALANCE. Proj. 21 02 029; Rep. 1, March 1949, 16pp. USAF School of Aviation Medicine, Randolph Field, Tex.

9 to 12 Ss have been examined before, during, and after staying 2 weeks at an altitude of 3,000 m. (10,000 ft.). The twilight visual acuity, which after a short stay at a simulated high altitude in the decompression chamber shows a marked decline, is restored to normal within 24 hours at actual altitudes of about 2,000 to 3,000 m. (6,500 to 10,000 ft.). This normal value was maintained throughout the following 2 weeks sojourn at this altitude. The brightness threshold in night vision was likewise restored to normal or better values after staying 24 hours at actual altitudes of about 2,000 to 3,000 m. (6,500 to 10,000 ft.)--in contrast to the deterioration observed in decompression tests. In those cases where the improvement was above the normal values, a recession was observed during the 2 weeks period at these altitudes. The examination of the ocular muscle balance after the first 24 hours revealed a tendency to esophoria, which in the course of the following 2 weeks at high altitude shifted to a tendency to exophoria. These processes, depending on the extent and moment of their manifestations, may gain importance in long distance flights. They may be induced in pressure cabin aircraft in which the prevailing pressure is less than that at ground level.

R 13

2813

Farnsworth, D. THE FARNSWORTH-MUNSELL 100-HUE AND DICHOINOUS TESTS FOR COLOR VISION. J. Opt. Soc. Amer., 1943, 33, 10, 568-578. Paper presented at Symposium on Color-Blindness at the meeting of the Optical Society of America, March 4-6, 1943, New York.

2813

The Farnsworth-Munsell 100-Hue test was developed as a laboratory technique for the analysis of color anomaly. From data obtained in this manner new types of color vision tests can be created for specific purposes. The Dichotomus Test, B-20, for code-color discrimination was thus derived. Principles upon which these tests are constructed are described and preliminary results presented.

GJ1,R2.

2815

Rowland, Louise S. SELECTION AND VALIDATION OF TESTS FOR COLOR VISION--RELATIONSHIP BETWEEN DEGREE OF COLOR DEFICIENCY AND ABILITY TO IDENTIFY SIGNALS FROM A "BISCUIT GUN". Proj. 137, Rep. 7, Nov. 1943, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

32 normal Ss and 84 color deficient Ss were given a battery of color vision tests before taking part in 1 or more field tests involving the recognition of the red, green and white signals from a "biscuit gun". Of the 6 tests studied, only the Color Threshold Lantern was adequate in selecting those color deficient individuals who were able to distinguish signals from the biscuit gun. When biscuit gun signals were shown from a distance of 1 mi., the visibility of the signals was much greater at night than at dusk or in the daytime. In the experiments made at night, all the normal and all the color deficient Ss identified the color correctly. At dusk all the normals and about 1/2 the color deficient Ss made perfect scores. In the experiments made in the daytime, some of the normals and all the color deficient made errors. (HEIAS)

2817

Rowland, Louise S. A LANTERN FOR MEASURING CHROMATIC THRESHOLDS. Proj. 97, Rep. 1, Dec. 1942, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A lantern for measuring chromatic thresholds is described. Its purpose is to provide a quantitative test for ability to recognize aviation signals and to provide a basis for selecting those color deficient individuals who can be considered "color safe" insofar as recognition of signals is concerned. Determinations made with a color lantern using signal colors of varying intensity show definite and reproducible differences in the scores of color anomalous Ss. 33 normal and 27 color deficient Ss were tested. Approx. 10% of those with anomalous color vision make scores equalling those of normal Ss. Since the test approximates closely the actual conditions involved in the recognition of signal colors, the normal scores made by some color anomalous Ss indicate that their defect is not sufficient to cause any significant impairment in ability to identify signal colors. (HEIAS)

2819

Rowland, Louise S. AN ABRIDGED EDITION OF THE AMERICAN OPTICAL COMPANY PSEUDO-ISOCROMATIC PLATES FOR TESTING COLOR PERCEPTION. Proj. 68, Rep. 1, July 1942, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

26 Ss were examined by means of 3 pseudo-isochromatic tests: a) The American Optical Company series containing 46 plates; b) The 8th edition of the Ishihara charts containing 32 plates; and c) An abridged edition of the Ishihara charts (7th edition) containing 11 plates. The tests were given according to the standard procedure outlined in the regulations. A study was made of individual records to determine which charts gave results consistent with the results of the entire series. It was concluded that: The American Optical Company Pseudo-Isochromatic Plates contain a number of charts which should be omitted. Those include: a) charts which are read by a majority of color deficient subjects; b) charts in which normal subjects frequently make minor errors not related to color deficiency. An abridged version of the test composed of 23 of the more reliable charts was proven. In a group of 26 Ss, to provide a much more definite differentiation in the scores of normal and color defective Ss than does the complete test. It is recommended that further studies be made to confirm the advantages of the abridged version of the test described in this report.

R 4

2820

Russell, R.W. THE EFFECTS OF HIGH ALTITUDES (DECREASED BAROMETRIC PRESSURE) ON SIMPLE MENTAL WORK. Proj. 20, Rep. 1, March 1942, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

2 experiments were conducted to determine the effects of high altitude with and without O₂ on the level of proficiency of simple mental work. A simple addition test consisting of single digits was administered prior and after the "flight", and at altitudes of 35, 38, and 40,000 ft. In Exp. I, the effect of anoxic conditions on test behavior was studied. A series of runs in a low-pressure chamber were made in which 56 Ss were tested at an altitude of 18,000 ft. without O₂. The behavior studied was affected significantly by anoxia at 18,000 ft. No decrement in proficiency level occurred at 35, 38, and 40,000 ft. when O₂ was available. Exp. II tested the effects of high altitudes (35, 38, and 40,000 ft.) on the test performance when the Ss were supplied with regulation O₂ equipment and supply. No control groups were run. It was concluded that practice effects were not a significant factor, although a "let down" effect proved to be significant. The effects of altitude were negative. There was no decrease in performance between the samples taken at 35, 38, and 40,000 ft. (HEIAS)

2821

Schaefer, H.J. EXPOSURE HAZARDS FROM COSMIC RADIATION BEYOND THE STRATOSPHERE AND IN FREE SPACE. Proj. MM 001 059.13.03, March 1952, 9pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

The ionization dosage from cosmic radiation increases from its sea level value of 0.1 milliroentgen-equivalent-physical per 24 hours to a maximum of 15 mrep/d at 75,000 ft. for northern latitudes. It then decreases and levels off to a value of 9 mrep/d which is reached at about 140,000 ft. At larger distances from the earth the ionization dosage can be expected to increase again to twice the last mentioned value due to the gradually vanishing shadow effect of the earth. The actual ionization dosages in larger absorber masses (air, planes, rocket ships) will be considerably higher due to the transition effect. The multiplication factor which equals about 2.0 for the rarified air at 75,000 ft. altitude will be substantially larger for denser materials. The deflecting influence of the geomagnetic field excludes low-energy primaries from the equatorial belt. The thin-down phenomenon is limited to northern latitudes. The exposure hazard, therefore, can be expected to be substantially greater in the polar cap. For larger distances from the earth it can be theoretically derived that the equatorial zone of total exclusion of low-energy heavy nuclei extends to about 1,000 miles altitude and the zone of partial exclusion (i.e., of the gradual build-up of the full intensity) to about 8,000 miles altitude.

2822

Schmidt, Ingeborg. NEW TESTS FOR THE EXAMINATION AND TRAINING OF COLOR VISION. I. PSEUDO-ISOCROMATIC PLATES. Proj. 517, Rep. 1, July 1948, 11pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Hsu-Pen Wu's and 3 other sets of pseudo-isochromatic plates are tested to find whether the Wu plates are adequate for selection purposes and how they compare with the other tests. 100 normal Ss and 62 color defective Ss were tested. Wu's pseudo-isochromatic plates proved a good screening test, since it permits an especially definite differentiation between color normal and color deficient. This classification is more accurate than that afforded by the Ishihara plates, stilling plates, and AOC charts. However, the Wu plates are rather unreliable in determining quantitatively the red-green defect. An investigation of the precision of differentiation provided by each individual plate showed that some plates are very satisfactory, whereas others were of only little value, having been interpreted incorrectly by a high percentage of color normals. It is recommended that the pattern and color of some plates be modified and that some plates should be omitted. Also, the illumination of the plates should be standardized. (HEIAS)

2825

Scobee, R.G. & Chinn, H.I. THE EFFECT OF CARBON MONOXIDE ON NIGHT VISUAL EFFICIENCY. Proj. 234, Rep. 1, Jan. 1944, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The effect of low blood concentrations of CO on night visual efficiency was investigated. The following functions were tested before and after CO inhalations: light and form perception thresholds, visual acuity, contrast discrimination, muscle balance, depth perception, color vision, and accommodation. A blood concentration of CO up to 20% has no constant demonstrable effect on night visual efficiency. It is possible that muscle balance and depth perception are affected in CO anoxia. (HEIAS)

2826

Scobee, R.G. & Green, E.L. A COMPARISON OF TESTS FOR HETEROPHORIA: RELIABILITY OF THE SCREEN-MADDOX ROD TEST. Proj. 375, Rep. 2, July 1945, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The reliability of heterophoria measurements made at a testing distance of 20 ft. with the screen-Maddox rod test, as it is used in the AAF Physical Examination for Flying, was determined. 50 Ss were tested for lateral phoria and 49 Ss for vertical phoria by 2 examiners, each of whom repeated his examination on a subsequent date. A r of 0.95 was found for lateral heterophoria and a r = 0.92 for vertical phorias. (HEIAS)

R 3

2827

Karpovich, P.V. THE RELIABILITY OF THE AAF PHYSICAL FITNESS TEST. Proj. 184, Rep. 1, Oct. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

122 Pre-Flight Aviation Students at the San Antonio Aviation Cadet Center were tested and retested with the AAF Physical Fitness Test. The test possessed a high degree of reliability as shown by the coefficient of correlation of +0.85 for the Physical Fitness Ratings.

2828

Karpovich, P.V. EFFECT OF AGE UPON THE PHYSICAL FITNESS RATINGS. Proj. 191, Rep. 1, Jan. 1944, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Physical Fitness Ratings were collected for 8,712 AAF enlisted men between the ages of 18 and 38. Physical Fitness Ratings include sit-ups, pull-ups, and the 300 yd. shuttle-run. Lines of best-fit were calculated for each of these 4 indices vs. age. The slopes of these lines were significantly different from zero, indicating a definite effect of age upon the scores. (HEIAS)

2829

Karpovich, P.V. EFFECT OF AGE UPON THE PHYSICAL FITNESS RATINGS. Proj. 191, Rep. 2, July 1944, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

AAF Physical Fitness data on 10,550 enlisted men were gathered. The number of pull-ups and sit-ups, time for shuttle-run, and Physical Fitness Ratings (composite index derived from previous 3 scores) were each fitted to a line of best fit against age (range of 18 to 38). All 4 lines indicated a significant decrease with increasing age. (HEIAS)

P. 1

2830

Karpovich, P.V. THE EFFECT PRODUCED ON THE SCORES OF THE AAF PHYSICAL FITNESS TEST BY THE WEARING OF THE FATIGUE UNIFORM. Proj. 179, Rep. 1, Oct. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

2 series of experiments on the effect produced on the scores of the AAF Physical Fitness Test by the wearing of the fatigue uniform are reported. In the first, 267 Ss were divided into 2 groups, group A and group B. Each group was tested twice, once in fatigue uniforms and G.I. shoes and once in athletic uniforms and tennis shoes. In the second series, 445 Ss were divided into 3 groups, group C, group D, and group E. Groups D and E were tested the same as groups A and B; group C, a control group, wore athletic uniforms for both tests. In both experiments wearing the fatigue uniform instead of the athletic uniform slightly lowered the score obtained. There were inconsistencies in performance obtained with the component parts of the AAF Physical Fitness Test, particularly in running. That the inconsistencies were caused by inadequate supervision of the test was indicated because when the experiment was later repeated under more rigid supervision, the inconsistencies disappeared completely. The difference in the Physical Fitness Ratings obtained with the fatigue uniform and with the athletic uniform is of statistical significance, but it is not sufficient to be of practical importance in mass testing nor to warrant construction of special scoring tables. However, in following the progress of an individual, care should be taken that the same type of uniform is worn for all tests.

2832

Karpovich, P.V. THE EFFECT OF REVERSE AND FORWARD GRIPS UPON PERFORMANCE IN CHINNING. Proj. 178, Rep. 1, Sept. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

3830 Aviation Students were tested for chinning using the forward (overhand) grip. The mean value was 8.7 chinings per man. 4781 Aviation Students were tested using the reverse grip. The mean was 8.9 chinings per man. The difference was 0.2 chinings per man in favor of the reverse grip. This difference is significant from a statistical point of view. In order to avoid errors in scores, the AAF Physical Fitness Test regulations should be followed; namely, that the forward grip should be used during the test. From the standpoint of training, one should pay more attention to practicing the forward grip because this grip is more useful for a soldier in overcoming obstacles he may have to scale. A experimental kinesiological analysis of both types of chinning should be made for a better understanding of the action of the muscles involved.

2833

Karpovich, P.V. THE EFFECT OF FORWARD AND REVERSE GRIPS ON CHINNING AT VARIOUS PERFORMANCE LEVELS. Proj. 189, Rep. 1, Dec. 1943, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

To determine the effect of forward and reverse grips on chinning at various performance levels, 7000 Ss, after classification according to performance level, were given 2 chinning tests. Ss were divided into 2 groups, A and B. In the first test, Group A used the forward grip and Group B, the reverse grip; in the second test, the grips were reversed. The data indicated that differences between chinning scores with the reverse and forward grips exist and become greater with increases in the level of performance. It was concluded that in fitness testing the reverse grip should not be indiscriminately substituted for the forward grip. (HEIAS)

2835

Loucks, R.B. A METHOD FOR REDUCING MUSCLE ACTION POTENTIALS TO QUANTITATIVE INDICES OF TENSION FOR USE IN AIR CREW CLASSIFICATION TESTS. Proj. 44, Rep. 1, Oct. 1942, 9pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A method is described which makes possible a comparison of one individual with another on the basis of the AP activity which underlies the muscular tension involved in the performance of a particular task. The technique provides a numerical score for muscular tension immediately upon completion of a particular task. The application of this method to the measurement of muscular tension involved in the performance of a standard psychomotor test results in scores of such high reliability ($r = .95$) that individuals can be differentiated from each other with a marked degree of precision. The method may have value as a general technique for measuring the effect of drugs, fatigue, anxiety, etc., on muscle tension. The required equipment for the recording of muscular AP. (HEIAS)

2836
Loucks, R.B. IMPAIRMENT IN PSYCHOMOTOR PERFORMANCE WITH THE TYPE A-13 PRESSURE DEMAND OXYGEN SYSTEM AT 45,600 FEET SIMULATED ALTITUDE. Proj. 308; Rep. 1, Aug. 1944, 59pp. USAF School of Aviation Medicine; Randolph Field, Tex.

A group of 50 subjects were employed in an investigation of the amount of decrement in psychomotor performance at 45,600 ft. simulated altitude while utilizing the Type A-13 pressure demand oxygen system at 8 in. of pressure. In spite of a preliminary indoctrination run and denitrogenation procedures, 30% of the Ss had to be brought down to ground level within the first few minutes after reaching elevation, because of circulatory collapse or gas pains. For the Ss who completed their tests, the average of the individual decrements in performance at 45,600 ft. is almost as great as that shown at 18,000 ft. without the use of oxygen masks, but control measurements on a group of 40 Ss who performed the psychomotor test at ground level with pressure breathing indicate that the pressure breathing in and of itself causes sufficient distraction to produce an appreciable impairment in psychomotor performance. If the loss in efficiency due to the distraction effect of pressure breathing at ground level is subtracted from the impairment in performance with pressure breathing at 45,600 ft., the residual loss, which represents that portion of the decrement which is due to anoxia, is approximately the same as that produced at 15,000 ft. when the subjects do not wear oxygen masks.

2840
Masland, R.L. ALTITUDE TOLERANCE WHEN BREATHING OXYGEN AND WHEN BREATHING OXYGEN SUPPLIED UNDER POSITIVE PRESSURE. Proj. 213; Rep. 1, Aug. 1944, 12pp. USAF School of Aviation Medicine; Randolph Field, Tex.

This report is a review of a series of experiments undertaken at the School of Aviation Medicine to determine the gain in altitude tolerance obtainable by the use of oxygen and of oxygen supplied under positive pressure. 2 conclusions were reached: a) With adequate denitrogenation, using either demand or pressure breathing equipment, flights to 40,000-41,500 ft. may be continued for periods of half an hour, with a descent rate of less than 10% and with performance on the part of those who do not descend equivalent to that exhibited by individuals at altitudes of 12,000-17,000 ft.; b) With ascent above 43,000 ft. using pressure breathing, there is a rapid increase in descent rate, from 15% at 43,500 ft. to 36% at 45,600 ft. This descent rate is probably sufficiently high to make flights to such altitudes unwarranted, except in great emergency. However, where the tactical situation requires, such flights, it is probable that those individuals who do not suffer an unfavorable reaction will retain useful consciousness up to approximately 48,000 ft. (arterial oxygen saturation equivalent to 20,000 ft.) at least for short periods of time.

2838
Mann, C.W. VISUAL FACTORS IN THE PERCEPTION OF VERTICALITY. Contract N70NR 434 TO1, ONR Proj. NP 143 455 & BuMedSurg. Proj. NM 001-063, Cl. 29, Joint Proj. Rep. 29, Aug. 1952, 6pp. USN School of Aviation Medicine; Naval Air Station, Fla. (Tulane University).

2838
To investigate Gibson's hypothesis that errors in the perception of verticality will be less under consistent visual-proprioceptive stimulation than under discrepant conditions, nine subjects were required to set a target-rod in alignment with the gravitational vertical under 15 conditions of room and body tilt. Mean constant errors and mean average errors in rod-setting were analyzed in terms of the above hypothesis. The results are discussed in terms of the respective roles of visual and proprioceptive factors in judgments of verticality.

2839
Marcks, C.A. HOW DOES EQUIPMENT AND CLOTHING AFFECT THE PROBLEMS OF EMERGENCY SYSTEMS DESIGN. Sept. 1952, 7pp. USN Bureau of Aeronautics, Washington, D.C.

2839
This brief paper views the rapid growth in personal equipment components and in the complexity of protective clothing for aircraft operations during and since World War II. These trends are discussed in terms of their effects on emergency escape provisions, as affecting the safety of the pilot and as affecting the design of equipment and aircraft. The dangers of the present course are pointed out and a preferred approach is discussed.

2841
Mayo, A.W. ESCAPE DEVICES REQUIRED FOR FUTURE AIRCRAFT. Sept. 1952, 14pp. Douglas Aircraft Company, El Segundo, Calif.

Considerations involved in aircraft escape devices are surveyed. Safety and escape requirements should be based on a study of the particular conditions applying to the aircraft under consideration rather than on an attempt to arrive at them by generalization. In objectively analyzing the application of escape and safety devices to an aircraft, 3 considerations appear to be fundamental in determining the objective requirements of the system: these are moral, morale, and economic considerations. Safety is not an absolute, as it is possible to reduce indefinitely any defined risk by increasing expenditures of effort. Once the objective requirements are established, studies of specific conditions are in order. 2 general types of variables require consideration: a) Environmental control--control of the composition, pressure, and temperature within the escape device; b) Force control--control of the variations in magnitude and directions of accelerations of forces. It is emphasized that the maximum use of statistics should be made in order that excessive consideration not be given to extreme and unusual conditions of flight. (MEIAS)

2842

McDonald, R.K. & Kelley, V.C. STUDY OF ACCLIMATIZATION DURING A TWO-WEEK EXPOSURE TO MODERATE ALTITUDE. SOME OBSERVATIONS ON THE EFFECTS OF ALTITUDE ON METABOLISM. III. HEMOGLOBIN METABOLISM AND ERYTHROCYTOSIS. Proj. 21 02 029, Rep. 3, Oct. 1949, 13pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The investigations are concerned with the alterations in hemoglobin metabolism and erythropoiesis that occurred in a group of 26 Ss during a 2 week period of acclimatization at an elevation of 10,000 ft. There is an initial rapid rise in hemoglobin concentration and erythrocyte count which is attributable to release of stored red cells under the stimulus of anemia. This is followed by a more gradual rise attributable to formation of new cells. The hemoglobin levels attained during exposure to altitude are maintained for a considerable period of time after return from altitude. Hemoglobin destruction as judged by fecal urobilinogen excretion is increased during the early phase of exposure to anoxia but decreased below baseline values during the latter part of the exposure. Urine urobilinogen excretion increases progressively with time at altitude but returns to within normal limits immediately upon return from altitude indicating that there is inadequate liver function during anoxic stress of this degree but that this inadequacy rapidly disappears following termination of the stress.

R 9

2847

Grether, W.F. EFFECTIVE TARGET DIAMETER AS A FACTOR IN DETERMINING DIFFICULTY OF THE S.A.M. TWO-HAND COORDINATION TEST. Proj. 304, Rep. 1, July 1944, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

In the use of the S.A.M. Two-Hand Coordination Test for selection of aircrew personnel differences have been noted in the difficulty of different test units. In order to find the cause of these differences in difficulty, and thus be able to eliminate them, measurements of effective target diameter were made on the test units currently in use at Medical and Psychological Examining Units No. 6, 8, and 10. These measurements were then related to the current mean scores on the different units of this apparatus and found to give a correlation coefficient of +.457. This coefficient indicates that the effective target diameter is a significant factor in determining the difficulty of the S.A.M. Two-Hand Coordination Test. It is suggested that these differences in difficulty could be significantly reduced by maintaining a standardized effective target diameter on all test units.

2850

Hemingway, A. THE EFFECT OF ENVIRONMENTAL TEMPERATURE ON MOTION SICKNESS. Proj. 170, Rep. 3, Nov. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

971 Ss in the AAF were given a 20-min. swing test to determine whether or not a cool environment would reduce the incidence of swing sickness. The tests were conducted out of doors throughout one summer and winter under all types of weather conditions. Temperatures between 5 and 35°C had no effect on the incidence of swing sickness. In a small group of 11 Ss tested in an environment above 35°C the incidence of swing sickness was higher than in other groups. This is suggestive that a hot environment may favor motion sickness; but the group is too small for a definite conclusion to be drawn. (HEIAS)

2851

Karpovich, P.V. APPRAISAL OF THE PRESENT PHYSICAL TRAINING PROGRAM FOR AVIATION CADETS. Proj. 15, Rep. 1, April 1942, 6pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

2851

This report presents an appraisal of the system of physical training of aviation cadets at various types of flying schools (as of April 1942). It describes such aspects as organization of the physical training program, conduct of classes, "research" claims, facilities, etc., and presents suggestions for improvement of such programs.

2852

Karpovich, P.V. DEVELOPMENT OF SPECIAL AVIATION EXERCISES. Proj. 26, Rep. 1, April 1942, 6pp. AAF School of Aviation Medicine, Randolph Field, Tex.

2852

This is a report of the development of special calisthenics drills symbolizing a plane and pilot in action to stimulate interest among flying cadets and flying personnel in such physical exercises. The reaction to these exercises is presented along with a detailed and illustrative description of the exercises.

2853 Karpovich, P.V. A SPECIAL TAPE FOR THE MEASUREMENT OF CHEST EXPANSION. Proj. 24, Rep. 1, Oct. 1942, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Research conducted by the Department of Statistics of the School of Aviation Medicine revealed frequent and great errors in measurements of the chest girth of the flying cadets. The newly designed tape described in the body of this report is recommended, because: a) It is easier to use; b) Results obtained by different observers in chest measurement of 99 student flight surgeons and 10 enlisted men were more consistent when the new tape was used than with the ordinary tape.

2854 Karpovich, P.V. RELATION BETWEEN BREATH HOLDING TESTS AND THE ENDURANCE IN RUNNING AND HARVARD STEP-UP TEST SCORES. Proj. 373, Rep. 2, Nov. 1945, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A group of 48 aviation students was used for this study. The breath holding times obtained with 5 different tests were correlated with the maximum treadmill running times and the Harvard step-up test scores. Since the coefficients of correlation thus obtained are statistically not significant, the breath holding ability cannot be used for prediction of either running endurance or Harvard step-up test score. It is recommended that breath holding tests described in this report should not be used in assessing physical fitness of normal men.

R 7

2855

Karpovich, P.V. STUDIES IN THE AAF PHYSICAL FITNESS TEST: SIT-UPS AND LEG-LIFTS. Proj. 245, Rep. 4, Aug. 1945, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

223 aviation cadets were used to study the correlation between and the reliability of the number of sit-ups and the number of leg-lifts. Ss were divided into approximately equal groups, A and B. On the first day of testing Group A did sit-ups and Group B did leg-lifts. 4 days later, Group A did leg-lifts and Group B did sit-ups. For establishing the reliability of the leg-lift an additional group of 101 Ss were used. The reliability of the sit-up had been found previously and no additional data were required. The reliability of sit-ups is +.71 and that of leg-lifts is +.72; yet, in spite of the large degree of kinesiological similarity between the two exercises the coefficient of correlation is only +.38, and therefore these two exercises cannot be used interchangeably for testing purposes.

2859

Karpovich, P.V. STUDIES OF THE AAF PHYSICAL FITNESS TEST: SELECTION OF A TIME LIMIT FOR SIT-UPS. Proj. 245, Rep. 3, July 1944, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

To determine if a time limit may be validly substituted for an unlimited period of time in performing sit-ups 5 groups of Ss performed sit-ups with either a 1, 2, 3, 4 or 5 min. time limit. One week later each group performed sit-ups with an unlimited time limit. The Ss were 2,478 AAF personnel--602 mechanics, 532 basic trainees, and 1,344 aviation cadets. The 3-min. time limit correlated highest with an unlimited period of time in sit-ups performance. However, the correlation coefficient of +.70 (the highest) is too low to justify substituting a 3-min. time limit for an unlimited period of time in individual testing.

2862

Karpovich, P.V. STUDIES OF THE AAF PHYSICAL FITNESS TEST: TRAINING CURVES IN CHINNING. Proj. 245, Rep. 1, April 1944, 3pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

To determine the rate of improvement in chinning performance, a study was conducted on the effect of training on the chinning performance of 98 aviation students, half of whom were of low ability and the others of high ability. Both groups had half the members utilizing a forward grip and the other half a reverse grip. Results were presented in terms of comparison of the chinning test scores and training curves obtained from the various groups.
T. G. I.

2863

Gallagher, J.R. & Brouha, L. A SIMPLE METHOD OF TESTING THE PHYSICAL FITNESS OF BOYS. Res. Quart., March 1943, 23:26, 23-30. (Phillips Academy, Andover, Mass. & The Grant Study, Hygiene Dept., Harvard University, Cambridge, Mass.).

For the purpose of determining the physical fitness of boys, a simple step-test, requiring little equipment and which can be administered to large groups has been described. The greatest value of this test is that it permits the division of boys into groups on the basis of their fitness: the least fit may be separated from the fairly fit and from the very fit. (HEIAS)

2864

Gallagher, J.R., Gallagher, Constance D. & Sloane, A.E. A BRIEF METHOD OF TESTING COLOR VISION WITH PSEUDO-ISOCROMATIC PLATES. Amer. J. Ophthalmol., Feb. 1943, 26(2), 178-181. (Massachusetts Eye & Ear Infirmary, Boston, Mass.).

A brief method for testing color vision, utilizing the pseudo-isochromatic charts published by the American Optical Company, is suggested. This method requires less time to administer, is attended with much less difficulty in interpreting results, avoids the introduction of eye fatigue as a factor in the individual's response, and yet efficiently detects individuals whose color vision is impaired. It is recommended that 10 of the plates (plus three Malingers plates) be used, and that the failure of more than one of these tests be considered evidence of color-vision deficiency.

2866

Chinn, H.I. MOTION SICKNESS. Special Report, Dec. 1951, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The incidence and etiology of motion sickness are reviewed. The efficacy of various drug preparations as prophylactics is considered. The most promising preventive is the antihistaminic Lorgigan. A mixture of Benadryl and hyoscine gives excellent results against airsickness but produces undesirable side effects when taken for 2 or 3 days. Similarly, hyoscine alone or hyoscine aminoxide shows good protection against airsickness but produces side effects during frequent administration. The antihistaminics Dramamine, Trimerton, and Wellcome Preparation 47-83 give good protection. A number of other compounds are listed which give only fair or poor protection.

R 16

2868 Dempster, W.T. SPACE REQUIREMENTS OF THE SEATED OPERATOR. GEOMETRICAL, KINEMATIC, AND MECHANICAL ASPECTS OF THE BODY WITH SPECIAL REFERENCE TO THE LIMBS. Contract AF 18(600) 43, Proj. 7214, Tech. Rep. 55 159, July 1955, 254pp. USAF Aero Medical Lab., Wright Air Development Center, Dayton, Ohio.

The structure of the limb joints and the range and type of their motions were studied on cadaver material, with supplementary work on living subjects, in order to clarify geometric, kinematic and engineering aspects of the limb mechanism. Plans for the construction of manikin joints which showed normal ranges of limb movement were developed from this information. Specifications were also worked out for drafting board manikins which show correct limb ranges for seated postures. Subjects comparable to the model physique of Air Force flying personnel and highly selected small samples of muscular, thin, and rotund builds supplied information on the range of possible hand and foot movements which was consistent with the seated posture. Maximum dimensions of the work space for seated individuals were determined; a study of the kinematic factors involved permitted an evaluation of the potential utility of different regions within reach. Eight cadavers were dismembered to provide data on such physical constants as mass of parts, segment centers of gravity, density and moments of inertia. This work was supplemented by data on the distribution of body bulk in the living subjects studied. Applications of the above information to analyses of horizontal push and pull forces in terms of couples permitted an evaluation of the effectiveness of body mass, leverages and support areas.

R 172

2867 Gilbert, G.H. INTER-SENSORY FACILITATION AND INHIBITION. J. Gen. Psychol., 1941, 25, 381-407. (Psychology Dept., Connecticut College for Women, New London, Conn.).

This paper reviews the effects of heteromodal stimulation on sensitivity--the "dynamic" effect--of auxiliary stimulation. The experimental evidence available to date justifies the following tentative conclusions concerning the effect of heteromodal stimulation on sensitivity to stimulus intensity: Under conditions of momentary heteromodal stimulation a) a sufficiently intense stimulus will momentarily reduce sensitivity in another modality, and increase it after an optimum interval (about 1/2 sec.); b) a less intense heteromodal stimulus will momentarily increase sensitivity. Under conditions of prolonged stimulation, there is some evidence that the quality of the heteromodal stimulus may determine the direction of the effect, some stimuli acting as excitants, others as depressants. The effect will be limited by the lability of the sensation affected and individual differences in the susceptibility to heteromodal influence. The reported effects of heteromodal stimulation in space, color, and pitch discrimination may be regarded for the most part as secondary effects, depending on the effect of heteromodal stimulation on intensive sensitivity. From studies of more complex properties--flicker-fusion and phi-phenomenon--it is evident that on the complex level of stimulation we must also reckon with total field properties. Some of the theoretical implications are briefly discussed.

R 58

2870 Dinamore, Ruth A. & DuBois, P.H. A PRELIMINARY STUDY OF LEARNING IN THE B-500 FLIGHT SIMULATOR. Memo. Rep. 26, July 1952, 18pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C. (Washington University, St. Louis, Mo.).

2870

To evaluate the training proficiency of the B-500 Flight Simulator, the performance of 47 crews during progressively more difficult simulated flights was analyzed. Performance of the aircraft commander, flight engineer, and the entire crew functioning as a team was evaluated by instructors' observations recorded in Simulator Flight Check booklets. The results are presented and discussed in terms of the number of errors evidenced throughout the training course. Progress in certain specific training areas (e.g., emergency procedures, basic flying techniques) is also discussed.

T. G.

2874 Gagne, R.M. & Smith, P.K. CRITERIA OF ANOXIA TOLERANCE: III. EVALUATION OF A GROUP OF PSYCHOLOGICAL TESTS FOR USE AS INDICES OF ANOXIA. Proj. 89, Rep. 3, Nov. 1943, 14pp. USAF School of Aviation Medicine, Randolph Field, Tex.

An experiment was conducted to determine the effectiveness of a number of intellectual and psychomotor tests in revealing decrements in performance under conditions of anoxia. The tests employed were as follows: a) Addition Test; b) Code Substitution Test; c) Speediness Aiming Test; d) Compensatory Pursuit Test; e) a revised form of the Peg Moving Test; and f) Discrimination Reaction Time Test. All tests were found to have satisfactory reliability. The reliability of the Peg Moving Test was comparable to values obtained for the other psychomotor tests. Significant differences in performance under anoxia were shown to occur in the case of the Addition Test, the Pursuit Test, the Steadiness Aiming Test, and the Peg Moving Test. The Code Substitution Test and the Discrimination Reaction Time Test did not reveal significant differences. According to the distribution of differences under the control and experimental conditions, none of the tests in its present form could be used for indoctrination purposes to reveal individual decrements. The Compensatory Pursuit Test shows the most promise in this respect.

R 3

2875
Gray, J.S. & Green, E.L. VOLUNTARY VENTILATION CAPACITY: NORMAL VALUES AND RELIABILITY OF MEASUREMENT. Proj. 449, Rep. 1, Dec. 1945, 11pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Standardization data for a method of measuring the voluntary ventilation capacity of human subjects is presented. The method consists of measuring the ventilation during a brief period of maximum voluntary hyperpnea. Repeated tests in 89 aviation students revealed the reliability coefficient of the test to be 0.90. The mean ventilation capacity was found to be 168 L/min. with a standard deviation of 22 L/min. The ventilation capacity was found to be correlated with surface area, but not with age, height, or weight. A regression equation was obtained from which the normal ventilation capacity may be predicted from a knowledge of the surface area with a standard error of estimate of 15 L/min. This test should be clinically useful as a ventilatory function test of the respiratory system.

2876
Greenberg, R.J. THE INCIDENCE OF AIRSICKNESS IN AAF TRAINING AND COMBAT. A MEDICAL EVALUATION PROGRAM REPORT AAF AS M43. Proj. 467, Rep. 3, ca. 1946, 9pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Data concerning the problems of airsickness were obtained by means of individual interrogation of 1488 combat returnee flying personnel. The interrogation was designed to obtain an estimate of the incidence of airsickness in training and combat, the number of combat missions during which airsickness had interfered with the performance of duty, the flyer's opinion as to the cause of his airsickness, and any remedy he had found effective. The data were compared with other surveys of the incidence of airsickness during training and with the incidence of suspension from flying duty for airsickness during combat. The over-all incidence of airsickness during training was 25.7%. There were 10.2% sick on three or more flights and 2.9% on ten or more. All completed their training and tour of combat duty. The over-all incidence of airsickness during combat was small, 5.4%, comprised of 3.7% who had been airsick during training and 1.7% who had not. The rate of interference with the performance of duty during a combat mission because of airsickness was very low, 0.2% per one thousand man-missions for 29,501 man-missions. The remedies most frequently found to be effective in overcoming airsickness were "relax in the aircraft, continue to fly, stick with it until the symptoms no longer occur, eat moderately, don't eat foods that disagree with you, direct your attention, keep busy, think of something else".

2877
Greenberg, R.J. AN EVALUATION OF THE ALTITUDE TRAINING PROGRAM. A MEDICAL EVALUATION PROGRAM REPORT AAF-AS-M 43. Proj. 467, Rep. 1, ca. 1946, 7pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

2877
The AAF Altitude Training Program was evaluated by means of questionnaires administered to 1485 men, combat flying returnees, who received their training between 1941 and 1945. From the data were estimated the amount of training received and the general effectiveness of the program. Ratings given to three aspects of the program—lectures, training aids, and preparation for combat—and to more specific portions of the program (e.g., emergency procedures) were analyzed according to aircraft type, year of training, and number of combat missions undergone by the respondent. Recommendations for improving the program were made.

2878
Grether, W.F. CRITERIA OF ANXIA TOLERANCE: I. DEVELOPMENT OF PSYCHOLOGICAL TESTS FOR USE IN THE ALTITUDE CHAMBER. Proj. 89, Rep. 1, Dec. 1942, 12pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

2878
Seven psychological tests to be used for the measurement of intellectual and motor functions in an altitude chamber are described and evaluated. Criteria for evaluation include the effect of practice on performance, range of scores, and reliability. The tests were administered to groups of Ss, which included from 15 to 24 persons, on five different occasions. Learning curves are constructed and test-retest and odd-even reliability coefficients are computed on the basis of the scores. Each test is described briefly. Instructions and, for the three apparatus tests, wiring diagrams are reproduced.

2879
Grether, W.F., Connell, E., & Bjornstad, Jeanne M. EXPERIMENTAL EVALUATION OF THE NEW LONDON NAVY LANTERN FOR TESTING COLOR PERCEPTION. Rep. MCREXD 694 218, March 1949, 11pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio

An evaluation was made of the New London Navy Lantern by testing and retesting 10 color deficient and 71 color normal adults on the lantern, 3 Pseudo-Isometric Charts, 2 Anomalous Scope, and a Neutral Point test. The findings concerning the Navy Lantern may be summarized as follows: a) 5 of the 10 color deficient Ss made no errors on the Navy Lantern on the first test, and 3 of these 5 made no errors on the retest. This indicates that many color deficient individuals will not be detected by one trial on this lantern. Whether those not detected may be considered "color safe" for aircrew training was not determined by this investigation; b) 7 out of 71 color normal individuals made 1 or more errors on the Navy Lantern during either the test or the retest. This indicates that unless supplemented by another color vision test or administered by an exceptionally cautious and skillful examiner some individuals will be falsely diagnosed as color blind by the Navy Lantern; c) The general design of the Navy Lantern was found to be very excellent for convenience as a color testing device. A number of mechanical difficulties were experienced which could be corrected easily in future models.

2880

Grodins, F.S. THE EFFECT OF SEVEN HOUR EXPOSURE TO A PRESSURE ALTITUDE OF 10,000 FEET ON PSYCHOMOTOR PERFORMANCE. Proj. 402, Rep. 1, June 1945, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The psychomotor performance of 15 Ss was tested continuously on the SAM single dimension pursuit meter during a 7-hr. exposure to an altitude of 10,000 ft. A control group of 19 Ss was tested at an altitude of 1,500 ft. No significant differences were found between the average performance, measured by time on target at 30 min. intervals, of the control and test groups during the 7-hr. period. The negative results obtained mean either a) that there was no impairment of psychomotor efficiency or b) that there was impairment in efficiency but that sufficient reserve was available to compensate for it. Thus, the results obtained permit no conclusion as to whether or not a decrease in psychomotor efficiency occurred. (HEIAS) R 9

2881

Hemingway, A. AN APPARATUS FOR MEASURING THE ONSET OF SWEATING DURING THE DEVELOPMENT OF MOTION SICKNESS. Proj. 92, Rep. 1, Nov. 1942, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A galvanometric method which indicates the onset of sweating during motion sickness is described. The method described has been used on more than 100 swing tests for measuring susceptibility to motion sickness. It predicts with a high degree of accuracy the onset of sweating. In a few cases, as a rough estimate of 10% or less, Ss will become sick without sweating. The method is simple in operation and the circuit is easily assembled. (HEIAS)

2882

Hemingway, A. RESULTS ON 500 SWING TESTS FOR INVESTIGATING MOTION SICKNESS. Proj. 31, Rep. 2, Nov. 1942, 9pp. USAF School of Aviation Medicine, Randolph Field, Tex.

500 swing tests have been performed on glider pilots, cadets and airborne infantry. The incidence of swing sickness in 438 men--selected pro-glider pilots is 28.5% with half of these being mild and the other half severe cases of swing sickness. In a group of 16 cadets and navigators who were hospitalized for airsickness, the incidence of swing sickness was 100%. In a group of 35 airborne infantry who were airsick on recent maneuvers, the incidence of swing sickness was 80%. Blood pressures, pulse rates, and body temperatures were measured before and after swinging for all individuals tested. There were no significant changes. The incidence of swing sickness has been related to the history of motion sickness as determined by a questionnaire. A standardized scoring system was developed for the swing test. This standardized system is recommended as a means of measuring susceptibility to motion sickness.

2883

Hemingway, A. SPEECH INTELLIGIBILITY AT HIGH ALTITUDE IN THE COLD UNDER CONDITIONS WHICH CAUSE ICE FORMATION IN THE MASK. Proj. 398, Rep. 1, Aug. 1945, 13pp. USAF School of Aviation Medicine, Randolph Field, Tex.

13 altitude chamber flights were performed to determine the usefulness of mask heaters for the prevention of ice formation in oxygen masks at high altitudes and to investigate the effect of the heaters on speech intelligibility. 15 Ss with heated and 15 Ss with unheated masks read word lists at 60°F and 20,000 ft. altitude. Recognition of the recorded readings was tested the next day. Using heated masks there were significant increases in speech intelligibility as indicated by the reduction in errors of word recognition, and by the reduction in equipment failure after 3 hrs. (HEIAS)

2884

Rowland, Louise S. SELECTION OF A BATTERY OF COLOR VISION TESTS. Proj. 108, Rep. 1, Feb. 1943, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

5 tests of color perception were given to 160 Ss. The purpose was to evaluate these tests as to their suitability for rapid screening of all color deficiencies, quantitative tests of degree of defect, or as adjunct tests for obtaining further information. Not all Ss were given all 5 tests. The Rabkin (Russian) is proved to be the best and simplest screening test of all those studied. It is not now available in quantity and the abridged version of the A.O. charts (S.A.M. Res. Proj. 68, Rep. 1 & 2) is the next best choice. According to the present data, the threshold lantern (S.A.M. Res. Proj. 97, Rep. 1) provides the best means of estimating the degree of defect: first, because it distinguishes 6 different degrees of color deficiency, whereas, the other tests provide only 3; second, it bears a close relationship to one of the more important field requirements in that it employs Aviation Colors as defined by the Bureau of Standards. It is recommended that further studies be made with these and additional tests on larger groups of normal and color deficient Ss. It is further recommended that test which prove most suitable as quantitative tests be studied in relation to actual performances such as the identification of flares, signals, etc. and other operational duties which may be indicated after a "job analysis" is completed.

2885

Schmidt, Ingeborg. NEW TESTS FOR THE EXAMINATION AND TRAINING OF COLOR VISION. III. COLOR VISION MULTITESTER (SIGNAL LAMP) FOR AVIATION. Proj. 21 29 006, Rep. 3, April 1952, 14pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

2885

This report gives a detailed description of the development and design of a signal lamp which may more effectively classify color defectives than color vision tests currently used. Specifically designed for aviation testing, the Color Vision Multitester for Aviation presents such features as fixed exposure and inter-exposure periods, transportability, simultaneous testing of five applicants as well as other more technical aspects.

T. G. I. R 14

2887

Smith, R.B. STUDY OF ACETATE HOODS USED TO SIMULATE BLIND FLYING. Proj. 511, Rep. 1, Feb. 1948, 5pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

2887

To determine whether the use of acetate filters on cockpits in simulated blind flying constitute a cause of headaches, the specifications of the filters used by the USAF were examined. A clinical examination of 20 men having approximately equal vision in the two eyes was made as follows: 1) visual acuity was determined at distance of 20 ft. without a filter, through neutral gray, red, and blue filters, and 2) muscle balance was tested under the same conditions. Both types of readings were converted to continuous variables and studied by analysis of variance.

T.

2888

Cibis, P.A. & Halperin, H. FAULTY DEPTH PERCEPTION CAUSED BY CYCLOTORSION OF THE EYES. Proj. 21 24 013, Rep. 1, Sept. 1951, 10pp. USAF School of Aviation Medicine, Randolph Field, Tex.

100 Ss were examined for cyclotorsion in 2 different tests. 70 gave evidence of marked cyclotorsion significant on a 5% probability level when the illumination or state of adaptation was changed. The investigation revealed, furthermore, that cyclofusional compulsions during bright adaptation continued, although gradually attenuating, up to 15 minutes during the period of dark adaptation. The effect of general oxygen deficiency and alcoholic intoxication on cyclotorsion was studied in a limited number of Ss.

R 17

2889

Strughold, H. INVESTIGATIONS ON THE USEFULNESS OF CONTACT LENSES IN FLIGHT. i. THE SENSIBILITY OF CORNEA AND CONJUNCTIVA OF THE HUMAN EYE. Proj. 21 24 005, Rep. 1, May 1951, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The sensations and their topographical distribution on the cornea and conjunctiva of the human eye are reviewed. The purpose of the review is to provide a summary of this data as a basis for the construction and use of contact lenses. The cornea and conjunctiva, bulbi of the human eye respond to mechanical stimuli with pain sensation only. The pressure sense is not represented in these areas. The center of the cornea is the most pain-sensitive spot of the whole body. The border of the cornea is 10 times, and the corneal border of the conjunctiva bulbi is about 150 times, less sensitive than the center of the cornea. This zonal difference in the sensitivity to mechanical stimuli is of significance in the problem of fitting contact lenses. Finally, for comparison, a review is given of the topography of the temperature sense on the cornea and conjunctiva.

R 35

2890

Rowland, W.M. THE EFFECT OF SULFATHIAZOLE AND SULFADIAZINE ON VISUAL FIELDS, OCULAR MOTILITY, AND DEPTH PERCEPTION. Proj. 99, Rep. 1, Dec. 1942, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Data was collected from 8 Ss to study the effect of sulfathiazole and sulfadiazine on visual fields, ocular motility and depth perception. From the data obtained it was concluded that: a) The visual fields for white, red, and blue of Ss who had taken 4 grams a day of sulfathiazole or of sulfadiazine over a period of 5 days were not affected by these drugs; b) Ocular motility as measured by adduction and abduction was not significantly affected by the administration of similar doses of these drugs; c) Depth perception was not adversely affected in Ss who had such therapy.

2891

Keil, F.C. THE EFFECTS OF LOW BAROMETRIC PRESSURE ON THE FIELD OF VISION. Proj. 158, Rep. 1, June 1943, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Visual field defects of sufficient severity to be observed subjectively occurred as a result of ascent to a simulated altitude above 33,000 feet in 1.8 per cent of 500 subjects studied. These defects were a part of a more or less characteristic syndrome, i.e., joint pains, "chokes", headaches, visual symptoms, and collapse. In the 9 cases studied, no permanent damage resulted.

2892

Campbell, P.A. POSSIBLE EFFECTS OF SMALL DAILY DOSES OF SULFADIAZINE ON FLYING PERSONNEL. Proj. 293, Rep. 1, July 1944, 37pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Daily doses of 1 gm. of sulfadiazine were given to 19 Ss for 6 weeks. Plasma levels of free sulfadiazine averaged from 2 to 5 mgm. per cent depending on the time after the administration of the drug. No decrement in performance was found on a battery of psychological tests (3 psychomotor and 3 paper and pencil), either at ground level or without supplementary oxygen at 18,000 ft. simulated altitude, was found. No significant effects were found on: a) physical fitness; b) blood morphology or hemoglobin concentration; c) bacteriological flora of the nose and throat; d) auditory acuity; e) visual functions including light threshold and foveal visual acuity; f) ability to equilibrate while blindfolded; and g) susceptibility to motion sickness. It is recommended that flying personnel be permitted to fly whether or not they are receiving daily doses of 1 gm. of sulfadiazine unless it is demonstrated that they are unusually sensitive to the drug. (HEIAS)

R 1

2893

Keil, F.C., Jr. VISUAL FIELDS IN THE DARK-ADAPTED STATE. Proj. 35, Rep. 1, Dec. 1942, 5pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

2893

To determine the size of the physiological central scotoma (hence the available sensitive retina at low illuminations) present under dark adapted conditions, measurements were taken on 22 subjects at three brightness levels (4.3, 4.9, 5.2 log micromicrolamberts) during the course of and after dark adaption on both dark-field and bright-field scotometers. The data are presented graphically and analyzed for individual differences. Discussion is related to testing of night visual efficiency and implications for training in night visual tasks.

T. G. 1.

2896

Bernage, J.J., Norrishan, R. & Ellison, B.C. AN EXPERIMENTAL EVALUATION OF THE APPLICATION OF HARMONIC ANALYSIS TO THE TRACKING BEHAVIOR OF THE HUMAN OPERATOR. Contract AF 18(600) 16, RDB 694 39, Tech. Rep. 53 304, May 1954, 36pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio.

5 experiments were carried out to determine the applicability of harmonic analysis to the tracking behavior of the human operator for the purpose of obtaining descriptions of the behavior useful to systems design engineers. The results indicate that the behavior is non-stationary and nonlinear in all the visual tracking situations. However, under the condition of an auditory input, neither equally equivalent to and presented simultaneously with the visual input the behavior is stationary. The error behavior in this case resembles low power, random noise.

R 4

2897

Bernage, Isabel R. THE RELIABILITY OF HEIGHT, WEIGHT, CHEST, AND ABDOMINAL MEASUREMENTS OF AVIATION CADETS. Proj. 18, Rep. 1, July 1942, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Measurements of height, weight, chest, and abdomen of 230 aviation cadets were examined for reliability by comparing the dimensions recorded on WD AGO Form 63, Physical Examinations, and on WD AGO Form 64, Physical Examination for flying. From this data it was concluded that: a) Measurements of height and weight as recorded on WD AGO Form 63 and on WD AGO Form 64, are highly reliable; b) Independent judgments of height are correlated to the extent of .97; of weight, .96. (The coefficient of correlation may vary from 1.00 for perfect inverse relationship through 0 for random relationship, to 1.00 for perfect positive relationship); c) The dimensions of the chest at expiration and of the abdomen as recorded show moderately high reliability. The correlation between successive measurements is .76 for chest at expiration and .76 for abdominal circumference; d) Chest expansion as recorded demonstrates low reliability. The correlation between chest expansion as reported on WD AGO Form 63 and WD AGO Form 64 is .37; e) With rare exception, measurements of height and of chest are now recorded to the nearest half inch, rather than the nearest quarter inch as directed in par. 25, AR 40 105 and par. 27, AR 40 105. It is recommended that steps be taken to increase the reliability of chest expansion measurements.

2899

Buel, J. DEVELOPMENT OF A 'FALLING HAMMER' FOR PRODUCING PSYCHOLOGICAL STRESS. Proj. 285, Rep. 1, July 1944, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A "Falling Hammer" for producing psychological stress are described. The apparatus is in fact dangerous to S if all procedures to insure safety are not carried out. However, even though S knows he is safe from harm, apprehension persists. The stimulus is the sight and sound of a black object--the "hammer"--which falls and strikes a loud blow near S's hand. (HEIAS)

2900

Buettner, K. EFFECTS OF EXTREME HEAT ON MAN. 1. PROTECTION OF MAN AGAINST CONFLAGRATION HEAT. Proj. 21 02 103, Rep. 1, Feb. 1950, 1Epp. USAF School of Aviation Medicine, Randolph Field, Tex.

Large scale conflagration and the heat flash of the atomic bomb not only add to the known dangers of fire, but also produce entirely new hazards. The laws of heat exchange from fire to man and those of his main physiological responses are briefly discussed. In addition to CO poisoning and the many hazards caused by the vastness of the destructions, radiant heat is of utmost importance. It can be thoroughly averted by using aluminum protective clothing.

R 10

2901

Burchell, H.B. REPORT OF ACCIDENTS RESULTING FROM ANOXIA IN AIRCRAFT. Proj. 206, Rep. 2, April 1944, 11pp. USAF School of Aviation Medicine, Randolph Field, Tex.

42 fatal and 139 non-fatal cases of anoxia occurring in heavy bombardment aircraft have been reviewed. Since the most frequent cause of anoxia with demand equipment has been the inadvertent disconnection of the mask-to-regulator tubing, continued emphasis in indoctrination on this hazard should be given to flying personnel. Freezing of the continuous flow mask was the outstanding cause of anoxia when this type of equipment was used. Freezing of demand masks of both the A-10 and A-14 types is being reported in increasing numbers and continued investigation on methods of preventing this is indicated. Anoxia due to poor indoctrination has practically disappeared from the recent reports. If indoctrination is to be improved further the only suggestions are that more practical teaching be given on handling of specific emergencies. There is enough evidence in the reports received that is worthwhile to teach crew members how to perform artificial respiration. 3 lives were apparently saved in combat aircraft by continued artificial respiration. A few suggestions concerning how the reports of anoxic deaths should be written are given. Questionnaire forms have been less useful in teaching than letter reports which give a running account of the anoxic accident. Sufficient data on accidents resulting from anoxia in aircraft are now available to make a training film covering the subject.

2902

Campbell, P.A. A PRELIMINARY REPORT ON THE STUDY OF AIRSICKNESS. Proj. 31, Rep. 1, Aug. 1942, 28pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A number of methods were tried in order to find which tests are most efficient for the determination of susceptibility to airsickness before flight. The methods used were the questionnaire, the swing test, vestibular tests, and gastrointestinal studies. Of 150 men given the swing test, 112 had no symptoms of swing sickness, 17 had mild symptoms, and 21 had severe symptoms. Analysis of the swing tests show that 43% of airsickness susceptibles were swingsick in 20 min. of supine swinging, while only 11% of non-susceptibles were swingsick. The vestibular tests (vertigo, nausea, sweating, and pallor) show a similar order of predictability value. Combining the 2 tests does not add appreciably to predictability. Partial analysis of the questionnaire method indicates that history of motion sickness is fairly dependable in predicting that airsickness will occur. The gastrointestinal survey shows that in most individuals the motion of swinging depresses gastric motor function as measured by tone and peristalsis. None of the Ss who maintained some gastric peristalsis showed any evidence of motion sickness. (HEIAS)

2906

Garvey, W.D., Knowles, W.B. & Newlin, E.P. PREDICTION OF FUTURE POSITION OF A TARGET TRACK ON FOUR TYPES OF DISPLAYS. Proj. NR 592 030, NML Rep. 4721, April 1956, 9pp. USAF Research Lab., Washington, D.C.

2906

Tracking on a search radar scope or vertical plotting board often requires the prediction of future positions of a target based on its past history. Accuracy of prediction was measured in terms of deviations in range and bearing between estimated and actual position plots of four different displays: linear and non-linear Plan-Position Indicators, linear and non-linear E-scan. Sixty problems were presented to 32 subjects. Signals were presented at the rate of six per minute; after the second signal, the subject indicated the estimated position of the next signal by a mark, and so on through the track. Accuracy of performance was compared for the four displays.
T. G. I. R 4

2907

Greenhill, L.P. INSTRUCTIONAL FILM RESEARCH PROGRAM. FINAL REPORT. Contract N6CMR 269, March 1956, 21pp. Pennsylvania State University, State College, Penn.

2907

This is the final report of the Instructional Film Research Program at the Pennsylvania State University. Included are a brief history of the program, a list of the studies carried out in four major areas (teaching of performance skills by film, teaching of facts and principles by film, film utilization studies, restructuring of attitudes through films), and a list of the staff members.
R 155

2909

Hurvich, L.M. THE RANGE OF APPREHENSION AND SENSORY DISCRIMINATION. J. exp. Psychol., Sept. 1940, 27(3), 313-317. (Harvard University, Cambridge, Mass.).

2909

To determine the span of apprehension for both monocular and binocular vision, stimulus cards (five to ten dots) were presented tachistoscopically at a fixed illumination (1.2 ft.-c) and for a fixed time interval (100 msec.) to six observers. Data were total number of correct judgments and reaction times for each stimulus for right, left and both eyes together. Discussion is in terms of theoretical implications.
T. R 15

2910

Harding, J.G. CAMOUFLAGE OF ARMY AIRCRAFT UNDER ARCTIC CONDITIONS. Proj. AA 1253, 3pp. USA Arctic Test Branch, Big Delta, Alaska.

2910

To determine the most suitable camouflage scheme for Army aircraft under Arctic conditions, the L-19A aircraft and the standard H-13C Helicopter (olive drab with red wing tips and empennage, red, white, and blue national insignia) were studied. Standard all-season camouflage nets were used in combination with various improvised covers and paint schemes. Aerial photographs were made of the various schemes and evaluated in terms of effective concealment for various seasons and terrains as well as the man-hours required. Recommendations are included.
I.

2911

Higgins Ink Co., Inc. TECHNICAL ILLUSTRATION. 1953, 62pp. Higgins Ink Co., Inc., 271 Ninth St., Brooklyn 15, N.Y.

2911

This manual on technical illustration includes discussions of axonometric drawing, perspective drawing, lettering, rendering techniques, and graphic training aids (wall charts, static overhead projection transparencies, operable overhead projection transparencies, and lantern slides).
I.

2912

Helson, H., & Grove, Josephine. CHANGES IN HUE, LIGHTNESS, AND SATURATION OF SURFACE COLORS IN PASSING FROM DAYLIGHT TO INCANDESCENT-LAMP LIGHT. J. opt. Soc. Amer., 1947, 37, 387-395. (Bryn Mawr College)

2912

To study changes of surface color caused by shifting from daylight to incandescent-lamp light. Trained observers viewed Munsell color chips (13 hues, various values and chroma levels) under Illuminant A and matched each to a sample as viewed under Illuminant C. Each color was presented against white, gray, and black backgrounds. Discussion concerns observed shifts of the three color dimensions (hue, lightness, saturation) as a function of illumination as compared to "expected" shifts predicted from the Helson-Judd color conversion principle.
T, I, R 4.

2913

Immergluck, L. THE ROLE OF SET IN PERCEPTUAL JUDGMENT. J. Psychol., 1952, 34, 181-189. (Dept. of Psychology, Sarah Lawrence College, Bronxville, N.Y.).

2913

Some aspects of the role of set in the area of perceptual judgment were investigated--specifically, the extent to which simple perceptual responses are subject to routinization and how such routinization will affect perceptual judgment. Two series of cards, each containing a pair of simple geometric designs (one of which was a more perfect geometric example), were prepared; one series contained the more perfect figures on the right side, the other used a mixed order. The final card for both series placed the more perfect figure on the left. One group of 16 subjects responded to the set series, the other to the mixed series. Errors on the final card were recorded and compared in terms of the initial questions posed.
T. I. R 15

2908

Grinstead, A.D. & Ambler, Rosalie K. A STUDY OF THE DISTRIBUTION OF AIRCRAFT ACCIDENTS IN NAVAL AIR TRAINING. Proj. Rep. NM 001 059 20-01, April 1951, 9pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

This study was undertaken to determine whether accidents occur more frequently than chance allows at any particular time of day. Data were taken from the flight and accident records of 9TU-1 for the period 15 October 1949 through 14 October 1950. During this year 69,911 hops were flown and 43 accidents due to causes other than material failure occurred. There were 9 flight training periods beginning at 0730, 0830, 0930, 1030, 1130, 1230, 1430, and 1500 respectively. The total number of hops and "non-material" accidents was recorded for each of the daily flight training periods. Since all periods overlapped, a plane was assigned to a training period on the basis of take-off time. The 2 diurnal curves plotted from the data closely approximated each other in shape; this suggested that accident occurrence was a function of the number of planes in the air at a given time. To examine this possibility, the ratio of the number of accidents to the number of hops was calculated for each period and compared with the theoretical ratio of accidents to hops based on chance expectancy for each period. The observed ratio of the number of accidents to the number of hops was not significantly different from the theoretical ratio based on chance. Further, the difference between accident occurrence in each training period and accident occurrence for the remainder of the day was not significantly different. The data were analyzed in the same manner for days of the week instead of periods of the day; similar results were obtained. It was concluded that, within the limits of this data, periods of the day when accidents occur more frequently are simply the periods when there are more planes in operation; and that no systematic factor is in operation in the distribution of these accidents by days of the week.

2919

Lovell, G.D. & Morgan, J.J.B. PHYSIOLOGICAL AND MOTOR RESPONSES TO A REGULARLY RECURRING SOUND: A STUDY IN MONOTONY. *J. exp. Psychol.*, June 1942, 30(6), 435-451. (Northwestern University, Evanston, Ill.).

An experiment was devised to determine in part the behavior displayed by Ss in response to a regularly recurring tone of 60 cps. The tone rate was set both faster and slower than the normal respiration of each S and changes in his breathing were recorded, as he sat quietly in a Morris chair for 40 min. Pulse rate and palmar skin resistance were recorded and Ss were observed by E for any overt accompaniments to the sounder. Each of the 38 Ss filled out a questionnaire relating to his attitude during the experiment and to his relaxation habits. The results indicate the following conclusions: a) the respiration rate of Ss approximates that of the sounder, and breathing becomes rather regular; b) Ss relax significantly during a period of such stimulation whether the rate is faster or slower than normal respiration rate; c) Ss given definite instructions and suggestions to relax did not show any difference in relaxation from Ss which had no such instruction; d) since respiration changes were noted in all Ss, and motor accompaniments to the regularity of the sound, such as bobbing the head, were observed in most Ss, the inference was drawn that such responses aid in the relaxation that was observed. It was proposed that these motor responses help to discharge surplus energy or tension in the body and thus allow a greater degree of relaxation than would otherwise be attained. (MEIAS)

R 45

2916

Krendel, E.S. A SURVEY OF SUGGESTED MATHEMATICAL METHODS FOR THE STUDY OF HUMAN PILOT'S RESPONSES. *Ca.* 1953, 128-135. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio. (Franklin Institute Laboratories, Philadelphia, Penn.).

This paper reviews some of the past suggestions for appropriate mathematical models to describe human operator performance and presents some of the current thinking at the Franklin Institute on the problem. The non-linear nature of the human operator is discussed and the difficulties in attempting to arrive at a linear, time invariant description of human operator behavior are pointed up. Transfer functions which have been proposed are discussed briefly. The use of spectral densities, at the Franklin Institute, for examining behavioral characteristics and some preliminary experiments are described. (MEIAS)

R 8

2920

Peters, R.V. THE RELATIVE INTELLIGIBILITY OF SINGLE-VOICE AND MULTIPLE-VOICE MESSAGES UNDER VARIOUS CONDITIONS OF NOISE. JOINT PROJECT REPORT. Proj. #M COI 104 500.56, July 1955, 9pp. USN School of Aviation Medicine, Pensacola Air Station, Fla. & Ohio State University Research Foundation, Columbus, Ohio.

The purpose of the present experiment was to test the hypothesis that continuity of voice during a message transmission contributes to listener efficiency. Evaluations were made of the intelligibility of single-voice and multiple-voice transmissions under a) 5 conditions of white noise and b) 3 conditions of speech babble. 48 speakers served as experimental Ss. The voice transmissions were multiple-choice intelligibility test word groupings. The following conclusions may be drawn on the basis of the experimental results: a) Continuity of voice during a message transmission contributes to listener efficiency. Under conditions of both white noise and speech babble, single-voice transmissions were consistently more intelligible than were multiple-voice transmissions; b) The contribution of continuity of voice to listener efficiency may vary according to the particular listening conditions as was indicated by the fact that the mean values of intelligibility did not follow the same trend for single-voice and multiple-voice transmissions under the 5 conditions of white noise.

R 4

2920

Oseas, L. & Underwood, B.J. STUDIES OF DISTRIBUTED PRACTICE: V. LEARNING AND RETENTION OF CONCEPTS. *J. exp. Psychol.*, Feb. 1952, 43(2), 143-149. (Northwestern University, Evanston, Ill.).

2920

The effect of distribution of practice on concept learning was studied. Four groups of 18 college students learned nine simple concepts (sizes and shapes of geometrical forms) each with a given interval between presentations of stimulus lists (6, 15, 30, or 60 seconds). Learning and retention scores (trials to criterion) obtained by the groups are compared.

T.G.R 9

2921

Hamon, R.L. LIGHTING SCHOOLROOMS. Pamphlet 104. 17pp. Federal Security Agency, U.S. Office of Educ.

2921

This pamphlet gives a non-technical background on school lighting for the information of architects, school plant planners, and educational administrators. It includes definitions of terms and discussion and recommendations for (1) brightness, balance of natural and artificial light sources and reflecting surfaces within the visual environment, (2) penetration and control of ambient illumination, and (3) artificial illumination.

R 3

2924

Peters, R.W. STUDIES IN LISTENER RECEPTION OF VOICE MESSAGES: THE PERSISTENCE OF THE EFFECTS OF LISTENING CONDITIONS. JOINT PROJECT REPORT. NM 001 104 500.55, June 1955, 7pp. USM School of Aviation Medicine, Pensacola Air Station, Fla. & Ohio State University Research Foundation, Columbus, Ohio.

The purpose of the present experiment was to test the effect of various S/N ratio listening conditions upon the reception of subsequent materials. Listeners were tested following indoctrination listening at +8 db, 0 db, or -8 db S/N ratios. All listeners were tested at a 0 db S/N ratio. Testing and indoctrination materials were written down intelligibility words presented with white noise at the various S/N ratios. Three groups of listeners, with 38 persons in each group, served as experimental subjects. The results indicate a persistence effect of an adverse listening condition upon the reception of subsequent materials. Mean reception values were significantly lower for listeners indoctrinated at -8 db S/N ratio prior to their response to test materials than were the reception values for the listeners indoctrinated at either +8 db or 0 db S/N ratios.

R 2

2925

Peters, R.W. LISTENER PERFORMANCE AS A FUNCTION OF LISTENING TIME FOR VARIOUS SIGNAL-TO-NOISE CONDITIONS. JOINT PROJECT REPORT. NM 001 104 500.55, June 1955, 8pp. USM School of Aviation Medicine, Pensacola Air Station, Fla. & Ohio State University Research Foundation, Columbus, Ohio.

Listener reception was evaluated, with respect to values earned at the end of 8 cumulative time intervals during an hour of continuous testing, for several signal-to-noise conditions. The noise was babel, prepared by superimposing 2 voices on a single recording. Mean values of listener reception did not follow the same trend for each listening condition. As the signal-to-noise ratio was decreased, a temporary decrement in listener reception followed after approximately one-half hour of listening. This decrement became more pronounced and more lasting as the signal-to-noise ratio was decreased.

R 5

2926

Reynolds, B. & Adams, J.A. PSYCHOMOTOR PERFORMANCE AS A FUNCTION OF INITIAL LEVEL OF ABILITY. *Amer. J. Psychol.*, June 1954, 67(2), 266-277. (USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.).

2926

In an investigation of the learning of a motor task as a function of level of initial ability, two groups of 480 subjects (basic airman trainees) were given 80 and 60 20-second trials on the Rotary Pursuit Test with massed or with distributed practice (with a 5-second or a 30-second intertrial interval). Each group was subdivided into deciles on the basis of performance on the first five trials. Learning curves (time on target over trials) for the various subgroups are compared, and the scores are analyzed statistically.

T. G. R 6

2931

Graham, C.H. & Bartlett, H.R. THE RELATION OF SIZE OF STIMULUS AND INTENSITY IN THE HUMAN EYE: III. THE INFLUENCE OF AREA ON FOVEAL INTENSITY DISCRIMINATION. *J. exp. Psychol.*, 1940, 27, 149-159. (Psychological Lab., Brown University, Providence, R.I.).

2931

To study the influence of area on foveal (cone) intensity discrimination, threshold determinations were made by two subjects for six circular areas varying in radius from 2 to 28 minutes of visual angle at a constant exposure duration (0.03 seconds), and over a range of 4.6 log units of adapting intensity. The data are presented graphically and discussed in terms of visual theory.

T. G. R 8

2932

Wickens, D.D. & Briggs, G.E. MEDIATED STIMULUS GENERALIZATION AS A FACTOR IN SENSORY PRE-CONDITIONING. *J. exp. Psychol.*, Sept. 1951, 42(3), 197-200. (Ohio State University, Columbus, Ohio & University of Wisconsin, Madison, Wisc.).

2932

To investigate the role of mediated stimulus generalization in sensory pre-conditioning, four groups of ten subjects each were assigned to one of the following conditions: 1) a verbal response to paired stimuli (a tone and light); 2) a verbal response to the same stimuli presented independently; and 3) a verbal response to one but not the other stimulus (with two groups of subjects assigned here). The results are presented and discussed in terms of the frequency of response transfer manifested under each condition of sensory pre-conditioning.

T. R 5

2930
Graham, C.H. VISUAL SPACE PERCEPTION. *Fed. Proc.*, June 1943, 2(2), 115-122. (Psychology Lab., Brown University, Providence, R.I.).

This paper is a brief summary of the cues, monocular and binocular, used in visual space perception. Stereoscopic range finding is then considered, both from the standpoint of the instrument and the operator. Next, coincidence range finding is considered. These 2 types of range finding illustrate the use of monocular cues (coincidence range finding) and of binocular cues (stereoscopic range finding). This leads to a brief consideration of perceptual constancy. Lastly the perception of movement and speed is briefly considered.

(HEIAS)
R 5

2933

Minograd, L. & Van Dyke, R.D., Jr. FLIGHT DETERMINATION OF THE EFFECTS OF RUDDER-PEDAL-FORCE CHARACTERISTICS ON THE AIMING ERROR IN AZIMUTH OF A CONVENTIONAL FIGHTER AIRPLANE. NACA Res. Memo. RM A50006, July 1950, 32pp. National Advisory Committee for Aeronautics, Washington, D.C. (USAF Aces Aeronautical Lab., Moffett Field, Calif.).

Flight tests were conducted to study the effect on the aiming error in azimuth of a change in the rudder-pedal-force characteristics of a conventional fighter airplane equipped with an illuminated fixed gunsight. Simulated gunnery runs were made on both ground and aerial targets with the normal rudder and with a rudder so modified that the rudder-pedal-force variation in sideslip was approximately zero. The effect of the modification on the mean azimuth tracking errors was insignificant (less than 1 mil); however, the pilots noted that with the modified rudder it was fatiguing to fly the airplane for any length of time.

R 0

2941

Bousfield, W.A., Esterson, J., & Whitmarsh, G.A. THE EFFECTS OF CONCOMITANT COLORED AND UNCOLORED PICTORIAL REPRESENTATIONS ON THE LEARNING OF STIMULUS-WORDS. Contract Nonr-651(00), Tech. Rep. 18, June 1956, 8pp. ONR, University of Connecticut.

2941

To investigate the effect upon learning of providing additional cues to the stimulus, 165 subjects were given two successive presentations of 25 stimulus words (nouns) in five categories either as to concept or color under three conditions: (1) words alone, (2) words presented simultaneously with their uncolored picture, or (3) words presented simultaneously with their colored picture. These conditions represented varying degrees of compound-ness of signs represented by the object. The number of stimulus words recalled correctly immediately after presentation was evaluated by analysis of variance techniques for differences due to experimental conditions. Errors (words not in stimulus list, repeated words) were analyzed separately for the three conditions. A theoretical rationale of the study is presented. T. R 3

2944

Briggs, G.E. & Brogden, W.J. THE EFFECT OF COMPONENT PRACTICE ON PERFORMANCE OF A LEVER-POSITIONING SKILL. J. exp. Psychol., Nov. 1954, 48(5), 375-380. (University of Wisconsin, Madison, Wisc.). (AFPTIC TN 55 54).

2944

To investigate the effect of component practice upon performance of a motor task, four groups of eight Ss each were given practice on a lever-positioning task (a modified USAF Complex Coordination Test, Model E). While one group received practice on the whole task, the other groups practiced on various combinations of components and the whole task. The results are discussed in terms of a comparison between whole and part practice with regard to acquisition of skill on the whole task.

G. R 4

2945

Barger, D.M. TARGET GENERATING SYSTEM, TGS-1. Tech. Rep. 166 1 76, Jan. 1954, 52pp. Institute for Cooperative Research, Johns Hopkins University, Baltimore, Md.

2945

This is a report of a target generating system (TGS-1) designed as an instrument for research on problems of radar design and operation. A description of the various controls of this display is presented along with a detailed discussion of its design and operation.

G. I. R 7

2946
Belwin Company. FREQUENCY RANGE RESTRICTION EFFECTS UPON AN/AIC-10(VA-1) ARTICULATION SCORES IN 120 DB AMBIENT NOISE LEVELS WITH VARIOUS LEVELS OF STATIC INTERFERENCE. Contract AF 33(038) 23313, Rep. AFAC-5, May 1952, 16pp. Engineering and Research Department, Belwin Company, Cincinnati, Ohio.

The word articulation performance of Intercommunication Set AN/AIC-10(VA-1) was studied experimentally under controlled conditions of reduced bandwidth, simulated electrical noise and ambient acoustical noise such as would exist when listening in an aircraft to radio communication from another aircraft under marginal reception conditions. It was found that in a 120 db jet-aircraft type of noise spectrum the full frequency range of which AN/AIC-10(VA-1) is capable (approximately 300-6500 cps) is required for best intelligibility. This requirement holds for a wide variety of static interference conditions. In 120 db propeller-driven aircraft type of noise spectrum, degradation of intelligibility is quite severe for cutoff frequencies below 1500 cps.

R 15

2948

Chapanis, A. AN APPRAISAL OF THE VJ REMOTE RADAR INDICATOR. Contract N5 ORI 166, Task Order I, Proj. NR 784 001, 166-I-58, May 1949, 4pp. Johns Hopkins University.

2948

This report summarizes a number of studies in which the VJ Remote Radar Indicator has been compared against the VF as a criterion. Differences between reports from the two were considered as errors. The following topics are discussed: accuracy and speed of obtaining bearing and range data with and without bearing and range aids; the advantages of an experimental bearing counter; number habits of operators that influence performance; the effects of the target on performance; and the electronic stability of both VJ and VF radars.

2949

Brown, J.L., & Woodward, Lois K. ROD-CONE INTERACTION IN THE DARK-ADAPTED EYE. NADCHA-5604, Proj. NM 001 110 300, Rep. 1, April 1956, 32pp. (U.S.N. Aviation Medical Acceleration Laboratory, NADC, Johnsville, Pa.).

2949

To investigate the transition from cone function to rod function which occurs with changes in the criterion threshold when adaptation is held constant, the amount of light required to identify correctly the orientation of a pattern of parallel lines was measured with a variety of wavelength distributions of test light. Grating patterns ranged from very fine to coarse (0.143 to 0.0130 inch). Measurements were made with eyes of observers adapted to darkness and with short flash presentations (0.015 second). Threshold data (luminance) were plotted as a function of visual acuity (grating size) for each wavelength. Implications for practical use of the data are discussed.

G. I. R 27

2950
Strouse, M.M. & Fahy, T.P. MODEL OPTICAL GLIDE PATH INDICATOR SYSTEM. Contract NOAS 56.10771, Engng. Rep. 5099, April 1957, 20pp. The Perkins-Elmer Corp., Norwalk, Conn.

2950
The design and construction of a breadboard model of a projection optical system for an improved optical Glide Path Indicator System for aircraft landing on carriers is described. The model projector is one of 14 identical projectors which would be placed in an array seven projectors high and two wide. Designed to replace the mirror system currently used, the authors list six advantages of the projection system. Drawings used for the components of the system, and photographs of the completed model are appended.
T. I.

2951
Gordon, D.A., Zagorski, H.J. & Zeichner, J. THE DEVELOPMENT OF EXPERIMENTAL MESOPIC VISUAL ACUITY TESTS. Proj. 29535100, PJ 3513 01, PRB Res. Note 15, April 1953, 23pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

2951
Six tests of mesopic (moonlight) visual acuity were assessed in terms of test-retest reliability and score distribution. This information is to aid in selecting mesopic visual acuity tests for a later validation study. The six tests (New Army Snellen, Bausch and Lomb Checkerboard Variable Grid, Modified Landolt Ring, Line Resolution, Ortho-Rater New Army Snellen, and Ortho-Rater Modified Landolt Ring) were administered at mesopic brightness level to 117 soldiers and re-administered a week later. On the basis of the results, three of the tests were revised to increase the number of items and to include sufficient numbers of above-threshold items.
T. G. I. R 5

2952
Harris, J.D. THE EFFECT OF SENSATION-LEVELS ON INTENSIVE DISCRIMINATION OF NOISE. Amer. J. Psychol., July 1950, 53, 409-421. (USN Medical Research Lab., New London Submarine Base, Conn.)
This paper explores intensive discrimination for random frequency noise and describes the gradual increase in BL near stimulus threshold. 3 different procedures were used. In 1 procedure, two-category reports ('loud'-'soft') were required for each item; in the other 2, S reported only when he apprehended a stimulus change. These 2 procedures yielded comparable results throughout. The first procedure yielded the finest index of sensitivity and was much less affected by decrease in intensity. It was argued that this procedure allows cues below the level of apprehension to aid in the determination of reporting behavior and therefore lends itself to the discovery of sensitivity presumably nearer to the physiological limit of the organism. The differential intensive threshold for noise increments, under optimal conditions, ranges from 0.42 to 0.70 db. This range includes variations arising from psychophysical method, training of Ss, and manner of dealing with probably invalid reports. The threshold for decrements is about 0.1 db larger. A knowledge of the effect of psychophysical method is especially important in studies on the relation between intensity and differential intensive sensitivity. One method at 5 db above stimulus threshold yielded a differential threshold of 0.63 db; another method yielded 1.22 db. Differential sensitivity cannot become infinitely coarse as intensity decreases, but reaches a limit imposed by the fact that the noise vs. noise-increment judgment ultimately is transformed to a noise vs. no-noise judgment. A supplementary experiment places the coarsest possible differential intensive threshold at between 2.5 and 3.5 db; for intensities right down to stimulus threshold.
R 9

2953
Harris, J.D. AN EVALUATION OF EAR DEFENDER DEVICES: TWO EARPLUGS, FOUR CUSHIONS, AND THREE COMBINATIONS. Proj. NM 003 041 56.06, R 1, 271, Dec. 1955, 11pp. USN Medical Research Lab., New London Submarine Base, Conn.

Since the standard ear defender available for Navy use is unsatisfactory in some respects, a search for additional devices for protection against high intensity noise was undertaken. The following devices were investigated: 2 earplugs--the V-51R Ear Warden, and M005; 4 ear muffs: Grason-Stadler Type 001, "Noisefoam", and David Clark Company Models 124, and 372 1/4. Various combinations of the earplugs and muffs were also investigated. The M005 earplug, a cylinder of foam rubber impregnated with wax, was found to be as effective as the V-51R and to give more protection to those individuals for whom the V-51R is not suitable for anatomical reasons. The ear muffs were evaluated by the use of the Binural Free Field Bkeshy Threshold Shift Technique. The Model 372 1/4 adjustable-tension muff was found to be significantly better than the others and to be equal or superior to a good earplug at all frequencies from 300 to 4,000 cps. Due to its bulk, the Model 372 1/4 cannot be employed in all situations; maximum protection can, however, be achieved by wearing a good earplug plus any of several small lightweight earmuffs in combination.
R 35

2955
Garner, W.R. & Sleight, R.B. APPRAISAL OF DEVELOPMENT MODELS OF SIXTY-INCH VERTICAL PLOTTING BOARDS. Rep. 166 I 80, Jan. 1949, 7pp. Johns Hopkins University.

2955
To evaluate two development models of 60-inch vertical plotting boards, tests were conducted to determine the speed and accuracy with which target bearings and ranges could be estimated on each of the two new designs and on the old plotting board. Six observers were required to report range and bearing of different numbers of targets. Speed and accuracy scores were analyzed to find differences attributable to design of plotting board. In addition, the surface and lighting of boards were subjectively evaluated. Recommendations and a new design for grid overlay are included.
I. R 6

2956
King, E.J., Snider, A.E. & Hamburger, F., Jr. A PHYSICAL COMPARATOR FOR THE COLOR TEMPERATURES OF INCANDESCENT LAMPS. Contract N5 ORI 166, T.O.I., SDC Him, Engng. Proj. 20 F I; Proj. NR784 001, Tech. Rep. SDC 166 I 133, July 1951, 15pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.).

2956
An apparatus for evaluating the color temperatures of incandescent tungsten lamps by physical comparison techniques is described. A red-to-violet ratio method of establishing the effective slope of the radiometric function is utilized. The apparatus uses a 931-A photomultiplier to receive radiations from the "standard" and "unknown" lamps through red and violet filters sequentially. Resultant oscilloscope patterns are judged for equality. The advantages of this method are discussed.
G. I. R 15

2957

Burnett, W.A., Bogar, J.E., & Konhauser, J.D.E. QUEUEING THEORY APPLIED TO MILITARY COMMUNICATION SYSTEMS. Contract DA 49-025-SC-150, DA Proj. DA-3-99-01-001, SC Proj. 102'E, SC Tech. Requirements SCEL-2101E, HRB Proj. 57, Feb. 1956, 193pp. Signal Corps Evaluation and Analysis Group, Haller, Raymond and Brown, Inc., State College, Penn.

2957

To study the behavior of the building blocks of military communication systems, the theory of probability is applied to the problem of a waiting line (queue). Both single channel and multiple channel problems are considered: general formulation of the problem of single channel with Poisson arrivals, ordered queueing, and arbitrary call lengths; and multiple channel problems for Poisson arrivals, ordered queueing and exponential call lengths. Two methods are used to obtain solutions to these problems: one required setting up state probabilities, the other (Lindley) does not require this. Solutions are given in the form of graphs and formulas or in terms of equations not yet solved for practice. F. R 5

2959

Katzell, R.A., Thomson, K.F., Zalkind, S.S. & Lange, Eileen. COMBAT RECOGNITION REQUIREMENTS. Contract WTONR-38306, SDC TR 383 6 1, April 1952, 77pp. USN Special Devices Center, Fort Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

2959

To determine the relative importance of objects to be recognized in combat and to evaluate the training in recognition administered by the Army, interviews were conducted with combat veterans of the Field Artillery, AFMOR, and Antiaircraft Artillery. Recommendations are made with respect to targets and sensory clues to be emphasized and the stage of general training at which recognition training should occur. T. G. R 25

2961

Naval Air Technical Training. THE VOCATIONAL INTEREST INVENTORY AND PREDICTION IN THE NAVAL AIR TECHNICAL TRAINING COMMAND. 1956, 16pp. Chief of Naval Air Technical Training, Naval Air Station, Memphis, Tenn.

2951

To study the characteristics of the Vocational Interest Inventory (K.E. Clark) in relation to use in the Naval Air Technical Training Command, as an aid in vocational counseling of airman recruits, the Inventory was administered to 1971 recruits at an Airman Preparatory School. Scores were obtained for five aviation ratings and for four tests of the Navy Basic Test Battery. After 1/3 of the course in each of the five basic schools was completed, peer ratings on interest in content of course were collected and self-ratings obtained from those men willing to sign their names. Interest ratings were intercorrelated with each of the criterion measures. The predictive value of the Inventory and operational implications are discussed. T. R 18

2962

Loeb, M., Jeantheau, G., Weaver, L.A. & Richmond, R.G. A FIELD STUDY OF A VIGILANCE TASK. Proj. 6 95 20 001, Rep. 230, April 1956, 9pp. Department of the Army, USA Medical Research Lab., Fort Knox, Ky.

SS in troop carriers were required to respond rapidly to obscure signals occurring randomly under conditions of heat, noise and vibration; noise and vibration and under a control condition. Noise and vibration produced a significant increase in response time. Heat in combination with noise and vibration produced an additional but transitory decrement, but heat alone did not produce a significant change. No general temporal effect was observed R 10

2964

Morgan, C.T. PROBLEMS OF SYSTEMS COORDINATION AND PLANS FOR DEALING WITH THEM. Rep. 166 I 129, Dec. 1950, 9pp. Johns Hopkins University.

2964

This memorandum distinguishes two general types of problems in systems coordination: (1) man-machine problems at the level of the operator; and (2) problems of design of systems of operators and machines (interoperator). Recommendations are made about the kinds of groups that should be constituted to work on these problems: basic research, consulting, coordination, operational evaluation, systems coordination, and social systems. The functions of such groups and the types of organization in which they should exist are suggested.

2965

McCoy, E.P. & McIntyre, C.J. THE APPLICATION OF SOUND MOTION PICTURES FOR RECORDING BILLET ANALYSIS INFORMATION. Contract N6CNR 269, Tech. Bull. 53 6, Nov. 1953, 159pp. USN Personnel Analysis Div., Bureau of Naval Personnel, Washington, D.C. (Pennsylvania State University, State College, Penn.).

2965

This is a report of a methodological study on the application of motion pictures to the recording of information for analysis of billets. Fifteen sample films dealing with the maintenance duties of the Gunners Mate on the 3"50 Rapid Fire Twin Mount were submitted to panels of users and were judged as to adequacy. T. I. R 7

2967

Gifford, E.C., & Gaito, J. COCKPIT DESIGN STUDIES: STANDARD COCKPIT MOCKUP: SELECTION OF SUBJECTS FOR AIRCREW STATION DESIGN EXPERIMENTATION. Rep. NAMC-ACEL-318, Proj. TED:NAH AE-7052, Part I, Feb. 1957, 10pp. Aircrew Equipment Laboratory, Naval Air Experimental Station, NAMC, Philadelphia, Pa.

2967

To develop a reliable technique for selecting subjects for aircrew station design experimentation, eleven morphological features were selected which were considered critical in defining cockpit dimensions and arrangement and location of equipment. Measurements of these features were made by three anthropometrists on 42 subjects. The average of the three measurements for each feature was used to calculate intercorrelations which were then studied by factor analysis. From the resultant factors the morphological feature or features with the highest loadings were chosen to be used as a basis for selecting experimental subjects. The advantages of this technique are discussed. T. R 6

2969

Sandberg, K.O.W. & Lipshultz, H.L. MAXIMUM LIMITS OF WORKING AREAS ON VERTICAL SURFACES. Rep. 166-18, April 1952, 19pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.).

This experiment measured the maximum area which can be reached on a flat vertical surface by the 2 arms of 8 male Ss seated at varying viewing distances away from the surface. The paper discusses the influence of some of the variables: viewing distance, arm length, and body distance between pivot centers. It was found that each arm described an approximate circle whose diameter decreased as the distance between the S and the flat vertical surface was increased. The 3 viewing distances of 10 in., 15 in., and 20 in. were selected as representative of actual operating practice. At the distance of 20 in. from eye to vertical panel, the average S described a circle of 40.4 in. diameter with each arm. The 2-circle centers were approximately 12 in. apart, horizontally. When adjusted for the average anterior arm reach for almost 3000 AAF cadets, the circular diameter is 43.5 in. The area enclosed by 2 such 43.5 in. circles is the maximum area of reach for operators of approximately average size. When a manual task requires both hands to be at the same place simultaneously, the points which can be reached without a posture change are then limited to the common area of the 2 overlapping circles.

R 1

2970

Crazer, R., Zeitlin, L., & Zelnick, J. FREQUENCY DISCRIMINATION OF PURE AND COMPLEX TONES. Proj. 6-95-20-001, Rep. 223, April 1956, 9pp. AMRU, Fort Knox, Ky.

2974

Watts, A.P.A., & Wiltshire, H.C. INVESTIGATION OF EYE MOVEMENTS OF AN AIRCRAFT PILOT UNDER BLIND APPROACH CONDITIONS. Note 26, May 1955, 23pp. College of Aeronautics, Cranfield, Eng.

2970

To investigate the ability to discriminate small changes in frequency of pure and of complex tones, fifteen subjects (Army enlisted men of class A physical profiles) judged the middle tone in a series of three, as higher or lower than the end tones. Base frequencies of 190, 490, and 990 cycles per second were used for end tones; middle tone was varied up or down by 1, 2, 4, or 8 cycles per second; both sinusoidal wave forms and rectangular pulses of 15 micro-second duration were presented. The data (number of errors) were analyzed for differences due to wave form, frequencies and individual subjects. The findings are discussed in relation to the use of aural signal displays to the operation of nine detectors. T. I. R. 6

2974

To determine eye movement patterns of pilots flying by instruments, five runs were made by a pilot under Standard Beam Approach conditions in an Anson F41 fitted with an R.A.F. standard blind flying panel. Motion picture records of the pilot's eye movements over the various instruments during the last two miles of each of the five approaches were obtained and analyzed. Results are presented showing the proportion of time spent on each instrument, duration of fixation time on each instrument, frequency of eye fixations, sequence of eye movements, and link values between instruments. Recommendations for further research are made. T. G. I. R. several

2972
Switzer, R.E. THE HUMAN SIDE OF AIRCRAFT ACCIDENTS. Publ. H 36, Oct. 1951, 35pp. (A Presentation by Medical Safety Div., Flying Safety Officers.) - USAF Directorate of Flight Safety, Research, Norton AFB, Calif.

Approximately 60% of Air Force accidents result from failure, physical and psychological of the human element. The problems of the Medical Safety Division are: to discover the causes of human error in aircraft accidents, to determine the underlying factors, and to determine the causes of death and injury and their relationship to design and equipment. A detailed analysis of pilot errors indicate that 60% are due to judgment errors, 20% to attention errors, 15% to manipulation errors, and 5% to navigation errors. The causes are: insufficient knowledge, emotional factors, habit interference, stresses. An analysis of natural and variable stresses is given. Protective equipment is designed in the light of the analysis of the accidents. The greatest difficulty is the lack of knowledge on the part of the users about the equipment. (HEIAS)

R 4

2975
Haxe, H.W. & Averbach, E. APPARENT AND REAL RESOLUTION IN RADAR VISIBILITY. Contract AF 33 (038) 22642, Proj. 7192, Task 71598, Tech. Rep. 55-459, Sept. 1955, 10pp. USAF Wright-Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio. (Johns Hopkins University, Baltimore, Md.).

Differential sensitivity for luminance differences existing in 2 spatially separated homogeneous fields was measured under 3 conditions of viewing. In the first the comparison fields, presented on a cathode ray tube face, were separated by darkness; in the second the fields were joined by a transition area in which luminance increased linearly from the value presented in the darker field to that presented in the lighter field. A third condition controlled for the decrease in size of the fields which occurred with increasing separation of them. In all viewing conditions the darker field was presented to the left and the right of the lighter field equally often; and the observer's task was to detect the darker side of the display. Detection was significantly better with the gradient present than with the fields separated by darkness. The results, which suggest that the visual system can reform and sharpen the gradient of light separating a return from the background illumination on a radar screen, indicate that visual resolution for radar returns cannot be predicted in a simple way from facts known about the resolving power of the radar system. The factors which appear to determine visual resolution are not those which are affected critically by changes in the scale of the display alone.

R 9

2976.

Gaito, J., & Gifford, E.C. COCKPIT DESIGN STUDIES: STANDARD COCKPIT MOCKUP: COMPONENTS OF VARIANCE IN ANTHROPOMETRY. Proj. TED NAM-AE-7052, Part 2, Rep. NAMC-ACFL-320, Jan. 1957, 11pp. Air Crew Equipment Laboratory, Naval Air Experimental Station, NAMC, Philadelphia, Penn.

2976.

To obtain estimates of the sources of variance in anthropometric measurements and to determine the proportion of total variance contributed by each, three anthropometrists trained together on practice subjects for four weeks. Each anthropometrist then measured 14 subjects three times on each of 11 morphological features employing standard techniques. Measurements were obtained with in a period of one week and at about same time each day (42 subjects in all). The data were studied by analysis of variance techniques for variance attributed to inter- and intra-subject, and inter- and intra-anthropometrist. The proportion of total variance contributed by each of these sources to each of the eleven morphological measures was estimated. Recommendations for measurement procedures are included. T. R 6

2977

Fleishman, B.A. PREDICTING ADVANCED LEVELS OF PROFICIENCY IN PSYCHOMOTOR SKILLS. Proj. 7703, Task 77083, AFPRC-TN-56-10, Jan. 1956, 20pp. Skill Components Laboratory, AFPRC, Lackland AFB, San Antonio, Tex.

2977

This paper reviews recent work on the relations between aptitude variables and progress at different stages of learning on complex psychomotor tasks with a view to establishing the kinds of abilities and measures which best predict higher levels of proficiency in such skills. The typical design of the studies was to give samples of 200-300 subjects extended practice on the task and a selected battery of printed and apparatus tests. Correlations among scores taken from various segments of practice and from the reference tests were then studied by factor analysis. Criterion tasks were visual-reaction discrimination, visual-discrimination reaction, and tracking (rotary pursuit). The results are presented graphically and discussed in relation to psychomotor learning and prediction. T. C; R 6

2978

Webb, W.B., & Kaspar, J.C. THE ABILITY TO REPRODUCE TASK CUES AND THE ABILITY TO PERFORM THE TASK. Res. Proj. NM 001 108 101, Rep. 2, Aug. 1956, 8pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

2978

To investigate the relationship between ability to conceptualize the cues of a perceptual-motor task and ability to perform that task, 73 students in flight training drew a horizon line on cockpit views of the plane for a number of flight maneuvers. The responses of the ten subjects who had shown highest proficiency in the actual flight task of landing on a training carrier and of the ten showing lowest flight proficiency were analyzed for differences between the groups. The observed differences of conceptualization were further studied for individual consistency and stability of group tendencies. T. I.

2981

Case, H.W., Michael, J.L., Mount, G.E., & Brenner, R. ANALYSIS OF CERTAIN VARIABLES RELATED TO SIGN LEGIBILITY. 44-58. Department of Engineering, University of California.

2981

To study some aspects of legibility of highway destination signs, black letters on a white background and white letters on a black background were compared in outdoor, daylight conditions. Both closely spaced (between letters, half the letter height; between rows, 2/3 letter height) and widely spaced (1 1/3 letter height between letters and rows) letters (two rows of four letters each) were used. On the basis of an initial screening of visual acuity, subjects were assigned to a distant range (five equally spaced positions between 295 and 355 feet) or a close range (220 to 280 feet) for testing letter recognition. Scores (number of letters correctly identified for each of the four stimuli) were studied by analysis of variance for effects of letter-background colors, spacing, and interactions. T. R 18

2982

University of Illinois. HUMAN PERFORMANCE IN INFORMATION TRANSMISSION: IV. FLASH RECOGNITION OF FAMILIAR DISPLAYS. Contract DA 36 039 SC 56695, Rep. R 69, Jan. 1956, 91pp. Control Systems Lab., University of Illinois, Urbana, Ill.

2982

To investigate the problem of how much information a man can assimilate visually in a brief flash, a series of experiments were performed using familiar objects (alphabet letters and playing cards). Variables were: exposure duration (ten to 2000 milliseconds), stimulus complexity (two to eight letters or cards), response complexity (whole or single-ali), display geometry (one or two lines) and time (pattern of variation either known or unknown to subject). Three subjects responded as directed; if initial response was wrong they were required to guess until correct or for four additional responses. Amount of information transmitted was estimated by the method of standard matrix, error magnitude, or of hints. Discussion is in terms of capacity, filtering, time, and interaction characteristics of the data-gathering process. R 21

2983

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE JET ENGINE MECHANIC GRADUATES OF TTA COURSE NUMBER AB433230-2. FINAL REPORT. Proj. APG/CSC/916 A, March 1956, 16pp. USAF Operational Test Center, Eglin AFB, Fla.

2983

To determine the ability of apprentice jet engine mechanic graduates of Technical Training Air Force Course Number AB43230-2 to perform the duties of their Air Force specialty, eight representative graduates were studied during a 90-day on-the-job situation. Procedures included assignment to normal routine duties without explanation or demonstration until capability to perform the task was established; observation; and daily ratings of performance by the supervisor immediately responsible for performance of the job. The data were used to make a critique of the training program, of the job description, and of job training standards. Recommendations are included.

2984

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF APPRENTICE SPECIAL VEHICLE REPAIRMAN GRADUATES OF TTA COURSE NUMBER AB47132. FINAL REPORT. Proj. APG/CSC/974 A, June 1956, 26pp. USAF Operational Test Center, Eglin AFB, Fla.

2984

To determine the ability of apprentice special vehicle repairman graduates of Technical Training Air Force Course Number AB47132 to perform the duties of their Air Force specialty, six representative graduates were studied during a 90-day on-the-job situation. Procedures included assignment to normal routine duties without explanation or demonstration until capability to perform task was demonstrated; close observation and daily ratings of performance were made by the supervisor immediately responsible for performance of the job. The data were used to make a critique of the training program, of the job description, and of job training standards. Recommendations are included.

2985

Ford, J.W. THE BINAURAL PRESENTATION OF GUIDANCE DATA. Rep. OM 368 P 2 Rev., May 1949, 11pp. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.

2985

To determine the possibility of using the binaural direction-discriminating sense to convey both lateral and vertical guidance data to an airplane pilot, a laboratory model of such a system was constructed and demonstrated in conjunction with the Link Trainer. Lateral flight is controlled by means of a varying phase intensity relation reaching the pilot's ears through earphones and vertical flight by a tone of varying pitch. Tests of the system were made by qualified instrument pilots from commercial airlines, Civil Aeronautics Administration, Armed Services and the Cornell Aeronautical Laboratory. In addition, the system was flight-tested in a Boeing 247-D airplane in five "blind" approach landings. Recommendations for further development are included.

2986

Hermanns, T.G. FACTORS DETERMINING THE DIRECTION OF THE VISUAL AFTER-IMAGE DRIFT. J. exp. Psychol., Feb. 1941, 28(2), 187-198. (University of Washington, Seattle, Wash.).

A series of experiments are reported which demonstrate that there are at least 2 factors involved in the determination of visual after-image drift. One is the point of fixation relative to the object used to produce the retinal effects necessary for the production of the after-image; or we might say, the position of the retinal effects relative to the fovea which we have called the retinal factor. The other factor is the pattern of muscular stresses during retinal stimulation which leave their after effects persistent during the experiencing of the after-image; this we have referred to as the muscular factor. The retinally determined drift is demonstrated when the point of fixation is to one side of the object fixated, and the drift ensuing tends to be in the direction of the object relative to the point of fixation; this drift is dependent upon the locus of retinal stimulation and within the limits of the durations of retinal stimulation used is independent of the duration, and also independent of the muscular factors. The muscularly determined drift is demonstrated when the eyes during retinal stimulation are in a position of left or right orientation with fixation centered upon the object; this drift tends to be in the direction of the preceding muscle tensions.

2988

USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF JOINT USAF-CAA OVERRUN AND APPROACH LIGHTING. FINAL REPORT. Proj. APG/CSC/994 A, April 1956, 12pp. USAF Operational Test Center, Eglin AFB, Fla.

2988

To determine a recommended standard airfield lighting system for joint Air Force-Civil use, three systems were evaluated: U.S. Standard Configurations A (centerline system) and B (side lighting of overrun with centerline extension) and Configuration X (combination of A and B). The test aircraft made 274 night approaches. Of these, 151 were made by fighter aircraft and 123 by jet bombers. System evaluation was based on pilot preference and an analysis of adaptability of system to different types of Air Force aircraft. Recommendations are included. T. 1.

2991

Yarcho, W.B. FLOTATION TESTS OF LIFE PRESERVER INFLATED BENEATH THE PARACHUTE HARNESS. Proj. R-670-417, Tech. Memo Rep. WCRD 53-151, Dec. 1953, 13pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

2991

To establish the flotation characteristics of a pneumatic life preserver when inflated under a parachute harness, tests were conducted in a swimming pool. The subject wore a lightweight summer flying suit, a standard B-5 pneumatic life preserver, and a Class III quick-release canopy parachute harness. The harness was adjusted by experienced personnel to approximate service condition tightness prior to each trial. Trials were conducted with several arrangements of equipment, such as: parachute harness secured and one cell of life preserver inflated; parachute harness chest strap loosened with both cells of life preserver inflated; etc. The adequacy of the life preserver to supporting the subject was evaluated by observation. Recommendations for further testing are included. T. 1.

2992

Cartography Division, Aeronautical Chart and Information Center. THE G S R MODEL: GRAPHICALLY SIMULATED RELIEF BY GRADIENT DISTRIBUTION OF DETAIL ON LAYERS OF TRANSPARENT PLASTIC. ACIC Tech. Rep. 67, May 1955, 20pp. Aeronautical Chart and Information Center, Air Photographic and Chart Service, USAF, St. Louis 18, Mo.

2992

This report presents a method of depicting areas and objects, at predetermined scale, graphically and in three dimensions, by use of an assembly comprised of a number of layers of transparent plastic sheeting. Scale and size relationships, materials and equipment, construction steps, and the method of depicting such items as natural features, roads, railroads, transmission lines, bridges and other features are discussed. The effectiveness of this principle of presentation has been demonstrated through the construction of experimental models and prototypes. X

2993

Wilbanks, W.A., Webb, W.B., & Tolhurst, G.C. A STUDY OF INTELLECTUAL ACTIVITY IN A NOISY ENVIRONMENT. Rep. 1, Res. Proj. NM 001 104. 100, Oct. 1956, 7pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

2993

To investigate how a noise environment affects individual performance of an intellectual task, four tests from the Differential Aptitude Tests were selected as the task to be used: Mechanical Reasoning, Abstract Reasoning, Clerical Speed and Accuracy, and Numerical Ability. The tests were administered twice to 92 naval cadets divided randomly into two groups, once in noise (110-115 decibels) and once in quiet—using counterbalanced order for the two groups. The data were studied by analysis of variance for differences among individuals, sessions, orders, and sound conditions. Rank order correlation coefficients were computed for each group to check the reliability of individual behavior under quiet and under noise. Implications for selection procedures are discussed. T. R 4

2994

Briggs, G.E., & Fitts, P.M. TRACKING PROFICIENCY AS A FUNCTION OF VISUAL NOISE IN THE FEEDBACK LOOP OF A SIMULATED RADAR FIRE CONTROL SYSTEM. Contract AF 18(600)-1801, Proj. 7718, Task 77292 and 37050, Res. Rep. AFPTTC-TN-56-134, Dec. 1956, 7pp. Interceptor Pilot Research Laboratory, AFPTTC, Tyndall AFB, Fla.

2994

To determine the functional relation between visual noise in radar fire control system and tracking proficiency, four well-practiced subjects received 12 40-second trials on each of seven amplitude levels of visual noise. The Ohio State University Pilot Training Research Simulator served as the skill task. This apparatus provides a two-dimensional compensatory tracking situation simulating that of the F-86D aircraft at 35,000 feet and at 500 knots. Time-on-target scores (summed over the final three seconds of each trial) were analyzed as a function of noise level. Further discussion related percent of performance level under noise to maximum level of effectiveness.

T. G. R 3

2995

Cohen, J.D., & McKelvey, R.K. THE BEHAVIOR OF INDIVIDUALS AND PERSONNEL SYSTEMS IN THE SURVEILLANCE FUNCTIONS OF AN AIR DEFENSE DIRECTION CENTER: IV. OPERATIONAL PERFORMANCE CRITERIA. Proj. 7712, Task 77207, Res. Rep. AFPTTC-TN-56-117, Sept. 1956, 18pp. Crew Research Laboratory, AFPTTC, Randolph AFB, Tex.

2995

To obtain a description of surveillance activity (Aircraft Control and Warning) in terms of measurable aspects of behavior considered critical for effective system (Air Defense Center) operation, observations were collected from 24 airman operators whose experience ranged from ten to 36 months. The operators, selected at random from four teams, were rotated systematically through four positions in the surveillance section. Each team was observed under normal operational conditions for two 24-minute periods on three successive days. Response variables were selected which could be related to system criteria and standard operating procedures and analyzed in terms of traffic condition and load carried, accuracy, delay, currency of display, and adherence to crew operating procedure. Implications for research and training are discussed. T. I. R 3

2996

Conrad, R. SOME PSYCHOLOGICAL FACTORS IN SORTING LETTERS BY MACHINE. A.P.U. 271/56, Oct. 1956, 7pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

2996

This is an analytical discussion of the psychological (or human engineering) problems in letter sorting by machine. Current designs of letter sorting machines (England) with their operators are considered a bio-mechanical system and as such the following problems are discussed: deciphering, coding, keying, fatigue, and training. Problems still to be solved are listed.

2997

Broadbent, D.E. FALLACIES IN THE DESIGN OF INDUSTRIAL WORK. A.P.U. 275/55, 1955, 5pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

2997

This paper treats the relation of laboratory experiments on human behavior to applications in the field of work design. Three general assumptions frequently made in work design are considered in relation to experimental evidence from the laboratory: that the effect of prolonged work is to produce a steady decline in performance; that a man involved in movement tasks is more subject to fatigue than is the inactive man with a perceptual task, such as inspection; and that there is an unchanging optimum for working conditions. The manner in which laboratory findings should be applied in the field is further discussed.

2998

Begbie, G.H. ACCURACY OF AIMING IN LINEAR HAND-MOVEMENTS. A.P.U. 261/56, Aug. 1956, 41pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

2998

To study accuracy of aiming in linear hand movements six subjects were first given practice in drawing lines from a starting point towards a target followed by two experimental sessions. In the first the eyes were open; in the second the eyes were closed just prior to and during movement. Four line lengths (16, 20, 24, and 32 centimeters) and eight directions (0, 35, 90, 145, 180, 215, 270, 325 degrees) were drawn (128 per session). Error (distance of each line from target in millimeters) and bias (line passing clockwise or anti-clockwise of target point) were studied by analysis of variance of the influence of direction, extent and visual conditions. A simple theory of movement control was used to explain the results.

T.G.I.R 28

2999

Leonard, J.A. PERCEPTION AND THE USE OF VISUAL AIDS. A.P.U. 274/56, 1956, 7pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, Eng.

2999

This paper is based on a talk given to an Audio-Visual Aids Conference at Oxford, 1955. Attention is drawn to a possible effect of the use of visual aids; namely, the resulting greater uniformity of performance. Evidence for and against this effect is examined. Three practical aims of research in visual aids are discussed: presenting information for immediate use (as in piloting aircraft); presenting information for specific use for rapid mass learning (assembling a gun); and presenting information for purposes of education. The important role of the worker in investigations of the last type is stressed.

R 11

3000

Moody, J.A., Squires, P.C., Lewis, W.G., & Huff, J.W. PHOTOMETRIC SURVEY OF THE RED LIGHTING INSTALLATION ON THE U.S.S. DARTER (USS-576). Memo. Rep. 56-7, Proj. NM 002 014.08.11, Dec. 1956, 6pp. Medical Research Laboratory, U.S. Naval Submarine Base, New London, Conn.

3000

To determine the adequacy of the red lighting installation of the submarine U.S.S. DARTER, for dark adaptation of personnel, a photometric survey was conducted. Readings were made with an Ultra-High Sensitivity Spectra Brightness Spot Meter for all sensitive areas in the attack center, sonar room, radio room, ward, crew's mess, and galley. The data are evaluated in terms of the illumination necessary for the tasks to be accomplished while maintaining dark adaptation. Recommendations are included.

T.

3001

Broadbent, D.E. THE CONCEPT OF CAPACITY AND THE THEORY OF BEHAVIOR. A.P.U. 257/56, Aug. 1956, 12pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

3001

This paper presents the case for a qualitative application of information theory in psychological studies of human behavior in addition to the more common quantitative one. Reasons for distrusting quantitative theory in psychology are presented and discussed. The use of concepts from information theory in forming non-quantitative models is developed using as an example the extinction of conditioned responses. The advantages of such an approach are discussed.

R 30

3002

Bowen, H.M., & Woodhead, M.M. ESTIMATION OF TRACK TARGETS AFTER PRE-VIEW. Canad. J. Psychol., 1955, 2 (4), 239-246. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

3002

To explore differences among four types of navigational display for a track prediction task, twelve subjects predicted from immediate experience (complete tracks were observed prior to prediction) the targets of initiated tracks (1/3 of track was given). The four grids were exponential and linear polar coordinates and exponential and linear cartesian coordinates. The deviation of estimate from true termination of track was calculated as (1) distance in inches, (2) distance translated into miles, and (3) direction of error. The data were analyzed for differences due to type of grid and length of track. Findings are discussed with reference to interpretation of rectangular and polar systems.

T. I. R-5

3004

Mackworth, N.H., & Mackworth, J.F. REMEMBERING ADVANCE CUES DURING SEARCHING. A.P.U. 258/56, Nov. 1956, 20pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

3004

To investigate a form of receptor anticipation in which future events are identified on a visual display, and then this identification is removed so that advance cues must be remembered during decision-taking, 22 subjects were given an "search task consisting of four three-digit numbers representing objectives in each of 20 columns and required to move counters at timed intervals to bring them to the right place at the right time. Variables were (1) number of advance cues (zero to four); (2) speed (eight and four decisions per minute); and (3) grouping of advance cues. Two experiments were conducted. The data (percent correct decisions) were studied by analysis of variance techniques. Discussion is in terms of anticipation span.

T. G. R 23

3013

Mackworth, N.H., & Mackworth, J.P. VISUAL SEARCH FOR SUCCESSIVE DECISIONS. A.P.U. 234/56, Nov. 1956, 16pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

3018

To identify some of the factors affecting decisions taken from information supplied by multi-source displays, a laboratory task was devised to provide a mass of detail from which the subject had to pick out the one objective that was appropriate at any given time. Variables were: (1) average demand speed of decision (from 2.4 to 12 decisions per minute); and (2) display load (five to fifty columns through which visual search had to be made to find the objective). Two experiments (four and forty-four subjects, respectively) were conducted. The data (errors per min per 100 moves) were studied by analysis of variance techniques for effects of increased speed and load factors and their relationships.

R 14

3020
Sline, Yun & Graham, C.H. SPECTRAL SENSITIVITY OF THE CONES IN THE DARK ADAPTED HUMAN EYE. Proc. Nat. Acad. Sci., Jan. 1952, 38(1), 80-85. (Psychology Dept., Columbia University, New York, N.Y.).

New data on cone sensitivity, based on threshold measurements in 5 Ss with normal color vision, are reported. Sensitivity is at a maximum near 555 mμ. The spectral sensitivity curve shows 2 points of abrupt change in direction: one near 460 mμ and the other near 600 mμ. The findings are in line with the results of some previous experiments. (HEIAS)

R 24

3021

Fleishman, E.A. & Spratte, J.G. THE PREDICTION OF RADIO OPERATOR SUCCESS BY MEANS OF AURAL TESTS. Proj. 7700, Task 77011, AFPTRC TR 54 66, Nov. 1954, 13pp. USAF Personnel & Training Research Center, Lackland AFB, Tex.

3021

This paper describes an exploratory study into the utility of some auditory-perceptual tests (not now used by the Air Force) for predicting proficiency in telegraphic code reception. The tests evaluated included measures of discrimination of pitch, of loudness, of rhythm, of time, and of timbre; a test of tonal memory, and two new experimental tests. The criterion of success used was speed of code reception (number of groups per minute) at the end of the fourteenth week of training. The tests were administered to 400 entering radio operator trainees. The test scores were analyzed by correlational techniques.

T. R 9

3022

Miller, R.B., Folley, J.D., Jr., & Smith, P.R. A COMPARISON OF JOB REQUIREMENTS FOR LINE MAINTENANCE ON TWO SETS OF ELECTRONICS EQUIPMENT. AFPTRC-TR-54-83, Dec. 1954, 17pp. AFPTRC, Lackland AFB, San Antonio, Tex.

3022

To provide an example of a systematic approach and set of procedures for comparing job activities in the maintenance of two or more equipment systems, data obtained from two previous job analyses of the AN/APQ-24 and KI Bombardment Navigation Systems were analyzed. Specifications of maintenance procedures involved in checks, adjustment, replacements, repairs and trouble shooting were compared. Further characterization of the behaviors involved (discriminations, decisions, motor actions, and perceptions of response adequacy) were grouped and tabulated under psychologically similar categories on basis of "expert opinion" (grounded on explicit descriptions of behavior). Transfer of behavioral performance is discussed and suggestions for training are presented. T. G. R 2

3023

Lindsley, D.B., et al. A VALIDATIONAL STUDY OF OSCILLOSCOPE OPERATOR TESTS. Contract OEMar-919, Proj. SC-70, NS-146, OSRD Rep. 3712, Res. Rep. 10, April 1944, 9pp. OSRD, NDRC, Applied Psychology Panel, Yerkes Laboratories of Primate Biology, Orange Park, Fla.

3023

To determine their efficiency in predicting oscilloscope operator proficiency, 13 Oscilloscope Operator Tests were given to 194 operators at eight operating stations. Two officers in charge at each station supplied independent ratings of the men as operators and plotters. The relationships found between these ratings and the test results are discussed in terms of the efficiency of particular tests (e.g., plot reading, course location, etc.) in predicting an operator's proficiency.

T.

3024

Ward, D.W. THE METHOD OF "SINGLE DESCENT" IN GROUP AUDIOMETRY. Contract Nonr-1151(02), Proj. Designation Nr 146-092, BuMed & Surgery Proj. NM 001 102 502, Rep. 2, Oct. 1956, 15pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3024

To find a method for determination of auditory threshold that would lend itself to group testing, two methods were compared: (1) adjustment (both direct and indirect), in which each listener sets an attenuator to his own threshold, and (2) "single descent," in which the level of the test tone decreases steadily and listeners press a button "just when the beeps disappear." The reliabilities of both methods were tested and the method of "single descent" was studied further as a function of rate of descent, for effects of short term auditory fatigue, and for validity using standard clinical techniques as the criteria. The usefulness and limitations of the group methods are discussed.

T. G. R 9

3025

Cox, J.R., Benson, R.W., & Niemoeller, A.P. A MOBILE LABORATORY FOR GROUP HEARING TESTS. Contract Nonr-1151(02), Proj. Designation Nr 146-092, BuMed & Surgery Proj. NM 001 102 502, Rep. 3, Nov. 1956, 15pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3025

This report describes the construction of a mobile laboratory as part of a Navy program to investigate the auditory and non-auditory effects of noise exposure received by jet engine mechanics and members of the flight deck crew aboard aircraft carriers. The laboratory has proved a useful facility for making hearing measurements in the field. It contains a group audiometer of new design for making comparisons between groups of men and between before and after exposure tests taken of the same group of men.

T. G. R 1

3026

Doshier, D.G. CHANGES IN PSYCHOPHYSIOLOGICAL RESPONSES PRODUCED BY DELAYED SPEECH FEEDBACK. Contract Nonr-1151(02); Proj. Designation Nr 144-008, Dental & Surgery Proj. NM-001 102 502, Rep. 1, Oct. 1956, 8pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3026

To investigate changes in psychophysiological responses produced by delayed speech feedback, 30 subjects were presented with a single passage from the MacRobert's Manual (1) with direct speech feedback and (2) with delayed (0.18 seconds) speech feedback. Response measures were frequency and forearm tension, galvanic skin response, heart rate, respiration rate, and blink rate. Resting levels were determined for all measures except blink rate. The data were studied by analysis of variance techniques for differences in responses attributable to experimental variables. Cross judgments of amount of speech disturbance were discussed in relation to the results.
T. R 12

3027

Conner, B.J. & Chlarsky, J. TRAINING AIDS AND DEVICES. HSM 220/1 Appendix 45, June 1951, 21pp. US Research & Development Board, Department of Defense, Washington, D.C.

3027

This is a review of experimental research on training aids and devices for the purpose of providing the armed forces with "... sound principles and recommendations for making effective use of training aids and devices in military training." Topics include review of principles and research findings on films, film strips, synthetic training devices, and field trips.
R 16

3028

Hall, A.L. INDOCTRINATION IN USE OF THE RE-BREATHING APPARATUS, MULTI-PURPOSE (RAMP). Rep. 3, Res. Proj. NM 001 106 103, Dec. 1956, 6pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3028

To evaluate the Rebreathing Apparatus, Multi-Purpose (RAMP), for possible use as rescue apparatus in the special conditions encountered when aviators are trapped in aircraft submerged in shallow water, 20 naive subjects were indoctrinated in its use. All subjects completed tests in an indoor fresh water swimming pool. In addition, the RAMP was worn by a 182-pound man while he was attempting passage through normal vertical and horizontal hatches on a destroyer and carrier (CVL) type ships. Observations on all test performances are reported.
T. I. R 3

3029

Smith, W.M. SENSITIVITY TO APPARENT MOVEMENT IN DEPTH AS A FUNCTION OF "PROPERTY OF MOVEMENT." J. exp. Psychol., Aug. 1951, 42(2), 143-152. (Princeton University, Princeton, N.J.).

Using response time as the measure of sensitivity, the hypothesis was tested that sensitivity to apparent movement in depth would vary with the presence or absence of the property of movement characterizing a particular stimulus. The property of movement was defined as that characteristic of an object which describes its usual behavior pertaining to movement. This hypothesis was not confirmed by the results. However, from the data it was concluded that: a) The response time to apparent movement in depth varied as a function of different conditions of observations; b) Very wide differences were found among Ss in sensitivity to this kind of apparent movement; c) Significant interactions were discovered between conditions and stimuli, and also between conditions and Ss.
R 13

3030

Vaccaro, J. Jr. REPORT ON DEVELOPMENT OF INTEGRAL LIGHTING DEVICES. Proj. TED AUC AE 7051, Rep. NADC AT 5615, Feb. 1956, 19pp. US Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3030

This report covers the work done to provide suitable samples for testing the integral lighting method for aircraft instruments developed by the Aeronautical Medical Equipment Laboratory. The method employs a glass wedge with two light sources. Samples of four case sizes (1.5, 2.0, 2.75, and 5.0 inch) were fabricated for instruments of varying complexity (temperature, fuel, wheel and flap position, bank and turn, and attitude indicators). General visual inspection was made for such factors as light distribution, light spillage, and glare, and ease of lamp replacement.
I. R 1

3032

Fry, G.L. & Allen, M.J. EFFECT OF FLASHES OF LIGHT ON NIGHT VISUAL ACUITY. PART II. Jan. 1953. 17pp. Armed Forces, National Research Council, Vision Committee Secretariat. (Ohio State University Research Foundation)

3032

To investigate the effect of a flash of light upon night visual efficiency, changes in pupil size (two subjects) during the flash and time for return to normal after flash were measured. Variables investigated included: varying areas and brightnesses, varying retinal areas, role of stray light, duration of flash, and recovery from flash. Results are discussed in terms of possibility of predicting the course of constriction of a dark adapted eye when exposed to flash conditions of varying complexity.
G. I. R 12

3033

Duncan, C.P. & Underwood, B.J. TRANSFER OF TRAINING IN MOTOR LEARNING AS A FUNCTION OF DEGREE OF FIRST-TASK LEARNING AND INTER-TASK SIMILARITY. Contract 33(038) 11396, NADC TR 52 64, April 1952, 37pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Northwestern University, Evanston, Ill.).

3033

This is an experimental study of transfer of training as a function of degree of first-task training and inter-task similarity. Three hundred Ss trained on the Star Discrimeter (requiring movement of a lever from a center position into the appropriate one of six radial slots in response to one of six signal lights). First-task training varied from 10-180 trials; inter-task similarity was varied by changing light-slot relationships (2, 4, or 6 changes). Evidence of transfer to the second task is discussed regarding implications for training and equipment design.
T. G. I. R 8

3034
Fleishman, E. A. A SUMMARY OF PSYCHOMOTOR TEST DEVELOPMENT RESEARCH ACCOMPLISHED IN THE SKILL COMPONENTS RESEARCH LABORATORY. Laboratory Note SCRL-55-1. Jan. 1955. 32pp. USAF, Air Force Personnel and Training Research Center, Skill Components Research Lab., ARDC, Lackland, Texas.

3034
This paper is an "unpublished draft" describing the research carried out in the Apparatus Test Development Branch of the Skill Components Research Laboratory. More than 14 apparatus tests of psychomotor skills are evaluated against pilot proficiency. In the airman area, sixteen apparatus and printed tests are evaluated. In addition, a series of auditory-perceptual tests are evaluated as possible radio operator selective tests. In general, the article focuses on isolating and identifying psychomotor aptitudes relevant to a variety of Air Force jobs.

3035
Bridgman, C.S., Libby, J.E.P., & Solomon, R.L. KNOWLEDGE OF RESULTS AS IT AFFECTS TRACKING ACCURACY IN A MODIFIED E-14 TRAINER WITH THE B-29 PEDESTAL SIGHT. Contract OEXR-1171, Proj. AC-94, OSRD Rep. 6050, Rep. 8, Oct. 1945, 31pp. OSRD, NDRC, Applied Psychology Panel, (University of Wisconsin).

3035
To determine the effect of knowledge of results upon the framing accuracy of B-29 gunners, two groups of 12 students each were required to track and frame, on each of 20 days, 16 attacks (from a P-7 film) in a modified E-14 trainer. While one group received immediate knowledge of results, the other group received no information of performance. An additional group of ten graduate gunners performed under each condition. The findings are presented in terms of a comparison of mean absolute errors obtained under each condition of knowledge of results. An air phase using the Firing Error Indicator is also described.
T. G. I.

3036
Simpson, R.G. UTILIZATION OF JOB PROFICIENCY MEASUREMENT IN RELATION TO TRAINING PROBLEMS IN STRATEGIC AIR COMMAND. Contract AF 33(038) 10524, HRL Memo. Rep. 20, March 1952, 20pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C.

3036
This article, based on studies of on-the-job proficiency, presents a re-evaluation of training and research problems existing in the strategic air command (see HRL Reports No. 14 and 16). It is concerned with job proficiency evaluation, measurement, administration planning, and evaluation of training, and other problems primarily oriented to the establishment of a job proficiency program. Suggestions are offered concerning such aspects as the improvement of training programs, the provision of proficiency research, and the facilitation of inter-organization training information.
R 2

3038
Swartz, R.O. RADAR-BEAM SIMULATOR FOR TRAINING DEVICES AND MINIMUM SIGNAL DETECTABILITY STUDY. INTERIM REPORT. Prob. S 1228X C, Rep. S67 5(1210 ROS)1210 221/46, Oct. 1946, 13pp. USH Research Lab., Washington, D.C.

3038
This report describes a radar beam simulator which produces synthetic target signals on a radar indicator. Illustrations of the mechanical and electronic aspects of the system are included. Graphs of the beam patterns as a function of azimuth angle and relative power are also presented.
I, G

3040
Brown, G.E., Jr. GENERALITY OF TRACKING TRAINING. Contract OEXR 591, Proj. SCS 6, Rep. 4508, Memo. 7, Dec. 1944, 4pp. Tufts University, Medford, Mass.

3040
This report investigates the transfer of tracking proficiency to a different tracking task. The seven groups of trackers included an inexperienced group, a group trained on the Tufts trainer, and groups composed of men regularly assigned to tracking on the Director 17, Director 15, Height Finder, Radar SCR 263, and 40 in Gun. All groups performed the same tracking task on the Tufts trainer. The distribution of scores for individuals within each group is presented graphically, and the differences in group means are statistically evaluated.
T, C

3041
Abrams, W.H., Miller, J., Mallory, L.A., Hibbet, G.W., et al. A PROJECT FOR STANDARDIZING SUBMARINE PHRASEOLOGY AND DEVELOPING A TRAINING PROGRAM IN SUBMARINE VOICE COMMUNICATIONS. FINAL REPORT. Service Control N 118, OSRD Rep. 4795, Feb. 1945, 31pp. US Office of Scientific Research & Development, National Defense Research Council, Washington, D.C.; Harvard University Psycho-Acoustic Lab., Cambridge, Mass.; Psychological Corporation, Washington, D.C.; & Columbia University Div. of War Research, New York, N.Y.

In the program of standardizing phraseology, a systematic catalog was first made of alternative forms of all commands in common use, arranged according to the ship's operation involved. Then experimental tests were conducted to determine the intelligibility over sound-powered phones in the presence of noise of alternative station names and of key words frequently used in messages. Based on these tests and upon conformity with submarine usage, detailed uniform voice procedures and specific wordings for all important submarine commands were prepared and submitted for criticism to officers throughout the submarine service. The development of the training program proceeded concurrently with work on standardized phraseology. This covered a basic course in the fundamentals of telephone talking, an intermediate course emphasizing the use of standard phraseology, and an advanced course covering the combat team stage. Plans for the layout of a training room were developed and the necessary equipment designed. A text (Submarine Telephone Talkers' Manual) and an instructor's manual for the basic course were prepared.
R 9

3042
De Selincourt, M. THEORETICAL COURSE FOR THE USE OF CANDIDATES FOR THE PRELIMINARY PROFICIENCY CERTIFICATE (FRENCH) IN PARACHUTING. Trans. 416, Nov. 1952, 33pp. Royal Aircraft Establishment, Farnborough, Hants, England.

3042
A theoretical training course for parachutists from initial preparation to the actual jump is described. The following topics are covered: preparation of students, organization of jumping exercises, methods of determining jumping points, leaving the aircraft, controlled opening descents, delayed opening descents, landings, and the special cases of night jumps, high altitude jumps, and jumps over water.
T.

3044
Faber Birren & Co. THE APPLICATION OF
COLOR TO SHORE ESTABLISHMENT. Contract
N0y-75157, 1953. 93pp. U.S. Navy Dept.
Bureau of Yards and Docks, Washington, D.C.

3046
This manual is a comprehensive schedule for the
functional use of color in painting shore establish-
ment shops and equipment of the U.S. Navy. The spe-
cifications are based on research results from the
fields of illumination and ophthalmology and compre-
hensive study of case histories. In addition to
specifications for buildings (interior and exterior),
machinery, furniture, and transportation equipment,
special emphasis is given to a uniform safety code.
Standard color samples are included.
T.I.

3047
Timberlake, P.W. EVALUATION OF CELESTIAL NAVIGATION
FOR FIGHTER PILOTS. FINAL REPORT. Proj. APG SAS
98 A, Sept. 1953, 51pp. USAF Air Proving Ground
Command, Eglin AFB, Fla.

3047
A celestial navigation procedure for fighter pilots,
which requires celestial precomputations geared to the
dead reckoning flight plan, is described in this report.
The operational aspects of the procedure, its organiza-
tional impact, and its capabilities are analyzed. Re-
commendations are included.
T. G. I.

3048
Schwartz, I. & Sandberg, N. Elaine. THE
EFFECT OF TIME IN SUBMARINE SERVICE ON
VISION. Proj. NM 003 041.57.03, Rep. No.
253. Aug. 1954. 9pp. Medical Research
Laboratory, Bureau of Medicine & Surgery, U.S.
Naval Submarine Base, New London.

3048
To determine the effect on vision of time spent in
submarine service, the visual characteristics of 1064
submariners were analyzed in years in service and age.
Visual acuity and lateral phoria scores for distance
and near are compared with those obtained from over
2,000 candidates for submarine school for significant
differences. Results are discussed in terms of nature
of the submarine environment with implications for
personnel procedures.
T,G,R5.

3049
Katz, M.S., Morris, Ailene, & Dimmick, P.L.
EFFECT OF VARIOUS DURATIONS OF RED ADAPTA-
TION ON THE COURSE OF SUBSEQUENT DARK ADAP-
TATION. Proj. NM 003 041.58.01, Rep. 246,
Apr. 1954, 9pp. U.S. Naval Medical Research
Laboratory, New London, Conn.

3049
To ascertain the usable limits of red adaptation as
a substitute for dark adaptation in operational situa-
tions, observers were preadapted to white light (325
foot lamberts) for ten minutes, then donned red goggles
(two, five, or ten minutes), neutral goggles (ten minutes)
or moved to total darkness. Threshold measurements were
made throughout course of adaptation following the
second adapting period. Adaptation curves are compared
for the various conditions and findings related to
practical usage.
T,G,I,R4.

3050
Berkshire, J.R. FIELD EVALUATION OF A TROUBLE-
SHOOTING AID. Proj. 7714, Task 77253, AFFTC TR
54 24, June 1954, 8pp. USAF Personnel & Training
Research Center, Lackland AFB, Tex.

3050
The development and preliminary evaluation of a set
of trouble-shooting materials by means of which a me-
chanic can trace symptoms of malfunction to the under-
lying cause or causes are discussed. The experimental
materials included color-coded schematics of the bomb-
release chain of the AN/APQ-24 radar set with written
directions called "trouble locators". Six different
malfunctions were studied by 24 mechanics, one group of
whom were experienced and another with little or no ex-
perience. Each mechanic identified two malfunctions,
using his own methods for one and the trouble-shooting
materials for the other. Length of time and number of
components removed were compared for the two methods and
for the two groups.
T. R 4

3051
Kinney, Jo Ann, & Pratt, Cornelia H. THE
EFFECT OF REFRACTIVE ERROR ON ACUITY THROUGH
BINOCULARS. Proj. NM 003 041.57.01, Rep.
No. 245. April 1954. 11pp. Medical Re-
search Laboratory, Bureau of Medicine & Sur-
gery, U.S. Naval Submarine Base, New London.

3051
To study visual acuity through binoculars and the
extent to which refractive errors can be corrected by
adjusting the eyepieces of standard binoculars, (1)
the acuity of individuals with varying types of refrac-
tive errors was measured for unaided vision at 20 feet
and with binoculars at 140 feet covering various dioptric
settings of eye pieces, and (2) acuities of a group of
men were tested using their optimum binocular settings
and comparing performance of those who did and did not
have unaided acuity of 20/20. Results are analyzed in
terms of effect of refractive errors on use of binoculars
T,G,I,R6.

3052
Schwartz, I. & Sandberg, N. Elaine. VISUAL
CHARACTERISTICS OF THE SUBMARINE POPULATION.
Proj. NM 003 041.57.02, Rep. No. 252. June
1954. 11pp. Medical Research Laboratory,
Bureau of Medicine & Surgery, U.S. Naval
Submarine Base, New London.

3052
To investigate the visual characteristics of sub-
marine population and the degree to which visual stand-
ards were met, the crew members of fifteen submarines
were tested with Snellen Wall Charts and Bausch and
Lomb Ortho-Rater for acuity and phoria. Means and distri-
bution of subjects for the test items are presented with
cumulative frequency graphs showing distributions.
T,G,R5.

3055 Schaefer, K.E. STUDIES OF OXYGEN TOXICITY: 2. A WARNING SIGN OF ACUTE SYMPTOMS OF OXYGEN TOXICITY. Proj. NM 002 015-03-09, Rep. 232, Aug. 1953, 23pp. USN Medical Research Laboratory, LX, New London, Conn.

12 trained underwater swimmers from an underwater demolition unit swam at an average speed of 0.98 mi. per hr. at various depths (surface, 20 ft., 30 ft., 40 ft.) over a period of 93 min., with rest periods every 15 min. Average pulse rate and respiratory rate at the end of swims which were terminated because of symptoms were significantly higher than at the end of normally terminated swims--a fact which is believed to indicate that an increased sympathetic activity accompanies symptoms of oxygen toxicity. In contrast to resting conditions at high pressures of oxygen, dyspnea is the most frequent symptom during underwater swimming while breathing oxygen at higher than atmospheric pressures. Besides these 2 known phases of oxygen effects, another phase was discovered; a complete parasymphathetic dominance in regard to heart rate, as shown by a fixation of pulse rate, nonresponsiveness of pulse rate to change in activity from exercise to rest and from rest to exercise. This sign preceded the development of symptoms in 78% of all cases and in 100% of grave symptoms, e.g., convulsions. Therefore, it is felt that this sign can be used as a warning of symptoms of oxygen toxicity.

R 21

3056 Weybrew, S.B. Q-METHODOLOGY IN CRITERION RESEARCH, Proj. NM 003 041-53-01, Rep. No. 239, Oct. 1953, 28pp. USN Medical Research Laboratory, USN Submarine Base, New London, Conn.

This report is designed to investigate the general possibilities of Q-technique in criterion research. A brief discussion of Q-methodology, including limitations, is presented together with the empirical results from a study applying Q-technique to the specific problem of constructing criteria of an efficient submariner. In raters, 7 submarine medical officers, 6 submarine line officers and one civilian psychologist described an ideal submarine enlistee "man" by the Q-sorting method, the trait population being derived from previous research. The resulting Q-correlation matrix was computed and 3 centroid factors extracted. Categorical rating scales were then constructed for the "trait dimensions" rated relevant by the Q-sorter defining each factor. The results show a) gross 2-ratings provide a highly tenable description of the ideal submariner, b) there is closer agreement as to what constitutes an ideal submariner within the medical group as compared to the submarine line officer group, c) there is one generally agreed-on-Q-description (with the present Q-trait population) of the ideal submariner as the 2 other factors could not be differentiated from the first general factor.

R 21

3056 Seashore, R., & Kurtz, A.K. ANALYSIS OF ERRORS IN COPYING CODE. Contract OEXar-830, Proj. X-107, OSRD Rep. 4010, Rep. 5, Aug. 1944, 49pp. OSRD, NDRC, Applied Psychology Panel, Psychological Corporation, N.Y.

3056 An analysis is presented of 29,000 errors made by a large number of students in copying International Morse Code following 2, 4, 8, and 12 weeks of instruction. The data are presented in terms of quality of performance, order of difficulty of code characters, differences between good and average students, the effects of amount of instruction, and a classification of the types of errors which occurred most frequently at each level of training. Also included is a brief summary of other experiments in the area of radio code copying.

T. R 4

3057 Hixson, W.C., Harter, G.A., Warren, C.E. & Cowan, J.D., Jr. AN ELECTRONIC RADAR TARGET SIMULATOR FOR AIR TRAFFIC CONTROL STUDIES. Contract AF 33(616)-43, Proj. 7192, Task 71596, MACC TR 54 569, Dec. 1954, 83pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3057 The radar simulator described in this report was designed for research on air traffic problems arising from the need to control large numbers of aircraft in the vicinity of a landing field. The simulator provides independent control of speed and heading for 30 radar aircraft targets which are displayed on a Plan Position Indicator-type radar display with simulated ranges of either ten or 50 miles. The accuracy of target course generation, the flexibility of display system, and method of operation are discussed. Other uses of the device for general air defense problems are suggested.

T. G. I. R 11

3058 OSRD Staff. MEMORANDUM ON RADAR OPERATOR TRAINING: RESULTS OF STUDY OF SCR 270-71 OPERATORS-IN-TRAINING AT DREW FIELD. Contract OEXar-919, Proj. SC-70, NS-146, OSRD Rep. 1737, Res. Rep. 1, Aug. 1943, 6pp. OSRD, NDRC, Applied Psychology Panel, Yerkes Laboratories of Primate Biology, Orange Park, Fla.

3058 A study of SCR 270-71 radar operators-in-training based upon observations of approximately 500 operators for a period of approximately one month, was conducted to determine the effectiveness of the radar operator training program. Accuracy of range and azimuth reading proficiency were measured by means of the Philco Trainer. The results were presented and discussed in terms of the proficiency scores exhibited by the operators and the factors which appear to be relevant to improvement of the training program, e.g., student morale, course material, knowledge of results, training schedule arrangement, and so forth.

T. G.

3061 Lindsley, D.B., et al. A STUDY OF THE FOXBORO TRAINER AS A TRAINING DEVICE FOR LEARNING TO TRACK BY MEANS OF PIP-MATCHING. Contract OEXar-919, Proj. SC-70, NS-146, OSRD Rep. 3102, Res. Rep. 5, Dec. 1943, 15pp. OSRD, NDRC, Applied Psychology Panel, Yerkes Laboratories of Primate Biology, Orange Park, Fla.

3061 The Foxboro Trainer (BC-968-A), a training device for learning pip-matching tracking ability, was studied to determine its value as a tracking trainer and more specifically, to determine the degree of skill obtained at different stages of practice. Ss (25) were given three runs each day for 12 successive days with motivation being maintained by verbal encouragement and competition within the group. Tracking scores were plotted against Veeder error scores and the results were discussed in terms of the relative increment in tracking ability at specific stages of practice as well as the overall tracking improvements reflected by use of this device.

T. G.

3062

Saidoor, J.C., Mallory, L.A., & Hearsey, E.L. METHODS OF TRAINING TELEPHONE TALKERS FOR INCREASED INTELLIGIBILITY. Contract OENr-680, Proj. F-109(1), SC-67, OSRD Rep. 3178, Rep. 4, Jan. 1944, 41pp. OSRD, NDRC, Applied Psychology Panel, Psychological Corporation, N.Y.

3062

To evaluate methods of instruction in talking over sound-powered telephones, 14 methods were employed with approximately 650 recruits. Four general types of methods were specified: 1) instruction by reading materials silently, 2) instruction using phonograph records, 3) instruction by teachers over phones, and 4) instruction in teacher-classroom situation. Each man's speech was tested for intelligibility before and after training. The results were discussed in terms of the relative gains in intelligibility produced by each method.

T. R. 2

3063

Kaufert, E.B., Spragg, S.D.S., & Taylor, H.A. VALIDATION OF THE MODIFIED ARMY BC-968-A RADAR TRAINER AS A TRAINING DEVICE FOR AERIAL TRACKING OF THE MARK 37 GUN DIRECTOR WITH MARK 4 RADAR. Contract OENr-1171, Proj. N-114, OSRD Rep. 4476, Rep. 15, Feb. 1945, 18pp. OSRD, NDRC, Applied Psychology Panel, University of Wisconsin.

3063

The BC-968-A Radar Trainer (Foxboro Trainer), ordinarily used to train men in the operation of SCR-268 radar equipment was utilized in training Navy personnel in pointer's and trainer's tasks in tracking the Mark 37 gun director with Mark 4 radar. Its efficacy in this function was evaluated by selecting two groups of matched Ss (on the basis of a tracking test) and training one group on the BC-968-A trainer while the other group received no training. After 12 days, both groups were tested in the gun director. The results were discussed in terms of the comparative performance of each group.

T. G.

3064

Lindsley, D.B., et al. USE OF THE PHILCO TRAINER IN THE TRAINING OF A-SCAN OSCILLOSCOPE OPERATORS. Contract OENr-919, Proj. Sc-70, OSRD Rep. 2096, Res. Rep. 3, Oct. 1943, 26pp. OSRD, NDRC, Applied Psychology Panel, Yerkes Laboratories of Primate Biology, Orange Park, Fla.

3064

The use of the Philco-Trainer (Trainer Box BC-1070-A) in the training of A-Scan Radar Oscilloscope operators was evaluated by assessing the average error of azimuth reading for 72 men following seven days of training. The results were presented and discussed in terms of the distribution of azimuth and range error scores over days of training and for particular individuals initially poor in detection proficiency. Suggestions were offered for effective use of the trainer in improving operator proficiency.

T. G. I.

3065

Ratliff, F. & Riggs, L.A. INVOLUNTARY MOTIONS OF THE EYE DURING MONOCULAR FIXATION. J. exp. Psychol., Dec. 1950, 40(6), 687-701. (Brown University, Providence, R.I.). (ONR).

The purpose of this experiment was to measure rapid involuntary movements of the eye during steady monocular fixation of a stationary, object. A photographic method of recording was used. 4 main types of movements were observed: a) Small rapid motions with a median extent (peak to trough) of about 17.5 sec. angle of rotation, and frequencies ranging from 30 to 70 cycles per sec. b) Slow motions of irregular frequency and extent. c) Slow drifts in one direction or another upon which the motions mentioned above are superimposed. d) Rapid jerks with an average extent of about 5.6 min. of arc occurring at irregular intervals, at times apparently compensating for the drifts. Total movement due to the combined effects of these motions over a period of 3 or 4 sec. was usually less than 10 min. of arc during the steadiest fixations. On the basis of the above results conclusions were drawn regarding the motions of the retinal image of the object being fixated. a) During a fixation period of 3 or 4 sec. the image of the object being fixated may move across a total of 25 to 50 receptors. b) The slower motions, drifts, and jerks may carry the retinal image across about a dozen receptors. c) The small rapid motions move the retinal image across 2 or 3 receptors at most. However, the median extent of these motions is so small that the movement of the retinal image under optimal conditions of fixation is not likely to exceed the width of one receptor. The results of this experiment indicate that small rapid motions of the eye do occur during 'steady' fixation, but that the magnitudes of these motions are extremely small.

R 15

3066

Riggs, L.A. & Ratliff, F. VISUAL ACUITY AND THE NORMAL TREMOR OF THE EYES. Science, 1951, 114, 17-18. Contract N7our-358, T.O. 2, Proj. NR-141-359. ONR, Brown University.

3066

To offer some evidence on the physiological basis of visual resolution, data were obtained on binocular eye movements taken while the subjects were attempting steady fixation on a point. An analysis is made of the type of eye movement that occurred and the results are related to a theory of visual acuity.

I.R.15.

3067

Johnson, E.P. & Riggs, L.A. ELECTRORETINAL AND PSYCHOPHYSICAL DARK ADAPTATION CURVES. J. exp. Psychol., Feb. 1951, 41(2), 139-147. (Brown University, Providence, R.I.). (ONR).

Psychophysical procedures have been employed in experiments designed to match an earlier study of dark adaptation in which human electroretinal responses were used. The level of pre-adaptation was kept low enough to involve principally the scotopic system of the eye, since it was known that the retinal responses were primarily scotopic in origin. It was found that the extent of dark adaptation, measured as a lowering of the light intensity necessary to arouse a response, was roughly comparable in the absolute threshold experiments and in the electrical ones. The 2 sets of dark adaptation curves are not, and cannot be expected to be, identical. Their general similarity does, however, support the conclusion that human dark adaptation takes place largely at the retinal level, and that the scotopic visual system is responsible for the phenomena observed in both sets of experiments.

R-16

3068
Fitzpatrick, R. (Proj. Dir.). STUDY AND DEVELOPMENT OF EQUIPMENT FOR SIMULATING BLIND FLYING. PHASE B: FIELD SURVEY. Contract N70NR 37003, Proj. NM 001 035, SDC Proj. 6 BA, SDC TR 37003 1, April 1949, 120pp. USN Special Devices Center, Port Washington, N.Y. (American Institute for Research, Pittsburgh, Penn.).

3071
Lindale, D.B., et al. A RADAR TRAINER AND FLASH-READING METHOD FOR OPERATORS OF THE PLAN POSITION INDICATOR. Contract ONR-919, Proj. SC-70, OSD Rep. 4489, Res. Rep. 14, Dec. 1944, 17pp. ONR, NDMC, Applied Psychology Panel, Yerkes Laboratories of Primate Biology, Orange Park, Fla.

3069
This paper reports the results of the administration of a questionnaire on simulated blind flying equipment to 143 Navy pilots. Replies to questions are tabulated and analyzed to evaluate the equipment in terms of usage, comparisons of various systems, and difficulties and needed improvements. Appendices include a copy of the questionnaire and the comments of respondents (critical incidents, equipment difficulties, recommendations, etc.).
T.

3071
This article described an optical-mechanical trainer for the Plan Position Indicator which was developed to supplement an improved system, called the "Flash-Reading Method," of training in radar plot reading. The training device, the PPI Flash Reading Trainer, simulates all aspects essential to the task of learning to read plots. The system of training in which it is used emphasizes training in maximum speed in reading individual and successive target echoes and the standardization of problem situations. Potential applications of the trainer and training methods were discussed along with the results of their experimental application to radar plot training.
T. G. I.

3072
Fitzpatrick, R. THE DEVELOPMENT OF A RESEARCH PROGRAM ON ADVANCED SYNTHETIC ELECTRONIC TYPE FLIGHT SIMULATOR. Feb. 1950, 48pp. American Institute for Research, Pittsburgh, Penn.

3072
This report reviewed a survey made by studying the literature and conducting interviews and correspondence on the use of electronic flight simulators. Devices were evaluated; use of simulators was discussed, and a program for future research was proposed.
T. R 42

3073
Fitzpatrick, R. (Proj. Dir.). STUDY AND DEVELOPMENT OF EQUIPMENT FOR SIMULATING BLIND FLYING. FINAL REPORT: SUMMARY OF PROJECT. Contract N70NR 37003, Proj. NM 001 035, SDC Proj. 6 BA, SDC TR 37003 5, June 1949, 34pp. USN Special Devices Center, Port Washington, N.Y. (American Institute for Research, Pittsburgh, Penn.).

3073
This report summarizes the findings of a project for the study of methods for simulating blind flying. Four general approaches are discussed: two-stage systems, hood systems, lower systems, and single-stage systems. Current equipment is evaluated in terms of advantages and limitations, and recommendations are made for the adoption of specific equipment and for further research.
T. I. R 42

3070
Wapner, S., & Witkin, H.A. THE ROLE OF VISUAL FACTORS IN THE MAINTENANCE OF BODY-BALANCE. Amer. J. Psychol., 1950, 62, 385-408. (Clark University, Worcester, Mass. & Brooklyn College New York). (ONR).

Maintenance of balance on an unstable platform was studied under 4 conditions of the visual field: a) full visual field (highly structured); b) limited field (of weak structure); c) no visual field (S blindfolded); and d) an unstable (moving) field. As the visual field was weakened, eliminated, and finally made unstable, balance became progressively poorer for both men and women. It was found, however, that women showed differentially poorer balance than men when presented with unstable visual surroundings. There were marked and sustained individual differences in performance for each tested condition examined, both in pattern of scores from one condition to another and in rate of improvement. By controlling the condition of the visual field in both steadiness and balance, and by introducing a mechanism for adjusting the difficulty of the task to the weight of S, a significant relationship was found between steadiness and balance, greater steadiness being associated with better balance. The highest correlations between these stated were obtained for trials carried out under identical conditions of the visual field. The results of this and related studies suggest that individuals differ notably from each other with respect to extent of dependence on the visual field in their bodily orientations.
R 4

3074
Fitzpatrick, R. (Proj. Dir.). PHASE C. EXPERIMENTAL STUDY. (STUDY OF CERTAIN EQUIPMENT USED IN SIMULATED BLIND FLYING). Contract N70NR 37003, Proj. NM 001 035, SDC Proj. 6 BA, SDC TR 37003 3, May 1949, 28pp. USN Special Devices Center, Port Washington, N.Y. (American Institute for Research, Pittsburgh, Penn.)

3074
This is an experimental comparison of two simulated blind flight systems (Blue-Amber system and Venetian Blind system) from the point of view of the safety-pilot's vision. Six (50) viewed a cyclorama screen outside a mockup cockpit alternately through amber glass and through the blind. Task was to detect and identify 30 targets consisting of one or two black dots. Another six viewed 60 targets. Number of targets detected and identified is computed and compared for the two conditions. Implications of the results for safety in blind flight training are discussed. T. I. R. 40

3075
Fitzpatrick, R. (Proj. Dir.). PHASE D. STUDY AND DEVELOPMENT OF EQUIPMENT FOR SIMULATING BLIND FLYING. Contract N70NR 37003, Proj. NM 001 035, SDC Proj. 6 BA, SDC TR 37003 4, June 1949, 13pp. USN Special Devices Center, Port Washington, N.Y. (American Institute for Research, Pittsburgh, Penn.)

3075
As part of a project studying equipment for simulating blind flying, this report makes recommendations concerning the use of specific equipment within the Navy Blue-Amber system. Included are recommendations for improved practice with then-current equipment and for improved design of the system. Areas are pointed out where research is desirable.

3076
American Institute for Research. PHASE A. REVIEW OF METHODS. (STUDY AND DEVELOPMENT OF METHODS FOR SIMULATED BLIND FLYING). Contract N70NR 37003, Proj. NM 001 035, SDC Proj. 6 BA, Dec. 1948, 45pp. American Institute for Research, Pittsburgh, Penn.

3076
This report summarizes a survey of literature, interviews and correspondence on methods for simulating blind flying. Three basic systems (2-stage, hood, and louver) are described and discussed with regard to advantages and limitations. G. I. R. 27

3078
Keller, F.S. & Jerome, E.A. PROGRESS IN RECEIVING INTERNATIONAL MORSE CODE. OSRD Contract OEMSR 830, NDRC Proj. SC 86 & Rep. 5, Rep. 5366, July 1945, 46pp. Psychological Corporation, New York, N.Y.

3078
This article presents a recording system designed to describe a student's progress in learning to receive International Morse Code. A grading technique is one of the several means of evaluating progress which is presented, along with data on the progress of three hundred and forty-two students during training. Utilizing another large group of students, data is presented on the evaluation of progress of low-speed and high-speed operators and the effect of practice time upon proficiency. Finally, data is presented on the extent to which reclassification or elimination of students can be predicted from an evaluation of their progress in early stages of training. T. C.

3080
Baker, H.D. THE COURSE OF FOVEAL LIGHT ADAPTATION MEASURED BY THE THRESHOLD INTENSITY INCREMENT. J. opt. Soc. Amer., 1949, 3, 172-179. Contract N60nr-271, T.O. 9, Proj. NR-142-404. ONR and Columbia University.

3080
To determine the course of foveal light adaptation, threshold measurements (just barely perceptible increments of intensity) were made on two subjects for various intensities of adapting light (0.58, 5.9, 58, 580 millilamberts) over a period of fifteen minutes. The fovea was in a dark-adapted condition prior to exposure to illumination. The data are analyzed as a function of time of exposure to the four adapting intensities and discussed in relation to theories of photo-reception and neural processes in vision. T.O.I.R. 14.

3081
Graham, C.H. BEHAVIOR, PERCEPTION AND THE PSYCHOPHYSICAL METHODS. Psychol. Rev., March 1950, 57(2), 108-120. (Psychology Lab., Columbia University, New York, N.Y.) (ONR)

3082
Luneburg, R.K. THE METRIC OF BINOCULAR VISUAL SPACE. J. Opt. Soc. Amer., Oct. 1950, 40(10), 627-642. College of Physicians & Surgeons, Columbia University, New York, N.Y. (ONR)

Attention is given to some problems concerning stimulus and response in the psychophysical experiment. The role of instructions, classification of stimuli, and limitations of the S's verbal response are discussed. An examination is made of the stimulus-response relations of the following psychophysical methods: constant stimuli, single stimuli, limits, adjustment, sense-ratio, and reaction time. Representative stimulus-response functions are described. It is concluded that the behavior-evidenced in the psychophysical experiment is discriminating. Some historical aspects of psychophysical theory are considered and criticized. An attempt is made to relate the data of the psychophysical experiment and perception to the field of behavior theory. It is shown in equation (10) that psychophysical functions are describable as special cases of the general behavior function of equation (9). In the special case a specific aspect of a stimulus is the essential variable, and terms representing number of presentations of stimuli, time, and specific conditions of the organism are constant. In certain treatments that involve several psychophysical functions (e.g., intensity discrimination), one variable aspect of the stimulus is treated in equation (11) as a function of another aspect of the stimulus, the response and all other variables remaining constant. R 40

The aim of this paper is to show that the so-called visual space has a uniquely determined non-Euclidean metric, or psychometric distance function, the numerical parameters of which depend on the individual observer. Certain well-known phenomena of space perception, such as the horopter, the alley experiment and size constancy, are explained on the basis of the distance function. Methods of measuring the personal parameters of the metric are developed, and applications of the theory to the field of binocular instruments and pictorial representation of space are suggested. R 4

3086

Ryan, T.A., Cottrell, C.L. & Bitterman, M.E. MUSCULAR TENSION AS AN INDEX OF EFFORT: THE EFFECT OF GLARE AND OTHER DISTURBANCES IN VISUAL WORK. *Amer. J. Psychol.*, July 1950, 53, 317-341. (Cornell University, Ithaca, N.Y. & University of Texas, Austin, Tex.). (ONR)

Using a controlled rate of presentation of a letter checking-test and holding constant the visual relations between the work-area and the glare-source, muscular action potentials (MAP) were measured from 4 diverse regions of the body. Significant increments in MAPs were found when glare was introduced. There was no evidence of differential effects in different regions of the body. Combination of changes occurring at several points produced more significant results than those obtained from a single area. The total electrical activity for a period of work is thus shown to have validity, inasmuch as it reflects the effects of severe glare in group averages. The reliability and sensitivity of this index must be investigated further, however, since not all individuals in the group showed patterns similar to the group-averages. The fact that a given individual shows no increase in potentials during work under glare may reflect a real lack of effect in that particular individual or it may only mean that this index is not sufficiently reliable to measure effects in the single day's record.

R 20

3084

Murray, Elsie. MASS-TESTING OF COLOR VISION: A SIMPLIFIED AND ACCELERATED TECHNIQUE. *Amer. J. Psychol.*, 1946, 51, 370-385. (Cornell University, Ithaca, N.Y.).

A mass-testing procedure used on Cornell University entering students in the fall of 1947 is described, along with analysis and discussion of results. The regulations for testing were a) speed (1:1 min. per 5), b) setting (small table in open space in a large gymnasium), c) examiners (students trained by physician in charge), and d) testing hours (8-12 AM and 2-6 PM for 5 consecutive days). The test materials were 13 pseudo-isochromatic plates (Ishihara, 5th ed.), 10 correct was the score adopted for color normal and a record was kept of errors. It was found that of the 1866 men tested 144 or 7.7% scored 3-12 errors; out of 468 women, 11 were scored color deficient or 2.4%. These percentages compare favorably with those generally reported. Some discussion of certain doubtful plates is presented. Even though the procedure throughout was tentative, the writer feels that the results demonstrate that any institution interested in the future of its students, however pressed for time, will find it profitable to run a color-test along with its medical examination of entrance. (NEIAS)

R 33

3087

Harvard University. THE PROBLEM OF SELECTING AND TRAINING COMMUNICATIONS PERSONNEL. Contract GEMR 658, OSRD Rep. 987, MFR Rep. 27, Nov. 1942, 24pp. Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

3087

This report is concerned with the problems of adequate selection and training of personnel for communication in aircraft, ships, and tanks. It presents the results of experiments dealing with individual differences among communications personnel (e.g., differences in listening ability and articulation), the validation of tests of individual differences (e.g., the comparison of laboratory with actual flight performance), the efficiency of tests used to select communications personnel (e.g., acuity of hearing tests, etc.), and the use of equipment and particular types of instructions in the training of listeners and speakers (e.g., equipment information, resonant vs. non-resonant interphone system, etc.).

T. C. R 5

3088

Spragg, S.D.S. A STUDY OF THE TRACKING PROFICIENCY OF STUDENT OPERATORS DURING TRAINING ON AERIAL TRACKING OF THE MARK 37 GUN DIRECTOR WITH MARK 4 RADAR. OSRD Contract GEMR 1171 & Rep. 4049, MRC Proj. N 114 & Rep. 10, Aug. 1944, 16pp. University of Wisconsin, Madison, Wisc.

3088

To evaluate the proficiency of students trained to track the Mark 37 Gun Director with Mark 4 radar, and to study the effect of knowledge of results (or coaching) on such performance, two groups of Fire Controlmen students were compared. While one group was trained in the usual manner, the other group was coached during and following tracking runs. Performance was recorded on a Pointing and Training Record Sheet and by using a Mark 79 telescope as a check sight. Results are discussed in terms of the comparative performance of each group and the general proficiency evidenced by all of the subjects.

T. G. I.

3090
Lit, A. THE MAGNITUDE OF THE PULFRICH STEREO-PHENOMENON AS A FUNCTION OF BINOCULAR DIFFERENCES OF INTENSITY AT VARIOUS LEVELS OF ILLUMINATION. *Amer. J. Psychol.*, 1949, 62, 159-181. (Columbia University, New York, N.Y.).

The present investigation is concerned with the effect of differences in intensity at different base levels of illumination on the Pulfrich stereophenomenon. Determinations were made of the relationships existing between a) the magnitude of the near and far displacements, and b) the differences in retinal illumination existing between the 2 eyes for c) many basic levels of illumination. The following relationships were found: a) displacement and latency-difference increase as the difference in retinal illumination increases; b) displacement and latency-difference approach maximal values as the difference in retinal illumination increases; c) the rate of increase depends on level of illumination; slopes of the curves increase as level-of-illumination decreases; d) for a given difference in retinal illumination, displacement and latency-difference increase as level of illumination decreases; and e) the difference in retinal illumination necessary to produce a constant displacement or latency-difference becomes smaller as level of illumination decreases. The results obtained may be accounted for on the assumption that the absolute visual latent period and the logarithm of the stimulus-intensity are inversely related. The results are analyzed in terms of laws of space-perception, and additional experiments have been performed to test the relations.

R24

3091
Graham, C.H., Hammer, E.J., Mueller, R.D., & Note, F.A. STEREOSCOPIC SETTINGS WITH RETICLES PROVIDING MULTIPLE REFERENCE ANGLES: THE PERCEPTION OF SPATIALLY REPEATING PATTERNS. PSYCHOLOGIA, 1949, 27, 209-216. (Psychology Dept., Columbia University, New York, N.Y.). (GMR).

It is shown theoretically that, under certain conditions, a stereoscopic observer may align a target with a reticle at more than a single value of apparent range. Theory predicts that multiple alignments may occur when the visual angle, α , existing between adjacent equally spaced reticle marks is sufficiently small. If we designate the angular difference existing between a given alignment setting and the "true" alignment setting as n , then the condition for alignment is fulfilled when $\sin n = n$. An integral number, n , represents the degree of "false" fusion. Experimental data, obtained with the stereoscope and reticles described in the text, are in accord with theory.
R 6

3092
Davis, H., Parrack, H.O. & Eldredge, D.H. HAZARDS OF INTENSE SOUND AND ULTRASOUND. Ann. Oto., Rhino-, Laryngology, Sept. 1949, 58(3), 732-738.

3092
This paper reviews present evidence for the hazards to hearing of air-borne ultrasonic vibrations. Evidence for specific effects of these vibrations on the nervous system and sense organs is considered. High intensity sound hazards are discussed and various critical levels pointed out. Mild stimulation that gives rise to subjective feelings of fatigue, annoyance, irritation, and the like are mentioned.
G. R 5

3096
Kobrick, J.L. QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: II. DIMENSIONS OF THE UPPER LIMIT OF GLOVED HAND SIZE. Proj. Reference 7-83-01-004; Tech. Rep. EP-41, Dec. 1956, 185pp. Environmental Protection Research Division, Quartermaster Research & Development Center, Natick, Mass.

3096
This report presents human engineering information on the hand size of the soldier wearing various ensembles of Quartermaster protective gear. It is intended for use as a handbook by engineers for establishing size and space allowances in the design and sizing of hand-operated equipment. The criterion employed is the bare hand size that is equal to or bigger than the hand size of 95 percent of the Army personnel (95th percentile of the Army hand size distribution). The information is presented in pictorial form with index scales, so that dimensions can be measured on the pictures and referred to the index scale to establish actual size.
I. R 3

3097
Alluisi, E.A., & Kidd, J.S. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL. Contract AF 33(616)-3612, Proj. 7192, Rep. 690-3, Jan. 1957, 16pp. Research Foundation, Ohio State University.

3097
This is a progress report covering three months work on problems of air traffic control. Brief reviews of accomplishments to date and future plans are given for: operational studies of existing Air Traffic Control Systems, systems research on simulated systems, technical studies and supporting basic research, theoretical formulations, design and development of research equipment, and liaison activities. A list of personnel, submitted reports (21) and reports in preparation (3) are included.

3099
Davis, H. THE ARTICULATION AREA AND THE SOCIAL ADEQUACY INDEX FOR HEARING. LARYNGS, 1948, 58(8), 761-776. (Research Laboratory of the Central Institute for the Deaf, St. Louis, Mo.). (GMR).

The Social Adequacy Index (SAI) is a single number that indicates how well a person hears speech under average everyday conditions. The SAI is based on 2 different kinds of speech tests. One kind of speech test measures the hearing loss for speech in db. This is a measure of auditory acuity. The other kind of test measures the discrimination loss, i.e., the inability to recognize difficult words even when they are spoken loudly. Several tests are available for measuring auditory acuity; however, the only quantitative tests available at present for measuring discrimination loss are the phonetically balanced (PB) word lists given at high intensity levels. From the results of one test of each kind the SAI may be found either graphically or from a table. The Threshold of Social Adequacy, where a person still "gets by," but with considerable difficulty, is at SAI -- 33; meaning that he understands an average of 1/3 of the (PB) monosyllables that he hears under average conditions. Difficulty in social situations begins, however, when the index falls from normal (94-100) to 67, i.e., when 2/3 of the PB monosyllables are still understood. Hearing becomes socially useless at an SAI of 10 or 15 when simple sentences spoken in a very loud voice are no longer understood.
R 14

3100
Davis, T.R.A., Johnston, D.R. & Bell, F.C. SOME CHARACTERISTICS OF SHIVERING IN MAN. Proj. 6 64 12 028, Task USAFHL T 1, MEDEA, Rep. 383, May 1959, 14pp. USA Medical Research Lab., Fort Knox, Ky.

3100
To determine the relative roles of core and peripheral temperatures not only regarding the stimulation of shivering but also concerning the maintenance and regulation of shivering subsequent to its onset, ten human subjects (22 to 26 years of age) were studied. After one hour of stabilization at room temperatures (30 degrees C) in supine position on mesh cot and wearing shorts, each subject was wheeled into a cold room (14 degrees C) for one hour. Measurements included motor activity, rectal and surface temperatures in both warm and cold rooms. Immersion experiments used sea water. Onset of shivering was analyzed in relation to body size, surface area, latitude of origin, skin temperatures and rectal temperatures. The shivering pattern was also studied.

3102 Falconer, G.A., & Davis, H. THE INTELLIGIBILITY OF CONNECTED DISCOURSE AS A TEST FOR THE "THRESHOLD FOR SPEECH." LEARNINGS, 1947, 27(9), 581-595. (Central Institute for the Deaf, St. Louis, Mo.). (ONR).

A recorded test for the threshold of intelligibility for connected discourse (TICD) is described. The listener selects his own threshold by adjusting the volume control. The advantages claimed for this test are: a) speed (about 2 min.); b) interest for the listener and lack of fatigue; c) high face validity. (It uses a sample of an actual radio broadcast); d) satisfactory reliability; e) negligible learning effects. The chief disadvantage of the test is the subjective nature of the end-point. An occasional subject gives an erratic threshold. The TICD test was compared experimentally with Auditory Test No. 9 (syndetic words), using 50 normal and 94 hard-of-hearing ears. The thresholds obtained by the two tests were nearly identical. The normal and the hard-of-hearing were about equally reliable, with a slight advantage in favor of the hard-of-hearing.

3103 Day, R.H. & Baxter, J.R. A COMPARISON OF TWO TYPES OF VISUAL APPROACH AID. Note ARL/IE-4, Jan. 1959, 38pp. Dept. of Supply, Aeronautical Research Labs., Melbourne, Australia. (Dept. of Psychology, University of Sydney, Sydney, Australia).

3103 To compare the principles of glidepath guidance used in the British Angle of Approach Indicator and the Australian Precision Visual Glidepath, twelve experienced airline captains made three approaches on each system during conditions of clear visibility on moonless nights. Preferences under a variety of conditions and from a number of aspects were determined by questionnaire; flight profiles were also recorded. The data were analyzed for differences between the two systems. T. G. I. R 5

3104 Dearborn, W.F., Johnston, P.W. & Carmichael, L. IMPROVING THE READABILITY OF TYPEWRITTEN MANUSCRIPTS. Proc. Nat. Acad. Sci., Oct. 1951, 37(10), 670-672. (Tufts University, Medford, Mass.).

3104 This paper reports some of the results from an investigation of ways to improve the readability of typewritten manuscripts. Some of the features which were tried out experimentally were 1) the use of a "peak stress" format (capitalizing in each sentence the word to which the author would give maximum oral stress), 2) two-column arrangement, 3) single-spaced lines, 4) other spatial arrangements which break up the article into more comprehensible units of thought, and 5) blackening (by retyping over original) certain sections deemed by the writer to be of particular importance.

R 2

3105 Dally, W.H., Glassman, J. & Houghton, D.B. A DYNAMIC AIRCRAFT SIMULATOR FOR STUDY OF HUMAN RESPONSE CHARACTERISTICS. Contract AF 33(038) 10420, Final Rep. F 2169, Sept. 1952, 94pp. Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.

3105 This report covers the design and construction of a dynamic simulator of an aircraft in flight with which "human frequency responses" to visual signals may be measured for the purpose of determining optimum characteristics of an aircraft's controls. The simulator comprises an aircraft cockpit, a program unit that presents visual input stimuli on a cathode-ray tube in view of the pilot, an electronic analog computer that computes the aircraft equations of motion and resultant stimuli (target) motions, and a recorder for pilot responses and other desired quantities. Validation of the simulator is given in a separate report.

T. I.

3106 Davis, H., Silverman, S.R., & McAuliffe, D.R. SOME OBSERVATIONS ON PITCH AND FREQUENCY. J. Acoust. Soc. Amer., 1951, 21(1), 40-42. (Central Institute for the Deaf, St. Louis, Mo.). (ONR).

"Tone-pips" were produced by brief rectangular electrical pulses being delivered through 2 sound-effects filters in cascade with both high and low cut-offs set at 2000 cps. Nearly all of the acoustic energy of the final signal was found to be concentrated in a band about an octave wide and centered at 2000 cps. The pulsing frequency was varied independently between 50 and 150 pips per second. Listeners describe the resulting sound as a "metallic buzz." Listeners vary greatly in their ability to identify the 2 "pitches" present in this sound and in the accuracy with which they match with a pure tone either the pulsing frequency (about 130 per second) or the band-pass frequency (2000 cps in the present series). Errors of exactly one octave are particularly common. In the theoretical discussion we argue that the "pitch" of a pure tone is a double attribute compounded of "buzz" (correlated with frequency of volleys of nerve impulses) and "body" (correlated with position of maximum stimulation on the basilar membrane).

R 5

3107 Doelling, K. & Kryter, K.D. CHARACTERISTICS OF NOISE PRODUCED BY SEVERAL CONTEMPORARY ARMY WEAPONS. Contract DA 49 007 MD 985, Job 12,025, Rep. 630, March 1959, 51pp. Bolt Beranek and Newman, Inc., Cambridge, Mass.

3107 Measurements have been made of the noises associated with the firing of an M-1 rifle, 30 and 50 caliber machine guns, a 76 and 90 millimeter gun and a 105 millimeter howitzer. The noises are described in terms of maximum instantaneous peak value, duration, rise time, and frequency spectrum. The distributions of the above parameters in and around the several weapons have also been investigated. Recommendations are made concerning efficient data recording techniques.

T. G. I.

3108

Duddy, J.H. & Dempsey, C.A. LIGHT-WEIGHT SEATING: DESIGN RESEARCH AND DEVELOPMENT OF A NET SEAT FOR PROJECT MANHIGH. ONE OF A SERIES OF STUDIES PERTAINING TO CREW COMPARTMENT HABITABILITY FOR EXTENDED MISSIONS. Contract AF 33(516) 3068, Proj. 7222, Task 71747; WADC TR 58 307, Dec. 1958, 41pp. USAF Aero-Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

3108

This report describes the design research and development of a light-weight nylon net seat for Project MANHIGH (manned balloon flights in the hostile space-equivalent environment for extended periods of time). Experiments were conducted to determine the ways in which the complex contours of a continuous body supporting surface could be generated with nylon net. Three independent factors, found to affect the curvature of the surface, were varied empirically to develop an experimental seat design. An aluminum and nylon net saddle of the proposed seat was constructed and evaluated during flight.
T. I. R 9

3109

Staats, A.W., Staats, Carolyn K. & Heard, W.G. PSYCHOLOGICAL PROCESSES IN LANGUAGE COMMUNICATION. LANGUAGE CONDITIONING OF MEANING TO MEANING USING A SEMANTIC GENERALIZATION PARADIGM. Contract NMR 2305 (00); Tech. Rep. 4, May 1958, 8pp. Arizona State College, Tempe, Ariz.

3109

This study tests the hypothesis that a word meaning response can be conditioned to the meaning response of another word. Two types of stimuli were used: 1) words presented on a screen (conditioned stimulus--CS) and 2) words presented orally (unconditioned stimulus--UCS). The visually presented words were shown 14 times in random order. On each presentation the CS-word was paired with a different UCS-word. The CS-words ROCK and CARPET were always paired with UCS-words of positive or negative evaluative meaning. The order of pairing was reversed for two groups. Finally, all subjects rated a series of words including STONE and RUG on a semantic differential scale of pleasant-unpleasant. The scores were analyzed for mediated conditioned meaning to synonym words.
T. R 12

3110

Solomon, P., Kubzansky, P., Leiderman, P.H., Mendelson, J.H. et al. SENSORY DEPRIVATION. Science, Jan. 1959, 129(3343), 221-223. (Psychiatric Research Lab., Boston City Hospital, Boston, Mass.).

3110

This note presents a summary of a "Symposium on Sensory Deprivation" which was held at the Harvard Medical School in Boston on 20 and 21 June 1958. The working group represented men from a wide variety of disciplines who were working with problems of sensory deprivation, isolation, and confinement. Findings were reported relevant to the effects of deprived or restricted environments upon intellectual functions, opinions, attitudes, perceptual performance, reaction time, electroencephalograms, and physiological reactivity, as well as upon personality and emotions. Full proceedings are to be published.

3111

Hirsh, I.J. & Webster, F.A. SOME DETERMINANTS OF INTERAURAL PHASE EFFECTS. J. acoust. Soc. Amer., Sept. 1949, 21(5), 496-501. (Psycho-Acoustic Laboratory, Harvard University, Cambridge, Mass.). (Rep. PNR 68)

A 250-cycle tone was presented against 4 different kinds of background. The masking sounds were: a) pure tones; b) regular pulses (125 pps); c) random pulses (average 125 pps); and d) random noise. Combinations of filters permitted the presentation of these maskers in frequency bands that were varied in width and center frequency. The results indicate that the threshold for the tone in the presence of a regular, periodic masker does not depend to any significant degree upon interaural phase relations. A necessary characteristic of the masker that produces interaural phase effects is randomness or irregularity. Both masking and the interaural phase effects increase as the frequency band of a random masker approaches the frequency of the tone. Band width alone does not contribute to the interaural phase effects except as widening a band tends to bring one cut-off nearer the frequency of the tone. Wide and narrow band maskers, both of which contain the frequency of the tone, produce the same effects.

R 4

3112

Beals, Lynn S., Jr. THE GENERAL PRACTICE OF TRAINING. J. Aeronaut. Med., June 1952, 23, 271-279. (USN Special Devices Center, Port Washington, N.Y.).

3112

This is the text of an address to the Aero Medical Association. It is a description of the role of the human engineer in the training area (and specifically at the Special Devices Center, Office of Naval Research). Topics include: establishing a training program, training equipment, and problem applications.
T. R 2

3113

Shaw, M.E. RANDOM VERSUS SYSTEMATIC DISTRIBUTION OF INFORMATION IN COMMUNICATION NETS. J. Pers., 1956, 25(1), 59-69. (Office of Naval Research, Johns Hopkins University, Baltimore, Md.). Contract N5 orf 166, Proj. Des. NR 145 089, Rep. 166.1 203, Task-Order 1.

3113

To examine the effects of systematic as compared with random distribution of information upon the problem solving efficiency of small groups, 24 groups (four subjects each) were run on two types of nets (star and comb). Half of the groups in each net were given knowledge about the type of distribution (random or systematic); two problems varying in difficulty were used. Orders of distribution and problem presentation were counterbalanced. Task satisfaction ratings were made at end of experimental session. Measures of time (problem solution), number and content of messages, errors, and ratings of satisfaction were studied by analysis of variance techniques for differences due to information distribution and type of communication pattern.
T. I. R 11

3121

Brown, E.L., Matheny, W.G. & Flexman, R.E. EVALUATION OF THE SCHOOL LINK AS AN AID IN TEACHING GROUND REFERENCE MANEUVERS. (HUMAN ENGINEERING SYSTEMS STUDIES). Contract NSCRI 71, Proj. NR 784 003, SDC Proj. 20 L 1, SDC TR 71 16 7, Dec. 1950, 41pp. USN Special Devices Center, Port Washington, N.Y. (University of Illinois, Urbana, Ill.).

3121

This is a preliminary experiment in a series to evaluate the School Link trainer as an aid to flight training. Twenty students (in two groups) were rated on 15 actual landings of an aircraft, half having had three hours of previous practice in the Link with a simulated display of a runway as it looks during landing; half had no Link time. Errors per trial are recorded for each group and interpreted regarding transfer from the Link pre-training. Sample work sheets for rating landings are appended. Some additional data were gathered for nine students on other maneuvers.
T. G. I. R

3122

Williams, A.C., Jr. & Flexman, R.E. EVALUATION OF THE SCHOOL LINK AS AN AID IN PRIMARY FLIGHT INSTRUCTION. 1949, 27pp. Institute of Aviation, University of Illinois, Urbana, Ill.

3122

Two experiments on the effectiveness of pre-flight training in a School Link trainer are reported. In one, 46 students (three groups of 16) trained with 0, 2, and 4 hours on the Link before flight training; hours of dual flight instruction before solo are compared. In the second experiment, two groups of 24 students (one with Link training, one without) were evaluated in terms of number of trials to learn in-flight maneuvers. Results are evaluated for evidence concerning transfer of training from the Link to the flight condition.

T.

3123

Roscoe, S.N. THE EFFECTS OF ELIMINATING BINOCULAR AND PERIPHERAL MONOCULAR VISUAL CUES UPON AIRPLANE PILOT PERFORMANCE IN LANDING. *J. Appl. Psychol.*, Dec. 1948, 32(6), 649-662. (University of Illinois, Evanston, Ill.).

3123

To investigate the effects of eliminating binocular visual cues and of restricting the angular range of visibility upon pilot performance, six instrument pilots were tested for accuracy of landing an aircraft with 1) outside vision restricted to an image (outside visibility: ten degrees of visual angle) cast on a screen by a projection periscope, with binocular cues eliminated, 2) similar restriction achieved by goggles, binocular cues present, and 3) normal contact flight. Data are given as errors (feet) from the landing "spot" and compared for the various conditions. Practical implications for the design of planes and instruments are discussed.

T. I. R 6

3124

Balke, B., Ellis, J.P., Jr. & Wells, J.G. STUDIES ON ADAPTIVE RESPONSES TO HYPERVENTILATION. Rep. 57 113, June 1957, 13pp. *USAF School of Aviation Medicine*, Randolph AFB, Tex. (Air University).

3124

The possibility and nature of adaptive mechanisms to chronic hyperventilation were investigated. A standardized hyperventilation test procedure was employed to reveal alterations of psychomotor performance in relation to cardiovascular, respiratory, and biochemical responses during gradually increased hypocapnia under various experimental conditions. After normal control patterns had been established, the hypocapnia tolerance of six subjects was retested 1) after two weeks' training in hyperventilation, 2) after eight weeks' training for physical conditioning, 3) during severe physical fatigue, 4) at altitude of 14,000 feet after acclimatization, and 5) following return to sea level.

T. G. R 12

3125

Pollack, I. LOUDNESS AS A DISCRIMINABLE ASPECT OF NOISE. *Amer. J. Psychol.*, April 1949, 62, 285-289. (Harvard University, Cambridge, Mass.).

2 experienced listeners and 1 relatively inexperienced listener attempted to match a narrow band of noise-signal in terms of a) loudness, b) volume, c) annoyance, d) density, and e) force. The data was analyzed in terms of the difference between an equal-loudness adjustment and an adjustment in terms of each of the other judgments. It was found that: a) the low-frequency bands of noise are relatively more voluminous than high-frequency bands, b) both the very low and very high frequencies were relatively more annoying than the middle-noise frequencies, d) the relations obtained for volume are reversed for density, d) of all the criteria employed, force was the most poorly differentiated from loudness.

R 6

3126

Fortes, T.W. AUDITORY SIGNALS FOR INSTRUMENT FLYING. *J. Aeronautical Sciences*, March 1946, 13(3), 255-258. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

3126

This study is concerned with the applicability of auditory signals to instrument flight. Several investigations were undertaken to determine the following aspects of auditory signals: (1) the most discriminable types of signals; (2) the degree of accuracy with which such signals could be utilized; and (3) the number of simultaneous auditory signals which could be followed successfully. The experimental results of each aspect of this investigation are presented and discussed in terms of their application to Link Trainer flights. The general degree of accuracy of performance with various types of auditory signals and various modes of presentation is presented along with the inherent implications for application of this technique to training in flight.

3128 Pollack, I. THE EFFECT OF WHITE NOISE ON THE LOUDNESS OF SPEECH OF ASSIGNED AVERAGE LEVEL. *J. Acoust. Soc. Amer.*, May 1949, 21(3), 255-258. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

Continuous recorded speech passages were presented against a background of white noise and against a quiet background. The effect of the noise on the loudness of speech was determined by having listeners adjust the level of speech heard in quiet to sound equal in loudness to an assigned average level of speech presented against selected levels of background noise. In general, it was found that a) low noise levels produce a proportionately lower depression in the loudness level of speech than higher noise levels; b) as a first approximation, however, the effect of noise on the loudness of speech is a function of the speech-to-noise ratio rather than of the level of the speech alone or of the noise alone, and c) under none of the experimental conditions did white noise actually increase the loudness of speech (the "Egan effect"). The assumption that a given level of noise subtracts a constant number of loudness-units from speech (regardless of the level of the speech) was found to be fairly adequate in describing the experimental results.

R 6

3129 Thomas, G.J. EQUAL-VOLUME JUDGMENTS OF TONES. *Amer. J. Psychol.*, April 1949, 62, 182-201. (University of Chicago, Chicago, Ill.).

The present investigation demonstrates the nature of equal-volume contours throughout a large part of the auditory area (100 to 8350 cps.). In general, the contours indicate that at high intensities and high frequencies, a given change in frequency produces less change in volume than it does at lower intensities and frequencies. Throughout the middle portion of the contours, the procedure of adjusting the intensity of 1 or 2 tones which differ in frequency seems to yield essentially the same equal-volume contour as the procedure of adjusting the frequency of 1 or 2 tones which differ in intensity. However, when the method of intensity-adjustment is used, a tendency appears for the contours to flatten out at the extremes, thus giving a sigmoid shape to the contour and causing it to deviate at either end from the contour determined by the method of frequency-adjustment. Psychologically unophisticated subjects can learn with relative ease to make transdimensional equal-volume matches that are subjectively satisfying and consistent. Inter-individual differences appear to be greater than intra-individual differences from trial to trial. The equal-volume contours are considered to be reliable because contours determined at different times but with the same standard tone were found to be very similar.

R 21

3131 Pullack, I. SPECIFICATION OF SOUND-PRESSURE LEVELS. *Amer. J. Psychol.*, July 1949, 62, 412-417. (Harvard University, Cambridge, Mass.).

This note describes the more important conversion factors for transferring from one set of auditory intensity measurements to another. The most satisfactory specification of level developed by an earphone is in terms of the SPL at the face of a calibrated condenser microphone in a standard artificial ear. The conversions considered here are: calibration under an earphone cushion; calibration at eardrum-closed ear; real-ear response; calibration at eardrum-open ear and calibrations at eardrum-open ear with random incidence. (HEIAS)

R 9

3134 Wallach, H., Newman, E.B. & Rosenzweig, M.R. THE PRECEDENCE EFFECT IN SOUND LOCALIZATION. *Amer. J. Psychol.*, July 1949, 62, 315-336. (Swarthmore College, Swarthmore, Penn.).

This paper was concerned with what an S hears when 2 nearly identical sounds reach his ears from different directions and one follows the other after a slight delay. The conclusions were: a) 2 such brief sounds will be heard as a single sound if the interval between is sufficiently short -- the upper limit was found to be about 5 msec. for single clicks and apparently much longer, perhaps as much as 40 msec., for complex sounds; b) if 2 such sounds are heard as a single sound, the localization of the total sound is determined largely by the location of the first sound -- a precedence effect. Limitations of this precedence effect include: discontinuous or transient type sound, conditions around second sound relative to localization of total location and time interval, intensity, and similarity of second relative to first. (HEIAS)

R 11

3131 Cotzin, M. & Dallenbach, K.M. "FACIAL VISION:" THE ROLE OF PITCH AND LOUDNESS IN THE PERCEPTION OF OBSTACLES BY THE BLIND. *Amer. J. Psychol.*, Oct. 1950, LXIII, 485-515. (University of Texas, Austin, Tex.).

3131.

This study, the last of three investigations on the perception of obstacles by the blind, concerned the auditory dimension (pitch or loudness) involved in the perception. Four subjects (two blind and two with normal vision wearing a blindfold) were tested on their ability to perceive an obstacle under the following conditions: 1) a continuous sound (thermal noise containing all audible frequencies at high level intensity) was moved toward an obstacle at a rate controlled by the subject; and 2) a continuous sound (pure tones varying by octave relationship from 125 to 8000 cycles and at 10,000 cycles) was moved as before. Stimulus-limens were determined for each subject at distances varying from zero to six feet from the wall and the data were analyzed for the critical dimension. T. G. I.

3132 Dancher, J.W., Colman, K.W. & Courtney, D. THE SIMULATOR PILOT IN A DYNAMIC AIR TRAFFIC CONTROL SIMULATOR: AN ACTIVITY ANALYSIS. INTERIM REPORT. Contract FAA/ERD 27, Proj. N, Rep. 23, Feb. 1959, 54pp. Courtney and Company, Philadelphia, Penn.

3132

A dynamic Air Traffic Control (ATC) system simulator is currently being developed for the Federal Aviation Agency, Bureau of Research and Development. This report is concerned with an analysis of the simulator operator's activities. Included are a detailed description of the operator's task and its relationship to the over-all simulator system for personnel concerned with the conduct of ATC studies, an optimal set of procedures and sequences for accomplishing the various operations, a basis for a detailed specification of the requirements of the task as an aid in selecting operators, a basis for determining training needs and criterion measures of proficiency, and feedback for future simulator development to improve simulator console design.

T. I. R 10

3135 Bekey, G. von. THE MOON ILLUSION AND SIMILAR AUDITORY PHENOMENA. *Amer. J. Psychol.*, Oct. 1949, 62, 540-552. (Harvard University, Cambridge, Mass.).

In this paper auditory phenomena similar to the moon illusion are described: the optical vs. acoustical size of an orchestra from different locations in a large theater (just opposite to the moon illusion), and sound-image observations in an anechoic room (apparent distance as a function of observational angle--again inverse to the moon illusion). Existing theories of the moon illusion are briefly reviewed and the phenomenon of visual size constancy is then used to interpret this illusion. Also a kinesthetic spatial illusion is described.

R 10

3136

Minkins, J.E., Jr. & Stevens, S.S. THE MASKING OF PURE TONES AND OF SPEECH BY WHITE NOISE. *J. Acoust. Soc. Amer.*, Jan. 1950, 22(1), 6-13. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

This report presents the results of a study of the monaural masking of pure tones by white noise at 8 sensation levels (SL) from 20 to 90 db. The observed values of masking were employed to determine 2 basic functions: a) the critical band width of a masking noise, i.e., the ratio, in decibels, between the level of a pure tone and the level per cycle of the noise that is just able to mask the tone; b) the function relating the amount of masking to the effective level of the masking noise. With the aid of these 2 functions, a set of contours was constructed to represent the masked threshold for pure tones heard monaurally against a background of white noise having an ideal flat spectrum at the ear of the listener. A study was also made of the masking by white noise of speech in the form of continuous discourse. Measurements of the threshold of detectability and of the threshold of intelligibility were made at the same 8 noise levels used to mask pure tones.

R 7

3137

Davis, T.R.A., Johnston, D.R. & Bell, F.C. SEASONAL ACCLIMATIZATION TO COLD IN MAN. Proj. 6 64 12 028, Task USAMEL I 1, WEEA, Rep. 356, May 1959, 7pp. USA Medical Research Lab., Fort Knox, Ky.

3139

Larue, H.A., & Sklodowski, V.A. EFFECTIVENESS OF SCALD GRID MARKINGS ON TARGET LOCATION. May 1956, 23pp. Cracley Division, Avco Manufacturing Corp., Evendale Plant, Cincinnati, Ohio.

3127

To determine if the physiological changes induced by acclimatization in animals also takes place in man, six subjects (22 to 26 years of age) were studied for a period from October through February. Each subject received one hour of deliberate cold exposure (room temperature, 14 degrees C) per month preceded by one hour stabilization to 30 degrees C. Measurements for both conditions included resting metabolic rate, rectal and skin temperatures, and baseline motor activity. Shivering activity was measured by integrating muscle action potentials from right thigh. Heat acclimatization was obtained by eight-hour daily exposures to 49 degrees C, for three weeks with 20 minutes of exercise each hour.

R 7

3139

To investigate the effect of radar scope overlays on operator performance, a rectangular three-sector scope (target appearing in any one of the three sectors) was simulated on cards and presented tachistoscopically for 0.5 seconds. The task (20 subjects) was to report the location of the target by sector. Display variables were 1) type of sector separation (color, thin lines, thick lines, and thin lines with arrow) and 2) number of scaled grid markings (four degrees of "clutter"). Performance (per cent accuracy) was analyzed as functions of type and number of grid markings.

T. I.

3138 Bekesy, G.V. VIBRATION OF THE HEAD IN A SOUND FIELD AND ITS ROLE IN HEARING BY BONE CONDUCTION. *J. Acoust. Soc. Amer.*, Nov. 1948, 20(6), 749-760. QMC. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (Rep. PNR 56).

In a sound field the head is set into forced vibrations, and the vibrations are sometimes heard by bone conduction. For clinical purposes it is important to know the magnitude of these vibrations of the head so that, in cases of partial deafness, the roles of air conduction and bone conduction can be understood. The pattern of the head vibrations and the velocity of the deformation waves traveling along the bony wall of the skull were measured. For the velocity we found $c=570$ m/sec. In the course of the experiments, a new method of calibrating a vibration pick-up with a sound level meter was developed. It was found possible to construct an earphone that reduces the amount of "cross-hearing" to a very low value. With this earphone, hearing thresholds can be measured in many cases without using noise to mask the ear with the better hearing, even though the difference between the sensitivities of the 2 ears is greater than 40 db. It is shown that the maximal sound insulation that can be obtained with an ear plug is determined by the elastic forces acting between the skin of the ear canal and the bony wall of the ear canal.

R 15

111 - 335

3140 Hirsh, I.J. THE INFLUENCE OF INTERAURAL PHASE ON INTERAURAL SUMMATION AND INHIBITION. *J. Acoust. Soc. Amer.*, July 1948, 20(4), 536-544. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (Rep. PNR 51).

The difference between the binaural and monaural thresholds varies within fairly large limits. Although this binaural-monaural difference does not vary as a function of frequency when pure-tone thresholds are measured in the quiet, the difference does vary with frequency which has been used in the past to refer to the phenomenon in which the binaural threshold is lower than the monaural, obtained for masked thresholds only when the phase angles between the two earphones are opposite for the tones and the noise. If the tones and the noise have the same interaural phase angle the binaural threshold is higher than the monaural. This phenomenon, called interaural inhibition, as well as its antipode, interaural summation, is most marked at low frequencies and increases as the intensity of the masking noise is increased. The discussion considers some implications of these findings for the theory of masking and of interaural summation.

R 14

3142

HILLER, G.A. & LICKILDER, J.C.R. THE INTELLIGIBILITY OF INTERRUPTED SPEECH. *J. Acoust. Soc. Amer.*, March 1950, 22(2), 167-173. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (Rep. PNR 50).

This paper concerns the effects of interrupting speech waves--turning them on and off intermittently or masking them with intermittent noise--upon their intelligibility. The effects were studied with various rates of interruption and with the speech left undisturbed various percentages of the time. Tests were conducted a) with speech turned on and off in quiet, b) with continuous speech masked by interrupted white noise, and c) with speech and noise interrupted alternately, the speech wave being turned on as the noise wave was turned off, and vice versa. a) When the speech wave is turned on and off infrequently, the percentage of the message that is missed is approximately the same as the percentage of time the speech is off. When the interruptions are periodic and occur more often than 10,000 times per second, the interruptions do not interfere with the reception of the message. b) The quiet it is easy to understand conversational speech so long as the interruptions occur more than 10 times per second. c) When continuous speech waves are masked by noise that is interrupted more than 200 times per second, intelligibility is independent of the interruption frequency and of the percentage of time the noise is on, provided the ratio of average speech power to average noise power is held constant. Interrupted masking noise impairs intelligibility least if the frequency of interruption is about 15 per second. c) When interrupted speech and interrupted noise alternate at frequencies below 10 alternations per second, the noise does not impair intelligibility. At higher frequencies of alternation the temporal spread of masking becomes appreciable. The general features of these results are approximately the same whether the interruptions occur periodically or at random.

R 10

3144

HOWES, D.H. THE LOUDNESS OF MULTICOMPONENT TONES. *Amer. J. Psychol.*, Jan. 1950, 62(1), 1-30. (Harvard University, Cambridge, Mass.).

The loudness (in sones) of complex tones consisting of from one to 11 equally loud components is equal to the sum of the loudnesses of the several components. Unequally loud components are also shown to be additive with respect to loudness. Additivity begins to break down when the components mask each other; this point has been determined for components separated by equal pitch-distances. The decrease in the loudness of a complex tone due to intercomponent masking can be measured as the difference between its observed loudness and a theoretical value based on the hypothesis that the loudness of a complex tone is the sum of the loudnesses of its components. Measured in this way, the masking per component is invariant with respect to frequency, but depends on the loudness of the components and the pitch-separation between them. From these results a simple formula for the calculation of the loudness of multicomponent tones has been devised. This formula predicts accurately the results of previous experimentation with multicomponent tones. These simple relations in masking appear only when psychological units (sones and mels) replace the physical ones (decibels and cycles per second). The discovery of simple relations by means of these psychological scales constitutes a strong confirmation of the procedure by which they were established. The results for the masking of loudness apparently do not hold for masked thresholds of audibility. The possibility that loudness and audibility thresholds are different processes is discussed. Finally, a model based on the results is suggested, and its characteristics are compared with the known physiological properties of the auditory system.

R 39

3141

KIRSH, I.J. THE RELATION BETWEEN LOCALIZATION AND INTELLIGIBILITY. *J. Acoust. Soc. Amer.*, March 1950, 22(2), 196-200. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (Rep. PNR 67).

The binaural masked threshold for speech depends upon the relation between the interaural phase angles of the speech and those of the noise. When these phase angles are the same, the threshold is high, and both speech and noise appear to be in the same place. When the interaural phase angle of the speech is reversed relative to that of the noise, the threshold is low and the speech and noise appear to be in different places. These relations have been clearly demonstrated with earphones, and they suggest that in free-field listening the threshold of intelligibility might be affected by the relative locations of the sources of speech and of masking noise. It was found that when the azimuths of the sources of speech and of noise are changed relative to each other, the threshold of intelligibility changes by small but consistent amounts. When the sources are close together, the threshold is high; when the sources are far apart, the threshold is reduced. Although this relation is partially confounded by the effect of azimuth on the sound pressure levels at the ears, the factor of localization appears to play a significant role, especially when two ears are used and when the head is allowed to move. In order that the head-of-hearing may take advantage of these effects, they must have a hearing aid with two separate microphones mounted near the ears and connected each to a separate earphone.

R 10

3143

SMITH, M.H. & LICKILDER, J.C.R. STATISTICAL BIAS IN COMPARISONS OF MONAURAL AND BINAURAL THRESHOLDS: BINAURAL SUPPLEMENTATION OR BINAURAL SUPPLEMENTATION. *Psychol. Bull.*, July 1949, 46(4), 278-284. (Harvard University, Cambridge, Mass.). (PNR 72).

This paper examines the magnitude of the bias (supplementation effect) in the monaural-binaural comparison and whether it is influenced by the step of equating the monaural thresholds before determining the binaural threshold. It was found that further information on 3 main points is required to finally prove the existence of a summative process or reject the hypothesis of statistical bias: a) to what degree are the momentary sensitivities of the 2 ears correlated; b) to what degree are successive momentary monaural thresholds correlated; and c) how does the precision of a threshold determination depend upon the length of time spent in making it. (METAS)

R 12

3145

Miller, G.A. & Garner, W.R. THE MASKING OF TONES BY REPEATED BURSTS OF NOISE. J. Acoust. Soc. Amer., Sept. 1948, 20, 691-696. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

The masking of tones by continuous and interrupted noise was determined for 3 noise intensities, 3 noise-time fractions and rates of interruption varying from 0.5 to 512 interruptions per second. The decrease in masking effectiveness as a result of the discontinuity of the masking noise depends principally upon the duration of the silent interruption, and secondarily upon the frequency of the masked tone and the intensity of the noise. A computational device is presented which will permit a first approximation of the masking produced by interrupted noises.

R 2

3146

Black, J.W. INTELLIGIBILITY IN VOICE COMMUNICATION (PSYCHOLOGICAL STUDIES OF TRAINING TECHNIQUES). Contract N7CNR-411, Proj. NR 782 004, SDC Proj. 20 K 2, SDC TR 411 1-17, Sept. 1949, 36pp. USN Special Devices Center, Port Washington, N.Y. (Kenyon College, Gambier, Ohio).

3146

This report presents a discussion of the results of a series of experiments on intelligibility in voice communication. Some of the aspects discussed are as follows: variables in normal speech, testing voice communication, the control of speech through spoken stimuli and physical environment, monaural listening, training in voice communication, etc.

T. R 16

3150

Sutro, P.J., Ward, H.O. & Townsend, C.R. HUMAN VISUAL CAPACITIES AS A BASIS FOR THE SAFER DESIGN OF VEHICLES. ANNUAL REPORT. Contract AFEB 6 61-01 004, March 1958, 56pp. CAS Medical Research Lab., Columbus, Ohio.

3150

This report summarizes accomplishments during the year 1957 on a research project on human visual capacities as a basis for safer design of vehicles. The total behavioral field of vision has been studied by obtaining fields of fixation, standard fields of vision, fields with intermediate and maximum eye deviation, and field of maximum head rotations. Apparatus was developed and constructed for measuring peripheral acuity and form perception in a dynamic situation. Visibility areas of 16 contrasting vehicles were measured, analyzed, and rated. An analysis of conspicuity characteristics of motor vehicles was made. A general literature survey was completed.

G. I. R 3

3147

White, C.E. RELATIVE EVALUATION OF EARPHONES BY SEARCH TUBE MICROPHONE TECHNIQUES AS APPLIED TO THE PERHOFLUX PDR 8 AND THE TELEX TWINSET UNITS. Bumed Proj. NM 003 041-21-09, Rep. 235, May 1953, 56pp. USN Medical Research Laboratory, USN Submarine Base, New London, Conn.

This report was written to encourage laboratories to employ the very useful search tube microphone in audio research. First, closed acoustic couplers, their construction and use, are described--next, test methods for comparing headsets are indicated: loudness balance, frequency response, intelligibility, noise attenuation characteristics, and overload response. 2 measures of operating efficiency of headsets are described. The accuracy of search tube measurements was then examined experimentally. Finally, applications, advantages, and precautions of using search tubes are summarized. (HEIAS)

R 14

3148

Ades, H.W., Davis, H., Miles, W.R., Neff, W.D., et al. AN EXPLORATORY STUDY OF THE BIOLOGICAL EFFECTS OF NOISE. Contract N6CRI 020, Proj. NR 144079, Task 44, Dec. 1953, 116pp. University of Chicago, Chicago, Ill.

3151

USAF Air Technical Intelligence Center. SELECTED ARTICLES FROM SOVETSKAYA AVIATSIYA (SOVIET AVIATION). 4 JANUARY 1957 THRU 5 JUNE 1957. F TS 9290/111, 1957, 148pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio.

3148

In response to the problems produced by noise from jet aircraft, this report concerns interference by intense noise with functions other than hearing and the possibility of injuries caused by noise. This study assesses known limits of human tolerance and protective possibilities, discusses biological effects of noise medically and operationally, and includes recommendations for future research.

T. G. I. R 72

3151

This volume presents selected articles from Soviet Aviation. The following general topics are covered by one or more of the articles: training, bombing techniques and instruments, fire control methods and systems, rocketry, helicopters, night vision (for flight and gunnery), high altitude fighting techniques, and anti-atomic safety measures.

R 27

3149

Stingely, N.E. AEROMEDICAL EVACUATION LITTER PATIENT SAFETY HARNESS. Proj. 6354, WADC TR 57 6, Jan. 1957, 68pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3153

Tiedeman, D.V., Scheffler, I. & Starr, J. PRODUCTION, SPEED, ACCURACY AND SAFETY IN THE MAINTENANCE OF LONG-RANGE AIRCRAFT: A CONCEPT AND AN ANNOTATED BIBLIOGRAPHY. Contract AF 41(CJ7) 77, Proj. 45, Suppl. Agreement 2(57 213), Aug. 1957, 130pp. Educational Research Corporation, Cambridge, Mass.

3149

The purpose of this study is to recommend specifications for a mechanical restraining device that will provide the necessary restraint for the safety of injured personnel and psychotic litter patients during air evacuation. The medical and operational requirements for such a device were determined and tentative design specifications evaluated in a series of tests. A prototype model was constructed and evaluated. Final design specifications were developed for a proposed aeromedical safety harness for the evacuation of litter patients.

T. G. I. R 19

3153

This document presents a summary of evidence relevant to the determination of dimensions that are psychologically meaningful to the performance of the jobs of 1) pre- and post-flight line maintenance, and 2) servicing of long-range aircraft. An over-all framework was developed for summarizing the literature: 1) work pattern, 2) physical environment, 3) social environment, and 4) man-selection and classification, training, and motivation. Nearly 180,000 abstracts and titles from the Psychological Abstracts were examined and classified as core, peripheral, or irrelevant. All articles of the first two classifications were read and abstracted (not included here). A memorandum on human engineering implications in the maintenance of nuclear-powered equipment is appended. I. R 500 (approx.)

3154
Stansfield, R.G. FITTING THE JOB TO THE WORKER.
NATURE, June 1957, 172, 1284-1285.

3154
The proceedings of an international seminar, "Fitting the Job to the Worker," is summarized in this note. About 70 people, comprising physiologists, psychologists, engineers and industrial physicians, from 13 European and North American countries attended. The aim was to bring out what each had to contribute to the scientific study of the individual worker as he uses his tools and equipment and as he is affected by his immediate environment, and how such knowledge can be applied to the design of machine and workplace, either to increase the effectiveness with which the job is done, or to improve the worker's well-being.

3155
Vanderplas, J.M., Debons, A. & Crannell, C.W. LUMI-
NANCE AND "EXPECTANCY" AS DETERMINANTS OF RESPONSE
TIME TO A LIGHT SIGNAL. Proj. 7184, Task 71580,
WADC TN 58 292, Jan. 1959, 12pp. USAF Aero Medical
Lab., Wright-Patterson AFB, Ohio.

3155
This report describes an experimental evaluation of
two factors affecting the speed with which human opera-
tors respond to a warning light: intensity of the light
signal and delay interval between an auditory alerting
and the light signal. Four levels of intensity (from
1.4 to 17,616 foot lamberts) and seven variations from a
standard ten-second delay (4, 6, 8, 10, 12, 14, 16, or
18 seconds) were used. The subject's task was to release
a response switch upon appearance of the signal; there
were 72 subjects. The reaction time data were analyzed
as functions of the two factors under consideration.
T. G. R 3

3157
Wald, G. & Griffin, D.R. THE CHANGE IN REFRACTIVE
POWER OF THE HUMAN EYE IN DIM AND BRIGHT LIGHT.
J. opt. Soc. Amer., May 1947, 37(5), 321-336. (Har-
vard University, Cambridge, Mass.).

3157
This paper is concerned with an examination of a re-
ported phenomenon that the human eye behaves as though
relatively short-sighted in dim lights, its magnitude,
and its causes. Measurements of telescope settings by
21 observers in daylight and in dim light were made and
differences in setting compared to find the magnitude of
the effect. Factors associated with an expanded pupil,
the chromatic aberration of the eye, and accommodation
of the eye in dim light were investigated. The findings
are discussed in relation to the differential settings
of optical instruments in bright and in dim lights.
T. G. I, R 20

3158
Ward, J.H., Jr. USE OF A DECISION INDEX IN ASSIGNING AIR
FORCE PERSONNEL. Proj. 7719, Task 17112, WADC TN 59 38,
April 1959, 17pp. USAF Personnel Lab., Lackland AFB, Tex.

3158
Those responsible for the distribution of Air Force
personnel need to make decisions about the estimated
worth of individuals in various jobs and about the
assignment of individuals in a manner that will bring
about over-all effectiveness of the Air Force. This pa-
per presents techniques to aid in arriving at such deci-
sions. A system is developed that will provide a Deci-
sion Index for each individual in each proposed job as-
signment. Methods are described of computing and array-
ing the indexes for use in determining personnel assign-
ment.
T. R 6

3159
Webb, S. A COMPARATIVE STUDY OF SIX KEYSER ENTRY UNITS.
PO 06401, NE 091300 4(NEL 13 5), NEL Rep. 902, Feb. 1959,
12pp. USN Electronics Lab., San Diego, Calif.

3159
Two experiments were conducted to compare the rela-
tive effectiveness of six alternative keyset entry units
involving 64 items of information. In the first experi-
ment four of the units were found superior in terms of
perceptual motor performance; in the second experiment
these four units were studied further in a simulated
operational situation with greater perceptual and con-
ceptual complexity. Recommendations are made for in-
corporating the superior keyset entry unit in data-
handling systems which use current conventional tech-
niques.
T. I. R 10

3161
Meinberg, J.W. DOUBLE-WALLED FACEPIECES MA-1A ALTITUDE
HELMET. Contract AF 33(616) 3774, Proj. 7164, Task
71834, WADC TR 58 643, March 1959, 56pp. USAF Aero
Medical Lab., Wright-Patterson AFB, Ohio. (Pioneer
Scientific Corporation, Great Neck, N.Y.).

3161
This report describes the design and construction of
a double-walled lens to be used as face pieces on MA-1A
altitude helmets. The problem was to prevent water vapor
condensation on the inner surface under conditions pre-
vailing in sustained flight at very high altitudes and to
delay such condensation in emergency loss of plane canopy
or ejection in such a way as to provide unimpeded vision
to the flier during the probable duration of the emergen-
cy or of free fall through the upper atmosphere. The
limitations of such a device are analyzed and laboratory
tests of the lens are described.
T. R 7

3162
White, W.A., Jr., Welham, W.C. & Williams, S.B. VALI-
DATION OF PHYSICAL FITNESS TESTS BY MEANS OF MARKSMAN-
SHIP PERFORMANCE UNDER CONDITIONS OF ACUTE FATIGUE. M &
S Res. Proj. X 234, KP136/All(P-1)X 234, May 1944,
34pp. USMC Medical Field Research Lab., Camp Lejeune,
N.C.

3162
To validate four physical fitness tests (step-up
test, Army Air Forces physical fitness test, Schneider
test, and a tilt table test), a group of 104 Marines and
Hospital Corpsmen performed each of the tests. On the
day following the tests a 60-hour fatigue test was ad-
ministered beginning and ending with firing four strings
of 16 shots, using the M-1 rifle in the sitting position,
with the target at 300 yards. Scores on the four tests
were compared and correlated with the improvement or
decrement in firing the M-1 rifle after the fatigue test.
T. R 5

3163
USA Board NR6. EVALUATION OF THE LEAR NATURAL ATTITUDE
FLIGHT INDICATOR IN AN H-19 HELICOPTER, (DA PROJ NR
UNKNOWN; RDB TECH OBJ UNKNOWN). Proj. NR AVN 2056,
July 1956, 5pp. USA Board NR6, COMARC, Fort Rucker,
Ala.

3163
To evaluate the Lear Natural Attitude Flight Indica-
tor under simulated instrument conditions in H-19
Helicopters, Army aviators with varying amounts of in-
strument training in fixed wing and rotary wing aircraft
flew the H-19 Helicopter in which the instrument had been
installed. Instrument installation and maintenance
difficulties were recorded. Based on the trials a list
of deficiencies and suggested modifications were drawn
up and are included here.
I.

3167

Neff, W.D. INTERNATIONAL ASSOCIATION OF GERONTOLOGY THIRD CONGRESS. Tech. Rep. ONRL-82-54, Sept., 1954, 19 pp. ONR. American Embassy, London, England.

3167

This is a report of the Third Congress of the International Association of Gerontology, held July 1954 in London, England, and prepared by W.D. Neff. Brief summaries are presented of papers representing research under the general headings of changes in the EKG in psychiatric illness of old age, neurology of the aged, and studies of intelligence, learning, and special skills (e.g. speed of writing, language function, etc.) in the aged. A list of authors and papers is included.

3168

Mitkin, H.A. STUDIES IN GEOGRAPHIC ORIENTATION. Yearb. Amer. Phil. Soc., 1946, 152-155. (Brooklyn College, Brooklyn, N.Y.).

3168

A series of experiments investigating the way in which orientation toward the north-south-east-west axes of space is normally maintained is summarized. For most of the experiments the ability of the subject to remain oriented through a series of movements was tested. The variables were as follows: without the aid of vision, with a visual frame of reference, and with suggestion of illusory body motion (postural autokinetic effect). A paper-and-pencil test was devised to investigate further the nature of individual differences in orientation.

3169

Mitkin, H.A. THE EFFECT OF TRAINING AND OF STRUCTURAL AIDS ON PERFORMANCE IN THREE TESTS OF SPACE ORIENTATION. Rep. 80, Oct. 1948, 25pp. Division of Research, CAA, Washington, D.C. (Brooklyn College, Brooklyn, N.Y.).

3169

To determine the effect of training and of structural aids on performance in three tests of space orientation (Stability of Orientation Test, Dark-Room Test, and Rotating-Room Test), each test was administered twice to 196 subjects. Four groups of 49 subjects each were tested under the following conditions: 1) training given between first and second administrations, 2) structural aids varied between the two administrations, 3) additional testing given between administrations, and 4) test and retest with no interpolated activity. The test data were analyzed by methods of covariance to determine the effect of the differential treatment.
T. I. R 8

3170

Lightfoot, D., Carhart, R., & Jerger, J.F. EFFICIENCY OF IMPAIRED EARS IN NOISE: C. PERCEPTION OF SPEECH AT SUPRA-THRESHOLD LEVELS. Proj. 21-1203-0001, Rep. 6, Dec., 1953, 10 pp. USAF School of Aviation Medicine, Randolph Field, Texas.

3170

Standard speech discrimination tests were administered to normal and hard-of-hearing subjects at three suprathreshold levels, in quiet and in two levels of thermal noise. The general conclusion was that noise was not observed to exert a systematically detrimental effect on discrimination of monosyllabic words by hard-of-hearing subjects. There was, however, substantial variation among individuals.

3171

Lerner, D. COMMUNICATION SYSTEM MODELS. Report from: "Paper given at AAAS Meeting, Boston, December 1953." 5pp. Sociology Dept., Massachusetts Institute of Technology, Cambridge, Mass.

This paper is concerned with the segment of communication whereby public information is disseminated among the members of a political community. Regularities of behavior interrelating the 4 variables: channel, audience, source, message, are what is meant by a communication system. 2 main systems are distinguished: media and oral. The degree to which a society utilizes one or the other is descriptive of its social system. Interrelations among economic, political, and cultural variables are then hypothesized and described. Data from UNESCO sources were used and several correlation coefficients computed. (HEIAS)

3173

Mokoun, W. & Chaikin, G. A GUIDE TO COLOR BANDING FOR INDICATORS (METERS). Proj. TUI 2031, Tech. Memo. 2-59, March 1959, 9pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

3173

This report presents a rationale for color-coded banding of meters. The principles set forth are illustrated and swatches of the four colors that are considered maximally discriminable are given.
I.

3174

Black, J.W. AN APPLICATION OF SIDE-TONE IN SUBJECTIVE TESTS OF MICROPHONES AND HEADSETS. Joint Rep. NM 001 064, Rep. 20, Feb., 1954, 5 pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Florida. (The Ohio State Univ., Acoustic Lab.)

3174

Twenty-four experimental subjects attempted to repeat a phrase and to establish by control of the vocal level a level of side-tone that matched the level of the stimulus phrase that was heard. The experimental procedure followed the Method of Average Error. Alternative headset-microphone combinations represented broad-band and narrow-band transmission. The subjects tended to speak at a higher level than they should have to match the stimulus. The error was greater in noise than in quiet and greater in broad-band equipment than with narrow-band.

3175

Black, J.W., & Tollhurst, G.C. THE RELATIVE INTELLIGIBILITY OF LANGUAGE GROUPS. Joint Rep. NM 001 064.01, Rep. 21, May, 1954, 4 pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Florida. (The Ohio State Univ.)

3175

French, British, and American listeners heard recorded intelligibility tests spoken by French, British and American speakers. The American speakers were the most intelligible to the American listeners. The French speakers were the least intelligible to all groups. The intelligibility of the French and British speakers was improved for American listeners when the listeners were indoctrinated for one hour in the dialects of the speakers.

3176

Hartman, E.B. THE INFLUENCE OF PRACTICE AND PITCH-DISTANCE BETWEEN TONES ON THE ABSOLUTE IDENTIFICATION OF PITCH. Proj. NM-003 041-22.05, Rep. 206, June 1952, 14pp. USN Medical Research Lab., New London Submarine Base, Conn. (Reprinted from: Amer. J. Psychol., March 1954, 67(1), 1-14).

3176

To investigate the influence of practice and pitch-distance between tones on the absolute identification of pitch, 12 observers were asked to identify nine pure tones 48 times a week for eight weeks. The tones were separated by equal appearing pitch-intervals (either 50, 100, 200, or 300 mels). Correction of the judgment was made during the first seven weeks but not during the last. Results are presented and discussed in terms of learning as a function of pitch-intervals and the amount of retention of pitch identification following a duration of two months.
T. G. R 15

3177
 Morris, Ailene, & Dimmick, F.L. VISUAL ACUITY AT SCOTOPIC LEVELS OF ILLUMINATION. MRL Rep. No. 162, 1950, 9, 157-183. Bullied Proj. NR 003 041.04.03, U.S. Naval Submarine Base, Medical Research Laboratory, New London, Conn.

3177
 To investigate visual acuity at scotopic levels of illumination, acuity thresholds on checkerboard type target were obtained for six observers at eight levels of illumination between 3.7 and 6.7 log micro micro lamberts. The 50% lines were plotted in units of reciprocal visual angle against log brightness. Comparison is made with classic studies of the function covering higher ranges of illumination. Measurements of pupil change with illumination were made with an infra-red pupillometer.
 T.G. I. R. 9.

3178
 Mitchell, R.T., Morris, Ailene, Dimmick, F.L. THE RELATION OF DARK ADAPTATION TO DURATION OF PRIOR RED ADAPTATION. MRL Rep. 166, 1950, 9, 258-277. Bullied Proj. NR 003 041.49.01, U.S. Naval Submarine Base, Medical Research Laboratory, New London, Conn.

3178
 To investigate the effect of duration of preadaptation upon the immediate threshold and upon the course of dark adaptation, measurements were made following seven adaptation periods (zero to 40 minutes) wearing red goggles under a preadapting brightness of 150 millilamberts. Threshold data are plotted as a function of time in the dark following different durations of red adaptation. Sensitivity levels after five seconds in the dark after the varying periods of red adaptation and comparable periods of dark adaptation, are obtained. Operational interpretation of the data is made.
 T. G. I. R 11

3179
 Woodward, A.A. Jr., Cornish, E.R. Jr., Blevins, W.V., Cain, S.M., et al. PHYSIOLOGICAL EVALUATION OF A DIFFUSION BOARD PROTECTIVE SHELTER (U). Proj. 4 08 02 019 01, Rep. 2177, Sept. 1957, 48pp. USA Chemical Warfare Labs., Army Chemical Center, Md.

3179
 To ascertain whether human occupants of a diffusion board protective shelter are subjected to intolerable physiological stresses during occupancy up to two days, a prototype shelter was constructed and evaluated. A total of 18 subjects served in nine different tests. Physiological measurements were body temperatures, heart rates, respiratory activity, metabolic rates (calculated), and observations by an inside observer of various activities and signs of developing strain. Environmental data collected were air temperatures, relative humidity, barometric pressure, and gas composition of shelter air and outside air. These data were analyzed in terms of tolerable conditions of carbon dioxide concentration and temperatures.
 T. G. I. R 23

3180
 Ziegenruecker, G.H. & Magid, E.B. SHORT TIME HUMAN TOLERANCE TO SINUSOIDAL VIBRATIONS. Proj. 7231, Task 71786, WADC TR 59 391, July 1959, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3180
 Short time human tolerance criteria for sinusoidal vibration from one to 15 cps were determined using ten healthy male subjects ranging in age from 23 to 34 years. At each frequency, the amplitude was increased at a constant rate from zero to the point where the subject stopped the run because he thought that further increase might cause actual body harm. Lower and upper tolerance limits were established. Subjective tolerance limits were found to be caused by one or more of seven specific sensations or symptoms. Physiological observations during vibration exposure were also made.
 T. G. I. R 15

3181
 Hanes, R.H. THE CONSTRUCTION OF SUBJECTIVE BRIGHTNESS SCALES FROM FRACTIONATION DATA: A VALIDATION. J. exp. Psychol., Oct. 1949, 41(5), 719-728. (Johns Hopkins University, Baltimore, Md.). (Rep. 166, 11-97).

An attempt has been made to validate the fractionation technique for the construction of sensory scales by statistical comparison of the results obtained from estimates of 1/2 and 1/3 as bright and 2 and 3 times as bright. The results for 20 Os. each of whom made each type of estimate, were subjected to an analysis of variance. Since the differences between the 1/2 and 1/3 estimates and between the double and triple estimates were found to be significant, the construction of scales based on these different ratios was possible. In addition, the order in which the different types of estimates were made, the brightness level, individual differences and the various interactions of these factors were found to be significant. The individual subjective scale values, obtained for each type of estimate by each O, were also treated by the analysis of variance. The variance due to individuals was again significant, but the variance for type of estimate was not significant.
 R 15

3182
 Hanes, R.H. SUPRATHRESHOLD AREA BRIGHTNESS RELATIONSHIPS. J. opt. Soc. Amer., Jan., 1951, 41, 28-31. Contract NS-ori-166, T.O. I, Proj. Design. NR-784-001, Rep. 166-I-110, ONR, Special Devices Center, Port Washington, L.I., N.Y. (Johns Hopkins Univ., Inst. for Cooperative Research.)

3182
 To investigate size-brightness relationships for supra-threshold levels of brightness, eight observers made equal brightness matches of two test areas separated by 4-1/2 inches as seen against a dark background. Four test intensity levels (0.1, 1.0, 10.0, 100.0 millilamberts) and five different stimulus sizes (9, 18, 36, 144 minutes of visual angle) were investigated. Luminances of the variables required to match the standard luminance at each size were studied by analysis of variance method for each intensity level. Discussion relates the findings to visual theory and practical usage.
 T.G. R. 4.

3183
 Smith, F.L., Sweet, A.L., & Bartlett, N.R. THE DISCRIMINATION OF SMALL DIFFERENCES IN THE TIME OF MECHANICAL STIMULATION. J. exp. Psychol., 1949, 39, 569-574. Contract NS-ori-166, T.O. I, Proj. Design. NR-784-001, Rep. 166-I-87, ONR, Special Devices Center, Port Washington, L.I., N.Y. (Johns Hopkins Univ.)

3183
 To determine the sensitivity to differences in the time of mechanical stimulation of the finger tips (tactual discrimination of differences in the phase of vibrations), fingers of the right hand were stimulated by two wooden dowels connected to eccentricities and mounted so as to have an excursion of 3/4 inches. Five different speeds of vibration, ranging between 50 and 830 per minute were employed. At each speed of vibration, phase differences varied between zero and 180 degrees. Reaction time and percentage of judgments that the dowels were out of phase were derived from five subjects.
 F.T. R. 10.

3184

Leyzorek, M. TWO-POINT DISCRIMINATION IN VISUAL SPACE AS A FUNCTION OF THE TEMPORAL INTERVAL BETWEEN THE STIMULI. J. exp. Psychol., May 1951, 41(5), 364-375. ONR, Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.). (Rep. 166 1 125).

4 Ss were asked to judge the position of the second of a pair of light flashes with respect to the first when the distance and the temporal interval between these stimulus points were varied systematically. The temporal intervals were .25, .57, 1.32, 3.03, 6.96, and 16.0 sec. 4 conditions of observation were used: a) Foveal observation of stimulus points presented on a brightly lighted screen with no control of the Ss' fixations. b) Peripheral observation of stimuli presented on a lighted screen with the Ss' eye movements controlled by a fixation point 5 deg. to the right of the stimulus area. c) Foveal observation of stimulus points presented in complete darkness, fixation not controlled. d) Peripheral observation in complete darkness, fixation controlled as in b). The range of thresholds obtained, from the shortest time interval, .25 sec., to the longest, 16.0 sec., was as follows: a) Condition a) gave the lowest thresholds, 2.2 to 11.6 min. of arc. b) Conditions b) and d) gave approximately the same thresholds, from 7.4 to 14.2 min. of arc. c) Condition c) gave the highest thresholds, from 7.5 min. to 3 deg. 4 min. of arc. d) The variability of the Ss' judgments was inversely proportional to their precision.

R 4

3186

Carmichael, L. PERCEPTUAL ASSIMILATION IN A STEREOSCOPIC ILLUSION. Amer. J. Psychol., Jan. 1950, 63(1), 112-113. (Tufts University, Medford, Mass.).

3186

This note describes a stereoscopic illusion observed when observing a scene in nature with one eye and with the other eye a transparency of the same scene. The transparency had two objects (boats) not in the natural scene at the moment of observation. A perceptual assimilation of the boats into the natural scene was noted. The significance of this phenomenon for an understanding of distance perception is suggested.

3187

Gebhard, J.W. & Halsey, R.M. DISCRIMINATION OF SMALL TIME INTERVALS BETWEEN A VISUAL AND AN AUDITORY SIGNAL. Contract NSORI 166, Proj. NR 784 001, SDC Proj. 20 F 1, SDC TR 166 1 60, Jan. 1949, 14pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.).

In these experiments 1 or 2 dots were employed and the audio signal was given at positions preceding, following, or on the dots. S's task was always to judge when the click occurred with respect to the visual patterns. The conditions tested included effect of 2 dots vs. 1 (click given randomly with either dot), effect of radial position of dots, effect of position on circumference of the display, and effect of angular separation. Ss varied markedly in the fineness of their ability to detect the coincidence of auditory and visual signals and did not show evidence of learning after the first few trials. Their thresholds were very stable and could be readily reproduced. 90% correct judgments of coincidence can be obtained from practiced Ss when the time separations are as little as 15 to 45 msec. The applications to performance on audio-visual displays are indicated. (HEIAS)

R 3

3188

Head, H. MANEUVERABLE TARGET POSITIONING UNIT. SDC Rep. 166 1 73, March 1949, 19pp. ONR, Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Engineering Lab., Baltimore, Md.).

One phase of psychological research into the effectiveness of various radar display equipment calls for laboratory simulation at the radar indicator of conditions which exist when a friendly aircraft is maneuvered in accordance with instructions from radar observers. A Maneuverable Target Positioning Unit was developed to fulfill this requirement. The machine drives one point (maneuverable aircraft) with respect to another (radar observer), and provides controls for speed and course as selected by the operator. These motions are used to position the shafts of range and bearing potentiometers. The potentiometers control the output of a separate target generating system which, in turn, produces the maneuverable target on the radar indicator under consideration. One unit is complete and 2 additional units are under construction. Preliminary tests show satisfactory performance and indicate that the machine may be expected to function as intended in the projected research program.

R 3

3190

Flottorp, G. PURE-TONE TINNITUS EVOKED BY ACOUSTIC STIMULATION: THE IDIOPHONIC EFFECT. Acta Oto-laryngol., Aug.-Oct. 1953, 43, 396-415. ONR. (Harvard University, Cambridge, Mass.). (Rep. PNR-130).

When an ear is stimulated with a pure tone of a certain frequency and intensity, some persons may perceive an extra tone called an idiotone in addition to the stimulus tone. The perception may be in the form of beats, roughness, or distinct double tones, and it may be followed by a more-or-less rapidly decaying after-tone after the stimulus tone has been turned off. The pitch of this evoked tinnitus is nearly unaltered by the various frequencies that are used as eliciting stimuli. The frequency corresponding to the idiotone is characterized by an inability to elicit an idiotone for any intensity, and this frequency is extremely stable. No change was found during 3 years of experimentation. The influence of various aspects of the stimulus tone upon the evocation and the character of the idiotone are described. A correlation is found between an idiophonic effect and a localized threshold change but no increase in resolving power seems to accompany the idiotone. The source of the idiophonic effect is discussed. It is concluded that the idiophonic effect cannot be used to support a theory of high-tuned circuits (high Q electromechanical elements) in the cochlea, but rather that it points to some kind of time-consuming process, such as biochemical action in sensory elements and nerve cells.

R 30

3191
Shaw, M.E., & Rothschild, G.H. SOME EFFECTS OF PROLONGED EXPERIENCE IN COMMUNICATION NETS. *J. Appl. Psychol.*, 1956, 40 (5), 281-286. Contract W5-ori-166, Rep. 166-I-202, Proj. Designation NR 145-089, Task Order 1, ONR, Johns Hopkins University.

3191
To study the effects of different communication nets upon group behavior when the groups operated in the same net over a period of days, eight groups (four subjects) were assigned to each of three nets (star, slash, and common) and were required to solve two simple arithmetic problems each day for a ten-day period. Questionnaires were answered at end of period asking for job satisfaction ratings (over-all and day-to-day), group leader, and system of communication, if any. Time scores for solving the problems, number of message units, errors, ratings of satisfaction, emergence and leadership were analyzed for differences due to type of communication net and for changes attributable to experience. The extent of agreement with previous similar experiments is discussed. T. G. I. R 14

3192
USAF Operational Applications Lab. BIBLIOGRAPHY OF TECHNICAL PUBLICATIONS. Sept. 1955, 22pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C.

3192
This bibliography of Technical Notes (memos) and Technical Reports represents a continuous program of research from 1948 on. The facility has been known by three names: Human Resources Research Laboratories, USAF; Human Factors Operations Research Laboratories, Air Research and Development Command; and Operational Applications Laboratory, Air Force Cambridge Research Center, Air Research and Development Command. R 250 (approx.)

3193
Gerathewohl, S.J., Taylor, W.F. THE EFFECT OF INTERMITTENT LIGHT ON VISION. Proj. 21-1206-0014, Rep. 1, Dec., 1953, 8pp. USAF School of Aviation Medicine, Randolph Field, Texas.

3193
To investigate the effect of intermittent light on the recognition of printed matter, a reading chart with gradually decreasing brightness contrast was read (sixteen groups of 26 subjects each) under steady and flicker conditions with four light-dark ratios and two flicker frequencies (9, 15 cycles per second). The number of lines read under each condition was taken as the index of readability or visibility under low-contrast conditions. The subjective effect of enhanced brightness at certain flicker rates (Bartley effect) is discussed in relation to the findings. T. I. R 6

3195
Beals, L.S., Jr. HUMAN ENGINEERING PROBLEMS IN TRAINING DEVICES. Presented at: 57th Annual Convention of the Association of Military Surgeons, New York, N.Y., Nov. 9-11, 1950, 4pp. USN Special Devices Center, Port Washington, N.Y.

3195
This is the text of an address to the Association of Military Surgeons. Human engineering is defined, and its application in the area of training devices is illustrated with cases that have occurred at the Special Devices Center, Office of Naval Research.

3196
Wilson, C.L. & Mackie, R.R. RESEARCH ON THE DEVELOPMENT OF SHIPBOARD PERFORMANCE MEASURES. FINAL REPORT (IN FIVE PARTS). PART I. THE USE OF PRACTICAL PERFORMANCE TESTS IN THE MEASUREMENT OF SHIPBOARD PERFORMANCE OF ENLISTED NAVAL PERSONNEL. Contract NB 0170001, Nov. 1952. ONR, Personnel & Training Branch, Washington, D.C. (Res. Corp. Management & Marketing, Los Angeles, Calif.)

3196
Beidler, L.M. A THEORY OF TASTE STIMULATION. *J. Gen. Physiol.*, Nov. 1954, 28 (2), 133-139. (Office of Naval Research, Washington, D.C. & Physiology Dept., Florida State University, Tallahassee, Fla.)

The treatment in this paper of available quantitative data on the response of taste receptors to sodium salt stimulation clearly indicates that the ions of the chemical stimulus are loosely bound to some substance of the taste receptor. This can be thought of as an initial reaction which ultimately leads to stimulation of the receptor and an eventual depolarization of the associated sensory neuron. The speed of the total reaction suggests that the receptor substance is located on or near the surface of the receptor. The recently proposed enzymatic reactions for chemoreceptors do not appear plausible for sodium salt stimulation of the taste receptors of the rat. R 7

Research has been conducted to determine if objective and reliable measures can be developed to evaluate shipboard performance of Navy enlisted men. Adequate measures of performance are necessary to determine proper qualifications for advancement and to determine the effectiveness of selection and training programs. A series of Practical Performance Tests, designed to measure the practical factors of shipboard performance, has been developed. These tests have been administered to Electrician's Mates and Engineers serving aboard submarines. They have been shown to be valuable additions to existing performance measures. Information about the usefulness and importance of performance tests is presented in this report. The reliabilities and interrelationships of the tests are discussed, and observations are made on the construction of performance tests. Results of correlational studies with other measures of shipboard performance are also given. R 100 (approx.)

3199

Broadbent, D.E. EFFECTS OF NOISES OF HIGH AND LOW PITCH ON BEHAVIOUR. A.P.U. 222/54, Sept. 1954, 11pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

Three groups of subjects worked for two sessions in noise at a five-choice serial reaction task. On one day the noise was restricted to frequencies above 2000 cps, and on another to frequencies below that frequency. The high-pitched noise gave more errors in performance, the difference being most important at the highest intensity of 100 db. When reaction times were measured to the same noises, the first reaction of a series with the same type of stimulus was slower when the stimulus was low intensity and low pitched. With high pitched or high intensity stimuli this was not so. It thus appears that sounds more likely to interfere with work also produce a faster reaction when themselves acting as signals, confirming a view already advanced about noise effects; that the effect is due to competition between various stimuli to control response.

R 12

3204

Fouriezos, N.T., Hutt, M.L. & Gietzkow, H. MEASUREMENT OF SELF-ORIENTED NEEDS IN DISCUSSION GROUPS. Contract N6ONR 232, Proj. NR 172 301, Task 7, Oct. 1950; 682-690. University of Michigan, Ann Arbor, Mich.

3204

This paper accepts the importance of motivation as a factor in determining the nature of processes which go in a group situation and suggests a technique whereby one of these motivations--self-oriented needs--may be measured in group discussion situations. The development of a rating-scale technique, a demonstration of its validity without clinical background information about the need-structure of the participants, and proof of its reliability are presented. Implications of the results of the research for leadership training are discussed.

R 10

3205

Festinger, L., Back, K., Schachter, S., Kelley, H.H., et al. THEORY AND EXPERIMENT IN SOCIAL COMMUNICATION. Contract N6ONR 23212 NR 170 698, May 1950, 123pp. Institute for Social Research, University of Michigan, Ann Arbor, Mich.

3205

This bulletin presents a number of laboratory reports together with a theoretical integration of work done to date on a program of research in the area of social communication. The studies have centered mainly on two sets of problems: communication stemming from pressures toward uniformity in groups, and communication in hierarchical structures. The six reports included are grouped under these two problems.

T. G. I. R. 46

3206

Ritchie, M.L., & Baker, C.A. (Ed.) PSYCHOLOGICAL ASPECTS OF COCKPIT DESIGN - A SYMPOSIUM REPORT. Proj. 6190-71573, 71556, WADC TR-57-117, April 1957, 137pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (University of Illinois).

3206

This is a report of a symposium on the psychological aspects of cockpit design. The general areas treated in this symposium are the following: the development of integrated instrument and display panels at various facilities, e.g., Hughes Aircraft, Wright Air Development Center, and the Navy Fixed- and Rotary-Wing Programs; cockpit research at Bell Helicopter Co. and Glenn L. Martin Co.; the problems and methods in cockpit research; the problems and methods of whole-panel flight evaluation; and the whole-panel design objectives to be met in future aircraft.

T. I. R. Some

3208

Westheimer, G. MECHANISM OF SACCADIC EYE MOVEMENTS. A.M.A. Arch. Ophthalmol., 1954, 52, 710-724. (Ohio State University).

3208

To study the nervous and muscular mechanisms subserving saccadic eye movements, a photographic method was developed for recording horizontal eye movements with a high degree of precision for both time and extent. The subject was instructed to fixate a neon light bulb and to change fixation to another target light when it became visible. Responses were obtained for symmetrical positioning of the two targets on either side of a median plane and for angular separations at nodal point of eye of two to thirty degrees. The recordings were studied for typical characteristics of movement pattern--position, velocity, and acceleration. The findings are related to physiological evidence from other sources and a mathematical treatment of the system is described. G. I. R 26

3210

Cook, E.B. & Wherry, R.J. THE URINARY 17-KETOSTEROID OUTPUT OF NAVAL SUBMARINE ENLISTED CANDIDATES DURING TWO STRESSFUL SITUATIONS. Hum. Biol., May 1950, 22(2), 104-124. (Tufts Medical School, Boston, Mass. & Ohio State University, Columbus, Ohio).

3210

As part of a larger investigation of a variety of measures in the selection of submarine personnel, the urinary 17-ketosteroid excretion of a group of naval enlisted submarine candidates during two stressful situations were studied. A psychological stress situation (taking a personality test and the Officers Classification Test) and a tank stress (routine training in the Submarine Escape Training Tank) were utilized; during the course of each situation, four urine samples were taken. Comparisons were made with basal samples.

T. G. I. R 28

3213

Judson, A.J. & Cofer, C.N. THE EFFECT OF A REINFORCED RESPONSE IN A SIMPLE VERBAL PROBLEM. Contract N7ONR 397, Tech. Rep. 8, ca. 1950, 5pp. University of Maryland, College Park, Md.

3213

This paper reports two experimental studies of associative strength. In one experiment, 20 Ss made 10 associations to each of 10 stimulus words, and recognition of the words they selected was tested six weeks later, with the associated words each appearing with three unrelated words. The second experiment duplicated this pattern to some extent, but with nonsense syllables. Correct responses (recognition of words with associative strength) are analyzed and interpreted regarding the effect of reinforcement on response potential.

T. R 2

3214

Judson, A.J. & Cofer, C.N. A FURTHER ANALYSIS OF DIRECTION IN A SIMPLE VERBAL PROBLEM. Contract N7ONR 397, Tech. Rep. 7, ca. 1950, 18pp. University of Maryland, College Park, Md.

3214

To study the effects of serial order, unambiguous stimuli, and response potential in forming verbal associations, 321 college students took a 48-item test. Each item consisted of two unambiguous and two ambiguous words, such that either unambiguous word might equally logically be selected as not associated with the other three words; Ss selected what they considered the unrelated word. Serial order of items and of words in items varied among 12 forms of the test. Twelve items had one alternative that could be selected on a religious criterion. Ss' choices are analyzed as functions of word order, unambiguous stimuli, and Ss' religion.

T.

3215

Judson, A.J. & Cofer, C.N. AN EXPERIMENTAL ANALYSIS OF THE ROLE OF DIRECTION IN A SIMPLE VERBAL PROBLEM. Contract N7ONR 397, Tech. Rep. 6, 1950, 19pp. University of Maryland, College Park, Md.

3215

To study the effect of the serial order of stimuli in forming associations, 129 college students were given a 45-item test. Each item contained four words; Ss selected one word as unrelated to the other three. There were two equally logical responses possible with each item. In 12 items, the order of the words was varied in different forms of the test. Ss' selections are analyzed with regard to the effect of word order on their choice. Results are interpreted with respect to the formation of a response "set."

T. I. R 20

3216

Judson, A.J. & Cofer, C.N. THE ROLE OF INCREASED ASSOCIATIVE STRENGTH IN REASONING. Contract N7CNR 397, Tech. Rep. 5, ca. 1947, 12pp. University of Maryland, College Park, Md.

3216

To investigate the transfer of verbal associations to the solution of a novel problem, 397 college students were tested. Initially, three groups learned word associations, including "rope-swinging" associations with one group, "twine-rope" and "word-rope" with the other two. A fourth (control) group learned no associations. All four groups were then tested with a problem that could be solved by swinging a string. Number of "swinging" solutions to the problem are compared for the four groups to evaluate the effect of the learned associations. Results are interpreted in light of Hull's theories of association reinforcement and response generalization.

T. R. 11

3217

Cofer, C.N. VERBAL BEHAVIOR IN RELATION TO REASONING PERCEPTION AND LEARNING. I. INTRODUCTORY STATEMENT. Contract N7CNR 397, Tech. Rep. 4, ca. 1950, 3pp. University of Maryland, College Park, Md.

3217

This is an introductory statement establishing the theoretical viewpoint for a series of experiments reported elsewhere. Consideration is given to the possibility that certain stimuli which function within the organism to mediate behavior are verbal and/or symbolic in character. Two situations are described to illustrate this viewpoint.

R 6

3218

Farnsworth, D. TRITANOMALOUS VISION AS A THRESHOLD FUNCTION. Proj. NM 002 014 09 06, XV(3), Rep. 274, July 1956, 12pp. USN Medical Research Lab., Naval Submarine Base, Conn. (Reprinted from Die Farbe, 1955, (4), 185-196).

3218

This is a critical survey of tritanomalous and tritanopic color vision. Tritanomalous color vision can be interpreted in terms of the ratio of the blue to the green plus red physiological tristimulus values. There are conditions for which this ratio appears to be constant for any fixed product of retinal area and illumination. The degree of tritanomalous vision is related to the absolute value of this product and to other constants of vision. In particular, tritanomalous vision is not exclusively a foveal or small field phenomenon. Inherited and threshold tritanopia display the same symptoms; tritanopia and tritanomalous vision are different degrees of the same type of color deficiency.

G. R. 23

3219

Rogers, O.E. ANALYSES OF BASIC TRAINING STAGE GRADES FOR MULTI-ENGINE AND SINGLE-ENGINE AVIATORS. Proj. NM 001 109 102, Rep. 3, Aug. 1956, 14pp. USN School of Aviation Medicine, Naval Air Station, Fla.

3219

This report presents three analyses of basic training stage grades for a randomly selected sample of 199 officers who had completed advanced training for multi-engine and single-engine aviators. Factor analyses were made to determine whether the same or different factors account for variance in the two types of aviators. Other analyses were made to determine differences in grades between the two and differences in standard partial regression coefficients (beta weights) for predicting performance during advanced training.

T.

3220
Dupertuis, G.W., Pitts, G.C., Osserman, E.F., Walham, V.C., et al. THE RELATION OF SPECIFIC GRAVITY TO BODY BUILD IN A GROUP OF HEALTHY MEN. Proj. NM 004 066 03 06, June 1950, 6pp. USN Medical Research Institute, Bethesda, Md. (Western Reserve University School of Medicine, Cleveland, Ohio).

Specific gravity determinations by underwater weighing, calculation of per cent body fat, and descriptions of physique by Sheldon's somatotyping technique were carried out on a group of 81 healthy male subjects selected to include representatives of the extremes of body build. The average age of this group was 26.6 years and the average weight, 165 pounds. The data reveal that people of different body types vary enormously in specific gravity. Soft, round, fat individuals have a low body density, whereas lean people, whether heavily muscled or delicately built, are uniformly of higher body density. An equation is presented which makes it possible to predict body specific gravity with an average deviation of 0.007 from the figures obtained by immersion. From these predictive values the average error for estimation of body fat is only $\pm 3.5\%$.

R 5

3225
Gelfan, S. EXPLOSIVE DECOMPRESSION AT HIGH ALTITUDE. Amer. J. Physiol., July 1950, 162(1), 37-53. (School of Medicine, Yale University, New Haven, Conn.).

Rats were explosively decompressed to simulated altitudes of 35,000 to 75,000 ft. in air and in 100% oxygen. The survival time at altitude becomes progressively shorter with higher final decompression altitudes until about 52,000 ft. is reached, after which it becomes constant and independent of altitude, whether in air or in oxygen. Below this critical altitude the difference between the survival times in oxygen and air widens sharply. In terms of duration of respiration following decompression, this minimal time which becomes constant above 52,000 ft. is on the average about 18 sec. when decompressed from 20,000 ft. in air, 30 sec. when decompressed from sea level in air and 40 sec. in 100% oxygen (including 20 min. preoxygenation). Rapid decompression per se, even up to 75,000 ft. is not fatal for rats. Unless recompressed quickly enough, however, they die at altitude from anoxic anoxia. The rate or chances of survival of rats, when recompressed at free-fall rate following decompression to altitudes of as high as 75,000 ft. is given for both oxygen and air. The considerably better chances of survival from the higher altitudes in oxygen are due to the preoxygenation and the fact that the increase in pressure during recompression becomes quickly significant below 52,000 ft. in oxygen. Some of the pathological changes resulting from the decompression and concomitant anoxia are briefly described.

R 25

3227

Peters, H.W. LISTENER RESPONSES TO VOICE MESSAGES AS A FUNCTION OF SIGNAL-TO-NOISE RATIO AND EXPERIENCE WITH SIMILAR MESSAGES. Contract N60NR-22525, ONR Proj. Designation NR 145-923, BuMed & Surgery Proj. NM 001 104 500, Joint Proj. Rep. 64, July 1956, 9pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3227

To evaluate the combined effect of amount of exposure to training messages and noise level for test message reception upon listeners' test responses, highly similar training and test messages were constructed. Listeners (twelve groups of 18 subjects each) responded to test messages heard at one of four signal-to-noise ratios (+10, +5, 0, and -5 decibels) after exposure to 0, 4, or 12 periods of training messages. Number of correct responses and number of incorrect responses corresponding to training lists were analyzed for differences attributable to familiarity with training messages and for noise levels of reception. T. R 2

3228

Morris, A., Katz, M.S., & Bowen, Jane D. REFINEMENT OF CHECKERBOARD TARGETS FOR MEASUREMENT OF VISUAL ACUITY LINES. J. Opt. Soc. Amer., 1955, 45 (10), 834-838. (U.S.N. Medical Research Laboratory, Naval Submarine Base, New London, Conn.).

3228

To evaluate the checkerboard target for its applicability to visual acuity experimentation, the standard target was modified to eliminate all cues other than resolution, produced in varying sizes and mounted on both black and white. The targets were validated by psychophysical measurements of the acuity thresholds and chi-square techniques of analysis. Two methods for varying the visual angle were compared: varying target size and varying target distance. The range of stimuli required to establish an acuity limit was determined. T. G. I. R 9

3229

Walker, W.C. ELECTRICALLY HEATED FLYING SUIT, ONE-PIECE. Memo Rep. No. MCREXB-666-SD. June 1950. 13pp. USAF, Air Materiel Command, Engineering Division.

3229

This is a memorandum report on the results of cold chamber and field service tests conducted on experimental electrically heated suits "together with a description of the type G-1 Electrically Heated Suit". The advantages of the G-1 suit over others of its kind are listed and recommendations for standardization are made. I.T.

3230

Moeller, G., Fooks, G., Sperling, H.G., Farnsworth, D., et al. DARK ADAPTATION AND THE NEAR ULTRAVIOLET. Contract Nonr 1276(00), Proj. NM 002 014.09.05, MRL Rep. 268, Oct. 1955, 12pp. USN Medical Research Lab., New London Submarine Base, Conn.

2 studies of the effects of exposure to the near ultraviolet (principally 334, 365, and 396 mμ) upon subsequent dark adaptation are reported. For the first study, a Hecht-Shlaer adaptometer was modified so that radiation from a mercury lamp or incandescent lamp (control) could be added to the light adaptation field of the adaptometer. 4 conditions of light adaptation were employed. 3 Ss produced 20 dark adaptation curves each, 5 under each condition. No differences were found between the ultraviolet and the control conditions. Exposure to the higher brightness raised the threshold at 25-30 minutes by 0.12 log units. In the second experiment the ultraviolet and control light adaptation fields differed from each other in both color and spectral composition, and were much brighter than in the first experiment. Again there was no reliable evidence that exposure to the near ultraviolet affects subsequent dark adaptation deleteriously. The source of discrepancy between these negative findings and the positive results reported by others has not been identified. (HEIAS) R 15

3231

Miller, J.W., & Ludvig, E. THE RESULTS OF TESTING THE DYNAMIC VISUAL ACUITY OF 1000 NAVAL AVIATION CADETS. Contract Nonr-586(00), ONR Proj. NR-142-023, BuMed and Surgery Proj. NM 001 110 501, Rep. 10, Aug. 1956, 15pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3231

To examine the dynamic visual acuity of a large population, threshold measurements were made on 1000 young men (naval aviation cadets) having a static visual acuity of 20/20 or better uncorrected. A rotating mirror apparatus presented a test object traveling at horizontal angular velocities of 20 and 110 degrees per second. Frequency distributions of obtained thresholds and the parameters characteristic of the dynamic acuity of the individual were presented and tested for normality. The possibility of classifying the subjects into distinguishable groups on the basis of threshold values was explored. Applications to pilot selection are discussed. T. G. R 13

3233
Schafer, T.H. INFLUENCE OF THE PRECEDING ITEM IN MEASUREMENTS OF THE NOISE-MASKED THRESHOLD BY A MODIFIED CONSTANT METHOD. J. exp. Psychol., June 1950, 40(3), 365-371. (USN Electronics Lab., San Diego, Calif.).

The entire psychometric function for 3-sec. tonal signals presented at 5-sec. intervals in a background of thermal noise varies with the intensity of the preceding signal. Within 1 db of threshold the number of equally intense signals detected varies by approximately 25% as a function of the preceding signal. A relatively intense preceding signal reduces the percentage detected, a moderately intense preceding signal increases it, and a preceding signal at the same intensity slightly reduces it. Following a suggestion of Fernberger's for mitigating the influence of the preceding item, a sequence of a chosen set of signal intensities is given in which each precedes all of the others and itself very nearly the same number of times. R 7

3234

Hammond, E.H. TRAJECTORY DISPLAY SYSTEM, AMMUNITION
ANALYTIC TEACHER. Rep. 170, May 1950, 22pp. USN
Electronics Lab., San Diego, Calif.

3235

This report describes a Trajectory Display System
for simulating flight paths of aircraft, rockets, and
shells by lighting successively a series of neon lamps.
The system is a component of the Amphibious Assault
Teacher. Details of construction and operation are given
together with recommendations for improvements.

3236

Sells, S.R., & Payne, R.B. STUDIES, COMBAT
PRISONER, WITH SPECIAL REFERENCE TO THE MILITARY
FUNCTIONS IN RELATION TO VISUAL TEST
ENCOUNTERS IN FLYING. THE USAF SAN ANTONIO
MICROGRAPH. Proj. 21-04-006, Rep. 1.
July 1950. USAF, School of Aviation Medicine,
Randolph Field, Texas.

3237

This report describes a new model (1950) of an op-
thalmic accommodation-convergence graph for studies
of visual fatigue. A number of the revisions of the
original flow graph which were made by Bureau are in-
corporated in the present model. Structural details of
the dark room, stimulus unit, observer's station, the
control and recording system are given. Photographs and
diagrams are included.
1,37.

3238

Steele, R.J. A STATISTICAL ANALYSIS OF ELECTRONIC
EQUIPMENT FAILURES IN EDUCATION. SE 06472 (SE 21 1),
Ecol. Rep. 261, Feb. 1955, 18pp. USN Electronics Lab.,
San Diego, Calif.

3239

Forty-two published reports of the Evaluation Branch,
U.S. Navy Electronics Laboratory, were examined and the
failures reported therein were analyzed statistically.
The equipments covered a wide range of functions and in-
cluded radar sets, radio receivers and transmitters,
sonars, and other electronic equipments. The relative
frequency of 28 common categories of failure was plotted
as a bar graph. Descriptive statements of the type of
failure for each category were given. Recommendations
are made for the benefit of Bureau of Ships contractors.
G. 1.

3240

Lincoln, M.M. NOISE LEVEL LIMITS FOR THE AVOIDANCE
OF DEAFNESS IN SHIPBOARD MACHINERY SPACES. Code 371,
Rep. 371 X 27, Nov. 1955, 31pp. USN Bureau of Ships,
Washington, D.C.

3241

In this report a set of octave band noise level
limits for machinery spaces of naval vessels is pro-
posed. The noise limits were arrived at by examining
a previously proposed spectrum in the light of the
American Standards Association report "Relations of
hearing loss to noise exposure". The noise in machi-
nery spaces is limited so that the unprotected ear of
the watch stander, assigned to machinery spaces over
his entire naval career, does not suffer hearing loss
over that normally expected due to aging. Noise
levels actually encountered in naval machinery spaces
are presented with results of application of noise
control measures.

3242

Sargent, F., Sargent, Virginia, Johnson, R.E. &
Stolpe, S.G. THE PHYSIOLOGICAL BASIS FOR VARIOUS
CONSTITUENTS IN SURVIVAL RATIONS. PART II. THE
EFFICIENCY OF YOUNG MEN UNDER CONDITIONS OF
MODERATE COLD. Contract AF 18(600) 80, Proj. 7156,
MADC TR 53 484, Part 2, Vol. II, May 1955, 706pp.
USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.
(University of Illinois).

3243

From February 22, 1954, through April 4, 1954,
87 volunteer airmen and 12 volunteer non-commissioned
officers served as subjects in a study of survival
rations in moderate cold at Chanute Air Force Base
and in the field at Camp McCoy, Wisconsin. The
methods not described in other publications and all
the original data collected during the six-week period
of study are given in the appendices which make up
this volume.
T.

3244

Jones, A.R., Jr. TEST RESULTS OF PLASTIC AND GLASS
SAFETY LENSES USED IN SERVICE OF BOSTON NAVAL SHIPYARD,
GROUP III, NON 121 CDR. Proj. 1070 4, Part 3, Final
Report, ca. 1950. USN Electronics Lab., New York Naval
Shipyards, Brooklyn, N.Y.

3245

Fifty protective spectacles were subjected to service
conditions for approximately a six month period then sub-
jected to tests of 1) bare values, 2) impact resistance,
3) a test to determine deterioration of definition as a
result of increase in haze, and 4) visual inspection.
Results are presented in a five page table showing type
of lens (glass or plastic), duration of use, subject com-
ment, and so forth, as well as results of laboratory
tests. A second table shows variations in wear with in-
dividual service represented.

3246

Miller, J.W. THE MEASUREMENT OF DYNAMIC VISUAL
ACTIVITY WHILE THE OBSERVER IS ROTATING.
Contract Nour-606(OC), ONR Proj. NR-162-023,
Bull. 9 Surgery Proj. NR 001 110 501, Rep.
11, Oct. 1946, 12pp. U.S. Naval School of
Aviation Medicine, Naval Air Station, Pensacola,
Fla.

3247

To determine the effect on visual acuity of rotating
the observer with the target in a fixed position, three-
fold determinations were made with the subject (a) re-
rotating at five different angular velocities from 20 to
120 degrees per second. The data were compared with data
taken previously when the observer was stationary and
the target motion was produced by a rotating mirror and
with static acuity measurements. The results of a num-
ber of experiments reported in the literature, in which
ocular pursuit was examined, were related to the findings.
T. C. R 15.

3248
Chitt, R.L. & Oberst, F.W. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. I.
EFFECTS OF CHEMICAL COMPONENTS OF DRAMAMINE. Proj. 21 32 014, Rep. 1, Aug. 1950, 50p. USAF
School of Aviation Medicine, Randolph Field, Tex.

The relative effectiveness of Dramamine and Benadryl in the prevention of airsickness
was determined. No significant difference was found between Benadryl (50 mg.) and Dramamine
(100 mg.) in protecting subjects from airsickness during simulated turbulence in an airplane.
8-chlorotheophylline gave no significant protection. A combination of hyoscine-hydrobromide
(0.65 mg.) and Benadryl (50mg.) was found to be more effective than either drug alone. A
combination of 1/2 if doses of hyoscine-hydrobromide (0.33 mg.) and Benadryl (25 mg.) gave an
effectiveness 1/2 to that of a full dose of hyoscine (0.65 mg.) but inferior to the full
dose mixture.
R 6

3247
Mickle, W.E., Davis, R.G., Miller, J.G., Harrison, C.P., & Nist, E. A REVIEW OF THE LITERATURE RELATED TO THE SCOPE-INTERPRETATION AND MAP-READING TESTS OF THE AIRCRAFT OBSERVER. Contract AF 13(600)-1209, Proj. 7711, Task 47001, Res. Rep. AFTRC-TR-57-115, Aug. 1957, 37pp. Operator Lab., AFTRC, AEC, Randolph AFB, Tex. (University of Missouri).

3247
The purpose of this review is to summarize research findings pertinent to the problem of determining optimum characteristics of radar-target charts. Studies of perception, studies involving radar-reading, studies involving geographical orientation, and those involving charts and their use were summarized if the contents seemed relevant to the Aircraft Observer's scope-interpretation and map-reading tasks. Some evaluation and discussion of the findings is provided.
R 67

3252
Miller, J.W. THE EFFECT OF ALTERED ILLUMINATION ON VISUAL ACUITY MEASURED DURING OCULAR PURSUIT. Contract Nour-50C(00), ONR Proj. NR-142-023, BuMed & Surgery Proj. NR 001 110 501, Rep. 12, Sept. 1956; 15pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3252
To investigate the effect of intensity of target illumination on dynamic visual acuity, threshold determinations were made by six subjects while being rotated at angular velocities from 25 to 120 degrees per second. Six levels of target (Landolt ring) were used (0.04, 0.20, 1.0, 5.0, 25.0, 125.0 footmilles) at each velocity. Static acuity was then determined with the subject stationary and 0.7 second target exposure. The data (threshold of arc) were analyzed as a function of intensity of illumination. An interpretation of the results is presented.
T. C. R 17

3253
Foster, R. & Hardy, J.O. THE REACTION TO PAIN AS DETERMINED BY THE GALVANIC SKIN RESPONSE. CHAPTER V. Reprinted from Life Stress and Bodily Disease, 1950, XVII, Proceedings Association for Research in Nervous & Mental Disease, 1949, 16pp. Russell Sage Institute of Pathology, Cornell University Medical College, New York, N.Y.

3253
A study of the GSR as a reaction to graded, standard intensities of pain were carried out on four normal Ss. The pains were induced by intense thermal radiation and were graded from threshold to eight dols in steps of two dols. Three series of experiments were performed. 1) The Ss, in a relaxed state, were exposed daily over a six-month period to pains presented in a fixed order from zero, threshold, two, four, six, and eight dols; the GSR to each pain was recorded. 2) The Ss were similarly studied in hot and cold environments. 3) Studies were made before, during, and after events calculated to induce anxiety. Differences between pain sensations and pain reactions were discussed.
G. I. R 35

3255
Chinn, H.L., Oberst, F.W. & Wilks, S.S. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIR-SICKNESS. III. STUDY OF ADDITIONAL ANTIHISTAMINICS IN AIRPLANE AND SWING. Proj. 21 32 014, Rep. 3, Aug. 1950, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The study examined the effectiveness of antihistamines in protection against motion sickness. The antihistaminics Decapryn and Chlor-Trimecon exert only a slight protection against airsickness induced by artificial turbulence. Artone, an antispasmodic, protects against airsickness but to a lesser degree than hyoscine. Chlor-Trimecon and Thephorin do not protect against swing sickness. It is concluded that antihistaminic potency is not related to motion sickness prophylaxis.
R 7

3256
Rand, G.W. & Ray, J.T. EVALUATION OF THE NEW LONDON NAVY LANTERN COLOR VISION TEST. Contract NTRC 434, T.O. 1, Joint Memo, Rep. 1, May 1950, 17pp. Office of Naval Research, Washington, D.C. Tulane University, New Orleans, La.

The evaluation of the New London Navy Lantern test was conducted in terms of the American Optical Company's Pseudo-Isochromatic Plates, 1940 edition, as the independent criterion. 372 consecutive patients (civilian, officers, and enlisted personnel) of the Department of Ophthalmology, School of Aviation Medicine, Pensacola, Florida, served as the experimental population. Of the 372 subjects, 41 (11.02%) were judged as color-deficient by the A.O. plates, and 148 (39.78%) were judged as color-deficient by the N.L. test. For each subject the A.O. plates were administered in an illuminated room, of the 372 subjects, N.L. tests and retests were administered to 303 in an illuminated room, the remaining 69 subjects were tested in a dark room. On the basis of the analysis of results for each of the foregoing conditions it was concluded that a) to enjoy the maximum test-retest reliability, the N.L. test must be employed under the conditions for which it was designed; b) under these conditions the N.L. test's selectivity is poor when judged by strict statistical standards; c) the most favorable passing criterion for the N.L. test appears to be one of 3 errors (inclusive) and d) with the alteration of the passing criterion it becomes apparent that the circumstances will allow for a substantial improvement of the N.L. test. On the basis of the improvement possible, it may be concluded that the additional experimentation necessary to achieve this gain would be justified. Several possibilities for improvement of the N.L. test are also considered.

3257
Peters, R.N. THE EFFECT OF LOW-PASS FILTERING OF SIDE-TONE UPON SPEAKER INTELLIGIBILITY. 060 Res. Foundation Contract W6NR 22525, Proj. NR 145 993 & USN School of Aviation Medicine, BuMedSurg. Proj. NR 001 104 500.47, Joint Proj. Rep. 49, April 1956, 8pp. USN School of Aviation Medicine, Naval Air Station, Fla.

3257
To study speaker intelligibility as a function of low-pass filtering of side-tone, 24 speakers read intelligibility testing materials under four side-tone conditions, two filtering and two nonfiltering conditions. Frequencies above 600 cycles per second in side-tone signal were attenuated for filtered conditions with compensation made for level due to filtering versus nonfiltering. Criterion measures of speakers' intelligibility were obtained from panels of listeners (12 per panel). The data were analyzed by variance techniques for differences among the four conditions.
T. R 12

3261
Miller, E.P. OCULAR PURSUIT OF A TARGET
MOVING IN AN APPARENT CIRCULAR PATH. Proj.
NM 001 110 108, Rep. 1, Sept. 1956, 20pp.
Bullard, V.S. Naval School of Aviation Medi-
cine, Naval Air Station, Pensacola, Fla.

3257
Arnold, W.C., Eberle, R.R., & Klepach, P.
STUDY OF A NEW SYSTEM FOR AIR TRAFFIC CONTROL
EMULATING THE CURRENT COORDINATED DISPLAY.
Contract DA 36-039-sc-64567, June 1955, 82pp.
Bell Telephone Labs., Whippany, N.J.

3262
To compare dynamic visual acuity tested with a rotary
prism and with a rotating mirror apparatus, threshold
measurements were obtained from 150 naval cadets. Two
groups (50 each) were tested with both devices (angular
velocities of 20 and 110 degrees per second for mirror;
50 and 77 for prism of 15 prism diopters). Rotating ob-
jects (three groups) were tested only with prism (4, 8,
and 16 prism diopters) for angular velocities found to
produce a similar range of visual acuity loss (25/20 to
20/200). Frequency distributions of threshold data, com-
parisons of results from the two tests, and analyses of
effects upon visual acuity of circular movement were made.
Suggestions are given concerning use of rotary prism as a
test of dynamic visual acuity.
G. T. I. R 7

3257
This report presents a broad plan for a new system of
air traffic control based on the use of radar as a pri-
mary source of traffic control information. This infor-
mation can be integrated with other supplemental flight
control data so as to present a fully coordinated pic-
ture of the air traffic control situation in a control-
ler's area. The display is presented by means of a
cursor-coordinated three-dimensional display. The require-
ments of the new system are given in detail, preliminary
circuit design considerations are presented, and the need
for simulation of the system in order to demonstrate fur-
ther its operational feasibility is discussed.
T. I. R 9

3263
Bell Research and Design Inc. CAPABILITIES AND LIMITA-
TIONS INVESTIGATION OF LONG-DURATION FIELD ACCESS EQUIP-
MENT. FINAL REPORT. PRESENT LITERATURE SEARCH AND
PRELIMINARY EXPERIMENTAL ANALYSIS. Contract DA 36-039
SC 64563, Proj. 122B & DA Proj. 3 99 12 022, Rep. 312,
May 1956, 12pp. Bell Research and Design Inc.,
Cambridge, Mass.

3263
The scope of Phase I of this work encompasses es-
sentially a literature search and preliminary theoretical
analyses of the important physical and psychological vari-
ables that affect the transmission of speech through
the atmosphere on the one hand, and those that affect the
intelligibility of the received speech on the other. A
brief discussion concerning the variability of experi-
mental data is presented. The report concludes with an
evaluation and analysis of the parameters to be investi-
gated further in the light of the foregoing analysis.
T. I. R 54

3265
McCroskey, R.L., Jr. SOME EFFECTS OF ANESTHE-
TIZING THE ARTICULATORS UNDER CONDITIONS OF
NORMAL AND DELAYED SIDE-TONE. Contract N60NR
22525, ONR Proj. Designation NR 145-935, Bullard
& Surgery Proj. NM 001 104 500, Joint Proj.
Rep. 65, July 1956, 12pp. U.S. Naval School
of Aviation Medicine, Naval Air Station, Pen-
sacola, Fla.

3265
To determine the relative effects of tactile cues
from the articulators and auditory side-tone upon speech,
six speakers recorded three forms of multiple-choice
intelligibility tests under four conditions: (1) normal
side-tone, (2) delayed (0.13 second) airborne side-tone,
(3) disrupted tactile feedback (articulators anesthetized),
and (4) delayed side-tone plus loss of tactile feedback.
The stimuli were presented to 900 listeners in quiet and
in noise (4 signal-to-noise ratio). Criterion measures
of duration, correctly articulated words, and correct
word perception were studied by analysis of variance
techniques. The findings are discussed in relation to
factors affecting speech accuracy.
T. G. R 10

3266
Hardy, L.H. POLYCHROMATIC PLATES FOR TESTING COLOR VISION. FINAL REPORT. Contract N60NR
70200, Oct. 1950, 15pp. Office of Naval Research, Washington, D.C. (Columbia University,
New York, N.Y.).

The H-R-R Polychromatic Plates is a device for screening color-defective Ss, classify-
ing red-green and blue-yellow defectives, and estimating extent of defect in terms of mild,
medium, and strong. The test yields no clues for memorization or coaching; and the symbols
(simple geometric designs) are familiar to all types of Ss. It was evaluated as a screening
device with 110 normal and 57 defective Ss; results show it agrees with the American Op-
tical approved test. The evaluation of its classification of the 57 defectives shows re-
sults in agreement with the Nagel Anomaloscope. The rating of extent of defect for the
57 Ss was also compared with several standard color vision tests. (REIAS)
R 4

3263
Vobator, J.C., Hirots, H.W. & Lichtenstein, N. SAN DIEGO COUNTY FAIR HEARING SURVEY. J. Acoust. Soc. Amer., July 1950, 22(4), 473-483. (USN Electronics Lab., San Diego, Calif.).
(USNLT Rep. 210).

A phonographically recorded test of the ability to hear pure tones was given to 3666
people at the San Diego County Fair in the summer of 1948. Absolute thresholds were de-
termined at 5 frequencies and masked thresholds at 2 frequencies. The results were analyzed
according to the age, sex, musical training, and past noise environment of the listeners.
and according to their statements as to whether or not they had difficulty in hearing. As
expected, auditory sensitivity was found to decline with age; women were found to be more
sensitive than men for the higher frequencies; and men who worked in noise showed greater
than normal losses at high frequencies. The data indicated, in addition, that musically
trained men and women possess greater hearing sensitivity than do men and women without
musical training, and that the 20-29 year old males tested at San Diego in 1948 appeared
to have a greater loss at the high frequencies than did most males of the same age group
who were tested in surveys before the war.
R 13

3270 Hellibrandt, F.A. & Moutz, Sara Jane. ERGONOMAPHIC STUDY OF HAND DOMINANCE. Amer. J. Phys. Anthropol., June 1950, 3(2), 225-236. (Baruch Center of Physical Medicine & Rehabilitation, Medical College of Virginia, Charlottesville, Va.).

The influence of variations in stress on hand dominance was studied on 65 normal adult subjects. Differences in functional capacity were elicited from 144 ergographic work experiments. Observations were confined to wrist extension. Both unilateral and bilateral exercise was administered. The evidence supports the following conclusions: a) the laterality distribution curve is unimodal and essentially normal in form; b) the mean degree of functional superiority is moderate and falls to the dextral side of ambilaterality; c) bilateral exercise tends to equalize functional performance; d) both hands perform equally well under moderate stress and differences in handedness cannot be evaluated; e) fatigue suggests asymmetry in functional capacity; f) hand dominance is subject to wide physiological variation; g) it is postulated that the relative difference in performance at that point in the curve of work where optimal functional capacity is demonstrated, may be a sound and definable criterion of laterality.

3273 Kozsa, V., Briggs, R.W. and others. HIGH ALTITUDE BASECUTS. Memo Rep. NREMO-635-66K. Sept. 1950. 30p. USAF Air Materiel Command, Engineering Division.

3272 This memorandum reports the results of 14 human tests of high altitude bailouts which investigate their feasibility from a physiological standpoint, their practicability of automatic equipment for ejection seat and free bailout methods of escape. Descriptions of apparatus and methods as well as subjective reports of the parachutists are given.

3275 Mann, C.W., & Canella, C.J. AN EXAMINATION OF THE TECHNIQUE OF COPULOMETRY. Contract NMR-475-05, ONR Proj. Designation NR 142-456, BuMed and Surgery Proj. NM 001 110 500, Rep. 42, Joint Proj. Rep. 42, May 1956, 21pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3271 Haber, H. & Fleck, H. A COLOR SATURATION THRESHOLD METER. J. opt. Soc. Amer., 1950, 40, 450-451. Special Project. USAF, School of Aviation Medicine, Randolph Field.

3271 This report describes a meter designed to measure the threshold of color saturation and desaturation in which a gradually changeable mixture of white and colored light can be produced. A change in ratio of luminance of two lights can be measured between zero and infinity. Details of design are presented with a functional sketch of the meter. Two additional improvements are suggested. G.I.R.

3275 To examine copulometry as a psychophysical tool in the analysis of the vestibular apparatus, a total of 22 subjects was studied: nine normal, eight seasick, three aviators, and two pathological cases. Each subject was rotated, in darkness, at velocities of 9, 17, 32, and 60 degrees per second. Immediately after rotation, two types of copulograms were obtained: (1) sensation (reports of duration of sensation of rotation after chair was stopped), and (2) oculogyral, OGI (reports of duration of first post-rotational effects). Copulograms were analyzed with respect to linearity, slope, intercept, correlation of sensation, and OGI copulograms, and variability of after effects. All data were studied for differences between the seasick and non-seasick. T. G. I. R 15

3272 Mann, C.W., & Ray, J. ABSOLUTE THRESHOLDS OF PERCEPTION OF DIRECTION OF ANGULAR ACCELERATION. Contract NMR-475-05, ONR Proj. Designation NR 142-456, BuMed and Surgery Proj. NM 001 110 500, Rep. 41, Joint Proj. Rep. 41, May 1956, 15pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3277 Mann, C.W. FINAL TECHNICAL REPORT. Contract NMR-475-05, ONR Proj. Designation NR 142-456, BuMed & Surgery Proj. NM 001 110 500, Rep. 43, Joint Proj. Rep. 43, June 1956, 7pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3272 To test the organismic sensitivity of the human to accelerated horizontal rotation, threshold measurements were made by applying a given degree of angular acceleration to the subject and varying the time for reporting direction of movement yielded 75 percent correct responses. The range of angular accelerations was from 0.027 to 0.133 degrees per second squared. Testing was done in the dark with head in a fixed position. The time thresholds are analyzed as a function of angular acceleration. The importance of the time factor in threshold determinations is discussed. T. G. R 8

3277 This is a final report of a joint project between Tulane University and the United States Naval School of Aviation Medicine, Pensacola, Florida. The primary concern of research was with the visual, proprioceptive, and other sensory mechanisms influencing disorientation of pilots. A brief outline of the development of the project, a listing of technical reports, and a general progress report are presented. Areas are suggested in which further research is indicated. R 43

3278
Chubb, L.W. LOW TEMPERATURE FACE PROTECTIVE DEVICE. Contracts DAM 109 qm 224 & W44 109 qm 2011, Dec. 1950, 20pp. Rayfield Corporation, Cambridge, Mass.

A low-temperature head-protective device has been developed which meets the design requirements from the trial of torque, respirator EX 43-2. The major changes include interior design of AF A-13 of mask has been copied to improve universality of fit, angle of vision has been greatly enlarged through use of larger poggie lenses brought closer to the contour of the face, ease of donning and doffing has been improved by using 1 adjustable but permanently fastened elastic headstrap, half of the models have been equipped with a speech diaphragm to improve speech transmission. Rifle aiming interference has been reduced by poggie radiation and intake valant have been located in recesses to insure against accidental dislocation. (NICAS)

3279
French, R.S., & Martin, L.B. A FLIGHT-LINE TROUBLESHOOTING TRAINER FOR A COMPLEX ELECTRONIC SYSTEM: THE MAC-2 TRAINER. Proj. 7709, Rep. AFFTC-EX-57-106, July 1957, 11pp. Maintenance Lab., AFFTC, ARDC, Lowry AFB, Colo.

3279
This report describes the basic features of a flight-line troubleshooting trainer (MAC-2) for the MA-7A Bomb Navigational System. The trainer was designed to represent system data flow and operation in the simplest possible terms while retaining characteristics of a miniature system. The relationships of control and indicators, including the potential for a variety of malfunctions, were built into the device by means of circuitry resembling that of the actual system. Basic operation of the MA-7A System data-flow tracing and circuit analysis, the use of schematics, and the selection and use of appropriate test equipment can be learned and practiced as a supplement to practical training.

3258
Strong, H.L. ALASKAN WET-COLD FIELD TEST OF EXPERIMENTAL PERSONAL AND SURVIVAL EQUIPMENT. Memo. Rep. no. WCHXD-670-21R. Sept. 1950. 32pp. USAP, Air Materiel Command, Engineering Division.

3288
This memorandum report describes an Alaskan wet-cold field test conducted to assess the protective value of experimental personal and survival equipment. Eleven articles, including an igloo-type shelter, pneumatic fabric, modified Yukon store, tools, boots, etc. are individually described, evaluated for efficiency and protection, and recommendations are made for future use.

3295
Whittingham, D.G.W., Davidson, I.L. & others. AN INVESTIGATION OF SOME OF THE EFFECTS OF MARCHING IN FLYING BOOTS. EXERCISE OSTHOPOD I. AFRC 729. Dec. 1949. 56pp. Great Britain, Flying Personnel Research Committee, RAP Institute of Aviation Medicine.

3299
This report describes an investigation of the practicability and efficiency of the Paraborough flying boot and its effects on the human foot during a 60-mile simulated survival march in hot weather. Effects are assessed by radiographic, podographic and thermal measures on the wearer's foot; location and number of lesions (blisters) and wear on the boot itself are determined. A separate investigation is conducted under laboratory conditions to observe any relationship between foot swelling and rise in environmental temperature.

3299
Page, H.E. & Lyon, V.W. PRELIMINARY REPORT ON PERFORMANCE IN THE SWS CYCLOHAKIC LINK AND ITS RELATIONSHIP TO SUBSEQUENT PERFORMANCE IN STAGE A OF FLIGHT TRAINING. Proj. NX 001 058.09.01, Research Rep. Nov. 1950. 24pp. Naval School of Aviation Medicine, Pensacola.

3299
To test the effectiveness of preflight training in the SWS Link Trainer (a flight simulator), 100 Naval aviator students were given five hours of link instruction. Achievement was measured with four turning maneuvers in a link that yielded performance scores, and the instructors assigned subjective grades. These measures are intercorrelated and correlated with subjective grades on performance of 65 of the students in Stage A of flight training. Results are discussed regarding needs for further research.

3300
Kaizer, H. A QUANTIFICATION OF TEXTURES ON AERIAL PHOTOGRAPHS. Tech. Note 121, June 1955, 33pp. Optical Research Laboratory, Boston University.

3300
The purpose of this experiment was to obtain the basic data necessary for the development of ordered categories for the description of aerial photographs. Seven aerial photographs of natural terrain were studied. Texture was measured physically by determining the (1/e) th parameter of the autocorrelation function for density. Twenty subjects arranged the same photographs in order of coarseness of texture. The subjects viewed the photographs under reflected light for one set of judgments, and by transmitted light for another. A correlation is reported between the orders generated by the subjects, and those by the autocorrelator, and the utility of this relation for the classification of aerial photographs is discussed.

T. G. I. R 5

3301
MORANT, G.H. SURVEYS OF THE HEIGHTS AND WEIGHTS OF ROYAL AIR FORCE PERSONNEL. IV. AVERAGE WEIGHTS AS A CRITERION OF THE PHYSICAL CONDITION OF GROUPS OF MALE SERVICE PERSONNEL. FRAC 711(c). Oct. 1950. 11pp. Livingston Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

a) This report presents provisional average weight standards for groups of British male Service personnel. b) The 4 grades of weight distinguish between 'probably excessive', 'good', 'satisfactory', and 'poor'—refer to average weights reduced to a constant height (67.5 in.). and the method used in doing this is described (section 4.3). The standards are not intended to indicate the significance of weights of individuals. c) 2 systems are presented, one far untrained, and the other for trained personnel. They refer to British conditions and may be inappropriate for the corresponding communities in any other country. d) The limits of the grades of mean weights were chosen after comparison of the records for 19 series relating to a total of 1,400,000 adolescents and men. An American investigator using American data might conclude that the 'probably excessive' zones of the proposed British standards should be labelled satisfactory and that any below them should be labelled 'poor'.

3305
STUNT, S.C. PREMODULATION SPEECH CLIPPING AND FILTERING: A CONSIDERATION OF THEIR EFFECTS ON THE INTELLIGIBILITY OF SPEECH. Proj. W4 003 041.21.04. MNL Rep. 155, Vol. 9, Aug. 1950. 6pp. USN Medical Research Lab., New London, Conn.

Speech clipping and filtering circuits in voice communication systems so distort the transmitted speech as to raise a question of their effect on intelligibility. Results of several experiments indicate that speech clipping alone improves intelligibility when signals are partially masked by electrical noise entering the system between transmitter and receiver. Signals which are not so masked are similarly affected to almost the same degree. Intelligibility improves as clipping increases up to at least 24 db. Under extreme noise masking, very heavy clipping (100 db or more) improves intelligibility, but reduces noise masking. or signals not so masked. Other experiments show that intelligibility is not likely to suffer when voice frequencies below 500 cycles are sharply attenuated, with the possible exception that when masking white noise is very intense, restoring low frequencies causes a slight increase of intelligibility. Attenuating frequencies above 3500 cycles has no significant effect on intelligibility. However, reducing the low-pass cut-off point to 2500 cycles does lower intelligibility considerably. It is suggested that band-pass filtering limits be 600 to 4000 cycles.

R 12

3303
Fiedler, F.E. SOCIAL PERCEPTION AND GROUP EFFECTIVENESS. Contract No. 01-07135, Proj. NR 170-106, Feb. 1955. 14pp. Group Effectiveness Research Lab., University of Illinois.

3306
Strughold, R. THE HUMAN TIME FACTOR IN FLIGHT. II. CHAINS OF LATENCIES IN VISION. Nov. 1950. 9pp. USAF, School of Aviation Medicine, Randolph Field.

3303
This report reviews the general nature of a contract program on social perception and group effectiveness. The method of measuring interpersonal perception is described. Investigations summarized here, deal with relatively simple structured work units and with formally organized crews and the subgroups within them. These latter have included B-29 Combat Crews, Tank Crews, and Open Hearth Shops. Two studies in progress are designed to explore intergroup relations and productivity of the whole organization. Methodological studies completed are listed along with technical reports and journal publications by members of the research team.

R 15

3306
To analyze the time consumption of the various processes which lead to distinct visual perception, data from pertinent literature is analyzed in terms of conjugate and disjunctive eye movements, accommodation and pupillary reaction. This complex of processes is designated as "chains of sensory latencies of lower order" as opposed to "chains of sensory latencies of the higher order" formed by recognition, comprehension, etc. The importance of these complexes for safety in ground and air traffic is pointed out.

T. G. I. R 31

3304
Erickson, J.R., Gambrell, L.M., King, R.E., Stanton, C.I., & Van Wymen, K.G. TRAFFIC STUDY OF COMMUNICATIONS AND RELATED OPERATIONS. Contract DA 36-039-sc-64567, June 1955, 62pp. Bell Telephone Labs., Whippany, N.J.

3307
Bell Telephone Labs. SYSTEMS ENGINEERING RELATING TO COMMUNICATIONS FACILITIES FOR THE COMMON SYSTEM OF AIR TRAFFIC CONTROL. PART I. HARTFORD SECTION - TRAFFIC STUDY OF COMMUNICATIONS AND RELATED OPERATIONS. Contract DA 36-039-sc-64567, June 1955, 273pp. Bell Telephone Labs., Whippany, N.J.

3304
This interim report on air traffic control represents a study of the application of an air-ground data link. Preliminary consideration is given to (1) system planning, (2) specific technical problems associated with an air-borne data link, and (3) general performance requirements for the data link. Three equipments (an ATC Signalling System, a data transfer and display, and an ATC plotting display) are considered and their utilization in the Traffic Control System analyzed. An integrated system of communications and displays, semi-automatic in nature, is proposed for operational simulation studies. Technical problems of derivation, storage and display of traffic control information are studied and general conclusions stated.

I.

3307
This is a final report on one sector of a study of the communications traffic in air traffic control. In an effort to understand the system, especially the manner in which communications was interwoven with the control system, statistical studies were made of voice communications (duration of calls, incoming vs. outgoing, and predictability), message classifications, rates of communication activity, calling rates and holding times, communication delays, and age of information. These data were studied in relation to aircraft delays and clearances. Analyses were directed towards prediction of effect of making changes in the present systems. Recommendations are made. Individual memoranda covering the statistical studies in detail and a collection of tables and charts are appended.

3308
Low, P.M. EFFECT OF TRAINING ON ACUITY OF PERIPHERAL VISION. Rep. 66, Sept. 1946, 94pp. Division of Research CAG. (School of Medicine, University of North Carolina).

3308
To study the effects of systematic training of peripheral vision, 13 subjects completed a three-month course (twice-weekly laboratory periods). Test objects (Landolt Broken Circles, Airplane Silhouettes, and Isolated Forms) were used with a hand-operated perimeter under carefully controlled exposure conditions. An initial acuity test was given with a check test every fourth period and the airplane silhouettes were used for training. Special tests included: Isolated Circles, Night Visual Acuity, Rapid Recognition, and transfer tests of Isolated Forms, acuity at 90° from line of vision, and Non-Formalistic Recognition. Three types of scores were derived (acuity, millimeter variability, and percentage standard error) and analyzed for changes during the course of training. Manual for testing procedure is appended.
T. R. 13

3309
Davis, H., Silverman, S.R., & McLaughlin, D.R. PITCH AND FREQUENCY. Contract N60nr 272, 950, 9pp. Office of Naval Research, Washington, D.C. (Central Institute for the Deaf, St. Louis, Mo.).
"Tone-pips" were produced by delivering brief rectangular electrical pulses through 2 sound-effects filters in cascade with both high and low cut-offs set at 2000 cps. Nearly all of the acoustic energy of the final signal was found to be concentrated in a band about an octave wide and centered at 2000 cps. The pulsing frequency was varied independently between 50 and 150 pips per second. Listeners describe the resulting sound as a "metallic buzz". Listeners vary greatly in their ability to identify the 2 "pitches" present in this sound and in the accuracy with which they match with a pure tone either the pulsing frequency (about 130 per sec.) or the band-pass frequency (2000 cps in the present series). Errors of exactly 1 octave are particularly common. In the theoretical discussion we argue that the "pitch" of a pure tone is a double attribute compounded of "buzz" (correlated with frequency of volleys of nerve impulses) and "body" (correlated with position of maximum stimulation on the basilar membrane).
R 7

3311
Keist, B.P., Shaeley, W.P., Byers, J.M., Jr., & Chinn, H.I. RELATIVE EFFECTS OF HEAD IMMOBILIZATION AND MEDICATION ON THE INCIDENCE OF AIRSICKNESS. Rep. 55-78, Oct. 1955, 3pp. USAF School of Aviation Medicine, Randolph APB, Tex.

3311
To investigate the relative effects of head immobilization and medication on the incidence of air sickness, 102 paratroopers on simulated combat jumps were randomly distributed aboard C-119 aircraft. They were divided evenly into four groups receiving C.65 milligrams of hyoscine hydrobromide with and without head support and placebo with and without head support. On four two-hour flights (jumps on three) each man had served as subject in each group. The incidence of airsickness (vomiting) was analyzed for differences due to medication and head rest. Further study was made of differential effects on individuals exhibiting motion susceptibility.
T. R 6

3312
Smith, E.E. EFFECTS OF THREAT INDUCED BY AMBIGUOUS ROLE EXPECTATIONS ON DEFENSIVENESS AND PRODUCTIVITY IN SMALL GROUPS. Contract N60nr-1147(63), NR 170 226, Tech. Rep. 1, Aug. 1956, 62pp. Group Process Laboratory University of Colorado, Boulder, Colo.

3312
To investigate the effect of threat induced by ambiguous role expectations upon group performance, 146 subjects were placed into five-person problem-solving groups in four conditions (one control condition contained three person groups). The task was a variation of the "twenty-question" parlor game, with work productivity measured during the second ten-minute period. Role ambiguity was induced by means of two trained silent plants into experimental groups and was reduced by pre-task clarification of roles of silent plants in control groups. Measures were made of task efficiency, group defensiveness, group satisfaction, group cohesiveness, inter-member attractiveness, and intra-group hostility. The results are analyzed for changes due to changed role expectations.
T. R 16

3313
Gibbs, P.A., & Huber, F. STUDIES ON EFFECTS OF WINDSHIELDS AND/OR AIR OF DIFFERENT DENSITIES ON STEREOSCOPIC VISION. I. MATHEMATICAL PRINCIPLES CONCERNING DISPLACEMENT EFFECTS ON BIODIRECTIONAL PERCEPTION OF DIRECTION, SIZE, AND DISTANCE, AND TRIDIMENSIONAL PERCEPTION OF DEPTH. Rep. 1, Nov. 1950, 21pp. USAF School of Aviation Medicine, Randolph Field, Tex.

In the present paper, the mathematical principles were derived for the effect of transparent plane-parallel panels on displacement (i.e., perception of direction), apparent enlargement, apparent change in shape, and apparent change in distance of an observed object. Furthermore, the change in the angle of parallax at which two objects at different distances are seen was computed when a panel or windshield with plane-parallel surfaces is interposed. All calculations pertain to resurfaced, laminated, bulletproof, heat-treated, windshield panels with 38.1 mm. thickness and a refractive index of 1.515. It was shown that with the great distances encountered in aviation all effects of interposed panels were negligible with exception of the change in the angle of parallax and thus the apparent change in distance. Depending on the angle of incidence of the panels, the change in the angle of parallax may amount to $\pm 30\%$. If the distance was below 10 m (indoor experiments) all the effects were significant. Numerical calculations show that the deviation of light rays through shock waves under practical conditions amounts to less than 1 min. of arc and thus presents a very small problem. It can therefore be omitted.

3314
Edwards, D.A.W. SOME OBSERVATIONS ON THE EFFECTS ON HUMAN SUBJECTS OF AIR AND STRUCTURE BORNE VIBRATIONS OF VARIOUS FREQUENCIES. Sept. 1950, 121pp. FPRC, RAF Institute of Aviation Medicine, Farnborough, Hants, Eng.

3314
To investigate the effects of air and structure borne vibrations on human subjects, a series of studies were conducted. Personnel (ground engineers and test pilots) working with jet aircraft were questioned and examined. A detailed study of subjective impressions of exposure to high intensity structure and air borne vibrations was carried out by the author. Estimates of change in respiratory pattern and oxygen consumption were made. Principles of design and development of ear defenders were reviewed and an attempt made to improve existing patterns. The sources and spectral distribution of frequencies and intensities in reciprocating engine and jet propelled aircraft are described. A review of available literature is included.

3315

Psychological Research Associates, Bureau of Ordnance. HUMAN ENGINEERING PRINCIPLES FOR MINE TEST SET DESIGN. Contract Word 15618, NAVORD Rep. 5339, May 1956, 95pp. Bureau of Ordnance, Department of the Navy.

3315

This manual presents some human engineering principles to assist the engineer in the design of Mine Test Sets for greater operator accuracy and efficiency. The first section is devoted to those considerations common to all mine test sets, such as labeling, coding, construction features and the arrangement, location, grouping and position of controls, indicators, cables, and other parts of the panel. Two sections are devoted to general types of Mine Test Set panel parts: controls and indicators. The final section is an illustration of the application of the principles to proposed panels for two Mine Test Sets, ME246 Mod 0 and ME246 Mod 0.

Human engineering check lists for overall design consideration are appended.

T. I. R 7

3316

Bach, L.X.N., Sperry, C.J., Jr., & Ray, J.T. STUDIES ON THE EFFECTS OF FLICKERING LIGHT ON HUMAN SUBJECTS. Contract DA-44-009-eng 2448, Proj. 8-18-06-003, Final Rep., June 1956, 73pp. Department of Physiology, Tulane University Station, New Orleans 18, La.

3316

To investigate the effects of flickering light on human subjects with a view to the use of flickering light as a possible tactic in battlefield operations to cause interference with cognitive functions of the enemy, a series of studies were undertaken: (1) determination of intensity, frequency, time of exposure, and light-dark ratio, most likely to cause dizziness, sleep, or unconsciousness; and (2) determination of interference effects on such tasks as tapping in certain sequences, walking and rifle-firing. The results are discussed in terms of possibility of using this technique to achieve objective and effective interference with consciousness.

T. G. I.

3317

Bickel, H., Atkin, J., Bergen, A. & Weiss, M.R. SIMULATION STUDY, 1 NOVEMBER 1955 TO 31 JANUARY 1956. Contract AF 19(604) 1572, Proj. LIGN, Rep. P 5/133, Feb. 1956, 54pp. Dept. of Electrical Engineering, Electronics Research Labs., Columbia University Engineering Center, New York, N.Y.

3317

This project report (November 1955-January 1956) covers work on development of a digital multi-target radar simulator of high realism and precision. Considerations involved in the problem of three-dimensional simulation are presented. Improvement and extension of an existing single-target radar simulator included testing of various azimuth estimation procedures employing the AFRC digital beam splitter. One section is concerned with our reduction and analysis. Work is continuing on the problem of clutter simulation.

G. I. R 10

3318

Jerger, J.P. THE EFFECT OF STIMULUS INTENSITY ON THE PATTERN OF RECOVERY FROM AUDITORY FATIGUE. Rep. 55-143, Jan. 1956, 6pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

3318

To study the effect of stimulus intensity on the pattern of recovery from auditory fatigue, measurements were obtained from light subjects with a threshold tracing signal (4000 cycles per second) prior to and during recovery from a two-minute stimulating tone (3000 cycles per second). Intensity of stimulating tone varied (80, 85, 90, 95, 100, 105, and 110 decibels) in seven testing periods. Individual and mean recovery curves, threshold shifts at thirty seconds and magnitude of "bounce" at approximately two minutes are analyzed for each intensity level. Results are interpreted in terms of their significance for predicting susceptibility to permanent noise-induced hearing loss.

3325

Green, R.F., Morris, E.B., & Spragg, S.D.S. THE EFFECT ON PERFORMANCE OF VARYING THE DIRECTIONS AND PLANES OF MOVEMENT OF THE CONTROL CRANKS ON A COMPENSATORY TRACKING TASK. Prepared under Contract W600-241, T.O. 6, Proj. 20-M-1d, Tech. Rep. 241-8-18, Aug. 1955, 4pp. Special Devices Center, Fort Washington, N.Y. (University of Rochester).

3325

To determine whether certain display-control relations which had been found to be optimum for a following tracking task would also prove optimum for a compensatory tracking task, 32 subjects attempted to keep a target centered under cross-hairs of a three-inch aperture by using two hand controls rotating in the vertical plane parallel to the frontal body plane or by rotating left crank in the vertical plane parallel to the frontal body plane and the right crank in the vertical plane perpendicular to the frontal body plane. Four different combinations of directions of rotation were practiced during a 55-minute period. The scores (time on target) were analyzed for differences due to position of hand wheels and direction of rotation.

T.

3326

Jerger, J.P. LOUDNESS ADAPTATION FOLLOWING INTENSE ACOUSTIC STIMULATION. Rep. 56-9, Jan. 1956, 8pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Northwestern University).

3326

To study loudness adaptation following exposure to intense acoustic stimulation, twelve subjects adjusted the loudness of a control tone (right ear) to match a test tone (left ear) under three conditions: (1) continuous test tone (4000 cycles per second at 80 decibels), duration ten minutes, matching at one-minute intervals; (2) same procedure following a fatiguing tone (3000 cycles per second, 100 decibels, 100 seconds duration); (3) following the fatiguing tone, a discontinuous test tone with same matching procedures. The data were analyzed for differences between normal and post-fatigue adaptation. Comparisons were made with other measures of acoustic stress from a previous experiment. Results are interpreted in terms of their significance for isolating the noise-susceptible individual. G. R 5

3328

Renbourn, E.T. THE SPINE PAD: A DISCARDED ITEM OF TROPICAL CLOTHING. AN HISTORICAL AND PHYSIOLOGICAL SURVEY. Rep. 54, Dec. 1955, 10pp. Directorate of Physiological and Biological Research, Ministry of Supply, London, England.

3328

This paper surveys the history of the use of the spine pad, a now discarded item of tropical clothing worn to protect the spine from the rays of the sun and consequent heat stroke. The physiological ideas that influenced the use of the spine pad are discussed and development of the understanding of the causes of heat disorders is traced. Photographs are included.

I. R 91

3330

Hattin, D.E. EFFECTS OF TILT ON A STANDARD MS 28024 TURN AND SLIP INDICATOR. Task 13681, Tech. Note WADC 55-630, Nov. 1955, 6pp. Directorate of Flight and All-Weather Testing, WADC, Wright-Patterson AFB, Ohio.

3330

To determine the effects of tilt on a standard MS28024 turn and slip indicator, five pilots made six flights with the indicator mounted with its face set (1) parallel, (2) five degrees face up, (3) fifteen degrees face up, and (4) fifteen degrees face down with respect to a plane perpendicular to the longitudinal axis of the aircraft. Four standard maneuvers were performed and photographic records made of instrument behavior. Pilots filled out questionnaire on their observations. Results were evaluated in terms of the advisability of using a tilted turn and slip indicator as a primary flight instrument in event of altitude indicator failure.

I.

3334

Austin, G.M., Lee, A.S.J. & Grant, F.C. A NEW TYPE OF LOCALLY-APPLIED STEREOTAXIC INSTRUMENT. *J. Amer. Med. Assoc.*, May 1956, 161, 147-148. (Neurosurgery Dept., University of Pennsylvania, Philadelphia, Penn.).

A new lightweight stereotaxic instrument (weighing 1.5 lb.) for use in the brain of human beings is constructed mainly of anodized aluminum with a sterilizable plastic electrode holder. The instrument may be attached any place on the skull by means of three screws in the external table of the skull. The position of the electrode holder, referable to the basal and sagittal planes, is fixed by an arm filled with Wood's metal and chain. The reference planes of measurement include: a) an angular adjustment along the sagittal plane of the skull by means of a vernier; b) a coronal plane of angular adjustment up to 15°; c) a translation movement, lateral from the midline; and d) a vertical measurement along the electrode track.

3335

Spalding, C.K. RADIATION-EXPOSURE SURVEY OF X-RAY AND ISOTOPE PERSONNEL. ANALYSIS OF A TOTAL OF 7678 FILMS WORN BY PERSONNEL IN THESE TWO FIELDS SHOWS CLEARLY THAT THE X-RAY WORKER RECEIVED CONSIDERABLY MORE RADIATION EXPOSURE THAN THE ISOTOPE WORKER. *Nucleonics*, Dec. 1949, 5(6), 63-66. (Radiology Dept., New England Deaconess Hospital & Pathology Lab., Harvard Cancer Commission, Boston, Mass.).

Analysis of a total of 7678 films worn by X-ray and isotope personnel shows clearly that the X-ray worker received considerably more radiation exposure than the isotope worker. The latter personnel rarely ever approach the permissible-dose level, while several X-ray workers received greater than the permissible dose. (HEIAS)

R 8

3336

McCutchan, J.W., & Taylor, C.L. A QUANTITATIVE STUDY OF EVAPORATION FROM THE HUMAN BODY DURING SHORT EXPOSURES TO VARIOUS TEMPERATURES, HUMIDITIES, PRESSURES, AND WIND VELOCITIES. Contract AF 33(616)-32, Proj. 7155, WADC Tech. Note 55-522, June 1955, 41pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (University of California).

3336

To investigate the evaporation of water from the human body as a function of temperature, humidity, pressure and wind velocity, tests were conducted on two subjects. In one series of fifty tests, five levels of temperature, water vapor pressure, altitude pressure, wind velocity, and time were used and weight loss measured every five minutes. In addition, skin and rectal temperature, heart rate and estimated water accumulation on the body were measured. Additional series of tests at constant temperature (50° F mean value) were made. Oxygen was given for altitudes above 8000 feet. Data were analyzed as functions of the environmental variables over the specified ranges.

T. G. I. R 27

3338

Miller, R.B. HUMAN ENGINEERING DESIGN SCHEDULE FOR TRAINING EQUIPMENT. Contract AF 33(038) 22638, WADC TR 53 138, June 1953, 34pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (American Institute for Research, Pittsburgh, Penn.).

3338

This report is an organization of several hundred considerations which, from the human engineering standpoint, are important to the relevance and efficiency of training equipment. These considerations are applicable to a training device during initial planning, specification, prototype, or production model stages of trainer development. The items of the Design Schedule are grouped as follows: 1) designing a trainer to use as a demonstrator of principles, 2) controls, 3) displays, 4) control-display interaction, 5) programs, 6) scoring and error analysis, 7) motivation of the student, 8) conditions of practice and learning, 9) facilities for the instructor, and 10) research data on the task.

3340 Reynolds, J.B. & Blodreau, Ina McB. AN EVALUATION OF SOME MANIPULATION TESTS FOR A BASIC SCALE OF MOTOR ABILITIES. Res. Note P & MS 52 5, March 1952, 6pp. USAF Air Training Command, Human Resources Research Center, San Antonio, Tex.

The present study is concerned with the evaluation of a group of manipulation tests with a view toward their later inclusion as items in a general scale of motor abilities. They are suitable scale material in terms of simplicity and durability of apparatus and ease of administration. Of 10 manual tests, 8 form a general cluster with respect to intercorrelation, and correlation with the Airman Classification Battery AC-1A. The 2 Finger Control items have little in common with the other manipulation or Airman Classification Battery variables. The other manual tests involve manipulation of small objects, while Finger Control is manipulation of the fingers only, and involves no testing materials. The 8 clustering manipulation tests meet the preliminary criteria for inclusion as items in a basic scale of motor abilities. They are fairly complex, in terms of moderate correlation profiles. Retaining them as possible items and yet they tend to have individual correlation profiles. Retaining them as possible items in a manipulation test for further evaluation seems warranted.

R 3

3342

Duncan, C.P., & Underwood, B.J. SPATIAL ERROR GRADIENTS IN MOTOR LEARNING AND TRANSFER. Contract AF 33(038)-11396, RDO 694-44, Tech. Rep. 53-65, April 1953, 11pp. WADC, ARDC, Wright-Patterson AFB, Ohio. (Northwestern University).

3342

To study the effects of task similarity on transfer of training, three groups of 26 male college students practiced moving a lever into the appropriate one of six radial slots in response to one of six signal lights. After 60 trials with one slot-light relationship, 30 trials were performed with a different relationship, the degree of similarity between the two tasks varying among the three groups. Errors and error gradients are analyzed in detail and discussed regarding implications for training and equipment design.

T. G. R 5

3343

Massachusetts Institute of Technology. INTELLIGIBILITY OF PROCESSED SPEECH. SUPPLEMENTARY REPORT. Contract W 19 122 ac 14, Tech. Rep. 11, Sept. 1949, 62pp. Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.

The work accomplished from July 1948 to July 1949 on the study of the intelligibility of processed speech is outlined. The over-all program includes 2 major phases: factors affecting intelligibility and bandwidth time compression of speech. Under the first phase, the effects of certain types of distortion on articulation and the determination of the threshold of flutter for a frequency-modulated tone are discussed. For the second phase, the work done on the speech-compression problem, the experimental work on amplitude and time quantization of speech waves, and proposals for future work are summarized. The instrumentation to be used for psychoacoustic experiments such as intelligibility tests and threshold determinations is briefly described.

R 103

3348

Prakash, A. BAYES, AND MINIMUM PROCESSES IN SAMPLING FROM FINITE POPULATIONS. Contract N6003 251, Task III (NR 042 993), Tech. Rep. 15, Feb. 1953, 10pp. Department of Statistics, Stanford University, Stanford, Calif.

3345

The primary aim of this paper is to investigate the assumptions in modern decision theory needed to yield the classical results in estimation and design in sampling from finite populations. The finite population is regarded as the outcome of a fixed sample size experiment performed by nature or some conscious being, using some probability distribution unknown to the statistician. The loss function, however, does not depend upon the form of the probability distribution but only upon the outcome of this large experiment. Use has been made of the fact that optimum strategy is to choose a sample of fixed size by the method of simple random sampling. The Bayes and minimum estimates and sampling procedures are obtained for various populations.

R 11

3349

Cope, A.D., Epstein, D.W. & Hopkins, R.E. WIDE ANGLE HIGH-DEFINITION TELEVISION SYSTEMS. Contract N6001 23605, Aug. 1952, 155pp. Laboratories Div., Radio Corporation of America, Princeton, N.J.

3349

This article presents a detailed description of an investigation concerning the potential application of wide angle high definition television system in the visual presentation of synthetic training devices. The following aspects were investigated: the evaluation and measurement of image quality, response characteristics of television systems, high definition pickup tube beams, wide angle optical systems, wide angle projection systems, projection tubes and yokes, and so forth.

3350

Goff, L.G. (Ed.) PROCEEDINGS OF THE UNDERWATER PHYSIOLOGY SYMPOSIUM, JANUARY 10-11, 1955. Publ. 377, 1955, 153pp. National Academy of Sciences & National Research Council, Washington, D.C.

3350

This document presents the proceedings of the Underwater Physiology Symposium held at Washington, D.C., January 10-11, 1955. The various papers presented are primarily concerned with the following general topics: oxygen toxicity, decompression and bends, and respiratory problems in diving. An extensive bibliography is included. Many of the papers present historical summaries of the research conducted on the particular topic being examined.

T. G. I. R 126

3351

Husson, G.S. & Reis, A.B. PHYSIOLOGICAL ADAPTATION TO CHRONIC HYPOXIA: A. RESTING OXYGEN CONSUMPTION. Rep. 55-14, Sept. 1955, 7pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Johns Hopkins University School of Medicine).

3351

To investigate the possibility of physiological adaptation to a state of chronic hypoxia, the resting oxygen consumption of 42 individuals with cyanotic congenital heart disease and that of 45 individuals with noncyanotic congenital heart disease (age range--six to forty years) were measured. The data (oxygen consumption in milliliters per minute per square meter of body surface and basal metabolic rate) are compared for differences due to chronic hypoxia.

T. G. R 9

3352
Bishop, D.E. OCTAVE BAND ANALYSIS OF NOISE MEASUREMENTS OF SHIPBOARD LIVING QUARTERS. Contract N0001 54669, Tech. Rep. 3, Proj. A 024 9 (Formerly 90 1099A), March 1953, 52pp. Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill.

This report presents the octave band analysis of noise measurements taken in 100 compartments of 8 vessels of Task Force 86, and 30 compartments of the USS Midway (CVB 41). The data are presented in terms of the median overall and octave band sound pressure levels for each compartment. The median levels for each compartment are determined from the set of noise measurements taken at different times in each compartment. Comparison of the collected noise spectra of compartments of different type vessels showed no significant differences in the shape of the median spectrum for destroyer-type vessels compared to the median battleship and heavy cruiser spectrum. The median levels for the battleship and heavy cruiser spectrum are approximately 3 db greater than the median levels of the destroyer-type vessels. Comparison of the variation of spectra levels with time showed that the median range of variation for 50% of the measurements in each compartment was approximately 4 db in each octave band. For design purposes, the spectra of many of the compartments can be approximated by a spectrum having a constant, decreasing slope of 4 db per octave, with the speech interference level 20 db below the overall sound level. From the limited data available, the median ventilation system spectrum has an increased proportion of energy in the low frequencies, with a decrease of sound levels in the higher octave bands approximating 6 db per octave.

3353
Miller, J.G. THE DEVELOPMENT OF EXPERIMENTAL STRESS-SENSITIVE TESTS FOR PREDICTING PERFORMANCE IN MILITARY TASKS. Contract DA 49 083 OSA 611 B 8 154, Proj. 29562000, PRS Tech. Res. Rep. 1079, Oct. 1953, 57pp. Psychological Research Associates, Washington, D.C.

3353
To find out if certain available tests were able to distinguish a man's reactions under stress conditions as opposed to his reactions in a normal situation, a number of potentially stress-sensitive tests were selected on the basis of a review of the literature and pretested on 48 paratroopers making their first jump from the 34-ft. mock tower. Four tests (critical flicker-fusion at dim intensity, the trembleometer, cancellation of C's, and the Primary Mental Abilities Word Fluency) were then administered to 500 pre-inductees under ordinary testing conditions and under stress induced by a continuous 8000-cycle, 90 db noise. The findings were interpreted in terms of a general theory of stress.
I.

3356
Grings, W.M., Rigney, J.W., Bond, N.A. & Summers, S.A. A METHODOLOGICAL STUDY OF ELECTRONICS TROUBLE SHOOTING SKILL. I. RATIONALE FOR AND DESCRIPTION OF THE MULTIPLE-ALTERNATIVE SYMBOLIC TROUBLE SHOOTING TEST. Contract NONR 228(02), Proj. NR 153 093, Tech. Rep. 9, Aug. 1953, 46pp. Department of Psychology, University of Southern California, Los Angeles, Calif.

3356
This report is one of two concerning a new type of test format which was a product of a methodological study of electronics trouble shooting. A conception of trouble shooting is set forth as it is related to problem-solving in general and as it is exemplified in electronics situations. The test format is described in detail. The pertinent aspects of its subject matter, relation to other trouble shooting tests, and alternative scoring parameters are discussed.
I.

3364
McGill, W.J. MULTIVARIATE TRANSMISSION OF INFORMATION AND ITS RELATION TO ANALYSIS OF VARIANCE. Contract AF 18(600) 322, HROAL Rep. 32, ca. 1952, 19pp. USAF Human Factors Operations Research Labs., Bolling AFB, Washington, D.C. (Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.).

The simple model of information transmission with one input variable and one output variable is inadequate in most psychological applications. More desirable is a model that permits us to study input-output correlations with several variables at the input, or at the output, or both. This paper shows that the definition of transmitted information may be generalized to include the effects of multiple sources of information. Multivariate transmission analysis resembles analysis of variance in many ways, but there are also fundamental differences between the methods. A "components of response information" model is developed in which response information is analyzed into several parts. One of the components is an error term; the others measure correlations between the transmitting variables and the responses. Statistical tests of the significance of the transmitting variables are possible.
R 4

3365
Tolson, J., & Corkindale, K.G. COMPARATIVE PHYSIOLOGICAL TRIAL OF ROCKET-FUEL-RESISTANT CLOTHING. Rep. 49, July 1955, 16pp. Clothing and Equipment Physiological Research Establishment, Directorate of Physiological and Biological Research, Ministry of Supply, London, England.

3365
To compare two types of rocket-fuel-resistant clothing, a test was carried out in a hot climatic chamber at a temperature of 77° F., relative humidity being approximately 64 percent. Eight men wore each suit twice during four test days for periods of work and inactivity. The heat stress was assessed by measuring internal body temperature, pulse rate, and total weight lost. Sweat retained in clothing was measured to compare the ventilation afforded. Subjective opinions and user preferences studied by analysis of variance techniques for differences attributable to suit design. User preferences and critical comments are presented. Design recommendations are included.
T. G. I. R 2

3367
Grings, W.M. (Princ. Investigator). SHIPBOARD OBSERVATION OF ELECTRONICS PERSONNEL: GENERAL CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH. Contract NONR 228(02), Proj. NR 153 093, Tech. Rep. 7, July 1953, 30pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

3367
This report is the last of a series of technical reports based on shipboard observations of electronics personnel on destroyer-type ships. Objectives of the research are re-examined and degrees of their attainment are evaluated. General conclusions derived from the research, suggestions for improvement in the electronics maintenance situation, and recommendations for future research within the electronics area are included.

3368
Hambacher, W.G. HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL WARNING AND CAUTION SYSTEMS. THE EFFECTS OF VARIATION IN TEMPORAL CHARACTERISTICS OF WARNING LIGHTS ON THEIR ATTENTION-GETTING AND -HOLDING VALUE UNDER DAY AND NIGHT CONDITIONS. NAMC-ACEL-299, TED NAMC-EL-52004, Part 7, Aug. 1956, 13pp. Air Crew Equipment Laboratory, Naval Air Experimental Station, NAMC, Philadelphia, Penn.

3368
This investigation was undertaken to develop an empirical basis for the design of warning lights in aircraft. Reaction times were measured on 12 subjects while they were continuously engaged in a tracking task. Four different delay periods were interspersed randomly between a "ready" signal and the stimulus. All of the subjects performed the task during the day and during the night. The results are factor-analyzed to determine whether any of these variables have a significant effect on reaction time.
T. I. R 2

3369
Graybiel, A. MEDICAL ASPECTS OF FLYING. Verck Rep. 3, July 1955, 11-14. US Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3369
The medical aspects of flying are described as they apply to the use of aircraft as transportation and as weapons. Problems related to the passenger and the crew are briefly evaluated from the viewpoint of preventative medicine. Specific contraindications for flying are listed.
I. R 22

3371

Grings, M.K. (Princ. Investigator). SHIPBOARD OBSERVATION OF ELECTRONIC PERSONNEL: A DESCRIPTION OF THE RESEARCH. Tech. Rep. 1, Jan. 1953, 11pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

3371

A nontechnical account is presented of a research program designed to investigate personnel problems associated with electronic maintenance and operation. The procedures used to obtain objective descriptions aboard ships operating in the Pacific area are given along with a description of the groups observed. The rationale underlying the development of a battery of observational techniques is discussed with each technique described in general terms. The treatment of data is discussed briefly and the methods used are evaluated. The paper concludes with some general evaluative comments on the use of a multi-method approach.

3372

Owen, D.M. A MANUAL FOR FREE DIVERS, WITH ESPECIAL REFERENCE TO THE AQUA-LUNG. Contract Nonr 76900, Ref. 53 94, Interim Rep. 1. Dec. 1953, 40pp. ONR & Woods Hole Oceanographic Institution, Woods Hole, Mass.

This manual presents material which applies to the Aqua-Lung diver and also to other self-contained diving means which use air for breathing. The following are section topics: mechanics of the dive, general precautions, corrective or emergency procedures, suggested safety precautions and requirements for underwater swimmers, and further discussion of some physiological consequences of diving. (HEIAS)
R. 35

3373

Morgan, R.L. & Eckstrand, G.A. EFFECTS OF A CHANGED ENVIRONMENTAL CONTEXT UPON PERFORMANCE OF A TRACKING TASK. Contract AF 18(603) 78, NADC TR 53 235, Oct. 1953, 20pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

3373

To study the effect of environmental context on transfer of training, two groups of 20 male Ss kept movable cross-hairs centered on a spot with a control stick in a simulated cockpit. One group practiced in a complex situation (enclosed cockpit, red panel lights, helmet, engine noise, vibration, etc.), the other in a simpler situation (open cockpit, ambient illumination, no helmet, no noise, no vibration). A week later, both groups practiced in the complex situation. Tracking accuracy under final conditions is interpreted regarding degree of realism required in training simulators.
T. G. I. R 11

3374

McGuigan, F.J. & Deneberg, J.H. ACCURACY OF M1 RIFLE SCORES OBTAINED ON THE KNOWN-DISTANCE RANGE. Res. Memo. 4, Jan. 1954, 10pp. Human Resources Research Office, George Washington University, Washington, D.C.

3374

This study compares the accuracy of "line" scoring (where coach or firer records position of a marker held over the hit) and "pit" scoring (where crew in pit score from a close-up study of the target) in evaluating marksmanship with the M1 rifle. Scores obtained both ways were compared for six companies of trainees ("pit" scores alone were obtained for four other companies). Some Ss were told of the "pit" scoring; others were not. Results are interpreted regarding relative accuracy of scoring methods and effectiveness of current training, and recommendations are made for future research.
T. G. R 2

3375

Flanagan, J.L. A SPEECH ANALYZER FOR A FORMANT-CODING COMPRESSION SYSTEM. Contract AF 19(604)-626, Sol. Rep. 4, AFRC-TN-55-793, May 1955, 114pp. Acoustics Laboratory, MIT.

3375

This paper describes a system for reducing the bandwidth necessary for the transmission of intelligible speech. It consists of an automatic encoder which translates the following features of speech into narrow-band control signals: (1) the frequencies of the first three formants; (2) the amplitude of voicing excitation; (3) the amplitude of turbulent excitation; and (4) the fundamental voice frequency. These control signals actuate a synthesizer which is, in effect, an electronic analogue of the human vocal mechanism. The precision necessary in such a system is deduced from psychophysical data in the literature, and the performance of a preliminary model with a bandwidth of 30 cps is evaluated.
T. G. X. R 82

3376

Levine, M. TRANSFER OF TRACKING PERFORMANCE AS A FUNCTION OF A DELAY BETWEEN THE CONTROL AND THE DISPLAY. Contract AF 18(600) 53, NADC TR 53 237, Nov. 1953, 27pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

3376

To study the effects of a time delay in display movement in response to a control movement on transfer of training, 2 experiments (50 and 35 subjects) were run. Subjects trained with various time delays (.015-.3 sec.) in a one-dimensional compensatory tracking task, then all transferred to a task with the same delay. Results (time on target) are analyzed for effects of changes in time delay in transfer and are interpreted regarding implications for accuracy of simulation in trainers.
T. G. I. R 13.

3377 Judd, D.B., Plaz, L. & Farnsworth, D. TRITANOPIA WITH ABNORMALLY HEAVY OCULAR PIGMENTATION. J. Opt. Soc. Amer., Dec. 1950, 40(12), 833-841. (National Bureau of Standards, Washington, D. C.).

The chromaticity confusions characteristic of tritanopia may be represented on the (x, y)-chromaticity diagram by a family of straight lines intersecting at a copunctal point near the shortwave extreme of the spectrum locus. A case of congenital tritanopia is reported that departs from typical tritanopia, first by having a junctionity function abnormally curtailed on the shortwave end, second by having chromaticity confusions among object colors describable by straight lines on the (x, y)-plot intersecting in an area surrounding the spectrum locus at 460 mμ instead of near the shortwave extreme, and third by confusing incandescent lamp light at a color temperature of 2900°K with the spectrum at 566 mμ instead of the typical tritanopic value of 579 mμ. It has been found that all three of these disagreements with typical tritanopia are to be expected from a tritanope possessing normal macular pigmentation combined with an ocular pigment five times normal. We believe, therefore, that this case of atypical tritanopia departs from typical tritanopia because of abnormally heavy ocular pigmentation.
R. 32

3379

Lehmann, G. PRACTICAL INDUSTRIAL PHYSIOLOGY. Contract Nonr-12889(01), April 1955, 78pp. ONR, San Diego State College Foundation. (Max Planck Institute for Industrial Physiology, Dortmund, Germany).

3379

This paper is a review of the physiological factors which are important in planning industrial work. The history of industrial physiology is related briefly, and the role of physiological considerations in industrial practice is described. The principal topics treated are: mechanics of the human body, its energy consumption and output, coordination of movements, fatigue and the effect of rest periods. Following the verbatim translation, abstracts are given of selected passages.
T.

3385

Greer, F.L. SMALL GROUP EFFECTIVENESS. Contract NMR 1274(00), Series 1900 - Institute Rep. 6, 1956, 29pp. Institute for Research in Human Relations, Philadelphia, Penn. (Rand Corporation, Santa Monica, Calif.).

3386

To study relationships between personality and effectiveness in small groups, a large number of natural Army groups performing a field task were used. The measure of group effectiveness was based on observer ratings of 120 nine-man infantry rifle squads during a six-hour, black firing simulated combat problem. Each subject answered a questionnaire which measured eight personality and seven demographic variables. A ten-item sociometric questionnaire was given and members of the 13 most and least effective squads were interviewed. The findings are discussed in relation to leadership and group cohesiveness.

T. R 27

3387

Hadley, M.E. & Cooper, M.L. (Prof. Div.). COMMUNICATION IN HIGH-LEVEL AMBIENT NOISE FIELDS. PART I. NOISE ANALYSIS AND EQUIPMENT PERFORMANCE. FINAL REPORT. Contract DA 36 039 SD 6449, Proj. 12B, Proj. 84B, May 1956, 146pp. The Signal Corps Communication Lab., Fort Monmouth, N.J. (Radio Corporation of America, Camden, N.J.).

3388

To provide design information relevant to Signal Corps voice communications systems used in and between high-level noise environments, the noise spectra in three helicopters and seven armored vehicles were determined and analyzed. Articulation tests were conducted using the interphone portion of Radio Set AF/RC-7 (representative of present Signal Corps equipment) under conditions of high-level sound in both laboratory and field. Using the noise spectra obtained, calculations were made of the articulation performance of a system composed of elements which are now available and the system was tested. The characteristics of the recommended system are specified. Interim measures for improvement in intelligibility of the present system are given.

T. G. I.

3389

Price, A. PRELIMINARY REPORT OF OBSERVATIONS OF STANDARD AND EXPERIMENTAL COLD WEATHER CLOTHING AND RELATED ITEMS UNDER ANTARCTIC CONDITIONS - OPERATION DEEPFREEZE I. Proj. No. NT001-002, NT001-006, NT001-045, Rep. 14, July 1956, 17pp. Bureau of Supplies and Accounts, Dept. of the Navy, Washington, D.C.

3390

To observe the adequacy of standard Navy cold weather clothing under operating conditions in the Antarctic and to evaluate experimental gear under service conditions, a technical observer accompanied a task force constructing bases in Antarctica from mid-December 1955 to March 1956. The men wore Navy A-1 and A-2 cold weather clothing ensembles for both land and skidboard use. The information and data in this preliminary report are a summary of subjective data based on observations and interviews with the personnel and the recommendations resulting from the study.

3389

Miller, R.B., Folley, J.D., Jr. & Smith, P.R. TROUBLE-SHOOTING IN ELECTRONICS EQUIPMENT. A PROPOSED METHOD. Contract AF 33(038)-12921, Proj. 507 U08 0001, March 1953, 93pp. American Institute for Research, Pittsburgh, Penn.

3389

Detailed step-by-step procedures based upon rational and logical considerations are presented for trouble-shooting of electronics equipment. This logical method (trouble-shooting by logical elimination of malfunction sources) is compared with a second general method (trouble-shooting from probability data) which is based upon records of previous malfunctions. Part I contains a discussion of levels and kinds of trouble-shooting in electronics equipment; Part II details the specific check sequence for efficient malfunction isolation; and the appendix presents mathematical proof of efficiency of the half-split technique. (See 498.)

T. I. R 3

3390
Grater, T.V. COMMUNICATION WITH CLIPPED SPEECH SIGNALS. Contract DA 36 039 SD 15375. Quarterly Rep. 7, 1 Feb.-30 April 1953, 99pp. Communications Circularity Lab., Northwestern University, Evanston, Ill.

In this study of communication with clipped speech signals the viewpoint is taken that intelligibility may be associated with the correlation functions of speech spectra and individual sounds. The effect of infinite clipping on the correlation functions of clipped speech sounds is determined using methods which have been developed for noise theory. Since the behavior with whispered speech has been found experimentally to be similar to the behavior with voiced speech, this leads to criteria for the design of the linear filter to produce the infinite clipper. The statistical properties of the rectangular waves resulting from infinite clipping are derived. Using these, the improvement in signal-to-noise ratio which may be achieved by the use of infinitely clipped speech is investigated. It is shown that further improvement may be obtained through the use of the correlation detector, but that this improvement is not restricted to the use of clipped speech. A measure of the loss of intelligibility resulting from mixture with noise is obtained by the use of the concept of the cross-correlation function. The effect of time quantizing on the intelligibility of the infinitely-clipped wave is investigated; conclusions drawn from the study of the correlation function of the time-quantized wave agree with published experimental results. Possible applications of infinite clipping are suggested.

R 22

3393

Stange, F. REPORT ON REAR SCREEN SLIDE PROJECTION. KWELIS R-791, June 1956, 40pp. The Special Services Center, Fort Washington, N.Y.

3393

As part of a large research project on the use of television as a medium for rapid mass training, evaluations of all available types of rear screen slide projectors designed for television are made. This report discusses the purpose and value of rear screen slide projection for increasing the scope and flexibility of the television studio. The limitations of the technique are set forth. Both production and technical aspects of the technique are given in detail.

I.

3394

Dunn, P.P., Flagle, C.D., & Hicks, P.A. SIMULATION OF MESSAGE-HANDLING PROBLEMS IN ARMY COMMUNICATION SYSTEMS. Tech. Memo. ORO-T-335, June 1956, 67pp. Intelligence Div., Operations Research Office, The Johns Hopkins University.

3394

To develop a methodology appropriate to the study of Army communication systems, with particular reference to communication traffic problems, and problems related to procedures and doctrine for organizations involved in message handling, an analysis was made of facts revealed by studies of field exercises and maneuvers. The limitations of available tools for study of problems encountered in Army communications lead to two requirements: further exploitation of mathematical methods with development of new methods as a possibility, and the development of simulation techniques applicable to rapid study of traffic and organizational problems. Appendices present the basic queueing theory, performance criterion for systems handling multiple priorities, the design of an analog simulator, and programming and analysis of field data. T. G. I. R 16

3400

Sanders, J.M. THE INFLUENCE OF SURREND ON TRACKING PERFORMANCE. PART I. TRACKING OF COMBINED POSITIVE AND COMPENSATORY ONE-DIMENSIONAL TASKS WITH AND WITHOUT A SURRENDER SCHEDULE. Contract AF 38(600) 50, WADC TR 52 229, Part I, Feb. 1952, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3400

To test the hypothesis that increasing the availability of information about the direction, rate, and acceleration of target motion will improve tracking performance, four groups of five Ss each performed a series of tracking tasks on two different target rates and under two conditions of surround illumination. The tasks were varied in five steps from pure compensatory to pure pursuit (following) tracking. Time-on-target scores were analyzed for effect of target course rates, surround illumination, and percent pursuit component. This was the first of a series of studies on the same subject. T. G. 2 5

3402

Schipper, L.M., Kidd, J.S., Shelly, M. & Swede, A.F. TOWER SYSTEM EFFECTIVENESS AS A FUNCTION OF THE METHOD USED BY CONTROLLERS TO OBTAIN ALTITUDE INFORMATION. A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33(515) 3612, Proj. 7192, WADC TR 57 278, June 1957, 19pp. USAF Aero Medical Lab., WADC, Wright-Patterson AFB, Ohio.

3402

To investigate the effect of introducing a direct and continuous visual display of altitude information to a pattern-feeder controller under varying traffic loads (aircraft entry rates of 50 or 56 seconds), 4 highly-experienced controllers were required to control simulated aircraft from entry points 50 miles out to the Ground Control Approach (GCA) gate with and without the display. For a series of 15 problems, each involving 26 aircraft, system effectiveness (control time per aircraft, average fuel consumption, delay buildup, number of go-arounds at GCA gate, number of collisions, and number and type of controller-pilot communications) was measured and evaluated by analysis of variance for differences due to display and to traffic load. T. 1. R 11

3403

Webster, J.C. & Thompson, P.O. FACTORS AFFECTING SPEECH INTELLIGIBILITY IN AIRCRAFT CONTROL TOWERS. PO 06401, IE 121303 1 (REL 1544), Rep. 357, March 1952, 28pp. USN Electronics Lab., San Diego, Calif.

3403

Noise, intelligibility of signal, and operator fatigue were studied as they affect Navy Air Station control-tower operations. Two different mock control towers were constructed in which licensed Civil Aeronautics Administration and Navy air-controllers were tested for ability to discern the words of standard multiple-choice word listings incorporated into standard aircraft-control-tower phraseologies. Time to respond, correct identification of aircraft, response made to correct channel, and number of words understood and repeated correctly were studied as functions of variables associated with the talkers, transmission path, and with the receivers. Recommendations for improved practices are made. T. G. 1. R 6

3404

Eckstrand, G.A. & Morgan, R.L. A STUDY OF VERBAL MEDIATION AS A FACTOR IN TRANSFER OF TRAINING. WADC TR 53 34, Feb. 1953, 28pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3404

To determine whether the same verbal responses to a set of color stimuli and a set of response forms will result in these stimuli becoming functionally similar, 62 Ss divided into three groups learned three tasks using a modified Hull-type memory drum. Task 1 consisted of learning to push one of six switches for each of six colors presented on the drum. Task 2 differed for each group: 1) learned to associate one of the six colors with each of the six forms used; 2) learned to associate written names of the colors with the forms; and 3) learned to associate names of house parts with the forms (control group). Task 3 consisted of learning to push one of the six switches for each form. Errors on trial 1, errors to one perfect trial, and average number of correct responses per trial were analyzed for task 3 performance. T. R 14

3407

Drachler, A.J., Bratt, R.M. & Yankov, D.M. SENSITIVITY AND DEFICIENCIES OF PRECOMBAT TRAINING AS REFLECTED BY IMPROVEMENT IN KOREA. PMS Rep. 954, Jan. 1952, 25pp. The Personnel Research Branch, Adjutant General's Office, Washington, D.C.

3407

To evaluate the effectiveness of infantry training for actual combat, 57 infantrymen were interviewed on the main line of resistance during hostilities in Korea. They were questioned as to the strong and weak aspects of their training in the light of their combat experience. Results (percent responses) are analyzed for implications for improvement of infantry training. Verbatim responses are appended. T. 2 for

3409

Fraser, D.C. A STUDY OF FATIGUE IN AIRCRAFT INTERIM REPORT. 1. VALIDATION OF TECHNIQUES. AFM 185/52, Dec. 1952, 13pp. Psychological Lab., Applied Psychology Research Unit, M.C., Cambridge, England.

3409

This paper reports the results of giving a laboratory vigilance task to groups of navigators at different altitudes. The main feature of the task is that the operator has to detect the significant stimuli (large holes) that are interspersed randomly throughout a long series of neutral stimuli (smaller holes) as they move across a horizontal display he then has to photograph the significant stimulus when it is exactly half-way through its travel by pressing a camera button. The score is the variance of the subject's estimates about his own mean estimates. Results are given comparing navigator and naval ratings performance for performance after short and long sorties and for performance under stress conditions. T. G. 2 8

3410

Stump, R.E. TOGGLE SWITCHES - ACTIVATION TIME AS A FUNCTION OF THE PLANE OF ORIENTATION AND THE DIRECTION OF MOVEMENT. WADC TR 52 51, Sept. 1952, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3410

To determine, in various combinations of plane and direction of movement, the time required to throw a conventional toggle switch to the on position and then off, 12 Ss were required to perform this operation in each of six directions of throw variously assigned to three planes of motion (frontal, parallel, and flat). A spring-loaded toggle switch was used and the times required to perform the on-off throw were recorded. Practical implications of the data for operation of an indicator such as a Yeeder-type counter were discussed. T. G. 1.

3412

Neely, K.K. A STUDY OF MAYDAY AND S.O.S. AS RADIO-TELEPHONE DISTRESS SIGNALS. DRML Proj. 118, DRML Rep. 118 5, POC D77 94 40 07, May 1955, 6pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

3412

To determine the relative merits of MAYDAY and S.O.S. as radiotelephony distress signals, the detectability values (audibility thresholds) were compared in the presence of speech and noise. Twelve speakers of varied dialects made three-minute recordings of each term with an overall noise level of 55 decibels. Ten listeners, in a white noise environment of 103 decibels, responded to a multiple choice intelligibility test and the test words as they were fed into the earphones simultaneously. Detectability thresholds of each listener/speaker combination (120) were tabulated for each test word - the lower threshold being considered the more efficient index for a distress signal. T. R 7

3413
Folger, J. CONFIDENCE LIMITS TABLES FOR SMALL SAMPLES OF BINOMIALLY DISTRIBUTED DATA. *Eng. Mono. 6*, May 1953, 12pp. USAF Human Resources Research Laboratories, Maxwell AFB, Ala.

3413
Tables are presented indicating the 95 per cent confidence limits for binomially distributed data. They are tabulated by n , the total number in the sample, and by x , the number of successes in the sample. The fraction x/n gives the percentage of success in the sample; the confidence limits are tabulated in percentage terms.
T. 2 4

3414
Lowy, R.C. TEST RESULTS OF G-41 ANTI-BLACKOUT SUITS IN THE HUMAN ACCELERATION. *USAF Rep. 157*, April 1953, 5pp. Reference Research Medical Labs., Toronto, Ontario, Canada.

3414
This report compares the blackout tolerance of fifty Canadian pilots wearing G-41 Anti-blackout suits in the Human Centrifuge to the normal tolerance of the same subjects without the protective suits. Results for the two experimental conditions are analyzed in terms of average blackout level.
R 3

3415
Lutz, G.C., Bancroft, R.M. & Carter, E.T. RAPID DECOMPRESSION WITH PRESSURE-DEMAND OXYGEN EQUIPMENT. *Proj. 21 1221 0008*, Rep. 2, April 1953, 5pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

3415
To measure pressures imposed upon the lungs and other organs of the chest in the event of sudden loss of cabin pressure at high altitudes while using pressure-demand oxygen equipment, 35 rapid decompressions were made from a simulated cabin altitude of 20,000 to 25,000 ft. to a simulated flight altitude of 47,000 to 50,000 ft. in 0.3 to 0.5 seconds during normal respiratory activity with the pressure-demand oxygen equipment. Barometric and gas pressures were recorded directly and intra-thoracic pressures indirectly. Changes in blood oxygen saturation were recorded on a number of Ss. Subjective impressions were obtained after testing. A control test without positive mask pressure was run.
T. G. R 8

3416
Bernhard, R., DeCarlo, J.D., et al. MATERIAL INFORMATION FLOW PROCEDURES SUMMARY REPORT. *Contract AF 33(616)-2647*, Nov. 1956, 112pp. Electronics Div., Monroe Calculating Machine Co., Morris Plains, N.J.

3416
This summary report describes and evaluates in detail Material Information Flow Procedures for Air Force supply operations at base level. The requirements for an electronic data-processing system are described. The impact of such a system in an area now operating with manual methods is evaluated.
I.

3417
Klemmer, E.T. & Muller, P.F., Jr. THE RATE OF HANDLING INFORMATION: (KEY PRESSING RESPONSES TO LIGHT PATTERNS). *HFORL Mono Rep. 34*, March 1943, 11pp. USAF Human Factors Operations Research Laboratories, WADC, Bolling AFB, Washington, D.C.

Several tests were given to determine the rate of transmission of information through the human channel when the information was encoded for presentation in flashing lights and the operator's output was the pressing of corresponding keys. The independent variables were the rate at which the lights were flashed (2 to 5 per sec.), and the number of bulbs which might be lighted in the stimulus (1 through 5). All possible stimulus bulbs were equally probable and any number could be lighted simultaneously. In addition to these forced rate tests, the 5 bulb test was given as a self-pacing test. The main results were: a) Increasing the stimulus presentation speed increases the information transmission rate only up to a point where the S is making a few errors. Further increases in presentation speed result in large decreases in informational transmission; b) Increasing the number of possible light bulbs in the stimulus from 1 through 5 more than tripled the maximum informational transmission rate; c) In the range of speeds from 2 to 5 per sec. the reaction time is not a function of stimulus presentation rate; d) The reaction time increases with the number of possible light bulbs in the stimulus but is not a linear function of the information presented in the range from 2 to 5 stimuli per sec.; e) The stimulus presentation speed at which maximum transmission occurs is very close numerically to the reciprocal of the reaction time for that test; f) The self-pacing test results in as high information transmission as the maximum reached in the forced rate tests; g) The Ss would put out information with the key pressing response at a rate double that of their ability to transmit information from the flashing lights.
R 5

3418
Doelling, K., Merton, D.A., et al. A CORRELATION OF TURBOJET NOISE DATA. *Contract AF 33(616)-2151*, Proj. 7210, WADC TR-51-401, July 1956, 126pp. Aero Medical Lab., WADC, AFPC, Wright-Patterson AFB, Ohio.

3418
Turbojet noise data have been compiled from measurements in engine test facilities and under static open field conditions and are presented in this report. About 100 measurements on 20 types of turbojets (no jet stream modifiers such as teeth or corrugations) are given. Total acoustic power and distribution of power in octave bands of frequency have been calculated and tabulated. For open field data, directivity information is presented in plots of sound pressure level as a function of angle. Each acoustic measurement is accompanied by the engine operating conditions. A history of each test includes source of data, type of measurements and method used to calculate acoustic power. No critical evaluation of the data is given.
T. G. R 9

3419
Bishop, E.W., Dorsey, L.N., & Channell, R.C. PROPOSED SPECIFICATIONS FOR A HELICOPTER PILOTAGE MAP. *Contract Nour 1648(00)*, Nav-TransCom Proj. 20-P-13, Tech. Rep. 1648-00-1, Oct. 1956, 56pp. HDC, Dunlap and Associates, Inc., Stamford, Conn.

3419
To develop a map which would provide more accurate navigation of helicopters, a job analysis of the navigational task, a survey of current aeronautical charts and a landmark recognition study were conducted. As a result of the study specifications were derived for the following: terrain features, chart scale, color, type size and style, chart size, hydrographic features, etc. A sample helicopter pilotage map is included in this report.
T. G. I. R 9

3420
Gordon, D.A., Zapurski, H.J. & Zeidman, J. A COMPARISON OF ORTHO-RATER AND WALL CHART VISUAL ACUITY MEASUREMENTS. *Proj. 29635100*, PJ 3513 01, PEB Res. Note 10, Feb. 1953, 11pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

3420
To compare the relative difficulty, the test-retest reliabilities, and the correspondence of visual acuity scores obtained on Ortho-Rater and wall chart tests, letter and modified Landolt ring tests were administered to 117 soldiers by both methods. Light levels were the same for both tests. A retest was given to the same subjects two weeks later. Recommendations are made on the basis of the findings as to the suitability of using the more convenient instrument method.
R 8

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3433

Adley, J.V. DIRECTION-OF-PLANE-TURN STEREO-TYPES. Contract AF 18(600) 55, Proj. 7152, Task 7. 575, WADC Tech. Rep. 57 308, July 1957. 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

Right-handed subjects were asked to grasp a knob and turn it so as to effect a specified change in the intensity of a light mounted just above it. Equal numbers of subjects were asked to increase and to decrease the brightness of the light, the request being phrased in a variety of ways. Two significant tendencies were found. First, 73.3% of the subjects turned the knob clockwise to increase or counterclockwise to decrease the brightness of the light. This tendency was strongest when an increase was required and when the function to be controlled was phrased in positive terms (i.e., as "brightness" rather than "dimness"). It was not significantly dependent upon the use of the words "increase" or "decrease" or upon the sex of the operator. Second, 62.5% of all subjects turned the knob clockwise. This general turn-clockwise tendency was found to persist among an additional set of right-handed subjects when the light was covered up and the subject was asked simply to turn the knob; among left-handed subjects (used only in this condition) the tendency to turn clockwise was not statistically significant.

R 8

3436

Merin, R.E. & Grant, D.A. SPATIAL STIMULUS-RESPONSE CORRESPONDENCE. PERFORMANCE ON A KEY-PRESSING TASK AS A FUNCTION OF THE DEGREE OF SPATIAL STIMULUS-RESPONSE CORRESPONDENCE. Contract AF 18(600) 54, WADC TR 53 252, Oct. 1953, 27pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

This report describes an experiment to determine the effects upon speed and accuracy resulting from systematic variations in indicator-control arrangements. The indicators (stimuli) were 8 red lights arranged in a row on a display panel. The subjects operated a finger keyboard of 8 controls (response keys), likewise arranged in a row. Any light could be made the stimulus for any response key, and in yet through this mechanism that spatial stimulus-response correspondence was varied. Kendall's tau, a measure of rank correlation, was used to measure the degree of correspondence. Performance with direct correspondence between the stimulus lights and response keys was found to be very much superior to all other conditions studied. Change from direct correspondence multiplied the average time per unit of work by a factor of 2 to 4 and increased errors by a factor of 4 to 15. Performance with direct correspondence was also found to be relatively independent of a supplementary source of visual information feedback and relatively free from interference training.

R 8

3438

Gordon, M.B. (Proj. Engineer). HUMAN ENGINEERING STUDY OF NAVAL AIR RESERVE TRAINING. PHASE I: SURVEY OF PROBLEMS. Contract NMR 895(00), SDC Rep. 895 001, March 1953, 44pp. USM Special Devices Center, Fort Washington, N.Y. (International Public Opinion Research Corp., New York, N.Y.).

This study was undertaken to: a) identify and define the problem areas in Naval Air Reserve training; b) order the problem areas in terms of the importance to Naval Air Reserve Training objectives; c) recommend practical steps which will improve the reserve training program. 1) problem areas were defined in operational items and in relation to other problems. Each area is followed by action recommendations specified in terms of goals, steps for implementation and anticipated end results. It was recommended that: a) the function of the Naval Air Reserve within national defense policy be reviewed in order to clarify the goals and objectives of the NAR training program; b) attention be devoted to the selection and training of instructors; c) training syllabi be standardized; d) there be improved implementation of the system for establishing the requirements for and the utilization of training devices.

3439

Daniels, R.E. & Konhauser, J.D.E. A PROCEDURE FOR RATING COMMUNICATION SYSTEM STRUCTURES. Contract DA 49 025 SC 150, DA Proj. DA 3 99 01 001, SC Proj. 102 E, SC Tech. Requirements SCEL 2101 E, Haller, Raymond & Brown, Inc., Proj. 57, Jan 1956, 78pp. Haller, Raymond and Brown, Inc., State College, Penn.

A procedure is presented for rating various net structures or connectivity patterns encountered in a communication system. It is gross enough to allow application when traffic load and other more detailed information about the using organization is not available, but it has sufficient flexibility to allow use of such information when it is available. An over-all rating is defined in terms of four sub-ratings which, in turn, are intended to score a net structure with respect to directness of paths of communication, invulnerability of the net to failure of individual paths, cost--in a generalized sense--of installation and maintenance of the net, and the message handling capacity of the net. An example illustrating the procedure and its flexibility is included. In addition the procedure is applied to a portion of an infantry Division of the New Army of the Field and to a Rifle Company.

3440

Kornfield, A.T. A SENSITIVE WEIGHING DEVICE. Contract AF 18(600)-96, Proj. 7155, WADC Tech. Note 55-516, July 1955, 15pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Saint Louis University).

3440

This is a report of research conducted to develop a method for continuous weight loss determination in human subjects under thermal stress. Following a survey of available physical components, an electric weighing scale was developed. This scale with a capacity of 100 kg and sensitivity below 0.1 gm utilizes as its principle unit a weighing transducer. Other component parts are described in detail and potential applications of the device in studies of thermal stress are outlined and discussed.

I. R. 3

3441

Miles, S. SOME EFFECTS OF INJECTION OF ATROPINE SULPHATE IN HEALTHY YOUNG MEN. Porton Tech. Paper 514, Oct. 1955, 37pp. Chemical Defence Experimental Establishment, Directorate of Chemical Defence Research and Development, Ministry of Supply, London, England.

3441

To investigate the effects of atropine sulphate on various systems of the body, healthy young subjects received injections of the drug and were evaluated for change in the following physiological processes and functions: vision (near and distance), pupil size, etc.; metabolic activity and work performance; pulse rate, blood pressure, oxygen intake, etc.; effect of atropine and change of posture on circulation; and other processes of this sort. The results are discussed in terms of the specific effects of atropine upon the central nervous system and the physiological processes outlined above.

T. G. I. R 32

3453

Brown, F.R. A STUDY OF THE REQUIREMENTS FOR LETTERS, NUMBERS, AND MARKINGS TO BE USED ON TRANS-ILLUMINATED AIRCRAFT CONTROL PANELS. PART 4. LEGIBILITY OF UNIFORM STROKE CAPITAL LETTERS AS INFLUENCED BY SIZE AND HEIGHT TO WIDTH RATIO AND AS COMPARED TO GERMANIC STYLES. REPORTED NOV 11 1953, 28pp. US Army Medical Research and Development Command, Philadelphia, Penn.

3453

To determine the effect of variations in size and in height-to-width ratio upon the legibility of capital block letters as they would be used on aircraft cockpit plastic lighting plates, a series of experiments was performed. In addition, a font of Germanic style capital letters characterized by variable height-to-width ratios, serifs, and monospaced stroke-widths was used. Tests with letters differing in these four characteristics were conducted using two exposure durations and five levels of red trans-illumination which simulated the conditions of night viewing of the plastic lighting plates. Daylight illumination and one exposure duration were used for the same letter variables. Recommendations were made on the basis of the results for letters to be used on plastic lighting plates. T. G. R 25

3454

Continental Army Command. TEST OF HELMET, COMBAT VEHICLE CREWMAN. Proj. 1737, DA Proj. 7-80-05-001, Dec. 1953, 7pp. Headquarters, COMARC, Fort Monroe, Va.

3454

This report presents the results of an experimental evaluation of the Combat Vehicle Crewman Model T-56-5 helmet. The following tests of this helmet were conducted: service test, technical inspection, test of helmet characteristics, comfort, functional suitability, and component durability. The results are presented and discussed in terms of the various deficiencies found to exist in the design of this helmet. Illustrations of the helmet are included in this report along with specific recommendations for improvement of its design. T. I. R 14

3455

Cohen, I.K., Cottle, M.C., Fortuna, A.L. & Ottman, D.K. DEVELOPING A GROUND TRAINING COURSE IN AIRCREW OPERATIONS PROCEDURE. PROGRESS REPORT. PERIOD: 1 JANUARY TO 30 JUNE 1953. HRCR Memo. 37, July 1953, 71pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C.

3455

This is a progress report on the development of a method for training B-29 crews to work together effectively. A course in "crew operations procedure," involving group solutions of typical problems, is recommended. Methods for obtaining critical incidents about which to build such a course are proposed, including interviews and questionnaires. Sample interviews and questionnaire items are given. I.

3456

McCormick, E.J. et al. A STUDY OF JOB INTER-RELATIONSHIPS. Air Force Res. and Developm. Proj. 200-003-0010, Aug. 1954, 29pp. Occupational Research Center, Psychology Department, Purdue University.

3456

This report represents a summary of a series of studies on the development of check lists of work and knowledge components of jobs, the assessment of their utility in defining job interrelationships, and the employment of suitable check lists to determine patterns of job interrelationships among some 4,000 jobs. The check lists are briefly described along with the statistical analysis of job variables. The results of an analysis of clerical and metal-working jobs are presented in terms of the relative consistency among different checklists. The results of the analysis of 44 variables in 4,000 jobs are presented and discussed with regard to their pattern of distribution and significance as job requirement factors. T. R 23

3458

USAF. Northeastern University. VISUAL MESSAGE PRESENTATION. Contract AF 19(122) 7, Quort. Progress Rep. 15, Feb. 1953, 48pp. USAF. Northeastern University, Boston, Mass.

Included herein are reports of progress made in the various topics under active study during the period from October 15, 1952 to January 15, 1953. General consideration is given to certain methods for obtaining speech compression. One approach considered involves the coding of certain phonemes and the reduction of waveform redundancy for the rest. Treated specifically are: a) the segmentation of phonemes, b) the extraction of the pitch period, c) the use of discriminatory analysis in vowel identification, d) the linguistic assessment of the phoneme-identification approach, and e) the portrayal of the joint distribution of original speech and its delayed version. Also given are descriptions of certain apparatuses for use in speech analysis. These include: a) equipment for observing speech waveforms, b) a variable-delay speech recording and playback system, and c) R.C. tilting and delay networks. R 21

3459

Carroll, J.E. & Schohan, B. CONSTRUCTION OF COMPREHENSIVE ACHIEVEMENT EXAMINATIONS FOR NAVY OFFICER CANDIDATE PROGRAMS. Proj. NR 154 138, Nov. 1953, 129pp. American Institute for Research, Pittsburgh, Penn.

3459

The purpose of the project reported here was to construct a new series of examination materials for measuring end-of-course achievement of students in naval officer candidate programs. Rather than mere factual information, test items were to measure "integrated knowledge" (problem-solving and decision-making ability). The examinations were administered as year-end tests to NROTC students in May 1953 and to various classes of officer candidates at the U.S. Naval School (Officer Candidate), Newport, Rhode Island. Statistical analyses, designed to evaluate the examinations given to the latter group are presented and discussed in detail. T. G.

3460

Mowrer, O.H. (Chm.). SYMPOSIUM ON MOTIVATION, 5-6 MARCH 1953. HF HML 201/1, 114pp. US Research & Development Board, Dept. of Defense, Washington, D.C.

Some titles presented at this Symposium were: "Research in Combat Areas"; "Problem of Motivation at the Recruit Level"; "Motivational Problems in Air Force Flight Training"; "Preliminary Investigation of Delinquency in the Army"; "Development of a Standardized Projective Test of Achievement Motivation"; "Problems and Techniques in the Evaluation of Motivation Among Naval Aviation Cadets"; "Contributions of Studies with Paratroopers to Theoretical Formulations of Fear and Stress"; "Motivational Factors in the Job Performance of Aviation Mechanics"; "Motivation, Perception, and Action"; "Theoretical Basis of Projective Measures of Fear"; "The Active Duty Intentions of Some ARDC Lieutenants (AFROTC) Related to Several Service-Associated Variables"; and "The Sources of Worker Motivation." T. G. R 15

3442

Gibson, J.J. PROPOSALS FOR A THEORY OF PICTORIAL PERCEPTION. Contract AF 33(035) 22804. HUMAN MEMO. REP. 35, May 1953; 18pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C. (Cornell University, Ithaca, N.Y.).

This report represents a first attempt to develop a systematic theory of pictorial perception, i.e. to analyze how a picture conveys information. Accordingly, the discussion goes as follows: words, pictures and models as substitutes for realities; the definition of the term "surrogate"; the production of surrogates; the consequences of surrogate-making for the perceiver and producer; conventional and non-conventional surrogates; the fidelity of a model; the fidelity and scope of a picture; space in pictures; the unique viewing-point for a picture; the approximation of pictorial perception to direct perception; the fidelity of chirographic pictures; and the advantages and disadvantages of realism in pictures.

(MEIAS)

R12

3443

Peterson, L.S. USE OF GRAPHS IN AIR FORCE TEACHING MATERIALS. Contracts AF 18 600 321 & AF 18 600 335, Res. Memo. 14, Aug. 1953. 47pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (University of Illinois, Urbana, Ill.).

The uses and limitations of graphs in instructional materials are discussed. Solutions to common graph problems are covered under the following headings: a) simple comparisons, b) a whole and its parts, c) multiple gain comparisons, d) loss and gain comparisons, e) frequency, and f) narrative charts. A summary of suggestions for constructing graphs is provided. This summary covers: a) titles, b) legends, c) labels, d) scales and scale captions, e) width spacing and arrangement of bars, f) lines, g) pictographs, and h) textures.

(MEIAS)

3445

Kinkle, G.A. & Wolff, J.F. "RESPONSE GUIDANCE" AS A FACTOR IN THE VALUE OF ACTIVE PARTICIPATION IN TRAINING FILM INSTRUCTION. Contract AF 33(038) 13678, HUMAN MEMO. 36, March 1953, 18pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C. (Yale University, New Haven, Conn.).

3445

In this experiment, two alternative "participation" procedures were tested as adjuncts to film instruction. In one procedure, the "participation" (practice) materials included hints or guidance clues to assist trainees in obtaining the correct answer. The other procedure was identical except for the absence of these clues. Approximately 660 men were shown a film on the use of the slide-rule—half used the guided practice and half the unguided practice method. A test of 25 items was given to all men immediately following the film. Test data were analyzed for effect of the two practice procedures. The effect of difficulty of material and level of intelligence on the results was also studied.

T. G. I.

3450

Coonan, T.J., & Klemmer, E.T. READING LINEAR SCALES: THE CONTRIBUTION OF EYE MOVEMENTS TO ACCURACY. AFRCR-TN-56-8, Oct. 1956, 19pp. Operational Applications Laboratory, AFRCR, Bolling AFB, Washington, D.C.

3450

To study the relation of eye movements to accuracy in reading scales, four practiced subjects were tested in two scale reading tasks. One task allowed only a single eye fixation; the second allowed two or more fixations. Exposure duration was varied from 0.10 to 1.00 second in both tasks. A photographic record of eye-movements during the task was taken and scale-reading errors recorded. The film records were analyzed in terms of whether or not an eye movement occurred, time of occurrence, and scale position fixated. Percent error scores were analyzed as a function of exposure time for both eye movement and single fixation tests.

G. R 2

3446

Goodman, S.L. WHAT MAKES FOR READABLE WRITING AND READING SUCCESS. Contract AF 18(600) 335, Res. Memo. 10, July 1953, 35pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (Division of Communications, University of Illinois, Urbana, Ill.).

3446

This report is concerned with two questions: what printed material best succeeds in carrying knowledge to man? and, what abilities, traits, etc., does man need to succeed in reading various materials? Research evidence is presented on one facet of these two problems: how readable writing relates to reading success. The various sections, each accompanied by a bibliography, are: 1) How can we measure reading success? 2) What do we know about reading success in adults? 3) What makes for readable writing? 4) How does readable writing relate to reading success? and 5) How can writing be evaluated so as to improve reading success?

R 6

3449

Dunlap & Associates, Inc. MATHEMATICAL MODELS OF HUMAN BEHAVIOR: PROCEEDINGS OF A SYMPOSIUM. Contract Da 49 007 MD 239, 1955, 103pp. Dunlap & Associates, Inc., Stamford, Conn.

3449

This article presents the proceedings of a symposium on the mathematical models of human behavior. The following topics are included among the various papers: an experiment on group preference, the application of mathematical models to accident processes, the prediction of gambling decisions, norms and habits of decision making under certainty, and other similar topics.

T. G. I. R many

3452 Trumbull, R. ANALYSIS OF BASIC FACTORS CONSTITUTING NECESSARY MATHEMATICAL PROFICIENCY REQUIRED FOR SUCCESS IN NAVAL AVIATION: REPORT IV. DIVISION, Proj. NM 001 058.20.04, April 1953, 21pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

The objective of this study was the development of a series of test items of division having a consistent range of difficulty. Such items were selected from a test series on the basis of demonstrated difficulty established through a simple answer error count. Also, other items were constructed on the basis of the processes involved in their solution after previous testing had established the relative difficulty of these processes. This study of NavCad competence is the fourth in a series evaluating their performance in basic operation of arithmetic.

R 12

3462
Fritz, M.F., Humphrey, J.E., Greenlee, J.A. & Madison, R.L. SURVEY OF TELEVISION UTILIZATION IN ARMY TRAINING. FINAL REPORT. Contract 530(01), SDC Rep. 530 01 1, Dec. 1952, 145pp. USAF Special Services Center, Fort Washington N.Y. (Iowa State College, Ames, Iowa).

3462
To explore the question of whether television could be advantageously integrated with Army training programs, an extensive survey of existing television potentialities was made. Observations of existing procedures at Army television stations and at educational stations were made. Experimental literature and television literature were examined. A criteria check list was devised to determine what Army subjects could be televised and validation thereof accomplished. Other areas studied included television training aids, equipment, operational techniques, selection and training of instructors, and kinescope recordings. Recommendations were included.
T. R 98

3463
Webb, Wilse S., & Nolan, C.Y. A STUDY OF THE ACTIVITIES OF AVIATION MACHINIST'S MATES IN FLEET ACTIVITIES. Contract Nonr-816(02). Tech. Rep. 1. 1953. 94pp. ONR, Washington Univ., St. Louis, Mo.

3463
This study attempts to develop a method of describing the actual job activities of Aviation Machinist Mates in the fleet in order that the Aviation Machinist Mates curriculum may be evaluated in terms of these activities. A questionnaire designed to analyze activities was constructed and administered to 216 Aviation Machinist Mate Trainees and to trainees in other schools. The results are discussed in terms of frequency of certain activities, the population's attitude toward the activities, and a correlation between trainees and experienced Machinist Mates with regard to description of job activities.
T.

3464
Yoder, P.R., Jr. AIMING POST REFLECTORS T1 AND T2; INSTRUMENT LIGHT PROJECTOR T16; DESCRIPTION OF MATERIEL AND ANALYSIS OF FACTORS AFFECTING FIELD USE THEREOF. Ordnance Proj. TR1-1055C, DA Proj. 513-01-006, Rep. M55-1-1, Jan. 1955, 8pp. Fire Control Instrument Center, Frankford Arsenal, Philadelphia, Penn.

3464
This report presents a detailed description of the following equipments designed for use in an aiming system for night firing with field artillery weapons: the Aiming Post Reflectors T 1 (no tint) and T 2 (red tint), and the Instrument Light Projector T 16. Each of these items is discussed in terms of the factors affecting their field utilization, their optimal efficiency, and their potential modification to increase efficiency. Abundant illustrations and diagrams are presented.
G. I. R 1

3465
Mentzer, E.G. TESTS BY THE ANALYSIS OF VARIANCE. WADC Tech. Rep. 53 23, Jan. 1953, 48pp. WADC, Flight Research Lab., Wright-Patterson AFB, Ohio.

The Analysis of Variance procedure is described, and its possible applications and usefulness are discussed. The various statistical models and the tests by Analysis of Variance are explained. Test schemes and alternate test schemes are given (in Section VI) for all possible models of the two-factor, three-factor, and four-factor cases.

3467
Bolt, R.H., Beranek, L.L. & Newman, R.B. HANDBOOK OF ACOUSTIC NOISE CONTROL. VOLUME I. PHYSICAL ACOUSTICS. Contract AF 33(038) 20572, Phase II, Suppl. Agree. 1, CO 2, WADC TR-52 204, Dec. 1952, 397pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Bolt Beranek and Newman, Inc., Cambridge, Mass.).

3467
This handbook, comprising two volumes, is intended to provide an overall view of the noise control problem. Noise is here taken to mean only acoustic noise. This first volume is concerned with noise stimuli, their generation and control. The introductory chapter is concerned with general aspects of noise control, terminology, and measurements. Major sections are devoted to 1) noise source characteristics--specification of, aircraft engine noise, fluid flow devices, industrial machine noise, and miscellaneous environmental noise; and 2) methods of noise control.
T. G. I. R 22

3468
Hertman, A.E., Randall, W.C. & Peiss, C.N. THE EFFECTS OF AMBIENT TEMPERATURE AND AIR HUMIDITY ON THE REGIONAL RATES OF SWEATING. THE ELEVENTH OF A SERIES OF REPORTS ON STUDIES ON CHANGING HEAT LOSSES. Contract AF 18(600) 96, Tech. Rep. 6680, Part II, Jan. 1953, 69pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (St. Louis University, St. Louis, Mo.).

3468
To determine the effects of ambient temperature and air humidity (Pa) on sweating responses, evaporation from skin surface and thermal balance, four resting, nude, male Ss were exposed to the following environmental conditions: 1) "varied stress" in which operative temperature (Ta) rose at a rate of 0.1 degree C per minute from an initial level of 26-33 degrees C to 41 degrees C and Pa rose to high or moderate levels; and 2) "constant stress" in which Ta (39-42 degrees C) and Pa (high or low) were pre-set to cause heavy sweating. During experimental periods of 2 to 3 hours, Ss rested in a chamber on-screen nets allowing free circulation of air and evaporation. Regional sweating rates were obtained from 20 body surface areas and total sweat output was estimated. Recommendations for future research were made. T. G. I. R 13

3470
Morse, P.M. MIT PROJECT ON FUNDAMENTAL INVESTIGATIONS IN METHODS OF OPERATIONS RESEARCH. Contract DA-19-020-ORD-2684, DA Proj. 599-01-004, Ordnance R & D Proj. TB-0001, OCH Proj. 968, MIT Proj. DIC 7125, Interim Tech. Rep. 2, April 1, 1954 through Nov. 30, 1954, 37pp. MIT.

3470
This is an interim report of the MIT project on fundamental investigations in methods of operations research. The research program is described in terms of the active and completed projects. Included are the following: equipment failure and maintenance, development of waiting line theory and computational techniques, water use in a hydroelectric system, etc. A list of operations research seminar topics is presented.
T.

3471
Ades, H.W., Graybiel, A., Morrill, S.W., Tolhurst, G.C., & Niven, J.I. NYSTAGMUS ELICITED BY HIGH INTENSITY SOUND. ONR Proj. Designation NONR-1553, Joint Proj. NM 13 01 99, Subtask 2, Rep. 6, Feb. 1957, 21pp. US Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3471
In order to study some of the extra-auditory effects of loud noise deaf subjects are stimulated by high intensity sound, both pure tone of several frequencies (100-3000 cps) and wide band noise. In those showing positive response to vestibular stimulation in one or more standard tests, nystagmus was a regular consequence when the noise was of a sufficiently high intensity. Distinct and apparent movement in the visual field were in some cases regular concomitants of nystagmus, in others, less consistent.
G. R 6

3473

Kidd, J.S., & Alluisi, E.A. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL. Contract AF 33(616)-3612, Proj. 7132, R.F. Proj. 690, Rep. 4, April 1957, 52pp. Research Foundation, Ohio State University.

3480

Bray, C.W. (Dir.). RESEARCH PLANNING CONFERENCE ON FLEXIBLE GUNNERY TRAINING, 30 NOVEMBER - 2 DECEMBER 1950, LOWRY AIR FORCE BASE, DENVER, COLORADO. Conference Rep. 51 1, 57pp. ~~USAF Human Engineering Research Center, Lackland AFB, Tex~~

3473

This is a report of research conducted at the Wright Air Development Center on the human engineering aspects of air traffic control (ATC). Included are descriptions of operational studies of various existing ATC systems, the results of systems research on simulated ATC operations, studies on the role of such factors as lighting, visibility, etc., theoretical formulations concerning research methods, statistics, mathematical models, etc., and a description of equipment used in the study and simulation of ATC systems. R 509

3490

This is the report of a conference having the following purposes: 1) to answer four questions raised by Headquarters USAF on flexible gunnery training, 2) to familiarize HRC personnel with the current flexible gunnery training program, and 3) to review psychological research on the flexible gunner. Some details are given of research on synthetic trainers, in airborne training, and on selection of flexible gunners. Appendices include course outlines and training programs. T.

3474

Lambert, E.H., Wood, E.H., & Baltes, E.J. MAN'S ABILITY TO WITHSTAND TRANSVERSE ACCELERATION WHEN IN THE SITTING POSITION. N601 199, Rep. No. 418, Mar. 1945, 3pp. National Research Council, Committee on Medical Research, Office of Scientific Research and Development. (Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.)

5 subjects in the sitting position have been exposed to transverse acceleration in the dorsal-ventral direction of up to and including 10 g for 3 to 10 secs. No residual harmful effects were observed in any of the subjects. During the period of exposure the pulse rate decreased and the blood content of the ear increased in all subjects in whom the head was not supported at a level appreciably above that of the trunk. Premature systoles occurred during part of the exposures in 2 subjects. All subjects noted some feeling of dyspnea at accelerations above 8 g. Distracting epigastric pain occurred in 2 subjects. This pain was decreased by supporting the hips and shoulders above the level of the cockpit floor. Recommendations are listed which should be considered if it is proposed to expose pilots in the sitting position to high transverse accelerations.

3475

Miles, W.R. A MICRO-RECORDER FOR MEASURING SKIN TEMPERATURE AND SWEATING IN AIRPLANE PILOTS. Nov. 1943, 43pp. Div. of Research, US Civil Aeronautics Administration, Washington, D.C. (Yale University School of Medicine, New Haven, Conn.).

The details for the construction of the C.A.A.-N.R.C. Micro-Recorder, its calibration and the technique of reading the records are described and discussed in this report. This instrument is designed to measure emotional responses (temperature and humidity) on exposed areas of the skin. A small watch movement is employed to drive a recording disc capable of taking records over a period of twelve hours. A temperature unit and a humidity unit with small writing levers are mounted on the inside of the instrument at a position as close as possible to the front. By means of appropriate openings in the front plate of the watch case, the sensitive elements are directly exposed to the temperature and humidity 1 cm. from the skin, while the entire unit is mounted on a ring of porous rubber sponge material. R 2

3476

Bray, C.W. FINAL REPORT AND BIBLIOGRAPHY OF THE APPLIED PSYCHOLOGY PANEL, NDRC. N601 199, OSD Rep. 6668, June 1946, 66pp. National Defense Research Committee, Applied Psychology Panel, Washington, D.C.

This bibliography summarizes the work of the Applied Psychology Panel, NDRC, from 1942 through 1946 and presents material on selection, classification, and training of service personnel as well as human capacities in relation to the design and operation of military equipment. 513 references are listed. (HEIAS). R 513

3479

Voss, H.A. & Wickens, D.D. MEMORANDUM ON A COMPARISON OF FREE AND STADIAMETRIC ESTIMATION OF OPENING RANGE. Contract OENSR 700, Proj. N 105, Memo. 29, OSD Rep. 6114, Oct. 1945, 26pp. US Office of Scientific Research & Development, Washington, D.C. (University of Pennsylvania, Philadelphia, Penn.).

3481

Birmingham, H.P., Householder, A.S., Kappauf, W.E. & Taylor, F.V. CHECK SIGHT SCORING METHODS. Contract CENSR 815, Proj. N 111, Rep. 1, OSD Rep. 4525, Jan. 1945, 12pp. US Office of Scientific Research & Development, Washington, D.C. (Brown University, Providence, R.I.)

3479

To compare ability of the 20 millimeter gunner to estimate opening range using the reticle of the Gun Sight Mark 14 with that of the range setter using unaided vision, 183 enlisted men were divided into two groups (gunners and range setters) and given training in range estimation on the firing line over a period of three days. They were then trained and tested in estimating the opening range of 1700 yards on both torpedo and medium altitude bombing runs. Differences in range estimations between the two groups were analyzed for the various conditions of the experiment. T. G.

3481

An analysis is made of the reliability and accuracy of two procedures for check sight scoring in a situation where one man tracks in both train and elevation. Both procedures involve measuring the percent of time that the tracker keeps the target within a defined scoring circle; one is a continuous scoring based on stop-clock scoring, the other is a sampling procedure based on spaced observations and a count. Comparative tests with four laboratory people acting as scorers and a larger scale test with 45 enlisted men as scorers were made. An outline for a recommended check sight scoring procedure is given. T. G. R 2

3482

Adams, J.A. STUDY OF FACTORS DETERMINING INDIVIDUAL DIFFERENCES IN SUSCEPTIBILITY TO NEGATIVE TRANSFER EFFECTS. Proj. 21 09 002, March 1955, 3pp. State University of Iowa, Iowa City, Iowa.

3452

This is a short note stating the objectives and describing the methods of Lewis' studies of transfer in motor learning. Included are short descriptions of the Complex Coordination Test (Machburn Apparatus), the Two-Hand Coordination Test, and two versions of the Turret Pursuit Apparatus.

3483

Deese, J., Lazarus, R. & Strange, J. STUDY OF THE EFFECTS OF STRESS UPON THE LEARNING AND PERFORMANCE OF PERCEPTUAL-MOTOR TASKS (21 09 004). Co. 1955, 5pp. Johns Hopkins University, Baltimore, Md.

3483

This paper describes the background, the experimental design, and the treatment of an investigation of the effects of stress upon the learning and performance of a psychomotor task in different individuals. Fifty trials on a simple perceptual-motor task (Rotary Pursuit Test with divided attention) were administered to 280 Air Force basic trainees under five different conditions of failure stress. The performance scores are to be studied in relation to findings from the Morshach test as well as to learning.

3485

Sidorsky, R.C. & Newton, J.M. SHIP CONTROL V. THE EFFECTS OF MOTION AND NUMBER OF SURFACES ON DEPTH CONTROL WITH A CONTACT ANALOG DISPLAY. Contract NMR 2512(00), Proj. SUSIC, Electric Boat TR SPD 59 010, P59 012, Feb. 1959, 9pp. Electric Boat Div., General Dynamics Corporation, Groton, Conn.

3485

To investigate two design characteristics (the use of one versus two surfaces and effect of displaying forward motion) of the Contact Analog (CA) display in submarines, five officers controlled a simulator which incorporated a CA display and a single joystick. They were required to make 200-foot depth changes under the four different display conditions. Three performance measures (depth error at 180 seconds, greatest depth error after 60 seconds, and time within plus or minus 30 feet of the ordered depth) were studied by variance analysis for effect of displays, motion, direction of depth change, range and subjects.
T. I. R 7

3486

Gagne, R.W. EXPERIMENT ON TRANSFER OF TRAINING BETWEEN TASKS DIFFERING IN PRECISION OF MOVEMENT. March 1955, 3pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

3486

This is a brief description of two experiments (using 240 and 144 basic airmen as Ss) in transfer of training between tasks requiring different degrees of precision of movement. The task was a modified rudder control apparatus, and precision was varied by varying target width. Numerical results are not reported.

3488

Nunex, R.V., & Seidel, R.J. PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF GUN BLAST WITH SPECIAL REFERENCE TO RECOILLESS RIFLES. Proj. DA 5502-09-010, Rep. R-1403, HE Rep. 18, Aug. 1957, 26pp. Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Penn.

3488

This report reviews the literature on general effects of gun blast which supplements a previous review (1955). Particular emphasis is given to recoilless rifles, although the information presented would pertain to all high explosive weapons engendering similar blast pressures at operator positions. Mean peak pressure, physiological effects, immediate cause of death, and lethal limits are discussed. Effects of blast on psychomotor efficiency and blast protection for the body and the ear are considered. Recommendations for further inquiries are included.
T. R 29

3490

Reynolds, J.B. EXPLORATORY STUDIES WITH VARIOUS FORMS OF PSYCHOMOTOR TASKS. Proj. 21-09-004, March 1955, 3pp. HRRQ, Perceptual and Motor Skills Research Laboratory.

3490

This paper reports briefly on a method for studying the components of motor skills by examining certain psychomotor apparatus tests that have been shown to have validity for selection of Air Force specialists. Preliminary results from studies of two-hand coordination tasks are discussed along with modifications of, or new pieces of, apparatus for testing the components. The practicability of the method is discussed.

3491

Reynolds, J.B. THE NATURE OF DIFFERENCES IN PERFORMANCE BETWEEN GROUPS TRAINED WITH DIFFERENT DEGREES OF SPACING BETWEEN TRIALS. Proj. 21 09 003, March 1955, 2pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

3491

This is a brief description of some experiments on the effects of different degrees of spacing between trials on the acquisition of complex motor skills. No quantitative data are reported.

3492

Vanderplas, J.M. A COMPARISON OF FOUR METHODS OF MEASUREMENT OF SHAPE DISCRIMINATION. Proj. 21 09 001, March 1955, 4pp. USAF Human Resources Research Center, Lackland AFB, Tex.

3492

To determine what differences, if any, appear in the results of three methods of measuring shape discrimination, a standard set of stimuli were prepared (one standard and five comparison shapes of varying degrees of similarity). The methods were varied in manner of stimulus presentation and response data collection. Response data are analyzed and compared for the various methods. Discussion is in terms of development of a criterion method for such studies.
G.

3495

Kappauf, W.E. NOTES ON THE DESIRED CHARACTERISTICS OF TRAINERS. Proj. N 111, Memo. 7, Jan. 1945, 8pp. Applied Psychology Panel, NDRC, Washington, D.C.

3495

This is a discussion of desired characteristics of trainers from the point of view of "... what the man is to learn," and "... the training conditions which foster most efficient learning." Discussion includes the following topics: nature and types of trainers, transfer, validity, avoidance of "secondary cues," practice, knowledge of results, guidance, motivation, and design recommendations.

3496

Kappauf, W.E. NOTES ON THE DESIGN OF PHOTOTUBE SCORING DEVICES FOR TRACKING TRAINERS. Contract OEMSR 815, Proj. N 111, Memo. 9, May 1945, 6pp. Applied Psychology Panel, NDRC, Washington, D.C.

3496

This is a discussion of the feasibility and requirements for the design of phototube scoring devices for tracking trainers. Equations for computing optimum tube aperture and target radii are formulated, and the effects of loss of sensitivity through cell degeneration are computed.
T.

3497

Kappauf, W.E. STUDIES OF THE RELIABILITY OF THE SCORING SYSTEM OF THE GUNNERY TRAINER MARK 5. Contract OEMSR 815, Proj. N 111, Memo. 12, Aug. 1945, 14pp. Applied Psychology Panel, NDRC, Washington, D.C.

3497

This report describes some studies of the reliability of the scoring system of the Gunnery Trainer Mark 5 and proposes corrections for the defects. Sample data on three-five Ss are reported, (percent hits per run). A proposed set of instructions for use of the trainer is appended.
G. I. R few

3498

Fry, C. A., Bridgman, C. S., & Allen, M. J. THE PERFORMANCE OF CYCLOPEDIA ON EYE AND HEAD POSITIONS. March-1959. Aug. 1963. 3499. ONI, Report to the National Defense Research Committee.

3498

To study the dependence of cyclophoria on various positions of the eyes in the orbits, with respect to each other, and on positioning of the head, a series of measurements were made for a variety of conditions of stimulation of the motor mechanism of the eye, including right and left versions, convergence and divergence, elevation and depression, and accommodation. The results are presented as averages of four or five separate settings. A synoptometer, haploscope, and head position instrument were used. An examination of the data is made in terms of Listing's law and applications made to design and use of height finder and range finding. G.I.

3499

Kappert, M.E. SUMMARY OF RESEARCH ON PSYCHOLOGICAL FACTORS IN THE OPERATION OF ANTIAIRCRAFT LEAD COMPUTING DEVICES AND DIRECTORS. FINAL REPORT. Contract ONR 615, Proj. N 111, Rep. 5, OSD Rep. 5425, Sept. 1945, 12pp. Scientific Preliminary Paper, NRC, Washington, D.C.

3499

This is a summary of the work accomplished under a project on psychological problems in operation of anti-aircraft lead computing sights and directors. In addition to an historical review of the project, a brief description is given of various activities including: preparation of operating procedures for director systems, operator-oriented analysis of directors, investigation of the reliability of trainers, research on tracking training, and research on the accuracy of unaided aerial target range estimation. H 25

3500

Kohl, Jessie M. REPORT OF SOUND CONFERENCE. 14-15 JUNE 1945. 146pp. NSA Medical Research Lab., New London Submarine Base, Conn.

3500

This is a report of a conference on sound which discussed such general topics as: selection of underwater sonar operators, methods of testing auditory acuity and standardization of military pure-tone audiometry. The results of relevant research studies are presented in detail. T. G. I. R 5

3502

Lambert, E.H. COMPARISON OF THE PROTECTIVE VALUE OF AN ANTI-BLACKOUT SUIT ON SUBJECTS IN AN A-24 AIRPLANE AND ON THE MAYO CENTRIFUGE. Contract W(33-033) ac 9166, Rep. 487, Oct., 1945, 9 pp. National Research Council, Office of Scientific Research and Development, Committee on Medical Research, Committee on Aviation Medicine.

3502

This study assesses the protective value of the G-4 (Z-1) anti-blackout suit against the effects of acceleration on passengers in an A-24 airplane and on the Mayo centrifuge. Thirteen subjects provided measures of g-tolerance under various g-line patterns determined by visual decrement, blood content of the ear, and pulse rates. Results are statistically analyzed, and recommendations are made as to the protective value of the suits. F.T.

3503

Valentine, G.A. PRELIMINARY DESIGN STUDY - UPWARD EJECTION SEAT - SHORT RANGE AIRCRAFT. Contract AF 33(600)-30072, Sept. 1956, 438pp. Wright Air Development Center, AROC, Wright-Patterson AFB, Ohio. (Stanley Aviation Corp., Denver, Colo.).

3503

A study is made to define some of the problems involved in high-speed upward ejection of pilot from aircraft and to determine and evaluate as many feasible solutions to these problems as possible. Seven aspects of seat design are considered: automatic escape sequences, seat adjustment devices, restraint harness configurations, limb retention devices, thrust devices, guide rail configurations, and crash acceleration absorbers. Recommendations are made as to features to be incorporated in an emergency escape system for an 800-knot short-range aircraft. T. G. I. R 6

Berry, R.M., Brown, A.H., Head, L.C., Hafe, J.P., et al. A SYSTEM OF AUTOMATIC DEVICES FOR THE DETECTION AND RECORDING OF ERRORS IN A 105 MM HOWITZER BATTERY. Contract ONR 615, Proj. SRS 11, OSD Rep. 5313, July 1945, 14pp. Office of Scientific Research and Development, Washington, D.C. (Tufts University, Medford, Mass.).

The devices described here were designed and constructed for use in connection with a general investigation of psychological factors in the operation and design of field artillery sighting equipment. The system consists of a set of sound scribers by means of which the verbal commands are recorded on wax discs, and a set of remote (indicating) devices for scale settings on the range quadrant, scale settings on the panoramic telescope, and actual directions and elevations of the howitzer tubes. The sound recording apparatus and remote indicator dials were mounted on benches in an Ordnance Maintenance Truck and connected with various parts of the system through electric cables. (HEIAS)

3504

Silvestro, A.W., Kelly, J.B. & Courtney, D. HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS. FINAL REPORT. Contract FAA/BRD 89, Proj. P, Rep. 28, Aug. 1959, 85pp. Courtney and Company, Philadelphia, Penn.

3505

This is the third and final report of a project devoted to bringing human factors considerations to the design of airport traffic control quarters. The recommendations in all three reports represent a best approximation of the task requirements and needs of human controllers as both human beings and control specialists, and the applicable knowledge from prior human factors research. This report sets out in some detail certain elements of the over-all task: 1) console design, 2) the sit-stand chair, 3) panel layout, 4) floor covering, 5) acoustical treatment, 6) lighting, 7) color, 8) air conditioning, and 9) radiation safety and living facilities. Recommendations are supplemented with the necessary drawings.

3506

Searle, I.W. & Murry, K.L. THE RADAR NAVIGATION TRAINER. Proj. 506 006 0002, Ser. Note AC 52 5, May 1952, 15pp. Naval Research Establishment, Rockland AFB, Tex.

3506

This research note describes the details of design and construction of a radar navigation trainer for use in an experimental ground course to teach basic phases of radar navigation in preparation for training on more advanced types of radar. Radar motion pictures are the essential component of the trainer. Instructions for operation--range measurement, alignment, and steering--are given.

I.

3507

Sarch, A.H., Hoggerd, B.F., Seiden, M., Vineberg, R., et al. A BIBLIOGRAPHY OF HUMAN FACTORS IN RADAR OPERATION AND MAINTENANCE. Sept. 1953, 43pp. 1953, George Washington University.

3507

This bibliography was compiled as a source of reference information on radar needs and requirements from the point of view of human resources research. Psychological, military, and engineering literature are included. Major categories covered are: 1) reviews and bibliographies; 2) radar operator research - training and training aids, visual effects of radar operation, operating conditions, selection, proficiency measurements; 3) human engineering; 4) electronic maintenance; and 5) peripheral, basic and methodological.

B 431

3508

Fryer, D.H., Feinberg, M.R. & Tomlinson, R.M. A GUIDE FOR DETERMINING TRAINING AID AND DEVICE REQUIREMENTS. Contract N7002 38304, SOC Rep. 383 04 1, May 1952, 20pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry & Co., Inc., New York, N.Y.).

3508

This is a detailed description of the steps to be taken in determining the requirements for training aids and devices in a training program. There are three phases in the procedure: 1) Orientation of Personnel; 2) Data Collection (student interviews, instructor interviews, observer's checklist); 3) Data Analysis. Interview forms and checklist are appended.

I.

3509

Senders, J.W. & Cruzen, Marianne. TRACKING PERFORMANCE ON COMBINED COMPENSATORY AND PURSUIT TASKS. Contract W 33 038 AC 19816, RDO 694 17, WADC TR 52 39, Feb. 1952, 14pp. USAF Aero Medical Lab., Wright Patterson AFB, Ohio. (USAF Aero Medical Lab. & Antioch College).

3509

To investigate the functional relationship between performance and the nature of the tracking task, various combinations of pursuit and compensatory tracking were introduced into a one-dimensional visual tracking task. Each of five subjects performed 25 trials on each of five conditions: zero, 25, 50, 75, and 100 per cent pursuit components in the task. Accuracy of performance was scored as time-on-target and analyzed as a function of per cent of pursuit component. The data were also studied by analysis of variance techniques.

T. G. I. R 3

3511

Guerlac, H.E., Lipetz, B. & Williams, P.W. AN INTRODUCTION TO SCIENTIFIC METHODS--AN ANNOTATED BIBLIOGRAPHY. ca. 1954, 38pp. Cornell University, Ithaca, N.Y.

This is a selected list of references from the large literature pertaining to scientific method. The references are annotated and are divided into 4 main divisions: introductory materials, historical sources, material on the philosophy of science, and, finally, works on scientific method per se. (HEIAS)

R 190(approx.)

3513 McFarland, R.A. & Moxley, A.L. HUMAN FACTORS IN HIGHWAY TRANSPORT SAFETY. ca. 1954, 295pp. Harvard School of Public Health, Boston, Mass.

Reports on 258 collision accidents incurred during the operations of a large trucking company in one year were analyzed to ascertain the relative importance of, and interrelationships between, environmental factors, vehicle condition, and factors pertaining to the drivers in causing these accidents. This analysis was undertaken in order to make specific recommendations for accident prevention, based directly on the determined causes. Type of vehicle contact, i.e., rear end, sideswipe, right angle, backing, and fixed object collisions, are analyzed separately. It is clear from the analysis that factors pertaining to the driver were predominant in causing most of the accidents. Findings are summarized in the form of specific recommendations for driver procedure and driver supervision, and for preventive measures through vehicle design and environmental control. (HEIAS)

R 56

3514

Vaughan, J.A., MacLeod, A.R., & Iampietro, P.P. SOME PHYSIOLOGICAL RESPONSES OF MEN WEARING BODY ARMOR IN THE DESERT. Proj. 7-83-01-0040, Tech. Rep. EP-44, March 1957, 19pp. USA Quartermaster Research and Development Center, Natick, Mass.

3514

To compare the use of various models of body armor under summer desert conditions (Yuma, Arizona) and their effect on the heat stress of the active soldier, measurements of heart rate, sweat rate, and body temperature were made on 15 heat acclimatized men during moderate exercise. Three body coverage areas were compared with a control condition (standard uniform). Effective temperature (E. T.) was used as an index of environmental stress. The data were studied by analysis of variance techniques for differences due to amount of coverage and for tolerance levels.

T. G. I. R 13

3515

Berkowitz, L., & Levy, B.I. PRIDE IN GROUP PERFORMANCE AND GROUP-TASK MOTIVATION. J. ~~Person.~~ Soc. Psychol., 1956, 53(3), 300-306. (ARDC Proj. 7713, Res. Rep. AFPTC-TR-57-43, April 1957. Crew Research Lab., AFPTC, ARDC, Lackland AFB, Tex.).

3515

To test the relation between pride in group performance and task motivation, 25 groups (3 subjects each) were distributed among five conditions: four representing a factorial design in which sets of either favorable or unfavorable performance evaluations were directed to the group as a whole or to individual members; the fifth was a control with no evaluations. At the end of the first work period (on a simulated Air Defense task) the subject completed a "pride in group performance" attitude scale, then had a 15-minute break. An index of concern with the group task (or task motivation) was constructed from the frequency of observed task-oriented discussion during the "break". These data were analyzed for differences due to type of evaluation received.
T. R 8

3517
Stumpers, F.L. A BIBLIOGRAPHY OF INFORMATION THEORY (COMMUNICATION THEORY--CYBERNETICS). Signal-Corps Contract DA36 039 sc 100, Proj. 18 1022 0, DA Proj. 3 99 10 022, Jan. 1953, 46pp. Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.

This bibliography is concerned with information theory and communication theory and covers the topics of theory, transmission capacity, methodology, radar, sensory processes, television, and pulse modulation. (HEIAS)
R Approx 900

3518

USN Special Devices Center. EQUIPMENT STUDIES I OF THE TELEVISION STUDIO-LABORATORY. NAVEXOS P 479, April 1955, 26pp. USN Special Devices Center, Port Washington, N.Y.

3518

This is a description of the layout and equipment of a television studio-laboratory, established "...for the research and evaluation of television as a medium for rapid, mass training." Descriptions and photographs of video, audio, communication, and test equipment are included.
1.

3525

Slade, I.M. PROTECTION AGAINST RADIANT HEAT. Paper SM/A/2/52, Jan. 1952, 6pp. The British Iron & Steel Research Association, London, England.

3525

This paper discusses the problem of protecting steelworkers against intense radiant heat. Various types of protective clothing are reviewed and a preliminary investigation in the use of heat reflection from the outer surface of the clothing. Six samples of aluminum coated fabrics were tested for performance in reflecting heat rays and for the amount of heat transmitted. The most promising sample was further compared with asbestos and ordinary white overall material. A loose overall and apron were made from the experimental material and are undergoing tests in a steelworks. (See 4004)
G. R 3

3526

Coakley, J.D., Muchmore, S.C., & Dunlap, J.W., Jr. HUMAN ENGINEERING STUDY OF OPERATING TIMES FOR COLLECTION AND REDUCTION OF METEOROLOGICAL DATA. Contract DA-36-039-SC-64647, Proj. 3-99-01-022, Final Rep., April 1957, 33pp. USA Signal Corps Engineering Labs., Fort Monmouth, N.J. (Dunlap and Associates, Inc., Stamford, Conn.).

3526

This is a human engineering evaluation of a system in which meteorological data are reduced to ballistic information. The primary evaluative criterion employed is that of time, i.e., the total time required in the performance of the various functions essential to the basic task. Operator-tasks, sub-tasks, and sub-task elements were analyzed and given time evaluations. The results are presented and discussed in terms of their relative implications for work sequences, manpower-time relations, the effects of sequencing, etc. Possibilities for further system development are carefully outlined and discussed.
G.

3527
Finsinger, J.E. (Dir.). THE EFFECT OF ANOXIA ON THE CRITICAL FLICKER FREQUENCY IN PSYCHO-NEUROTIC PATIENTS AND NORMAL CONTROL SUBJECTS. Contract NSORI 76, Proj. XIV 05 684, Tech. Rep. 13, May 1950, 7pp. ONR. (Psychiatry Dept., University of Maryland Medical School, College Park, N.J.).

In a series of 5 psychoneurotic patients and 5 control Ss the threshold for flicker and for fusion was measured while breathing air and while breathing a mixture of 14% oxygen and 13% oxygen. The critical fusion frequency of the control Ss was consistently higher than that of the patients in each condition of testing. Patients showed a greater decline in the mean critical frequency in cycles per sec. while breathing 13% oxygen than did the control Ss. The tentative conclusion is that patients are more severely affected by the reduction in oxygen than the control Ss.
R 1

3528

Shands, H.C., Finesinger, J.E. PSYCHIATRIC ASPECTS OF FATIGUE. Contract NSori 76, Proj. XIV OS 664, Tech. Rep. 12, Nov. 1949, 14pp. ONR. (Harvard University Medical School, Dept. of Psychiatry and Mass. Gen. Hospital, Dept. of Psychiatry, Boston, Mass.)

This report covers an investigation of a series of well over 100 patients who complained of chronic fatigue in the absence of previous exertion or medical disease. It was found that these patients all had some type of neurosis, most prominently a neurosis associated with anxiety symptoms. The symptom of fatigue could be demonstrated to be related to acute or chronic emotional stress. The stressful situations included those commonly seen in psychiatric illness, specifically losses of important emotional relationships, pronounced changes in relationships (feelings of disappointment, rejection, guilt, etc.). The data support the hypothesis that a feeling of fatigue can be explained more satisfactorily as the conscious manifestation of a defensive inhibition of overt aggressive activity, rather than as the result of energy consumption in the past.

* 123

3531

Finesinger, J.E. THE EFFECT OF BREATHING LOW OXYGEN MIXTURES ON A BATTERY OF PSYCHOLOGICAL PERFORMANCE TESTS IN PSYCHONEUROTIC PATIENTS AND NORMAL CONTROLS. Contract NSori 76, Proj. XIV OS 664, Tech. Rep. 11, March 1949, 16pp. ONR. (Harvard University, Medical School, Dept. of Psychiatry, and Mass. Gen. Hospital, Dept. of Psychiatry, Boston, Mass.)

A battery of psychomotor tests was administered to 31 normal control subjects and 30 psychoneurotic patients, first, while breathing 21% oxygen (sea level) and, then, while breathing 10% oxygen (18,000 ft.). The total exposure to the reduced oxygen tension was about 20 minutes, the tests being given during the latter 10 minutes of this period. The average performance in both patients and control groups dropped in almost every instance despite the counteracting effect of practice. The amount of decrement was significant at the 5% level of confidence in two instances with the patients (the Stylus Test and the Speed of Tapping Test); while with the controls, the decrement was not statistically significant in any instance. However, when the two groups were compared directly with one another in regard to the amount of change at the 10% level of oxygen, it was found that there was no significant difference between them. Both groups were also very much alike in regard to the type, frequency, and severity of physical symptoms reported.

3532

Chase, W.P. DEVELOPMENT AND ANALYSIS OF A PROFICIENCY TEST FOR IDENTIFICATION OF ON-THE-JOB TRAINING NEEDS. Proj. 7709, Task 77156, Res. Rep. AFTRC-TN-57-28, March 1957, 40pp. Maintenance Lab., AFTRC, ARDC, Lowry AFB, Colo.

3532

To develop written proficiency tests for providing an objective means of identifying the specific training needs of individuals for K-System mechanics assigned to the Strategic Air Command, experienced mechanics and test technicians prepared an initial test outline in terms of division of knowledge into job areas. Tests were administered on trial basis to mechanics at several bases. Test results were analyzed and items reviewed with field engineers from the K-System manufacturer for items to be incorporated in an operational test. Scores from this form were studied in relation to other indices of mechanic proficiency. Another form was developed and organized into area tests. Results from both tests were analyzed to determine the best form for use.

T, R 1

3533

Sulzman, J.H., Cook, E.B. & Bartlett, N.R. THE VALIDITY AND RELIABILITY OF HETEROPHORIA SCORES YIELDED BY THREE COMMERCIAL OPTICAL DEVICES. J. appl. Psychol. 1948, 32, 56-62. (USN Medical Research Lab., New London Submarine Base, Conn.)

Using 100 Ss, 3 tests for heterophoria, the Maddox rod, the Screen-Maddox rod, and the Screen and Parallax Tests, were compared. No clear-cut basis for preferring any one instrument to the other was found. No one of the 3 offered sufficient reliability to warrant the use of a fine scale for lateral or vertical phoria when the test was administered only once. Scores obtained with these 3 tests did not correlate to a satisfying degree with scores on one standard clinical test. However, reliabilities at least as great as some clinical tests now accepted and in use were found. (HEIAS)

R 3

3534

Cook, E.B. & Wherry, R.J. A STATISTICAL EVALUATION OF PHYSICAL FITNESS TESTS. Res. Quart. Amer. Assoc. Hlth. phys. Educa., May 1950, 21, 94-111.

This study which was carried out at the Naval Submarine Base, New London, Connecticut, attempted to separate the similarities and dissimilarities underlying measurements derived from the following physical fitness tests: Behnke Step-up; Harvard Step-up; Schneider Index of Physical Fitness; and the hand dynamometer. Ss were 120 submarine enlisted candidates with an age range of 17-26 yrs; 2 groups of 6 Ss each were tested weekly during an intensive 3-day experimental period with strict regulation of their lives during this period. Statistical analysis of the data by correlational methods revealed a low correlation between the fitness tests (from -.284 to +.231). The data were further appraised by factor analysis with the following conclusions: a) There is a basic resting pulse rate which characterizes each individual and which tends to remain relatively constant during any given day with a low day-to-day stability. b) Pulse response to prolonged violent exercise is a basic physiological factor. c) Endurance time in seconds is a basic repeatable measure of individual differences. d) There is a basic resting blood pressure rate which characterizes each individual and influences his pulse reactions to exercise. e) The fitness tests varied widely in the choice of physiological functions which they actually measured, and also in the contribution of these items to final test scores. Recommendations are included. (HEIAS)

R 20

3535 Sulzman, J.H., Cook, E.B. & Bartlett, M.R. THE RELIABILITY OF VISUAL ACUITY SCORES YIELDED BY THREE COMMERCIAL DEVICES. J. appl. Psychol., June 1947, 31(3), 236-240. (Medical Research Dept., USN Submarine Base, New London, Conn.).

This note presents a summary of reliability data for the acuity scales of the Keystone "Telebinocular", the American Optical "Sight-Screener", and the Bausch and Lomb "Ortho-Rater". Also included is information on the correlation of these measures with acuity scores using standard Snellen-type letters. (HEIAS)

3536 Kreezer, G.L., Hill, J.H. & Manning, V. ATTENTION: A BIBLIOGRAPHY AND CLASSIFICATION OF THE PSYCHOLOGICAL LITERATURE. Contract AF 33(616) 135, R00 694 J1 & 694 47, WADC Tech. Rep. 54 455, Aug. 1954, 46pp. USAF Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio. (Washington University, St. Louis, Mo.).

The following bibliography of 543 titles is based on a survey of the psychological literature on attention extending up to July 1954. The date of the earliest reference included is 1873. A classification of titles in relation to 37 subtopics in the area of attention follows the bibliography. This survey was undertaken as a basis for associated experimental studies of methods for measuring attention-demand value and experiments to determine the attention-demand value of a representative series of different kinds of stimuli.

3537

Robinette, Joan C. A SELECTED BIBLIOGRAPHY CONCERNING PHYSIOLOGICAL FACTORS IN AEROMEDICAL RESEARCH AND DEVELOPMENT. April 1957, 42pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

3537

This is a bibliography of the project work conducted by the Physiology Branch of the Aero Medical Laboratory Directorate of Research, Wright Air Development Center. The principle topics include thermal physiology and protective garments; toxicity of materials and toxic chemicals measurement; respiratory physiology and high-altitude protective garments; aircraft visual requirements; and nutrition and metabolism. The period covered is from 1940 to 1957. Included are memoranda, technical reports, notes, and handbooks.

R 348

3539

Naval Air Material Center. CHRONOLOGICAL LIST OF REPORTS. r. March, 1955, 5pp. Naval Air Material Center, Naval Air Experimental Station, Aero Medical Equipment Laboratory, Human Engineering Branch, Philadelphia 12, Pa.

3539

This bibliography is a chronological listing of Naval Air Material Center reports concerned with problems of aircraft lighting and visual displays. The period covered is from July 1945 to February 1955.

R54.

3541

Dorman, P.J., & Lawton, R.W. THE EFFECT OF PARTIAL SUPINATION COMBINED WITH THE ANTI-G SUIT ON G TOLERANCE IN NAVY PILOTS. A PRELIMINARY REPORT. WADC-NA-5436, W3 301 100 300, Rep. 4, TED ADC-AR-6300, May 1956, 12pp. U.S.N. Aviation Medical Acceleration Laboratory, NALC, Johnsville, Penn.

3541

To study the protection afforded by a position of partial supination (65 degrees) and the Navy 22 anti-blackout suit against positive accelerative forces, a total of 305 runs (human centrifuge) on nine trained centrifuge subjects and 24 Navy pilots was performed. The end point for terminating a run was grayout (peripheral light loss) and criterion of success was tolerance of a seven G stress for thirty seconds. All subjects were given runs in the upright position, those failing were given runs as follows until successfully meeting criterion: upright position with anti-blackout suit, partially supine position, and partially supine position with anti-blackout suit.

T. I. R 10

3542

Gottfried, A., & Ikraht, K. EVALUATION OF INTERFERENCE EFFECTS ON SPEECH COMMUNICATIONS. SC Proj. 132A, DA Task 3-93-12-021, Tech. Memo. R-1748, March 1956, 7pp. Signal Corps Engineering Laboratories, Communications Dept., Fort Monmouth, N.J.

3542

An objective method (whistle-point) for determining the gain of a communication system under actual operating conditions is described. The method can be utilized for determining the desensitization of receiving equipment caused by radio frequency noise. The use of this method for obtaining true signal-to-noise ratio measurements at the output of a receiver is discussed. A standard speech test signal is suggested for intelligibility evaluation by means of the articulation index.

G. I. R 8

3543

Johnson, A.P. & Kemp, E.H. PSYCHOLOGICAL RESEARCH ON BOMBARDIER TRAINING. NAVAER 30 70R 27, Rep. 9, ca. 1947, 151pp. USAF Psychological Research Project (Bombardier), Midland, Tex.

3543

This is a preliminary draft of Report 9 in the Army Air Force Aviation Psychology Program series. It covers in detail the research performed on bombardier training. Topics include: history of bombardier selection and training, criteria, instructor proficiency and selection, details of individual projects, summary and evaluation, and suggestions for future research. There is a seven-page glossary.

T. G. I. R few

3544

Varplanck, W.S., & Bishop, C.K. FIELD TEST OF OPTICAL INSTRUMENTS: FURTHER RESULTS. ONR N6ori-180, T.O., III, NR 143-292, June, 1950, 92 pp. ONR, (Indiana Univ., Dept. of Psychol.)

3544

To validate laboratory data on visibility of targets and nomographs based on the data (Tiffany Foundation), to determine the reliability of individual performers, and to relate the results to several evaluative tests for predicting visual efficiency, selected data from the research on Field Tests of Optical Equipment (performed at U.S. Submarine Base, New London, Conn., 1945) were analyzed statistically. A series of measures of the coefficient of atmospheric attenuation were derived with recommendations concerning the usefulness of the nomographs. The findings on individual differences are discussed with recommendations for further research to precede development of new visual efficiency tests.

T,R12.

3545

Chapanis, A., Garner, W.R., Morgan, C.T. & Stanford, F.H. LECTURES ON MEN AND MACHINES: AN INTRODUCTION TO HUMAN ENGINEERING. Contract NSORI 166, T.O. I, SDC Rep. 166 I 19, 1947, 246pp. USN Special Devices Center, Port Washington, N.Y. (Systems Research Lab., Johns Hopkins University, Baltimore, Md.).

Topics covered in this volume are: definitions and history of systems research, methods, the working environment, work and work place, equipment, communication, auditory information systems, vision, display problems, and the purpose and future of human engineering. Each chapter is followed by a selective reference list. (HEIAS)

3546

Gebhard, J.W. ACCURACY OF ALIGNING THE MOVABLE RANGE MARKER WITH BLIPS ON THE PLAN-POSITION INDICATOR. Contract NSORI 166, Rep. 166 I 46, Aug. 1948, 53pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.).

3546

To determine the accuracy of aligning the movable range marker on the rotating sweep of the Plan Position Indicator (PPI) with blips (targets) on a 20-mile sweep, four experiments were performed. Signals were displayed on the experimental PPIs (W 12-inch, TDT (Target Designation Transmitter) seven-inch, and BRI (Bearing and Range Indicator) five-inch displays), and a VF precision indicator used for making measurements. Errors (degree and direction of discrepancy between target and marker on the VF) are expressed in yards and analyzed in terms of the variables studied. Scope size, blip size, and type of equipment are discussed. T. G. I. R 9

3547

Gebhard, J.W. SOME EXPERIMENTS WITH THE VF AIDED TRACKING EQUIPMENT. Contract NSORI 166, Proj. NR 784 001, Rep. 166 I 53, Sept. 1948, 30pp. USN Special Devices Center, Port Washington, N.Y. (Psychological Lab., Institute for Cooperative Research, Johns Hopkins University, Baltimore, Md.).

3547

To compare tracking performance of radar operators using VF aided tracking equipment with manual tracking (centering the 2-scope presentation on a target by estimating course and speed and settling in an anticipated bearing and range displacement), three commonly occurring tasks were chosen. Experienced radarman were tested on each task using both methods. Error data were analyzed for differences due to tracking methods. T. I. R 4

3548

Gebhard, J.W. SPEED AND ACCURACY OF OPERATING THE TARGET DESIGNATION-TRANSMITTER MARK 11 MOD 1 AND THE BEARING AND RANGE INDICATOR MARK 3 MOD 2. Contract NS ORI 166, TO I, Proj. NR 784 001, Rep. 166 I 66, N.v. 1948, 37pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.).

3548

To determine the speed and accuracy with which radar operators can designate bearing and range information with Target Designation Transmitters (TDT-11) and receive it with Bearing and Range Indicators (BRI-3), two sets of data were obtained from six operators: 1) speed and accuracy required to locate a randomly assigned target, to set controls and to contact a BRI; and 2) speed and accuracy required to match dial pointers by arranging controls, to locate and adjust on target, and to signal direction. The results were evaluated in terms of the proficiency of these equipments in acquiring high speed targets. T. I. R 3

3549

Gebhard, J.W. TARGET CODING BY MEANS OF VISUAL FLICKER. Contract NSORI 166, T.O.I., Proj. NR 784 001, SDC Rep. 166 I 68, Oct. 1948, 5pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychological Lab., Institute for Cooperative Research, Johns Hopkins University, Baltimore Md.).

This memorandum deals with the technical aspects of flicker coding from the psycho-physical point of view together with an estimate of the labor required to carry out further necessary investigation. The chief variables that assume practical importance for coding by flicker are considered: intermittency of target, intensity of target, area of retina stimulated, light-dark ratio of cycle, and flicker patterning. (HEIAS)

3550
Garner, W.R. AUDITORY SIGNALS. Contract NS ori 166, T.O.I., Proj. Design. NR 784 001, SDC Rep. 100 I 71, Jan. 1949, 30pp. ONR, USN Special Devices Center, Port Washington, N.Y. (Systems Research, Institute for Cooperative Research & Psychology Lab., Johns Hopkins University, Baltimore Md.).

The problems and uses of auditory signals are surveyed. Auditory signals are a form of display, but are usually characterized by being discrete in time, and some action is assumed on receipt of the information. Whenever a communications situation is concerned with a limited kind of information, an auditory signal can be used to provide a fast indicator of what to do. They are also useful as a substitute for visual displays when the visual load on an operator becomes too great. A chief advantage of the auditory signal is that the transmission of information can be completely automatic. 2 systems, the radio range and the flybar, were used to illustrate the type of research done on these problems. Research on simple and complex discrimination, stimulus interactions, auditory localization, psychological scaling, and auditory illusions appears to be most profitable with respect to possible applications to the problems of auditory signalling. (HEIAS)
R 36

3551

Coehard, J.V., Barber, J.L. & Halsey, R.Z. SIMULATED DISPLAY OF BEARING AND RANGE IN RECTANGULAR COORDINATES. Contract NSC 166, T.O. I, Proj. Design. NR 784 001, Tech. Rep. SDC 166 1 81, May 1949, 12pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Institute for Cooperative Research, Psychology Lab., Baltimore, Md.).

Several experiments were conducted to determine the speed and accuracy with which target position can be read from an experimental display of radar bearing and range information in rectangular coordinates in which 360° of bearing were given on the x-axis and 40,000 yards of range were shown on the y-axis. A rectangular scope, produced by modifying a VD radar indicator, was first compared with a PPI with respect to accuracy of aligning a movable range marker with blips. The rectangular display was found to produce smaller alignment errors than the PPI, and to be free from the effect, present in PPIs, of greater error with longer ranges. The factor of target length had no effect on accuracy for the experimental display whereas on the PPI arc length interacts strongly with target range in determining alignment error. Several bearing grids were tested on a simulated rectangular display for the purpose of selecting the most suitable design. Bearing scales marked in intervals of 20° were found superior to those marked in intervals of 30° as measured by speed of reading and bearing error when visual estimations of target position were made. Size of display had no effect on either speed or accuracy, nor did different starting points of the bearing scale. It is concluded that a rectangular display is as efficient as, and in some respects superior to, a PPI for estimating target position. Its adaptability for displaying information for tactical evaluation is questionable due to the presence of distortion.

R 6

3552

Williams, S.B. VISIBILITY ON RADAR SCOPES. Contract NSC 166, T.O. I, Proj. Design. NR 784 001, Rep. 166 1 82, Feb. 1949, 50pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.).

3552

This survey report (1949) discussed the general design of CRT in relation to the visual requirements of a human observer. The following topics were covered: design and types of CRT; methods of research on visibility; kinds of factors influencing visibility; and review of research on visibility (electrical parameters, screen brightness and uniformity, pip size and shape, orientation factors, illumination variables, search methods, and perceptual problems).

3556

Pinc, B.W. MC-3, MC-4 ALTITUDE SUIT ASSEMBLIES DESCRIPTION, FITTING AND MAINTENANCE. Proj. 6536, WADC Tech. Rep. 56-654, Dec. 1956, 24pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

3556

This report presents the results of research on high altitude protective assemblies. Included among the clothing are the following: MA-2 helmet, MC-4 suit, MC-3 suit, gloves, jump boots, seat kit regulator, and others. The criteria of fit receive extensive discussion and such aspects as tailoring, taking measurements, etc., are illustrated. The article also includes a discussion of methods of maintenance.

T. I. R 3

3553

Chapanis, A. SOME ASPECTS OF OPERATOR PERFORMANCE ON THE VJ REMOTE RADAR INDICATOR. Contract NSC 166, T.O. I, Proj. Design. NR 784 001, Tech. Rep. SDC 166 1 91, June 1949, 50pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Psychology Lab.)

2 experiments were performed to determine how well operators could extract bearing and range information from the VJ remote radar indicator when they used it in different ways. In general, speed is inversely related to accuracy. Those conditions which make for less speed are more accurate and vice versa. Also, an overwhelming amount of evidence is presented to show that the VJ and VF are inherently unstable from an electronic standpoint. (HEIAS)

R 7

3554

Parker, Judith T., Austin, T.R., Bond, H.J. & Bricker, P.D. ANNOTATED BIBLIOGRAPHY OF REPORTS ISSUED BY THE PSYCHOLOGICAL AND ENGINEERING LABORATORIES, THE JOHNS HOPKINS UNIVERSITY, Contract NSC 166, Task Order I, Rep. 166 1-170, Sept. 1953, 102pp. USN Special Devices Center, Port Washington, N.Y.

This annotated bibliography of reports issued by the Psychological and Engineering laboratories at Johns Hopkins University covers the time period 1946-1953. Topics covered are: sensory processes, motor skills, methods, scale reading and dials, equipment, visual displays, and systems research. (HEIAS)

R 155

3555

Jerison, H.J., & Wallis, R.A. EXPERIMENTS ON VIGILANCE: ONE-CLOCK AND THREE-CLOCK MONITORING. Contract AF33(616)3404, Proj. 7193 71610, WADC Tech. Rep. 57 266, April 1957, 34pp. WADC, Wright-Patterson AFB, Ohio. (Aero Medical Laboratory; Antioch College, Yellow Springs, Ohio).

2 experiments on prolonged monitoring of Mackworth-type clocks are reported. In one experiment with 36 subjects a single clock was monitored. It was found that performance dropped from about 90% of the signals found to about 50% during the first half hour of work, and that the performance drop appeared to be continuous. In a second experiment, 11 subjects each monitored a panel of 3 clocks. Their performance curve appeared to be flat, but it seems likely that a rapid decrement from the 45% to the 27% level occurred during the first three minutes of work. These results are discussed in terms of the present state of knowledge about the human operator as a monitor and in terms of recommendations that have been made in the past concerning limitations of length of watches for monitors in order to maintain their efficiency.

R 10

3558 Gebhard, J.W. & Blodau, E.A. APPRAISAL OF AN EXPERIMENTAL PLAN POSITION INDICATOR PRESENTING SIMULATED BEARING, RANGE AND HEIGHT INFORMATION. Contract NS-ori-166, T.O. 1, SDC Rep. 166 I 37, Dec. 1947, 53pp. ONR, USN Special Devices Center, Port Washington, N.Y. (Systems Research Field Lab., Johns Hopkins University, Baltimore, Md.).

Two experiments were performed to appraise a conventional polar coordinate display modified to present bearing, range and height information. The display consisted of a PPI surrounded by an annulus. The first experiment measured the speed and accuracy with which operators could extract bearing, range, and height information from the display on 3 remote repeaters. The average time per target required on either a VJ with working error on the VC was 1.5 and on both VJ's, about 1.5. Average range error on a 40-mile scale was a 3 mile for all indicators. Average height error on a 40,000 ft. scale was a 500 ft. The second experiment measured speed and accuracy of target estimation for the display on a VJ, VJ, VJ, and VG. Average time per target was about 7 sec. Average range error on a 40-mile scale was about 1/2 mile, and the average height error on a 40,000 ft. scale was about 700 ft. (HEIAS)

3559 Lipschultz, H.L. & Sandberg, K.O.W. TARGET INDICATION AS A FUNCTION OF INSTRUCTION. Contract NSORI 166, Rep. 166 I 34, Nov. 1947, 22pp. USN Special Devices Center, Port Washington, N.Y. (Industrial Engineering Lab., New York University, New York, N.Y.).

3559 To determine the accuracy and speed with which a radar operator can indicate targets under three sets of instructions (for accuracy, for speed, and both accuracy and speed), five operators used two different methods to obtain readings on a search radar: 1) with continuous antenna rotation and the aid of a bearing cursor and movable electronic range ring on the PPI, and 2) by stopping antenna rotation on target and reading bearings from the relative bearing dial and ranges from the A-scope. Time and error data were analyzed with respect to both instructions and methods. Procedures to improve performance were discussed. T. G. I.

3560 Sandberg, K.O.W., & Lipschultz, H.L. A SURVEY OF THE IMPORTANCE AND USE OF CONTROLS AND DISPLAYS ON RADAR CONSOLE PANELS (A CONTRIBUTION TO PANEL LAYOUT). Contract NS-ori-166, T.O. 1, SDC Rep. 166 I-17, July 1947, 21pp. SDC, New York University, Industrial Engineering Laboratory.

3560 To determine, on the basis of importance and use, a sequence of priority considerations for the design and placement of controls and displays on the face of the radar console, four methods were considered and illustrated with an application to the SG-1b (Model 50) radar. These methods were: (1) an analysis of procedure under different operating conditions, (2) analysis of one operating condition which included times of elementary motion groups, (3) two group interviews (opinion) of thirty Navy personnel each, and (4) secret poll of six other personnel. The pooled results from these methods yielded a ranking of controls and displays on the basis of importance and use. T. I.

3561 Leyzorek, R. MOUNTING ANGLE OF A VJ REMOTE RADAR INDICATOR AND ITS EFFECT ON OPERATOR PERFORMANCE. Contract NSORI 166, Rep. 166 I 41, Feb. 1948, 13pp. Systems Research Lab., Johns Hopkins University, Jamestown, R.I.

3561 To investigate the effect of mounting angle of radar indicator on operator performance, seven experienced operators read bearing and range information from a VJ remote radar indicator mounted at seven angles (scope-face with respect to floor: 0, 15, 30, 45, 60, 75, and 90 degrees). Accuracy and speed scores were analyzed to discover whether there is an optimum mounting angle. A preference questionnaire was given to the operators and rank-order of the various angles was calculated on these results. Operator differences and practice effects were discussed. T. I. R 1

3562 Gebhard, J.W. DETECTION OF NEW TARGETS ON A CATHODE RAY TUBE (PPI-PRESENTATION) WITH AND WITHOUT AN ASSOCIATED AUDITORY SIGNAL. Contract NS-ori-166, T.O. 1, SDC Rep. 166 I 10, Feb. 1947, 9pp. ONR, Special Devices Center, Port Washington, N.Y. (Systems Research Field Lab., Jamestown, R.I.).

2 experiments were performed to determine whether the detection of a new target appearing on a radar plan position indicator (PPI) could be improved by synchronizing an auditory signal with the new blip. In the first experiment, 10 faint targets were presented on a PPI, and after one sweep of observation an eleventh one appeared. In the second, 10 saturated targets were presented among complex land and open sea returns, and after one sweep of observation an eleventh one appeared. The operators identified and reported the new targets upon discovery. The results of both experiments showed that detection of new targets accompanied by an auditory signal was accomplished without error, whereas targets searched for by visual means alone were found only half the time. No practical use can be made of the results of this experiment at the present time. It would in fact, not be possible for engineering reasons, to employ the experimental procedures in an operational situation. The experiment was done, however, as a preliminary test of a principle which might lead to the conduct of other experiments from which practical results can be expected.

3563 Reed, J.D. & Bartlett, N.R. COMPARISON OF MANUAL AND STANDARD METHODS OF TARGET INDICATION. Contract NSORI 166, Memo. Rep. SDC 166 I 9, Feb. 1947, 10pp. USN Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Baltimore, Md.).

3563 To compare two methods of target indication from a radar presentation, four operators performed two tasks on a simulated search radar: 1) estimated range and bearing of target with the aid of a bearing cursor and range marks were reported verbally, and 2) indicated target position by use of a pointing device attached to a pantograph. Targets were presented in varying numbers (five to thirty) on three sizes of scope (7, 10, and 20 inches). The results were given in terms of accuracy and speed scores for both methods. An error analysis was made. Effects of scope size and number of targets was discussed.

3565

Williams, S.B. & King, E. THE EFFECT OF CRT BIAS ON VISIBILITY OF TARGETS ON A REMOTE PPI. Contract N5 ori 166, T.O. 1, Memo Rep. 166 I 6, Dec. 1946, 12pp. ONR, Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Psychological Lab. & Electrical Engineering Lab., Baltimore, Md.).

The cathode ray tube of a VD remote PPI indicator has an optimal bias level with respect to target visibility. Every experiment in which CRT bias was varied yielded a curve of visibility with a maximum lying somewhere between the lowest and highest intensity (CRT bias) settings. In all cases maximum visibility was obtained with a moderately bright, light-yellow background, that is, with a comparatively low bias, and not with the dark or high bias background frequently employed by trained operators. The exact specification of this optimal level in volts or in units of illumination is not yet possible with existing measuring instruments. However, it can be fairly well defined visually. The experiments illustrate the difficulties of measurement and the methods employed.

R 1

3566

Chapanis, A. ACCURACY OF ORAL TRANSMISSION OF TARGET INFORMATION. Contract N5 ORI 166, Task Order 1, Memo. Rep. 165 I 5, Dec. 1946, 12pp. Systems Research Field Lab., Johns Hopkins University.

3566

To measure the speed and accuracy with which target (bearing and range) information can be transmitted orally over sound-powered telephones, teams of two men were employed in a total of 84 experiments. Target bearings and ranges were read at rates of four to 16 per minute and for various durations ranging from ten to 60 minutes. Tape recordings were analyzed for errors due to (1) talker versus recorder, (2) number of targets per minute, (3) successive work periods, and (4) subject differences.

T. G. R 2

3570

Garner, W.R., Hanes, R.M. & Reed, J.D. CALCULATION OF BEARING AND RANGE ERRORS DUE TO DELAYS IN TRANSMISSION OF RADAR INFORMATION. Contract N5 ORI 166, Task Order 1, 166 I 11, Feb. 1947, 24pp. Psychological Lab., Johns Hopkins University.

3570

This report deals with the errors to be found in reported target position which can be attributed to delays in reporting range and bearing information from radar positions. In order to show the magnitude of these errors, and also to facilitate the calculation of maximum allowable delays, for any given set of conditions, mathematical formulae are derived for the calculation of errors in range and bearing due to time delays in transmission of information. Descriptive and summary graphs are presented showing the interactions of several conditions.

G. I.

3567

Chapanis, A. SPEED OF READING TARGET INFORMATION FROM A DIRECT-READING, COUNTER-TYPE INDICATOR VERSUS CONVENTIONAL RADAR BEARING-AND-RANGE DIALS. Contract N5 ori 166, T.O. 1, Memo Rep. 166 I 3, Nov. 1946, 12pp. ONR, Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Systems Research Field Lab., Jamestown, R.I.).

This experiment measured the time required by operators to read bearing and range information from 4 types of standard Navy radar equipment (the SG and SR radars and VF and VJ remotes), and from a direct-reading, counter-type bearing and range indicator of experimental design. The results show that the experimental indicator enables operators to read bearing and range information in about one-half the time required for similar readings from the 4 standard units. The data also show that the fewest number of errors occurred in target information read from the experimental indicator. Most of the errors made in reading target settings from the radars occurred in the bearing information.

R 2

3568

Garner, W.R. SOME PERCEPTUAL PROBLEMS IN THE USE OF THE VG REMOTE PPI. Contract N5 ORI 166, Task Order 1, 166 I 2, Sept. 1946, 34pp. Systems Research Field Lab. & Psychological Lab., Johns Hopkins University.

3568

This report is one of a series concerned with a study of the VG, a radar remote indicator of the plan position type which uses a two-mirror system of reflection and projection to obtain a presentation 25 inches in diameter. An analysis was made of the perceptual problems involved in the use of the radar. Two experiments, using six Navy radar operators, were run (1) to compare the efficiency of plotting directly on the VG with that of a plotting table and (2) to test the use of the VG for obtaining range and bearing information about targets for the purpose of locating directors on targets.

G. I.

3569

Garner, W.R. A STUDY OF FACTORS AFFECTING OPERATION OF THE BG REMOTE PPI. Contract N5 ori 166, T.O. 1, SDC Rep. 166 I 1, Aug. 1946, 33pp. USN Special Devices Center, ONR, Port Washington, N.Y. (Psychological & Systems Research Field Labs., Johns Hopkins University, Baltimore, Md.).

This study determined the effects of various electronic and optical factors on the operation of the VG. Among these factors were: video gain, CRT bias, the limiting of PPI adapters, use of a higher accelerating voltage on the CRT, the type of viewing screen, and the intensity of the reflected light. An analysis of the operation of the VG was made in terms of detectability (ability of the targets to be seen), variability of detectability scores, and discriminability (ability of targets to be distinguished from each other). Each of these factors was studied separately and in relation to the other factors. 6 radar operators served as Ss. Detectability was measured by having S search continuously on a clear field while target intensity was increased 1 db/antenna sweep. Discriminability was measured by having S indicate when 2 concentric lines appeared to be separate as they moved around the scope. (HEIAS)

3571 Bartlett, H.R. & Sweet, A.L. THE AGREEMENT IN RANGE AND BEARING REPORTS FROM TWO VF RADAR REPEATERS TRACKING THE SAME TARGET SIMULTANEOUSLY WITH THE B-SCOPE. Contract NS or 166, Memo. Rep. 166 1.12, Feb. 1947, 11pp. ONR, Special Devices Center, Port Washington, N.Y. (John Hopkins University, Baltimore, Md.).

The error indices for stationary targets deviated from the Preliminary Instruction Book. 56% of the bearing reports from 2 VF repeaters were in exact agreement for a stationary target, and in no case was the disagreement greater than one degree. With respect to range reports, 19% were in exact agreement, 56% agreed within 20 yards, and all reports agreed within 100 yards. When contacts are moving, however, these data are not appropriate. For example, for targets with a relative speed of 80 knots, only 39% of the bearing reports were in exact agreement, and only 41% of the range readings agreed within 100 yards. The agreement between two VF reports decrease markedly as the speed of a target is increased. Therefore, the reliability of a single report of the position of a contact depends upon the relative motion of that contact with respect to the position of the radar.

3575 Gaito, J. HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS: THE CHOICE OF SUBJECTS IN DIAL LEGIBILITY EXPERIMENTS--A METHODOLOGICAL STUDY. Proj. TEP NAM AE-7047, Part IV, Rep. NAMC-ACEL-316, Feb. 1957, 12pp. Air Crew Equipment Laboratory, Naval Air Experimental Station, NAMC.

3575 To investigate the validity of extrapolating results of an experiment based on one population to other populations, a paper and pencil test on aircraft clock designs was administered to 127 experienced naval pilots, to 60 naval non-pilot aircrewmen, and to 55 naval non-aircrewmen. Using mean number of errors and mean time per reading as criteria of legibility, differences among the three samples were analyzed by various non-parametric statistical techniques. Differences studied were speed, accuracy, and relative effectiveness of the various clock designs. Implications of the findings for experimental research are discussed.

G. I. R 3

3576 Gyver, J.A. & Waldron, V.G. PHOTO INTERPRETATION TECHNIQUES: A BIBLIOGRAPHY. WADC DO (33 616) 52 20, March 1956, 162pp. US Technical Information Div., Library of Congress, Washington, D.C.

3576 The bibliography presents 510 annotated references to published literature on photo-interpretation techniques issued during the period of 1935-1955. Both English and foreign language references are included. Full informative abstracts are given for foreign language references and brief annotations for more readily available material. Topics covered include theory, principles, methods and techniques of photo-interpretation and the application of the techniques in various scientific and technological fields, e.g., ecology, geology, geography, physiography, geomorphology, hydrography, soil classification, forestry, engineering, and military science.

R 510

3577 Harris, W., Mackie, R.R., & Wilson, C.L. RESEARCH ON THE DEVELOPMENT OF PERFORMANCE CRITERIA: VII. PERFORMANCE UNDER STRESS: A REVIEW AND CRITIQUE OF RECENT STUDIES. Contract Monr 1241(30), Tech. Rep. 6, July 1956, 83pp. ONR, Human Factors Research, Inc., Los Angeles, Calif.

3577 This report surveys the literature of recent studies (1952-1956) that bear on the general problem of human performance under adverse conditions. The studies are classified as to (1) the duration of stress conditions and (2) the temporal relationships between the performance and stress periods. The review is organized in four parts: (1) stimulus conditions employed to study effects of stress upon performance, (2) performance measures and experimental design, (3) results and conclusions of the various investigators, and (4) a discussion of the problems involved in experimental study of stress and of proposed research plans. The appendix contains a selected annotated bibliography.

R. 71

3578 Bisom, J., & Keith, Lela. INJURY RATES IN NEW YORK STATE INDUSTRIES, 1955. Publ. B-94, Nov. 1956, 23pp. Division of Research and Statistics, Department of Labor, State of New York.

3578 This is a summary of the results of the fourth annual survey of injury rates by the Division of Research and Statistics of the State Department of Labor in cooperation with the United States Bureau of Labor Statistics. Requests for work injury information were sent to approximately 53,000 factory establishments. Replies were received from 33,000 representing over 3/4 of all manufacturing employees in the state. Injury-frequency rates (number of disabling injuries per million employee-hours worked) and injury-severity rates (number of days lost per million employee-hours worked) were computed. These rates are given for type and size of establishments and comparisons made with previous records.

T. R 1

3579 Henshaw, C.J., & Martin, R.S. SAFETY OF FLIGHT EVALUATION. AFPTC-TR-56-10, May 1956, 25pp. ARDC, Air Force Flight Test Center, Edwards AFB, Calif.

3579 This report presents the results of a safety of flight evaluation of two YC-121F aircraft. In addition to a determination of the safety for operational use of the engine-airframe combination, functional development data of maintenance discrepancies, manhour requirements, part consumption, aircraft availability, and systems analysis were obtained. The testing period covered thirty days and the aircraft were flown in a manner that would result in the maximum number of flying hours. Recommendations are included.

3581 Committee on Aviation Medicine and Military Personnel Research Committee. REPORT FROM CHAIRMAN FOR EXECUTIVE SUBCOMMITTEE. March, 1957, 2 pp. Committee on Aviation Medicine and Military Personnel Research Committee.

3581 This paper is a bibliography of reports received from the World War II Committee on Aviation Medicine and Military Personnel Research Committee, dealing with such topics as Clothing and Personal Equipment, Special Environmental Factors Affecting Performance, etc.

3583

Directorate of Flight Safety Research. PROCEEDINGS OF THE CONFERENCE ON PERSONNEL FACTORS IN FLIGHT SAFETY. June 1950, 45pp. Directorate of Flight Safety Research, Norton AFB, Calif.

This monograph presents the proceedings of a conference on personnel factors in flight safety held in June 1950 at the instigation of the Directorate of Flight Safety Research. The proceedings of the conference were largely in the nature of a general discussion, therefore indexing the contents is very limited. The topics covered include such personal characteristics as age, training, specialized experience, measured aptitudes, attitudes and morale of operating, maintenance and supervisory personnel. (HEIAS)

3584

Rowland, W.M. A STUDY OF METHODS OF GUN SIGHTING AT EXTREMELY LOW LEVELS OF ILLUMINATION. Contract N6ori 199, Sept. 1942, 4 pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The possibility of accurate gun sighting at illuminations below the foveal threshold was investigated. 27 experienced Ss were used. It was found that by proper use of the paracentral retina it is possible for trained observers to sight a gun at a dark object seen against a background the brightness of which is considerably below the foveal threshold, and to shoot with a moderate degree of accuracy. Illuminated sights are not as satisfactory at very low levels of illumination as ordinary sights. (HEIAS)

3585

Brown, J.L., Kuhns, Margaret P., & Adler, H.E. RELATION OF THRESHOLD CRITERION TO THE FUNCTIONAL RECEPTORS OF THE EYE. J. opt. Soc. Amer., 1957, 47(3), 198-204. (Contract AP 33 (038)-22616. Aero Medical Lab., WADC ARDC, Wright-Patterson AFB, Ohio. Columbia University).

3585

This study was designed to assess the effect of increasingly higher order luminance thresholds upon the transition from rod to cone function as reflected in performance of a series of visual tasks. Utilizing the Hecht-Schlaer adaptometer, luminance threshold measures were made in the dark adapted eyes of two subjects with eight color and some neutral tint filters. Seven gratings requiring visual acuities from 0.042 to 0.625 were employed. The results are presented and discussed in terms of the threshold luminance as a function of change in visual acuity requirements. The character of the visual function is described and the implications of the research related to situations in which the dark-adapted individual must read visual displays at higher levels of illumination. T.G.I.R. 19

3586

Lipschultz, H.L. & Sandberg, K.O.W. A STUDY OF ALIGNMENT ERRORS BETWEEN THE BEARING CURSOR AND ANTENNA TRACE ON THE PPI OF THE SG-1b (MOD.50) RADAR. Contract N5-ori 166, Memo Rep. 166 I 20, July 1947, 5pp. ONR, Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Systems Research Field Lab., Jamestown, R.I.).

The bearing cursor and the antenna trace of the PPI on the SG-1b (Mod. 50) radar are often found to be non-coincident. This report summarizes the results of a study on the alignment of the cursor and of the antenna trace under various conditions. No change in alignment between the antenna trace and bearing cursor was observed after the equipment was in the "on" position for a 6-hour period. Slight changes in alignment were observed after the equipment had been in "stand-by" condition overnight. Larger changes in alignment were observed as a result of movement of the chassis in and out of the console. Computations from these data show the maximum bearing errors resulting from misalignment.

3587

Gebhard, J. & Newton, K.V. BRIGHTNESS OF CREASE PENCIL MARKS ON A VERTICAL PLOTTING BOARD. Contract N5 ori 166, Memo Rep. 166 I 23, July 1947, 11pp. ONR, Special Devices Center, Port Washington, N.Y. (Johns Hopkins University, Systems Research Field Lab., Jamestown, R.I.).

The brightness of marked and unmarked positions on 2 vertical edge-lit plotting boards was measured with a Macbeth Illuminometer. 1 board was a Square Knock-down type at the Field Laboratory, the other was a Mark 4 Mod. 1 modified by the removal of the rear sheet of plastic. The upper seven-eighths of the boards was quite evenly illuminated. Near the base, about 8 in. from the lights, there was a sharp rise in brightness. Marks placed at the bottom of the board were about 5 or 6 times brighter than those near the top. On the Square Knock-down board the marks were about 5 times as bright as those on the modified Mark 4 board examined. China-marking pencils in white and yellow produced marks about 50-60 times as bright as the unmarked board. Other colors were relatively very dim. More light was reflected upward from a mark than in any other direction. If both sheets received the same amount of light from the lamps, marks placed on the front and rear of the board were about equally bright. The brightness of the lines etched into the plastic was about the same as a yellow grease pencil mark. A heavily marked up board contributed little to general room illumination. Over the range of 100 to 120VAC a change of 1 volt across the lamps produced a change in the brightness of a mark of about 0.5 apparent foot candles.

3588 Bartlett, N.R. TARGET INDICATION FROM THE PPI OF THE SG-1b (MOD 50) RADAR. Contract NSORI 166, SDC 166 I 24, Sept. 1947, 50pp. ONR, USN Special Devices Center, Port Washington, N.Y. (Systems Research Field Lab. & Psychological Lab., Johns Hopkins University, Baltimore Md.).

4 radarsmen served as operators in an experiment measuring the effectiveness of target indication from PPI. Measures were made with respect to the number of simultaneous raids, antenna rotation speed, and the use of reading aids such as the bearing cursor and range trace. A 10 min. "battle problem" was conducted with each SG. The following conclusions were reached: a) in general, higher rotation speeds are to be preferred to lower speeds, for they do little harm and may do some good. 10 rpm is about maximal for advantages of the higher speed. b) The limitation of the maximum frequency of reports than can be obtained in the traffic-handling capacity of the operator. All other factors are minor. c) There is little merit or disadvantage to the use of the bearing cursor. When used with the range trace, the bearing cursor increases slightly the frequency of reports; when used alone, it decreases them slightly. d) Most of the facts were definitely in favor of the range trace, and only one--the cost in time to use it--is against it definitely. (HEIAS)

3591 Chapin, A. THE RELATIVE EFFICIENCY OF A BEARING COUNTER AND BEARING DIAL FOR USE WITH PPI PRESENTATIONS. Contract NS ORI 166, Memo. Rep. 166 I 26, Aug. 1947, 15pp. ONR, Special Devices Center, Port Washington, N.Y. (Systems Research Field Lab., Johns Hopkins University, Jamestown, R.I.).

In a continuation of earlier work on this problem, a direct-reading bearing counter was constructed and mounted on a VJ remote radar indicator so that this method of exhibiting the bearing of targets could be compared with that of the bearing dial normally used for the purpose. An experimental placement of the range counters, above the PPI and directly to the right of the bearing counter, was also tested. The first experiment measured the speed and accuracy with which radar operators can locate a target appearing on the PPI, adjust the bearing cursor and movable range rings to the position of the target, and read the bearing and range rings to the position of the target, and read the bearing and range of the target from each of 4 different combinations of the bearing counter, bearing dial, and 2 range counters. The results show that, on the average, an operator can perform this sequence of operations 1.7 sec. (13.3%) faster per target when he reads bearings from the counter rather than from the dial. There were fewer serious bearing errors in readings from the counter than in those from the dial. Further analysis of the data shows that the increased speed in performance with the bearing counter was not obtained at the expense of accuracy in operating the equipment. The second experiment compared the bearing counter and dial in terms of the speed with which settings could be reproduced on the 2 types of indicators. The bearing dial proved to be superior to the counter for this type of operation. Taken in conjunction with the data of the earlier study on this problem, these experiments indicate that a direct-reading counter is more efficient than an annular scale for presenting bearing information which must be read from an instrument. The counter-type indicator, however, is less efficient if settings must be reproduced on set into the equipment. R 8

3589 Reed, J.D. & Bartlett, N.R. THE ACCURACY OF RANGE ESTIMATION ON A PPI WITH RESPECT TO THE DISTANCE OF THE TARGET FROM RANGE RINGS. Contract NS ORI, Memo Rep. 166 I 29, Nov. 1947, 9pp. Johns Hopkins University, Baltimore, Md.

3589 To investigate the relation between accuracy of range estimation of radar targets and the proximity of targets to the range ring, four radar operators estimated the location of targets on simulated Plan Projection Indicators. Factors varied were scope size (7-, 10-, and 20-inch diameters), target size (6 and 20 degrees), and target number per trial (5, 10, and 20). Errors of estimation (accuracy) were analyzed with respect to distance from nearest range ring, distance beyond the next smaller range ring, frequency with which certain criteria of accuracy can be expected, and scope size.

3590 Williams, S.B. THE SEARCH FACTOR IN DETECTING WEAK RADAR TARGETS. Contract NSORI 166, Memo. Rep. 166 I 28, July 1947, 11pp. Johns Hopkins University, Baltimore, Md.

3590 To study the relation between size of search area and speed of target detection on radar scopes, a series of detectability (first appearance of weak signal of gradually increasing intensity) measurements were made. The variables were area of search (entire scope to an area 3/4 by 3/16 inches), scope size (5, 7, and 25 inches in diameter), signal size (20 and 10 degrees lobe width), and noise or noise-free background. Detectability scores (db of signal voltage) were analyzed as a function of search area, target size, and noise background. Implications for radar practice were discussed.

3592 Sweet, A.L. & Morgan, C.I. COMPARISON OF THE CENTER-VERSUS-LEADING EDGE OF THE TARGET PIP IN RANGE DETERMINATION BY THE VF REMOTE RADAR INDICATOR. Contract NS ORI 166, Memo. Rep. 166 I 25, July 1947, 11pp. Johns Hopkins University, Baltimore, Md.

3592 To compare two methods of range determination on a radar scope, two experiments were performed. In both the stationary targets signals were sent through the SG radar to two VF indicators 1) where it was detected simultaneously by operators using each equipment either by using the leading edge or center of pip method and 2) where range measurements were made with one VF calibrated to the center of the pip and the other to the leading edge. The data were analyzed by computing the discrepancy between actual range and reports from the VF's. Differences in accuracy for the two methods were analyzed.

3593 Cookley, J.D. (Proj. Dirac.). THE EFFECT OF HEAT UPON THE PERFORMANCE OF MEN IN HIGH SPEED AIRCRAFT: A CRITICAL REVIEW. Proj. 20 H 16, Rep. 151 1 17, June 1948 107pp. USN Special Devices Center, Port Washington, N.Y. (Psychology Corporation, Division of Bio-Mechanics, N.Y.).

The effect of high temperature upon human performance is examined by means of a review of the relevant literature. The problems provided by high temperature for airplanes that fly at high speed are outlined. The thermal zone in which men feel comfortable is described, as well as thermal zones which cause deterioration in performance. Very high temperatures, combined with other adverse conditions, affect various aspects of human behavior. "Normal" performances on moderately complex tasks may be observed at effective temperatures up to about 85°F. As measured by the willingness of subjects to expose themselves to heat, 120°F is tolerable for an hr., 107°F for 2 hrs., and 95°F for 4 hrs. with severe humidity. (MC1A5) R 105

3594 Gebhard, J.W., DeGroot, S.G., & Glickman, R.W. THE INTERPRETABILITY OF PLOTTED INFORMATION ON POLAR-COORDINATE DISPLAYS. Contract N55R1 166, Proj. Des. NR 507 470, Rep. 166 1 152, July 1952, 7pp. Johns Hopkins University, Baltimore, Md.

3594 To investigate the intelligibility of plotted information; information on friendly and enemy targets was plotted in a simple code (shape) on 24-inch polar-coordinate displays, photographed, made into slides, and presented to five trained observers. The time taken to answer oral test questions was measured and analyzed for influence of (1) number of tracks in a sector (4 to 20), (2) length of past history in the tracks (three and ten minutes with and three minutes without time notations), (3) position on display (east, south, and west sectors), and (4) observers. The need for further study using dynamic displays is discussed. T. G. I.

3595 Hollander, E.P. CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS: THE NEWPORT STUDY I. RELIABILITY. Contract NMR 760(06), Tech. Rep. 1 56, Jan. 1956, 21pp. Psychological Labs., Carnegie Institute of Technology, Pittsburgh, Penn.

3595 To determine the reliability of peer ratings under various instructional sets and time exposures, 23 trainee sections at the Naval Officer Candidate School (OCS) in Newport were studied over a 16-week period. Four basic sociometric forms of the peer nomination variety were used. All sections were given a primary form calling for "success as a future Naval officer"; also, each section received one of three secondary forms--"leadership qualities," "interest and enthusiasm in Naval service," and "probability of success in OCS." Approximately half of the sections were given a "for research purposes" set the other half "for administrative purposes." Peer ratings were made at the end of 3, 6, and 13 weeks. Both internal consistency of scores and relationship over time were analyzed. T. R 15

3597 McCleary, R.A., & Morgan, C.T. GEAR-RATIOS FOR CURSORS OF PPI'S. Tech. Rep. SDC 166 1 96, June 1949, 5pp. ONR, Special Devices Center, Port Washington, N.Y. (Psychology Laboratory, Johns Hopkins University, Baltimore, Md.).

An experiment was designed in which different distances of cursor movement and different gear-ratios were run in random order. There were 7 different operators. The details of the experimental design were so arranged that a complete analysis of variance could be carried out on the results. Both the time taken to make a setting and the number of errors made in settings were used as measures of the operator's performance. There is an optimum gear-ratio for operating a remote PPI. This optimum, however, depends upon a number of factors--the most important of which is the angular distance through which the cursor must be moved to get it on the p.p.i. If the distance is very short, say, 15 degrees, the optimum is high--in the neighborhood of 20 revolutions of the crank for one revolution of the cursor. If the distance is longer, say, 165 degrees, the optimum is much smaller--about 5:1. If one averages all distances likely to be encountered in normal operation of PPI's, the optimum is still about 5:1. This, therefore, is the recommended ratio for typical radar operation.

3598 Gebhard, J.W., & Howbray, G.H. EFFECT OF THE REFLECTION PLOTTER ON THE VISIBILITY OF SIGNALS ON PPI SCREENS. Contract N5 orf 166, Tech. Rep. SDC 166 1 119, Dec. 1950, 7pp. USN Special Devices Center, Port Washington, N.Y. (Psychology Lab., Johns Hopkins University, Baltimore, Md.).

Measurements were made to determine the effect of the Reflection Plotter on the visibility of simulated radar signals on PPI screens. Three sizes of target were viewed at 12 inches on a CRT with a P-7 phosphor. These were: small (1 μ sec X 1"), medium (3 μ sec X 10") and large (10 μ sec X 30"). The data were obtained by the method of attenuating an 8 volt signal until a just visible signal was discerned. This measure was expressed in decibels, attenuation and was found at screen luminances corresponding to 2, 5, 8, and 10 volts of CRT bias beyond visual cut-off for the tube. No noise was used in the tests. In conditions of visibility were investigated: a) No Reflection Plotter; b) Clean Reflection Plotter without edge lighting; c) Clean Reflection Plotter with faint edge lighting; d) Dirty Reflection Plotter with bright edge lighting. The results show that the clean Reflection Plotter (condition 2) produced about 3 db of loss in signal visibility over the condition where no Plotter was used. A brightly lighted Plotter whose surface has been used and wiped to smear the residue of old grease pencil marks (condition 4) produced a 7 db loss over the condition where no Plotter was used. It is recommended that the Reflection Plotter should not be used on equipment whose primary purpose is the detection of weak radar signals. R 6

3599

Coskley, J.D. (Dir.). THE EFFECTS OF ULTRASONIC VIBRATIONS ON MAN. Contract NSCRI 151, Proj. NR 783 034, Proj. 20 M 18, Rep. 151 1 15, April 1948, 41pp. USC Special Services Center, Port Washington, N.Y. (The Psychological Corporation, New York, N.Y.).

3599

To provide a perspective for the ultrasonic problem of the pilot of supersonic aircraft, a critical review of available (1948) reports concerned with ultrasonic vibrations (frequency above 20,000 cycles per second) was made. The material is organized around (1) the reported effect of ultrasonic vibrations on human performance, (2) effects of local application of ultrasonic vibrations on man, and (3) sources and kinds of vibration in high speed aircraft--characteristics of and transmission to pilot. Summary tables and frequency analyses of measured intensities are included. A program of further research is suggested.

T. G. R 35

3602

Cohn, J.E., Carroll, D.G., Armstrong, B.W., Shepard, R.H., et al. STUDIES ON GAS EXCHANGE APPLICABLE TO FLYING PERSONNEL. THE MAXIMAL DIFFUSING CAPACITY OF THE LUNG IN NORMAL MALE SUBJECTS OF DIFFERENT AGES. Contract AF 18(600) 435, Proj. 21 1201 0014, Rep. 4, Sept. 1954, 8pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Environmental Medicine Dept., Johns Hopkins University and Hospital, Baltimore, Md.).

The maximal diffusing capacity of the lung for oxygen was determined in 21 normal subjects ranging in age from 17 to 76 years. There is a significant decrease in maximal diffusing capacity with age, the relationship being best described by the regression equation $D_{O_2} = 0.2 \text{ age} - 40.9$. The findings are of interest in relation to the nature of the aging process. It is not unlikely that the changes in the capillary bed of the lung in relation to age are similar to those occurring in other organs. The data presented and the regression equation derived therefrom provide normal standards with which to compare findings in patients with pulmonary disease.

R 8

3603

Riley, R.L., Shepard, R.H., Cohn, J.E., Carroll, D.G., et al. STUDIES ON GAS EXCHANGE APPLICABLE TO FLYING PERSONNEL. THE MAXIMAL DIFFUSING CAPACITY OF THE LUNGS. Contract AF 18(600) 435, Proj. 21 1201 0014, Rep. 3, Sept. 1954, 15pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Environmental Medicine and Medicine Depts., Johns Hopkins University and Hospital, Baltimore, Md.).

Multiple determinations of diffusing capacity have been performed during treadmill exercise on 3 normal subjects, using the low oxygen method of Lillenthal et al. (2). The severity of exercise and the severity of hypoxia were both varied over a wide range. In the 2 younger subjects, the diffusing capacity rose sharply at levels of oxygen consumption between 500 and 1,200 ml. per minute. There was no further rise when the oxygen consumption was increased to more than 2,200 ml. per minute. In the older subject, the diffusing capacity rose at values of oxygen consumption between 500 and 900 ml. per minute and there was no further rise at approximately 1,200 ml. per minute. The findings suggest that maximal values for diffusing capacity were achieved, and that the maximal diffusing capacity was lower in the older subject. The data also suggest that the maximal diffusing capacity can be reached either by hard physical work or by moderate work in association with severe hypoxia. From the technical point of view, both exercise and severe hypoxia facilitate the determination of diffusing capacity by the method which was employed. Various physiologic mechanisms affecting the behavior of the pulmonary capillary bed during exercise and hypoxia are discussed. The maximal diffusing capacity is thought to provide a quantitative estimate of the diffusion characteristics of the entire diffusing surface of the lungs.

R 22

3604

McNeill, J.M. AUDIO-VISUAL AIDS AS MEANS OF COMMUNICATION. A LIST OF REFERENCES. Library List 28, Aug. 1946, 4pp. US Department of Agriculture Library, Washington, D.C.

3605

This set of annotations summarizes the "facts and findings" of seven published papers or books on the use of audio-visual aids in communication and education.

R 7

7507

Moser, H.M., Dreher, J.J., & Adler, S. A COMPARISON OF HYPONASALITY, HYPERNASALITY, AND NORMAL VOICE QUALITY ON THE INTELLIGIBILITY OF TWO-DIGIT NUMBERS. Contract AF18(600)316, RF Proj. 519, Tech. Rep. 25, APCRC TN 55-60, July 1955, 5pp. Ohio State University Research Foundation.

3607

This study was designed to evaluate the effects of hypernasal and hyponasal as compared to normal nasal delivery upon the intelligibility of two-digit numbers. Six speakers reflecting Eastern and General American dialects recorded a list of two-digit numbers under conditions of simulated hyper- and hyponasality and normal delivery. The recorded lists were then presented to 11 subjects at two signal-to-noise ratios, and the number of errors were assessed. Triple analysis of variance was employed to determine the effects of methods, noise, speakers, and their combinations upon intelligibility. The dynamics of the two nasal conditions are discussed in terms of their negative influence upon effective communication.

T. R 8

3608

Moser, H.M., Dreher, J.J., & Adler, S. THE EFFECTS OF CONTROLLED BOUNCE BLOCK AND PROLONGED BLOCK ON THE INTELLIGIBILITY OF OPERATIONAL WORDS. Contract AF18(600)316, AFRCRN-55-61, RF Proj. 519, Tech. Rep. 26, June 1955, 6pp. The Ohio State University Research Foundation.

3608

This study was designed to investigate the effects of normal, bounce block, and prolonged block methods of voice transmission on the intelligibility of operational words. Fifty PB words of high frequency in air operations were recorded by the same speaker utilizing each of the three methods and presented to three groups of listeners (34 normal, 54 bounce block, and 48 prolonged block). An analysis of the relative intelligibility of the words under each of the methods of presentation leads to a discussion of the potential factors operant in each of the three methods and certain specific recommendations concerning further research.

T. G. I. R 3

3610

Moser, H.M., Dreher, J.J., & Adler, S. THE EFFECTS OF CONTROLLED AFFECTIVE TONE ON INTELLIGIBILITY. Contract AF 18(600)-316, AFPC TH 55-59, HW Proj. 519, Tech. Rep. 24, June 1955, 6pp. Ohio State University Research Foundation.

3610

This study was designed to determine the effect of conveying two-digit numbers with different emotions (by controlled intensity) upon their relative intelligibility. Four professional actors recorded a series of two-digit numbers while conveying four emotions: Joy, anger, sadness, and unemotionality. Thirty-nine subjects were then presented with the recorded lists and their responses were recorded with regard to number correct for each method of transmission. Analysis of variance was employed to assess the relative contribution of each method to intelligibility. Conclusions are drawn concerning the role of emotion in intelligibility. T. G. R 3

3619

Green, R.F., Zialles, H.L. & Spragg, S.D.S. THE EFFECTS OF VARYING DEGREES OF KNOWLEDGE OF RESULTS ON KNOB SETTING PERFORMANCE. Contract N60NR 241, SMLDEVEN Proj. 20 M 1D, Task 6, Tech. Rep. SPECDEVEN 241 6 20, Aug. 1955, 5pp. USN Special Devices Center, Port Washington, N.Y. (University of Rochester, Rochester, N.Y.).

3619

To investigate the effect of giving different kinds, or degrees of specificity, of knowledge of results on accuracy of knob setting, three groups of 30 subjects each were given the task of bisecting an angular extent (blindfolded) by turning a knob through the entire extent of travel twice and then setting the knob at the midpoint of the angle. Three degrees of knowledge were used, one for each group: 1) no objective knowledge given by experimenter of previous trial result; 2) limited knowledge given in terms of "correct," "too far," or "not far enough"; and 3) exact knowledge given in terms of degrees of error. Mean settings (in terms of constant errors) and variability scores were analyzed for the effect of the three conditions. Implications for training are discussed. T. G.

3612

Williams, J.A.C. COMPENSATING REST ALLOWANCES. A PRELIMINARY SURVEY OF VALUES APPLIED IN BRITISH INDUSTRY. CA/PE/2, April 1955, 6pp. College of Aeronautics, Aircraft Economics and Production Dept., Cranfield, England.

A survey was made of Compensating Rest (CR) Allowances applied in time study in British industry. This note summarizes and comments briefly upon these allowances now in use and presents 4 tables of allowances. A CR is "applied to an element of work so that the worker can recover from the physical and/or mental effort necessary to perform the work element," in a manner reported previously (3613). It should enable a normal worker, trained in the task, to work at a standard rate throughout the day without undue fatigue. The values appearing in the tables are for the following factors: energy output or effort, posture, attention, special clothing, external environment, eye strain, and general (personal hygienic needs, uncongenial surroundings, and monotony). (HEIAS)

R 6

3613

Williams, J.A.C. INDUSTRIAL TIME STUDY PROCEDURE. AN EXPLANATORY NOTE OF ITS PURPOSE AND A STANDARD METHOD. CA/PE/1, ca Apr. 1955. College of Aeronautics, Aircraft Economics and Production Dept., Cranfield, England.

This report presents the method used in the Work Measurement technique of Time Study in Great Britain. Time Study is defined as the determination of the proper time to allow for the effective performance of a specified task and is applied to repetitive work whose work content may be measured directly or derived synthetically. Following observation and recording of element times, a numerical rating is derived. (Observed rate of accomplishment of an element relative to concept of a standard rate and expressed on a suitable numerical scale is the Rating.) A Compensating Rest allowance is then applied to each element time value to compensate for physical and mental effort, posture, etc. This figure is then used to calculate a standard day's work. The appendix gives an example of the procedure. (HEIAS)

3615
Hajewski, T.R. FACTORS AFFECTING PUNCHING SPEEDS OF HOLLERITH OPERATORS. MECHANICAL FACTORS OUTSIDE THE CONTROL OF THE OPERATORS. Gofa Note 6, June 1954, 11pp. The College of Aeronautics, Cranfield, England.

On the basis of a number of tests using a standard keyboard under normal operating conditions and employing motion-study techniques, the following conclusions are reached respecting the influence on punching speeds of the various factors. The stroke of the key has very little influence on punching speeds; the spacing of the keys has an appreciable effect on punching speeds; the so-called "stiffness" of the punch is often not stiffness in the mechanical sense, but is a physiological reaction in the operator to different key-top pads; a certain amount of variability of pressure is always inherent in the machine, and operators are, within certain pressure ranges, extremely sensitive to such variability.

3624
Appley, D.G. & Appley, M.H. (Formerly Applezweig, D.G. & Applezweig, M.H.). STRESS AND BEHAVIOR: I. THE BEHAVIOR INTERPRETATION INVENTORY. Proj. NR 172 228, Contract N60R 396 (02), Aug. 1954, 15pp. ORR, Connecticut College, New London, Conn.

The prediction of behavior under stress may be made more meaningful within the framework of a motivational theory. Psychological stress is produced by a conflict of motives. An eclectic system of motivation was evolved, out of which a motivational measure was constructed. 31 behavior modes are listed; these represent varieties of responses which may be given to situational stimuli. The behavior interpretation inventory is a multiphasic motivational measure designed to yield a motivational profile. It consists of 124 items, 4 for each of the 31 behavior modes, each item containing a short description of a situation involving a mode of behavior, and 4 alternative responses describing reasons for the behavior described. The S chooses the most likely reason. 4 different forms have been constructed for the inventory. Analysis of data on all 4 forms is in progress. (HEIAS)

R 7

3625

Hollander, E.P. CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS: THE NEWPORT STUDY II. VALIDITY AGAINST IN-TRAINING CRITERIA. Contract NMR 760(06), Navy Tech. Rep. 2 56, Feb. 1956, 28pp. Carnegie Institute of Technology, Pittsburgh, Penn.

3625

From research completed with 23 trainee sections at the Naval Officer Training School in Newport, data are presented regarding the in-training validity of peer nominations as affected by three variables: 1) the period of time the group has spent together, 2) the nature of the set given (for research or for administrative purposes), and the quality or characteristic to be evaluated. The criteria used were pass-fail, final academic average, and final military aptitude grade. The usefulness of early peer nominations was discussed in light of the findings.

T. R 15

3627

Flanagan, J.C. (Dir.). RESEARCH NOTES. TROUBLE-SHOOTING. No. 10, Dec. 1954, 4pp. American Institute for Research, Pittsburgh, Penn.

The problem of maintenance of highly specialized electronics equipment is discussed in this research note along with a description of a logical and systematic method of trouble-shooting called the half-split method. This method is based on the premise that a trouble-shooting problem is essentially a mathematical problem. Assumptions and steps to be taken in using this technique are set forth. It is claimed that systematic use of the procedure promises greater efficiency in maintenance and more effective use of maintenance personnel. Its applicability to other than electronics equipment is discussed. (HEIAS)

R 1

3629

Fry, G.A. & Alpern, M. EFFECT OF FLASHES OF LIGHT ON NIGHT VISUAL ACUITY. PART I. Jan. 1953, 26pp. Vision Committee Secretariat, Armed-Forces-National Research Council, University of Michigan, Ann Arbor, Mich. (Ohio State University Research Foundation, Columbus, Ohio).

3629

To investigate the ability of the eye to see a dark object against a sky background at night after exposure to a brief flash of light, threshold measurements were made (three Ss) of the appearance of a vertical black bar on a background of constant luminance (0.0107 mL) following exposure to flashes of light varying in brightness, duration, number, area, and position in relation to test object. Data were given as time (seconds) required for return of visual acuity following flash exposure. Theoretical considerations were discussed.

T. G. I. R 7

3630

Allen, M.J., Fitts, P.M. & Slivinske, A.J. A MOVING TARGET OPTICAL PROJECTOR FOR USE IN AIR TRAFFIC CONTROL RESEARCH. Contract AF 33(616) 43, RDO 694 43, WADC Tech. Rep. 53 417, Jan. 1954, 8pp. WADC, USAF Aero Medical Lab., Dayton, Ohio.

The specifications and design of a moving target optical projector are described. This projector was specifically designed to meet the requirements of a versatile research apparatus in human engineering studies of air traffic control systems based upon ground displays of radar derived information. Although a few other optical simulators for air traffic control have been developed, none of these appears to offer all the advantages of the present one. The most important features of the simulator unit herein described are a) the linearity and precision of target movement which can be obtained without distortion or loss of focus of the image, b) the flexibility of coding provided for the target image and the area immediately surrounding each image, and c) flexibility in providing a simulated one-man display or a large projection screen which can be used by several controllers. The projector can be used singly or a large number can be used together. It can provide a static display, or when connected with a suitable course generator, it can produce a moving target display. The projector also has potential future use in an actual traffic control center.

3631

Ammons, R.B., Ammons, Carol H. & Morgan, R.L. TRANSFER OF TRAINING IN A SIMPLE MOTOR SKILL ALONG THE SPEED DIMENSION. Contract AF 33(038) 10 196, WADC TR 53 498, March 1954, 22pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Louisville, Louisville, Ky.).

3631

This study was conducted to obtain information on the general problem of the influence of the speed of a training task upon the performance of a following task. The task used was rotary pursuit at four different speeds. The speeds were assigned to the training and transfer periods in a way that resulted in all 16 possible combinations of speeds in the two periods and were presented under three different conditions of distribution of practice. A total of 48 subgroups were used forming a total of 193 Ss. The performance data were analyzed for transfer effects between tasks of different speed requirements.

T. G. R 20

3632

Ammons, R.B. KNOWLEDGE OF PERFORMANCE. SURVEY OF LITERATURE, SOME POSSIBLE APPLICATIONS, AND SUGGESTED EXPERIMENTATION. Contract AF 33(616) 95, WADC TR 54 14, Feb. 1954, 31pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Louisville, Louisville, Ky.).

3632

This report represents a systematization of much of the currently available information concerning the influence of knowledge of performance on learning, performance, and transfer of training. The results of a large number of studies are organized into 11 "empirical generalizations." Some possible applications of the generalizations to the design of training equipment are discussed and needed research studies, ranging from specific experiments to needed area programs, are indicated.

R 58

3633

Ammons, R.B., Ammons, Carol H. & Morgan, R.L. MOVEMENT ANALYSIS OF THE PERFORMANCE OF A SIMPLE PERCEPTUAL-MOTOR TASK UNDER VARIOUS CONDITIONS. RDO No. 694-17, Tech. Rep. 54-36, April 1954, 19pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

3633

To determine the value of motion pictures as a technique for recording, analyzing, and classifying movements made during the performance of a continuous perceptual motor task, a study was made of changes in rotary pursuit performance (64 subjects) due to duration of practice, introduction of rest periods, increased accuracy and rate of requirements. Motion picture recordings were made of the first and last twenty minutes of practice, and all movements were first classified into categories of types and then scored for each subject. Scoring reliability was estimated by correlating results from two scorers and by comparing performance scores for similar groups. The results were compared with those from other studies and validity of method determined. Implications for training are discussed. G. I. R 12

3635

Brown, K.T. FACTORS AFFECTING RATE OF APPARENT CHANGE IN A DYNAMIC AMBIGUOUS FIGURE AS A FUNCTION OF OBSERVATION TIME. WADC TR 53 482, Dec. 1953, 32pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3635

To investigate the rate of apparent change of an ambiguous figure (RAC) as a measure of certain physiological processes which contribute to visual fatigue, a method of determining curves showing RAC as a function of observation time was developed. A series of experiments were conducted to determine: 1) the general shape of the curve, 2) the relation between curves for right and left eyes of a given subject, 3) subject differences, 4) reliability of method, 5) differences in binocular and monocular curves, and 6) interocular transfer of increase in RAC.

T. G. I. R 31

3636 Brown, K.T. FACTORS AFFECTING DIFFERENCES IN APPARENT SIZE BETWEEN OPPOSITE HALVES OF A VISUAL MERIDIAN. J. Opt. Soc. June 1953, 43(6), 464-472. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.). (WADC Tech. Rep. 53-253.).

A difference in apparent size between opposite halves of the same visual meridian may be called a half-meridian difference (HMD). The HMD's have been measured in 6 subjects for both the horizontal and vertical meridians, using the right eye, left eye, and both eyes. All 6 kinds of measurements were made on each subject for periods of from 2 to 9 weeks. Significant differences were found between the HMD's of the left and right eyes in both meridians. Thus an ocular factor contributes to HMD's. This factor appears to be different visual angles for corresponding retinal points. Trends were sometimes found with respect to time, so there is also an unstable factor in the visual system which contributes to HMD's. This factor varies independently along the horizontal and vertical meridians. With a given meridian, however, the HMD's of the left and right eyes vary concomitantly. Thus the unstable factor is common to the two eyes and is probably located in the visual cortex. Since trends were found with respect to time, this means that for a given locus of retinal stimulation the subjective directional value relative to a foveal stimulus varies in a similar manner with respect to time. Thus topological transformations of subjective directional values have been found to occur. HMD's produced by the ocular factor appear relatively stable and usually small, whereas the HMD's of the left and right eyes are modulated concomitantly by the unstable factor, which sometimes causes large HMD's. These findings indicate that the relation between visual angles for a pair of corresponding retinal points is relatively stable, but the subjective directional values of both members of the pair with respect to a foveal stimulus sometimes vary markedly and concomitantly as a function of time.

R 19

3639 Gatti, Jennie. REPORTS OF RESEARCH IN THE FIELD OF ENGINEERING PSYCHOLOGY. Proj. 7180. WADC Tech. Rep. 54-220, Sept. 1954, 31pp. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio)

This bibliography lists by functional groupings the authors and titles of the reports published by the Psychology Branch, Aero Medical Laboratory, Directorate of Research, Wright Air Development Center, since its inception in 1945.

3637 Duncan, C.P. & Underwood, B.J. TRANSFER OF TRAINING AFTER TWO DAYS OF PRACTICE WITH ONE TASK OR WITH VARIED TASKS. Contract AF 33(616) 308, Proj. 7197, WADC TR 54 381, Sept. 1954, 14pp. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Northwestern University, Evanston, Ill.).

3637

To compare the effects of constant versus varied training on transfer of training, three groups of 45-46 college students practiced for two days pushing a lever into the slot appropriate to a visual stimulus. Stimuli were forms, nonsense syllables, and patches of color. One group practiced the same task (same stimuli) both days; another practiced five different tasks each day; the third had five different stimulus-response pairings each day. After training, all groups learned three additional tasks. Results (correct responses on final tasks) were analyzed for effects of variety of practice on transfer. Implications for the design of training equipment were discussed.

T. G. R 7

3638 Duncan, C.P. & Underwood, B.J. TRANSFER OF TRAINING AFTER 10 DAYS OF PRACTICE WITH ONE TASK OR WITH VARIED TASKS. Contract AF 33(616) 308, WADC TR 54 115, May 1954, 24pp. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Northwestern University, Evanston, Ill.).

3638

To study the effects of variety of practice on transfer of training, three groups of 36-37 college students practiced for ten days moving a lever appropriately in response to visual stimuli (forms, nonsense syllables, color patches). Conditions for the three groups were: 1) same task for ten days, 2) different task (stimuli) each day, and 3) same task but stimuli and responses reversed each day. Then all learned four final tasks in four days. Results (correct responses in final tasks) were analyzed for the effect of variety of practice on transfer, and implications for the design of training devices were discussed.

T. G. I. R 14

3640

Levine, M. TRACKING PERFORMANCE AS A FUNCTION OF EXPONENTIAL DELAY BETWEEN CONTROL AND DISPLAY. Contract AF 18(600) 50, RDO 694 44, WADC TR 53 236, Oct. 1953, 15pp. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3640

To provide a description of the functional relationship between tracking performance and exponential delay between control and display, twelve subjects (in two experiments) performed a compensatory tracking task with different amounts of delay ranging from .015 to 2.700 seconds. A function relating time-on-target to amount of delay was generated. Implications of the results for equipment design are discussed.

T. G. I. R 1

3641

Hittinger, W.F. A PROCEDURE FOR INVESTIGATING CERTAIN BASIC VARIABLES IN THE VOICE COMMUNICATION PROCESS. Contract DA 49-025-SC-150, DA Proj. DA-3-99-01-001, SC Proj. 102E, Rep. 57-M-8, Jan. 1956, 122pp. (Haller, Raymond, & Brown, Inc., State College, Penn.).

3641

This report contains a discussion of one military communication problem of lost net-use time and such variables as human factors, training, type hardware, type system, form of communication, effects of line noise or jamming and high ambient noise. An experimental procedure is developed for investigating the relative effectiveness of delayed and instantaneous break-in facilities in a communication system. Included as appendices are fully developed plans to implement the experimental procedures: (1) training and task considerations, (2) equipment and instrumentation, and (3) analysis of variance treatment of data.

I. R 94

3642

Jerison, H.J., & Wing, S. EFFECTS OF NOISE AND FATIGUE ON A COMPLEX VIGILANCE TASK. Contract AF 18(600)-50, Proj. 7193-71614, Tech. Rep. 57-14, Jan. 1957, 15pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

3642

To investigate the effect of noise stress on vigilance, nine subjects (college students) with normal hearing were required to monitor three clocks simultaneously and to respond when a clock hand made a double jump (about one minute for each clock). The experimental session consisted of 1/2 hour in quiet and 1 1/2 hours in noise (114 decibels); the control session was two hours in quiet (83 decibels); order of presentation was counterbalanced among subjects. Percent correct responses were analyzed as a function of time for both quiet and noise conditions. A further analysis of frequency of spontaneous responses was made. The findings are related to similar studies. T. G. I. R 5

3643

Morgan, H.L., Eckstrand, G.A., Rockway, M.R. & Newton, J.M. VERBALLY MEDIATED TRANSFER AS A FUNCTION OF ORDER OF TASKS. Contract AF 19(600) 78, WADC TR 54 41, Feb. 1954, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3643

To investigate the effects of order of training tasks on transfer of training, eight groups of 35 college students were tested. Four experimental groups learned (in varying order) verbal and motor responses to the same stimuli (visually perceived forms), then the same verbal responses to new stimuli, while four control groups learned different verbal responses to the two sets of stimuli. Then all groups transferred the previously learned motor responses to the new stimuli. Performance on the final task was evaluated for transfer as a function of order-of-presentation and interpreted in terms of Hull's theory of "mediated stimulus equivalence." T. G. I. R 8

3644

Simon, C.W. EFFECTS OF STRESS ON PERFORMANCE IN A DOMINANT AND A NON-DOMINANT TASK. Contract W33 038 AC 19816, WADC TR 54 285, June 1954, 41pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

3644

To study the relative effects of stress on dominant and nondominant tasks, 80 male college students practiced for varying amounts of time on a task requiring making settings by turning a knob to move a light. A clockwise turn of the knob caused the light to move clockwise (dominant task) for some Ss, counter-clockwise (nondominant task) for others. Then varying degrees of stress were introduced in the form of simultaneous tasks. Performance under stress was compared for the dominant and nondominant groups, and the results were discussed in terms of then-current learning theory. T. G. I. R 29

3645

Teichner, W.H., Kobrick, J.L. & Wehrkamp, R.F. EFFECTS OF TERRAIN AND OBSERVATION DISTANCE ON DEPTH DISCRIMINATION. Rep. 228, May 1954, 23pp. USA Quartermaster Research & Development Center, Natick, Mass.

3645

To determine the effects of observation distance, type of terrain, and time of day on monocular and binocular depth discrimination, an experimental study was conducted in the desert. Three types of terrain (sand, silt, and desert pavement) and a macadamized airstrip were the physical areas studied; distances of observation varied from 200 to 3000 ft.; and both mid morning and mid afternoon tests were made. Four Ss were used to obtain discriminations of the equality of spatial positioning of two homogeneous, smooth-textured, rectangular targets. The data were analyzed for the effect of these environmental factors on the precision of this visual function. T. G. I. R 31

3646

White, W.J. & Sauer, Shirley C. SCALE DESIGN FOR READING AT LOW BRIGHTNESS. Contract AF 18(600) 25, WADC TR 53-464, March 1954, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3646

This study concerned the manner in which speed and accuracy of quantitative scale reading vary as a function of graduation mark width and interval size under three intensities of red illumination such as are encountered in cockpits at night. The data consisted of time and error scores obtained by 18 Ss, each serving under all conditions. Graduation mark width varied from 0.008 to 0.063 inch; graduation intervals varied from 0.05 to 0.25 inch; and illumination levels were 0.002, 0.01, and 0.10 ft.-L. Conclusions were drawn concerning dimensions of scales for visual presentation of quantitative information in aircraft cockpits. T. G. I. R 13

3647

Mackie, R.R., Morehouse, L., & Clegg, D.A. MEASUREMENT OF FORCES AFFECTING HUMAN BODIES IN AIRCRAFT ACCIDENTS: A STUDY OF THE CRASHES DURING LANDING OF TWO INSTRUMENTED P6F DRONE AIRCRAFT. Contract Monr 1527(00), Proj. NR 118-381, Tech. Rep. 2, Feb. 1956, 36pp. Human Factors Research, Inc., Los Angeles, Calif.

3647

To determine whether instrumentation might provide crash load data which would be useful to those confronted with the task of designing for crash survival, accelerometers were placed in drone aircraft used for missile evaluation. The accelerometers, which were actuated upon being stimulated by a force of 8g or more and would continue for eight seconds, were mounted on the seat. Pictures were taken of a crash whenever possible. Findings (crash history, records of the magnitude and pattern of g forces with respect to time for duration of crash) from two airplane crashes were obtained and studied. Recommendations for future research are made. G. I

3649
Lundervold, A.J.S. ELECTROMYOGRAPHIC INVESTIGATIONS OF POSITION AND MANNER OF WORKING IN TYPEWRITING. Acta Physiol. Scand., 1951, 24: Suppl. 84. (Neurological Clinic and Pharmacological Institute, University of Oslo, Oslo, Norway & Human Anatomy Dept., University Museum, Oxford, England).

18 women and 29 men, belonging to different age-groups and having varying degrees of practice in typing, were subjected to electromyographic examination while typing on the machine. The combined force of muscle contractions increased when: writing speed increased, the writer was tired or chilled, in cases of loud noise, bad lighting and under psychic influences. Unpracticed writers and those in whom insertion activity had been recorded employed more muscle power than the others. Examination of individual motor units in patients with peripheral paresis showed that the same motor units were active in slow typing as in typing with maximum rapidity. In 51 out of 63 persons with occupation myalgia examined electromyographically insertion activity was recorded. All those used greater muscle power when writing on the machine than did the healthy Ss, and there were frequently recorded continuous action potentials during typing. (HEIAS)
R 180

3650
Guedry, F.E., Jr. & Niven, J.I. INTERACTION OF VESTIBULAR STIMULI OF DIFFERENT MAGNITUDES AND OPPOSITE DIRECTIONS. PART I. PERCEPTION OF VISUAL APPARENT MOTION DURING ANGULAR ACCELERATIONS. Contract W00R 434, TO 1 ONR Proj. NR 143 455 & Bumsburg. Proj. NM 001 063 01 36, Joint Proj. Rep. 36, Dec. 1954, 14pp. USAF School of Aviation Medicine, Naval Air Station, Fla.

3650
To investigate the validity of the torsion pendulum analogy for semicircular canal function, three subjects were accelerated to a predetermined level and then braked to a stop to produce positive and negative accelerations in rapid succession. They reported on the direction and duration of apparent motion of a visual target (oculogyral illusion). The obtained data were fitted by theoretical equations which had been derived from the standard differential equation for a torsion pendulum. The correspondence between experimental and theoretical data was examined.
G. R 4

3651
Bradley, J.V. DESIRABLE CONTROL-DISPLAY RELATIONSHIPS FOR MOVING-SCALE INSTRUMENTS. Proj. 7182 71514, WADC TR 54 423, Sept. 1954, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3651
This report summarizes a series of experiments designed 1) to investigate the effects of certain control-display relationships on making settings with moving-scale instruments, and 2) to attempt to find the optimum control to moving-scale display relationship. In each experiment several display-control assemblies were used which required the subject to make settings on the moving-scale dial by a knob control which was located below or above the dial. In one case a moving-pointer was used. The relationships of control and display were varied as to direction of scale increase and knob turn, and direction of scale rotation in relation to knob turn. Errors in setting were recorded and analyzed. Recommendations are included.
G. I. R 7

3651
Baker, C.W. FORMATION LIGHTS FOR FIGHTER AIRCRAFT. Proj. 7180, 170C Tech. Rep. 55 124, March 1955, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

An important consideration in the design of formation reference lighting on fighter aircraft is that the wing pilot should be provided with unambiguous information about the attitude and distance of the lead aircraft. The present formation lighting system used on fighter aircraft is inadequate in this respect, and, at least partially as a result of this, pilots frequently experience disorientation and confusion during night formation flight. The past research on formation lighting is reviewed and recommendations are made for modifications of the present formation lighting systems. These recommended modifications include: a) redesign of the wing-tip navigation lights so that they provide suitable reference lighting for wing aircraft, b) installation of a linear light on the fuselage near the wing root, and c) the use of a single rotary detent control knob which provides control for 3 brightnesses of formation lights, navigation lighting for cruise and join-up, and an off position.
R 16

3653
Loucks, R.B. LEGIBILITY OF AIRCRAFT INSTRUMENT DIALS: THE RELATIVE LEGIBILITY OF VARIOUS CLIMB INDICATOR DIALS AND POINTERS. Proj. 286, Nov. 1944, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Various modifications of the AC Type C-2 climb indicator were compared as to the accuracy with which they can be read during brief exposures. Removal of all mid-division lines beyond the 500-foot point as well as the words "up" and "down" results in a dial which is more legible than the standard indicator. It is clear from the reports of subjects being tested that mid-division lines which change in value from one part of a scale to another prove confusing and give rise to errors. Although a majority of subjects being tested prefer the dial with numbers at each of the scale divisions, the numerals at the 3,000 feet and 5,000 feet points of the simplified dial referred to above can be omitted without decreasing its legibility. Under the specific conditions of this experiment, numbers and division lines 1/32 inch in thickness are as legible as heavier lines and numbers, and are superior to lines and numbers 1/64 inch in thickness. A pointer which has only a luminous tip is inferior in legibility to the standard dial hand, but a pointer with a strip of luminous paint only 1/32 inch in width, throughout its length, is as satisfactory as the standard hand.

3654
Loucks, R.B. LEGIBILITY OF AIRCRAFT INSTRUMENT DIALS: THE RELATIVE LEGIBILITY OF MANIFOLD PRESSURE INDICATOR DIALS. Proj. 325, Dec. 1944, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Objective data are reported for providing specifications for optimum legibility of aircraft manifold pressure dials. With ultraviolet light the standard manifold pressure indicator dial (AC Type D-10) exhibits an improved legibility when the small numbers at the mid-division marks are obscured. A manifold pressure dial with 1/4 in. numbers is superior to a dial with 3/16 in. figures. It appears desirable to compress the width of the numerals in relation to their height in order that the association between a particular number and its appropriate division mark is of optimal clarity. It has been demonstrated that the starting point of a scale can be shifted considerably without affecting the dial's legibility. Within certain limits, the legibility of a dial appears to be closely associated with the angular spacing of the division marks. Two scales which have a difference in the angular spacing of the division marks that is only about one and a half degrees exhibit a statistically significant difference.

3655 Loucks, R.B. EVALUATION OF AIRCRAFT ALTITUDE INDICATORS ON THE BASIS OF LINK INSTRUMENT GROUND TRAINER PERFORMANCE. Proj. 341, Rep. 1, June 1945, 17pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Four different types of artificial horizon indicator have been compared with the standard AAF type of horizon indicator in terms of the objectively scored Link trainer performance as the subject attempts to maintain the fuselage in level and horizontal flight under conditions of rough air. All of the modified horizon indicators tend to show a slight superiority to the conventional instrument as contrasted with the differences between two similar instruments, and in the case of one category of measurement with the British type of horizon there is some degree of statistical significance to such differences. The indicator in which the moving pointer and horizon bar rotate in an opposite direction to that of the conventional type of AAF flight indicator is the one instrument that shows a superiority which has a questionable statistical significance. The reversed rotation indicator is also the one instrument which is most consistently preferred by the subjects. From an analysis of the various factors which have been tested in the four comparisons of modified instruments vs. standard, it is concluded that the most easily interpreted horizon indicator is one in which the reference horizon line remains fixed and the miniature aircraft rotates clockwise and when the plane rolls to the left the miniature aircraft rotates counter-clockwise, that when the plane climbs, the tail of the miniature aircraft moves below the fixed horizon line that is nearest to the pilot.

3656 Saul, E.V., Raben, Margaret W. & Jaffe, J. THE EFFECTS OF RIFLE RECOIL ON MARKSMANSHIP PERFORMANCE: A REVIEW OF THE LITERATURE AND THE DESIGNATION OF RESEARCHABLE HYPOTHESES. Contract DA 19-029-ORD 3461, Proj. TB 1-1000, Proj. Rep. 1, May 1955, 16pp. Institute for Applied Experimental Psychology, Univ. of Massachusetts, Medford, Mass.

3656 This paper presents the results of a concise survey of the literature relating the effects of rifle recoil to shooter behavior. A series of problems, amenable to experimental investigation, are suggested. These problems pertain to: 1) motor performance characteristics of the shooter and 2) design characteristics of the weapon. T. R. 21

3657 Harter, G.A., & Fitts, P.M. THE FUNCTIONAL SIMULATION OF COMPLEX SYSTEMS BY MEANS OF AN ANALOG COMPUTER, WITH THE F-86D, E-4 SYSTEM AS A SPECIFIC EXAMPLE. PART I. Contract AF 18(600)-1201, Proj. 7716, Tasks 77292 & 57050, Res. Rep. AFPTRC-TN-56-133, Part I, Dec. 1956, 12pp. Interceptor Pilot Research Laboratory, AFPTRC, Tyndall AFB, Fla.

3657 This report deals with the problem of simulation of complex systems, such as aircraft and radar, for training and research. A technique is described for analyzing certain types of physical systems for the purpose of determining how the system can be described mathematically and represented by an appropriate set of equations in an electronic computer. Such problems as degree of fidelity of simulation required and design of general purpose equipment that could be readily modified to represent new or novel systems are considered. Advantages and limitations of such a simulator are discussed. G. I. R 10

3661 Scales, Edythe M. & Chapanis, A. THE EFFECT ON PERFORMANCE OF TILTING THE TOLL-OPERATOR'S KEYSSET. J. Appl. Psychol., Dec. 1954, 38(6), 452-456. (Bell Telephone Laboratories, Inc., Murray Hill, N.J. & Johns Hopkins University, Baltimore, Md.).

3661 To investigate two measures of keying performance, accuracy and time, as a function of inclination of the keyset, 16 subjects were tested. The keyset was inclined at eight angles (0, 5, 10, 15, 20, 25, 30, and 40 degrees) relative to the horizontal working surface. Both practice and test sessions were included in the study, each extending over eight days. The subject's task was to key lists of ten-place number and letter combinations. Eight-by-eight Latin squares were used, the principle variables being subjects, days, and inclinations of the keyset. Time and error scores were analyzed for the effect of the variables with the results presented in a series of graphs. G. I. R 2

3662 Field, Sally M., & Davis, S.W. FATIGUE AND STRESS SYMPOSIUM, 24-26 JANUARY, 1952. Proj. Doughboy, Tech. Memo ORO-T-185, Sept. 1952, 139pp. Operations Research Office, Johns Hopkins University, Maryland.

3662 This symposium was aimed at providing background knowledge and experience in the areas of fatigue and stress. Each of nine researchers presented a summary of the pertinent information in his field and recommended possible measurement techniques for use under combat conditions and in future research. T. G.

3663 Bahrick, H.P., Noble, M. & Fitts, P.M. EXTRA-TASK PERFORMANCE AS A MEASURE OF LEARNING A PRIMARY TASK. Contract AF 33(038) 10528, Res. Bull. AFPTRC TR 54 119, Dec. 1954, 5pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (Reprinted from: J. Exp. Psychol., Oct. 1954, 48(4), 298-302).

3663 This report describes a test of a technique for seeking information on the degree of learning of a task through performance on an extra task. After varying amounts of practice on a task requiring the pressing of a response key to a visual stimulus, 140 college students continued performing the primary task while also performing mental subtractions. For some Ss the visual stimuli were repetitive, for others, random. Performance on both tasks (during simultaneous performance) is analyzed regarding the additional information on learning and overlearning repetitive and random tasks contributed by the subtraction scores. T. I. R 6

3664 Gibson, Eleanor J. & Bergman, R. THE EFFECT OF TRAINING ON ABSOLUTE ESTIMATION OF DISTANCE OVER THE GROUND. Contract AF 33(038) 22373, Proj. 7706, Task 77116, AFPTRC TR 54 95, Dec. 1954, 29pp. USAF Skill Components Research Lab., Lackland AFB, Tex.

3664 To determine the effect of training on absolute judgment of distance over the ground, 21 targets (18 by 24 inches, designated by a three-plate, three-color system) were arranged on a level mown grass field at distances varying from 43 to 435 yards as viewed from six different station points. A pretest and posttest were given to two groups (122 Ss). Interpolated activity differed: Group I received training (knowledge of results), Group II performed a paper-pencil test. Scores (estimates in yards) for the two groups on pre- and posttests were analyzed for effect of training. The course of learning was further analyzed. T. G. I. R 17

3666

Pickrel, E.W. PREDICTION OF THE TRAINABILITY OF "SLOW LEARNERS" FROM TESTS WITH A SYMBOLIC AND NONSYMBOLIC CONTENT. Proj. 7703, Task 77078, Res. Bull. AFPTRC TR 54-82, Dec. 1954, 12pp. USAF Personnel Research Lab., Lackland AFB, Tex.

3666

To study the efficacy of symbolic tests in evaluating men of marginal ability, two experiments were performed. In the first, two symbolic (words) and two nonsymbolic (pictures of concrete objects) tests and a reading test were administered to 274 airmen of marginal ability. In the second, symbolic and nonsymbolic tests were administered to 213 marginal airmen who were also trained on simple verbal and mechanical tasks. Correlational analyses of test results were interpreted regarding the nature of abilities measured with symbolic and nonsymbolic tests and the tests' comparative predictability of success in verbal and mechanical tasks.

T. R. 10

3667

Lesli, W. TRANSFER IN BURST CONTROL HABITS. Proj. 7708, Task 77141, Res. Bull. AFPTRC TR 54-81, Dec. 1954, 14pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

3667

This is a study of the effects of inverting the ratio of time triggering a burst in aerial gunnery to time resting between bursts on learning a desired burst-rest ratio. Eighty-four gunnery trainees were given special practice on maintaining a 1.5:0.5 ratio, then were given one or two tests with gun-cameras with a ratio of 1.5:4.0 required. A control group (68 Ss) was tested without prior practice. Results (errors in maintaining the required burst-rest ratio) were interpreted regarding the effects of such ratio inversion in training.

T. R. 11

3668

Volers, W.D. A COMPARISON OF THE COMPONENTS OF SIMULATED RADAR BOMBING ERROR IN TERMS OF RELIABILITY AND SENSITIVITY TO PRACTICE. Proj. 7713, Task 77219, Res. Bull. AFPTRC TR 54-74, Dec. 1954, 14pp. USAF Crew Research Lab., Randolph AFB, Tex.

3668

This study pertains to the problem of the effects of practice on the components of visual bombing error, and the consequences for proficiency evaluation. Simulated radar bombing was carried out by B-29 crew members during their combat training. The data were analyzed to discover the differences between range and deflection measures in terms of constant (mean) error, reliability, and sensitivity to practice. Circular error was also included in certain comparisons. The influence of the following factors was treated: targets, axes, crews, using a particular target, and within-crew variability.

T. G. R. 3

3669

Lawrence, D.H. & Goodwin, W.R. TRANSFER IN TRACKING BEHAVIOR BETWEEN TWO LEVELS OF SPEED. Contract AF 33(038) 14350, Proj. 509 C20 0009, AFPTRC TR 54-70, Dec. 1954, 11pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (Stanford University, Stanford, Calif.).

3669

To investigate the transfer effects on changing between tracking tasks of different speeds, 54 college students practiced tracking with a joystick for 22 trials. Targets had two speeds (approximately 75 and 100 targets per min.). Groups practiced varying amounts (0-18 trials) at the slow speed, then shifted to the fast speed. Hits on high speed trials were analyzed as a function of amount of practice at slow speed and with regard to whether the S shifted to high speed when told to or when he felt ready to.

T. G. R. 1

3670. Gibson, J.J. THE VISUAL PERCEPTION OF OBJECTIVE MOTION AND SUBJECTIVE MOVEMENT. Psychol. Rev., Sept. 1954, 61(5), 304-314. (Cornell University, Ithaca, N.Y.)

3 problems are first considered: how we see the motion of an object, how we see the stability of the environment, and how we perceive ourselves as moving in a stable environment. The experimental evidence on the perception of motion and movement is surveyed and the implications are stated as hypotheses for consideration and research. Some preliminary assumptions toward a psychophysics of kinetic impressions are set forth; these include the classification of relevant motions into 6 types: translation, rotation, size transformation, perspective transformation, deformation, multiple movements. The physical events producing these geometrical types of motion are described. (HEIAS)

R 19

3672. Bennett, V.F., Fitts, P.M. & Noble, M. THE LEARNING OF SEQUENTIAL DEPENDENCIES. J. exp. Psychol., Oct. 1954, 48(4), 303-312. (Ohio State University, Columbus, Ohio).

The 4 experiments reported here are concerned with: a) the relative difficulty of learning digram versus trigram probabilities, and b) the effect in such situations of sequential guessing habits. Exp. I was designed to determine sequential guessing habits in a situation where it was possible to make only a chance number of successes. 20 Ss predicted which of 5 events would occur, with knowledge of results provided after each response. By using a restricted random procedure, all possible engrams, digrams, and trigrams appeared equally often. The pattern of correct responses thus had maximum uncertainty. In Exp. II, 2 groups of 20 Ss each were given patterns which had equal engram but unequal digram (and trigram) probabilities. For one group the digrams conformed to the digram guessing habits obtained in Exp. I (Concordant group); the digrams for the other group were those used infrequently in Exp. I (Discordant group). A total of 10 digrams was used for both groups; practice continued for a total of 250 responses (25 repetitions of each digram). Exps. III and IV were similar to Exp. II except that trigram instead of digram patterns were used. All possible engrams and digrams appeared equally often in the pattern of correct responses; an appropriate prediction had to be based on the 2 preceding events. A total of 50 trigrams was used for both groups in each of these experiments. In Exp. III a total of 500 responses (10 repetitions of each trigram) was given. In Exp. IV the principle by which such patterns are generated was explained, and a total of 1000 responses (20 repetitions of each trigram) was given. It was found that the digram patterns of Exp. II were learned, but that little or no learning occurred with the trigram patterns of Exp. III and IV. It also was found that the influence of guessing habits persisted for an appreciable number of responses, especially when there was little learning.

R 11

3677
Shaw, M.E. SOME EFFECTS OF UNEQUAL DISTRIBUTION OF INFORMATION UPON GROUP PERFORMANCE IN VARIOUS COMMUNICATION NETS. *J. abnorm. soc. Psychol.*, Oct. 1954, 49(4), 547-553, Res. Bull. AFPTRC TR 54 115. (University of Wisconsin, Madison, Wisc.).

3677

To examine the effects of unequal distribution of problem-related information in different group structures, 15 four-man groups were randomly assigned to six experimental conditions (combinations of two types of information distribution - equal and unequal, and three communication nets - wheel, slash and circle). Each group solved three eight-item problems; each subject completed a questionnaire from which indices of morale and leadership were derived. Time, number of message units, and errors were recorded for individual positions and structures. The data were analyzed for effect of variables upon leadership, morale, and problem-solving efficiency. The centrality index was examined in light of these results.
T. I. R 8

3678

Biser, E., & Meyerson, M. THE APPLICATION OF DESIGN OF EXPERIMENTS AND MODELING TECHNIQUES TO COMPLEX WEAPONS SYSTEMS. SC Proj. 414A, DA Proj. 3-14-02-041, Engng. Rep. NR. E-1193, Oct. 1956, 18pp. Signal Corps Engineering Laboratories, Fort Monmouth, N.J.

3678

This article presents the conceptual plan and framework used to establish a Design of Experiments for a weapons system. A stochastic model for analyzing the system is outlined and its application discussed. The Monte Carlo calculational technique is utilized in assessing model parameters. The model is described as containing a fixed physical system, an assignment procedure, weapon characteristics, and a standard operating procedure.
I.

3679
Bilodeau, E.A. RATE RECOVERY IN A REPETITIVE MOTOR TASK AS A FUNCTION OF SUCCESSIVE REST PERIODS. *J. exp. Psychol.*, Sept. 1954, 48(3), 197-203. USAF Personnel & Training Research Center, Lackland AFB, Texas. (Skill Components Research Lab., Lackland AFB, Texas.) (IR 54 113)

5 groups of 5s practiced cranking as fast as possible for 10, 30, 90, or 180 sec. trials. Practice trials were distributed by interpolating either 0, 10, 30, 90, or 180 sec. of rest between trials. In general, rate of cranking decreased as a function of practice time or of number of previous practice trials. At all points each rest group was appropriately ranked from that with longest interpolated rest to that with least interpolated rest. Examination of recovery revealed the typical rest recovery function; that is, the rest recovery associated with rest 1 was an increasing and negatively accelerated function of rest duration. With successive rest periods, however, the amount of recovery increased progressively for the shorter interpolated rest periods, but decreased progressively for the longer resting period. This trend continued until two of the rest groups had exchanged their relative ranks. An extrapolation beyond the last rest period suggested a point at which recovery might be independent of all four rest durations. The independence after additional rests was verified for groups with 10 and 90 sec. of rest by replicating these groups, but using twice the number of rests. A comparison of the differences between the various resting conditions and the no-rest control group showed the greatest difference between groups to take place early in practice, but the most marked adjustment in difference between groups during the initial period of practice. This analysis, together with others, suggested that during the successive additional periods there is a rapid adjustment in rate of cranking and that with successive additional periods of practice and rest there is but a slight further adjustment in the pacing effect.
R 9

3682
Anderson, G.V., Fruchter, B., Manuel, H.T. & Vorchel, P. SURVEY OF RESEARCH ON SPATIAL FACTORS. Contract AF 33(038) 11046, Proj. 503 002 0001, Res. Bull. AFPTRC TR 54 84, Dec. 1954, 59pp. USAF Personnel and Training Research Center, Personnel Research Lab., Lackland AFB, Tex. (University of Texas, Austin, Tex.).

This survey outlines the progress of research which has attempted to describe the spatial abilities by factor analytic techniques. It deals with discussions of the nature of space as shown in correlational and factorial studies of ability and with the present status of research on spatial factors. The treatment is from two points of view, the historical development of factor description and the comparison of factors found in research utilizing various types of spatial tests. The original research descriptions of these factors are presented and new interpretations which lead to some new hypotheses are developed. (HEIMS)
R158

3686

Parks, R.B. VERBAL FEEDBACK IN PEDESTAL SIGHT MANIPULATION. Proj. 7708, Task 77141, Res. Bull. AFPTRC TR 54 91, Dec. 1954, 8pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

3686

To study the effects on gunnery performance of being informed verbally of results, 133 student airmen practiced (16 trials per day for five days) tracking and framing with a pedestal sight. Knowledge of results differed for different groups, including none (control), general knowledge of errors for individuals and for groups, and precise knowledge of errors for individuals. Improvement in time-in-error scores in range, azimuth and elevation is evaluated for the effects of amount and kind of verbal feedback.
T. G. R 5

3688

Muckler, F.A. & Matheny, W.G. TRANSFER OF TRAINING IN TRACKING AS A FUNCTION OF CONTROL FRICTION. Contract AF 33(038) 25726, Proj. 7706, Task 77122, Res. Bull. AFPTRC TR 54 122, Dec. 1954, 14pp. USAF Skill Components Research Lab., Lackland AFB, Tex. (Reprinted from: *J. appl. Psychol.*, 1954, 35(5), 364-367).

3688

The transfer of training in a manual pursuit tracking task was studied as a function of changes in control friction. A subject body of 105 Air ROTC students was divided into seven groups—a control group (no friction change), three groups with different increases in control friction, and three groups with different decreases in control friction. Results were expressed as mean number of trials to reach criterion of initial control friction, and their implications were discussed.
T. G. R 17

3710

Bair, J.T., & O'Connor, W.F. ANXIETY AND FLYING: III. CORRELATES OF PRE-SOLO STUDENT ATTITUDES TOWARD FLIGHT INSTRUCTORS. Special Rep. 56-25, Oct. 1956, 5pp. US Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3710

This study was designed to investigate the relation between certain attitudes of beginning flight students toward their instructors and their attitudes toward flying. A twenty-item sentence-completion test was administered to 93 cadets. Attitudes toward flying were correlated with attitudes toward instructors. The relation between certain attitudes toward flying (e.g., threatened by hazards involved) and attitudes toward instructors (e.g., criticalness) is discussed along with the general relation between student-instructor involvement and the student's involvement in the task of flying.

T. R 3

3712

Ludvig, E., & Miller, J.W. AN ANALYSIS OF DYNAMIC VISUAL ACUITY IN A POPULATION OF 200 NAVAL AVIATION CADETS. Contract Nonr-586(00), ONR Proj. NR-142-023, BuMed Proj. NM 001-075.01.07, Joint Proj. Rep. 7. Dec. 1954. 18pp. U.S. Naval School of Aviation Medicine, N.A.S., Pensacola, Fla.

3711

To analyze dynamic visual acuity, the ability of 200 Naval Aviation cadets to see moving targets (Landolt Ring) was tested. The results are presented and some aspects of the data are analyzed. The chief variables considered are the thresholds determined at an angular velocity of 200/sec. and 1100/sec. and the a and b parameters of the empirical equation $y = a + bx$ relating visual acuity to angular velocity of the test object. The frequency distribution of each of these variables is presented and tested for normality. Correlations between the variables are also analyzed and discussed.

3713

Duestsch, J.J., & Herbert, M.J. THE DEVELOPMENT OF A STATIC TARGET APPARATUS AND TASKS FOR THE STUDY OF CONTROL AND RETICLE CHARACTERISTICS. Proj. 6-95-20-001, Rep. 187, May 1955, 16pp. AMRL, Fort Knox, Ky.

3713

A target-alignment apparatus is described which use rate controls and a cathode-ray tube display to permit study of control and reticle configurations. To compare two methods of hand-control manipulation, two preliminary experiments were performed. In one study, all movement was restricted to the right hand; in the other, each hand controlled a separate plane. Three measures of performance were obtained: total time to align target with reticle initial error (a first movement which moved target away from reticle and final error (target not in alignment at moment of triggering). Scores were studied for differences due to type of control and for usefulness in further research on the apparatus.

T. G. I. R 2

3714

Williams, R.H. (Ed.). HUMAN FACTORS IN MILITARY OPERATIONS. Proj. SHOP, Tech. Memo. ORO T 259, Jan. 1954, 406pp. Operations Research Office, Johns Hopkins University, Chevy Chase, Ind.

3714

This is "... an analysis of human factors in military operations, with emphasis on the socio-psychological system of factors." Literature is reviewed and summarized for the following topics: the American community, some aspects of training, a problem in human engineering, emotional factors in combat, and group organization and dynamics. Recommendations are made for manpower policies, and the need for further research is discussed.

T. R 413

3715

Payne, R.B. & Harty, G.T. THE INFLUENCE OF DRUGS, MOTIVATION, AND JOB DESIGN UPON WORK DECREMENT. Rep. 55 16, Jan. 1955, 12pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

3715

To investigate the effects of drugs, motivation, and job design upon work decrement, 144 Ss were asked to perform on the USAF SAM Multi-dimensional Pursuit Test under 36 combinations of the following experimental conditions: four pharmacological treatments (no drug, placebo, dexadrine, and benadryl-hyoscine); three tuitional treatments (three levels of warning signals); and three motivational feedback treatments. The results are presented and discussed in terms of the relative effect upon proficiency of each of the variables and the combinations of variables.

T. G. R 27

3721

Gerjuoy, H. & Bechtoldt, H.P. GENERALIZATION EFFECTS IN SUCCESSIVE DISCRIMINATION LEARNING AS MEASURED BY RESPONSE SIMILARITY. FINAL REPORT. Contract NONR 1261 (00), Proj. NR 154 154, March 1955, 99pp. Dept. of Psychology, State University of Iowa, Iowa City, Iowa.

3721

This is a report of a series of studies (involving 261 college students) on discrimination learning with complex stimuli. Ss were required to learn appropriate motor or verbal responses to the position of a stimulus that included (in addition to position) such irrelevant cues as colors and auditory cues. Major variables were: number of discriminations to be learned concurrently, nature of various cues, and relative frequency of stimuli presentation. Results are discussed with regard to the interaction of generalization effects.

T. G. I. R 24

3722

Stevens, S.S. PITCH DISCRIMINATION, MELS, AND KOCK'S CONTINUITY. J. Acoust. Soc. Amer., Nov. 1954, 26, 1075-1077. Contract NSori-76, Proj. Order 1, ONR. (Harvard University, Psycho-Acoustic Lab.)

Recent data on pitch discrimination are shown to agree reasonably well with the values that would be predicted on the assumption that Jnd's for pitch are subjectively equal when measured in mels. The facts relating to-diplacsis and the estimation of musical intervals suggest that the difference limen may be expected to vary irregularly with frequency. A further argument is made that Kock's theoretical explanation of pitch discrimination is invalid.

R 10

3693
Havron, M.D., Lybrand, V.A. & Cohen, E. THE ASSESSMENT AND PREDICTION OF RIFLE SQUAD EFFECTIVENESS. Contract DA 49 083 OSA 658 D 13 253 20, Proj. 29564000, PRB Tech. Res. Note 31, Nov. 1954, 80pp. USA Adjutant General's Office, Personnel Research & Procedures Div., Washington, D.C.

In the present study, a daylight live firing field problem and a night blank firing field problem were developed to complete a comprehensive set of criterion field problems for use in assessing combat readiness and for research purposes in validating selection and assignment procedures. These field problems were developed by the combined efforts of military and technical experts. The problems were field tested with 112 9-man rifle squads. Criterion scores on each problem were derived for the squad leaders, the squad members, and for the total squad. The agreement among the umpires scoring each problem was found to be very high. Though the daylight blank firing problem and the night blank firing problem were more related to each other than either was to the daylight live firing problem, each field problem made a reasonably independent contribution to the composite score on unit effectiveness. The field problems can be used as criteria for validating potential squad selectors and as operational measures of squad effectiveness. Measures of 58 variables were also administered to the 112 squads. Significant validity coefficients were found for selection measures of general mental ability, specific aptitudes, and noncognitive personality characteristics similar to those already in use in the Army's selection and classification system. The successful predictors were usually measures of the squad leader. Interpersonal measures found to be indicative of group effectiveness were group measures of ability to anticipate the behavior of other squad members, the degree to which the squad leader fulfills the role expected of him by his squad members, the number of members nominated by the squad for an ideal rifle squad, and agreement between own preference and perceived preference of the squad.

R 57

3696
Zeldner, J., Goldstein, L.G., & Johnson, C. D. FACTOR ANALYSIS OF VISUAL ACUITY TESTS DURING DARK ADAPTATION. Proj. 29562000, PRB Tech. Res. Note 40, Nov. 1954, 41pp. Adjutant General's Office, Personnel Research Branch, Personnel Research and Procedures Div.

3696
The objective of this study was to determine the factorial structure of visual acuity tests administered during dark adaptation to various low brightness levels. 100 subjects were first adapted to a photopic level of illumination and then tested at intervals while adapting to scotopic, mesopic, or low photopic brightness levels. The test targets were the modified Landolt ring (a measure of retinal resolution) and the Chevron Contrast (a measure of brightness-contrast sensitivity). A principle-axis factor technique was used to factor the 35-variable intercorrelation matrix. After 19 rotations of the factor matrix, an orthogonal simple structure was found. Eight factors were isolated, identified, and are discussed.

3703
Thornton, G.B. RADAR RANGE PERFORMANCE AS A FUNCTION OF CRT OPERATING CONDITIONS - DRAFT CIRCULATED FOR COMMENT. Proj. 163, Rep. 163-2, Mar. 1955, 4pp. Dept. of National Defense, Defense Research Board, Defense Research Medical Lab., P.O. Box 62, Postal Station "K", Toronto, Ontario.

3703
This report shows how a substitution of terms in the classical radar formula permits the determination of the relation between change in visibility of radar target and change in maximum obtainable range of radar equipment.
G.R.

3706
McKelvey, R.K. & Cohen, J.D. THE BEHAVIOR OF INDIVIDUALS AND PERSONNEL SYSTEMS IN THE SURVEILLANCE FUNCTIONS OF AN AIR DEFENSE DIRECTION CENTER: 1. EXPERIMENTAL METHOD. PROJ. 7712, Task 77207, Tech. Rep. AFPTTC TR 54 98, Dec. 1954, 29pp. USAF Personnel and Training Research Center, Lackland AFB, San Antonio, Tex. (USAF Research and Development Command, Mather AFB, Calif.).

In order to collect and process data applicable to a multi-purpose program of research on the performance characteristics of Aircraft Control and Warning operators and teams in the surveillance functions of an Air Defense Direction Center (ADDC), a combination of time sampling and continuous behavior observation techniques of activity analysis has been developed. A method of schematizing operating procedures in stimulus-response terms and devising from it an optimal arrangement of observers and recording devices and a system of data reduction is described. Research objectives are briefly outlined. Developments in recording devices, aids for observers, and apparatus to facilitate data processing are presented. Methods of training observers and phasing observational techniques into the operational situation without significantly influencing ADDC standard operating conditions are described. Plans for analyzing the data and evaluating the data collection and processing procedures for their operational applications are indicated.

R 3

3707
Hollis, J.R. HUMAN ENGINEERING EVALUATION OF TRUCK, 1/4 TON, 4x4, UTILITY, M38A1. Proj. T81 1000 5, Tech. Memo 12, Mar. 1955, 11pp. Human Engineering Lab., USA Ordnance Corps, Aberdeen Proving Ground, Md.

The 1/4 ton, 4x4, Utility Truck, M38A1, was evaluated from the human engineering standpoint. Fixed working limits on future vehicles should be no smaller than those on present vehicles. The distance between the floor of the cab and the bottom of the dashboard should be at least 20 inches. There should be a minimum of 10 inches vertical distance between front edge of seat and lower edge of steering wheel rim. Forward arm reach requirements should not exceed 34 to 35 inches. At least 28 inches between lower rim of steering wheel and the base of the back of the driver's seat is required. There should be 4 inches of horizontal adjustment in the driver's seat.

R 19

3723

Pollack, I. MASKING OF SPEECH BY REPEATED BURSTS OF NOISE. *J. acoust. Soc. Amer.*, Nov. 1955, 26, 1053-1055, Contract NSori 75, Proj. Order 11, ONR. (Harvard University, Psycho-Acoustic Lab.)

The masking of speech by a periodically interrupted white noise was examined over a wide range of noise levels, rates of interruption, and noise-time fractions. To a first approximation, the masking produced by an interrupted noise is a constant fraction of that produced by a continuous uninterrupted noise. The masking produced by an interrupted noise is primarily a function of the interval between successive noise bursts and is relatively independent of the noise-time fraction and the rate of interruption of the noise, except insofar as these determine the interval between noise bursts. The effect of interrupted noise on the loudness of speech was also examined.

R 3

3724

Hughes, J.R. AUDITORY SENSITIZATION. *J. acoust. Soc. Amer.*, Nov. 1955, 26, 1054-1070, Contract NSori 75, Proj. Order 11, ONR. (Harvard University, Psycho-Acoustic Lab.)

This experiment studied the lowering of the absolute auditory threshold that follows low-tone stimulation. Monaural thresholds were determined continuously with a recording audiometer before and after the ear was exposed to a pure tone. The frequency, intensity, and duration of both the exposure tones and the test tones were varied. Auditory sensitization was found to be a general effect among seventeen subjects. The magnitude of the effect was investigated intensively with three subjects. Their results demonstrated that sensitization produced by a pure tone is nonspecific; a given tone can sensitize the auditory system to a relatively wide range of test frequencies. Conversely, a relatively wide range of exposure frequencies can sensitize the auditory system to a given test tone. This nonspecificity is consistent with what we know, through microelectrode studies, about the spread of energy on the basilar membrane and the spread of excitation in the auditory nervous system. Contralateral sensitization effects were found.

R 15

3725

Zwislocki, J. FACTORS DETERMINING THE SOUND ATTENUATION PRODUCED BY EARPHONE SOCKETS. *J. acoust. Soc. Amer.*, Jan. 1955, 27, 146-154, Contract NSori 75, Proj. Order 11, ONR. (Harvard University, Psycho-Acoustic Laboratory)

The factors that determine the sound attenuation provided by earphone sockets are analyzed on the basis of experimental evidence, and an attempt is made to determine the practical limit of sound attenuation attained by earphone sockets, when comfort and sound transmission from the earphone to the ear are taken into consideration. For frequencies below 700 cps the attenuation is limited by the mass of the system and the impedance of the flesh under the earphone cushion. For frequencies above 700 cps bone conduction is the determining factor.

R 8

3726

Konishi, F., Hawkins, Jean M., Grossman, M.I., Berger, Florence M., Isaac, G.J., & Friedemann, T.E. THE DIETARY COMPOSITION AND ADEQUACY OF THE FOOD CONSUMED BY SOLDIERS UNDER AN AD LIBITUM REGIMEN. Proj. 6-60-11-020, Rep. 184, July 1956, 105pp. Medical Nutrition Laboratory (9937), Fitzsimons Army Hospital, Denver 8, Colo.

3726

This is a study of the dietary composition and adequacy of the food consumed by soldiers under an ad libitum regimen. A food intake evaluation of 98 soldiers was conducted for a period of approximately 30 days during which time the intakes of calories, protein, fat and carbohydrate were measured. The diet was controlled with regard to eliminating food substances which offer difficulty in obtaining uniform assessments. The results are presented and discussed in terms of the mean intakes and their relation to energy expenditure, change in body weight, requirements under varied temperatures, etc.

T. G. I. R 73

3727

Zwislocki, J. DEVELOPMENT OF A SEMIPLASTIC EARPHONE SOCKET. *J. acoust. Soc. Amer.*, Jan. 1955, 27, 155-161, Contract NSori 75, Proj. Order 11, ONR. (Harvard University, Psycho-Acoustic Lab.)

The semiplastic earphone socket is characterized by high internal viscosity and low elasticity. It can be deformed easily, but in the absence of external forces comes back to its original shape. The high viscosity has a strong sound attenuating effect. The paper describes the developmental steps leading to the design of a circumaural semiplastic socket and the performance of the socket. Its most outstanding features are high noise attenuation and comfort.

R 4

3728

Stevens, S.S. ON THE AVERAGING OF DATA. *Science*, Jan. 1955, 121(3135), 113-116. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.)

This article considers the problems and techniques of averaging a set of data. First the relationship between the various kinds of scales of measurement and several measures of central tendency are examined. An experimental example of some data in which the required function is neither logarithmic nor reciprocal is then treated and discussed. (HEIAS)

R 3

3729

Krueger, G.K. INFORMATION THEORY AND MAN-MACHINE SYSTEMS. J. operat. res. Soc. Amer., Aug. 1954, 2, 320-323. (Tufts College, Medford, Mass.)

Information theory has been used recently as the basis for some experimental studies of the abilities of humans as processors of information. One possible approach to the analysis of man-machine systems is to consider the implications of such experimental knowledge for the design of man-machine systems. The functions performed by human operators in these systems are primarily those of control of the energy resources of the system. Control functions involve, by their very nature, the availability of relevant information and the opportunity to transmit control decisions reached on the basis of this information. It is important not only that enough information be available to an operator in order to carry out his control responsibilities, but also that these tasks be not complicated unnecessarily by the provision of too much or irrelevant information. Moreover, in applying an informational analysis to control tasks, it is essential that consideration be given as to what sorts of categories are perceptually possible for operators since any analysis which does not take into account certain perceptual limitations of humans is likely to be invalid. Following this point of view it is suggested that intelligent design of man-machine systems involves compatibility between the control requirements of a system and the capabilities of the men in the system.

R 7

3731

Guedry, P.E., Jr. SOME EFFECTS OF INTERACTING VESTIBULAR STIMULI. Proj. 6-95-20-001, Rep. 261, Subtask USAMRL S-5, March 1957, 14pp. USAMRL, Fort Knox, Ky.

3735

Gagne, R.M. AN ANALYSIS OF TWO PROBLEM-SOLVING ACTIVITIES. Proj. 7709, Task 77154, Res. Bull. AFTRC TR 54 77, Dec. 1954, 14pp. USAF Human Systems Personnel Research Lab., Lowry AFB, Colo.

3731

To study interacting effects of vestibular stimuli, six subjects were rotated (turntable) signalling subjective responses by key pressing. Stimulus conditions: positive angular velocity (28 degrees/second) for ten seconds after end of first subjective effect; velocity increased to 70 degrees/second; deceleration to 13.5 degrees/second at eight magnitudes (zero to 43.5 degrees/second²); maintained until subject signalled end of subjective effect. Records of responses, angular velocities and time were made. Intervals between termination of positive angular acceleration and termination of subjective reaction for actual direction and between termination of deceleration and termination of apparent rotation in the opposite direction were analyzed as a function of the magnitude of deceleration. Obtained results are compared to theoretical expectations. T.G.R 21

3735

This paper presents a description of two problem-solving activities illustrating types of commonly occurring human activities—diagnosing equipment malfunctions and interpreting aerial photographs—and an analysis of the behavioral characteristics which set them apart from routine, habitual acts. The analysis includes an attempt to "guess" at the nature of intervening variables which might then be subjected to experimental study.

I. R 2

3733 McGilli, W. INFORMATION THEORY AS A MODEL OF THE ORGANISMS AND AS AN ANALYTICAL TOOL FOR RESEARCH. Report from: "1953 Conference of American Association for the Advancement of Science." (Massachusetts Institute of Technology, Cambridge, Mass.).

This paper discusses a generalization of the concept of information transmission -- that information theory provides an analysis complete in every mathematical detail, that is closely related to analysis of variance. A sample analysis of some experimental data on frequency judgment is described. (HEIAS)

3734

Garnor, W.R. INFORMATION THEORY AND VISUAL DISPLAYS. ca. 1953, 8pp. Report from: "1953 Conference of American Association for the Advancement of Science." (Johns Hopkins University, Baltimore, Md.).

In this paper the author surveys some of the practical uses of information theory concepts with respect to problems of visual displays and the broader problems of visual perception. The experiments reviewed have been done in the setting of, or with the assistance of information theory, i.e. using it as a specific model or using statistical measures from it; and were selected as best demonstrating the value of information theory here. (HEIAS)

3736

Smith, O.W., & Smith, Patricia G. INTERACTION EFFECTS IN JUDGMENTS OF CURVATURE. Contract NOKR 401(14), Res. Rep., March 1957, 24pp. ONR, Cornell University.

3736

To investigate interaction effects of variables of stimulation in the field of view on judgments of curvature (criterion of perceived depth), subjects (132) viewed a semi-cylinder and made free observations as to surface, size, and curvature; following observation of scaled samples of curved surfaces (11 steps from concave to convex) judgments of curvature were made. The interaction of number of spots (9, 45, 126) upon the surface of the cylinder with the presence or absence of binocular disparity was studied at two distances of observation (near and far). Other cues (form transformation, linear perspective, brightness differences, etc.) were minimized. Free reports and scaled judgments were analyzed for interaction effects. An hypothesis is proposed to account for the findings. T. O. I. R 7

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3737
Rosner, B.S. & Neise, G.A. ANESTHESIA AND HEARING. *J. Acoust. Soc. Amer.*, Nov. 1954, 26.
1077-1078. (Psycho-Acoustic Laboratory, Harvard University, Cambridge, Mass.). Contract
NSORI 76, Proj. Order II, 588.

Evoked potentials to pure tone bursts were recorded from auditory cortex in cats. Thresholds for various frequencies as measured by this technique increased in a complicated fashion as depth of anesthesia increased.
R 2

3738
Blackwell, H.R. OPTICS AND VISION. Contract DA-36
039 SC 52654, Proj. 91 10, Proj. MICHIGAN Rep. 2144
55 P, Nov. 1956, 104pp. Vision Research Labs., The
University of Michigan.

3738
This extensive series of studies is concerned with assessing present Visual Surveillance Capabilities (VSC), and with developing improved procedures for using the human eye in battle-area surveillance. Field tests of optical surveillance included aerial visual, photographic, and television surveillance tests; simulator studies included ground-to-model, optical substitution, photographic, air-to-ground, and opaque print simulators. Studies of elements of the optical surveillance (optical properties of the atmosphere, and so forth) are included. Research instruments and techniques are developed in each area. Aids to VSC included improved Visual Surveillance procedures, illumination aids, optical aids, and aids to photographic surveillance.
G. I. R 2

3739
Saul, E.V. (Proj. Dir.). A REVIEW OF THE LITERATURE PERTINENT TO THE DESIGN AND USE OF EFFECTIVE GRAPHIC TRAINING AIDS. Contract N0NR 494(08), SDC Proj. 20, D 3, SDC TR 494 08 1, Oct. 1954, 192pp. *USN Special Devices Center*, Port Washington, N.Y. (Tufts University, Medford, Mass.).

3739
This is a preliminary draft of a review of literature pertinent to the design and use of graphic training aids, drawn from the following areas: psychophysiology of vision, perception, aesthetics, art, audio-visual education, advertising, engineering drawing, and quantitative graphics. Problems of selecting appropriate aids and of instructor utilization are treated. The bibliography is annotated in some detail.
T. G. I. R 281

3740
Bekeay, G.V. SUBJECTIVE CUPULOMETRY: THRESHOLD, ADAPTATION, AND SENSATION INTENSITY OF THE VESTIBULAR ORGAN FOR ROTATIONS IN THE HORIZONTAL PLANE. *Arch. Otolaryng.*, 1955, 61, 16-28. Contract NSORI-76, Proj. NR 142-201, Rep. PNR-148, ONR, Psycho-Acoustics Laboratory, Harvard University.

3740
To determine the range of fluctuation of vestibular sensations in normal persons, a series of observations was conducted. The subject, seated in a revolving chair, indicated the moment when he felt he had completed a 45° rotation; for angles smaller than 45° he attempted to keep his hand fixed relative to the room. The variation of threshold for rotary movement with time was recorded. Effects of repeated stimulations, weak and strong, were tested (five subjects) and the relation between stimulus and sensations for rotations in the horizontal plane were investigated. The implications of the findings for the design of a cupulometer and for the evaluation of measurements for diagnosis are indicated.
G. I. R 14

3742
Davis, H. ON THE RATE WITH WHICH INFORMATION IS COMMUNICATED. Rep. 56-20, May 1956, 148pp. *University of California, Los Angeles*.

3742
The author presents a formal mathematical structure aimed at characterizing the rate of communication of information data. An extensive discussion of this latter problem includes the following: definition of the concept of informative content, the character of discrete and continuous parameter stochastic processes, the definition and implications of transducers and physical system, the engineering application of informative rate, etc.
J. R 34

3744
Miller, J.G. INTEGRATION OF BIOLOGICAL AND SOCIAL DETERMINANTS OF STRESS REACTIONS. Contract DA 49 007 575, Proj. Rep. 1, Sept. 1954 - Feb. 1955, 11pp. Committee on Behavioral Sciences, *University of Chicago*, Chicago, Ill.

Theoretical and bibliographical work concerning the characteristics of psychological and physiological stress has been carried out. Specific research designs have been developed and instruments collected, designed, or built to use in carrying out these experiments. Psychological test instruments include films, a road-map test, a coding test, a turntable test, a logical game, the myokinetic test, and a pendulum test. The physiological indices include measures of galvanic skin response, heart rate, blood pressure, and respiration. Each of the new instruments devised or built is described in this progress report. Pretests have been carried out on a few subjects under non-stress conditions to learn the characteristics of, and develop norms for, some of the instruments. Preliminary studies with the stress of alcohol in-lic game, coding test, and myokinetic test, administered under the stress of alcohol intake, suggest that they may be stress-sensitive. Future detailed studies with all three instruments under stress and non-stress conditions are planned for various sorts of stress. The data will be treated by factor or cluster analysis and other methods of process analysis to determine which psychological and physiological indices of stress covary.

3745
Poulton, E.C. VERBAL EXTRAPOLATION AND INTERPOLATION. Apr 17/53, Oct. 1953, 12pp. *Medical Research Council*, Applied Psychology Research Unit, Cambridge, England.

A comparison was made between continuing sentences (extrapolation) and filling gaps of unstated size in sentences (interpolation), when both operations occurred at the same randomly selected places in a story. It was found that the operations did not necessarily give different answers, although interpolation was more difficult than extrapolation. However, by a suitable choice of postcontexts, changes could be produced in the meanings and first words of the answers. The addition of a postcontext could actually increase the range of answers given.
R 2

3746

Shackel, B. THE HUMAN LINES IN CONTROL. 1. APPARATUS: OPTIMUM EXPERIMENTAL CONDITIONS. APU 214/54, April 1954, 17pp. Applied Psychology Research Unit, MRC, Cambridge, England.

3746

In a study of one dimensional compensatory tracking performance, subjects were trained on a tracking apparatus and the following variables of performance were investigated: optimum control to display movement ratio, optimum type of training, and optimum amount of training. The tracking apparatus and the recording system are described in detail. The results are presented and discussed in terms of each of the above experimental variables and include subfactors as the value of an elbow rest, the learning curves, deterioration in tracking performance, and so forth.

3747

Shackel, B. THE HUMAN LINES IN CONTROL. 2. OPTIMUM CONTROL-DISPLAY RATIOS AT DIFFERENT DISPLAY DISTANCES. A.P.U. 215/54, April 1954, 7pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

3747

To test a proposed hypothesis relating optimum control and display linear movements to display distance, (optimum angular control movement/angular display movement equals a constant) twelve subjects performed on a one dimensional compensatory tracking task with a positional control and an instrument display. Taking the optimum ratio to be 3:1, at display distance of 500 millimeters, and forearm length of 300 millimeters, a value for the constant of five was obtained by the proposed formula. Two other distances (300 and 1500 millimeters) and six ratios from 3/4:1 to 5:1 were tested. Predicted optimum linear movements were calculated and compared with scores obtained from the tests. The implications for the problem of optimum tracking conditions are discussed. T. I. R 3

3748 Conrad, R. & Hille, Barbara A. COMPARISON OF PACED AND UNPACED PERFORMANCE AT A PACKING TASK. APU 219/54, July 1954, 17pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

An experiment to test the hypothesis that the output of industrial conveyor belt systems would be less than that expected from knowledge of the mean processing time, using 5 experienced operatives as Ss was carried out on the shop floor of a factory. 3 specific questions were examined: a) What is the nature of the distribution of cycle time when the work is unpaced?; b) If the same work is then paced at a rate based on the unpaced mean, is output adversely affected?; c) When operatives carry out a complete cycle; b) when the cycle is divided between two operatives. In the first condition, a machine delivers work to an operative at equal time intervals. In the second condition a machine delivers work at equal time intervals to one operative, who carries out part of the cycle, and then passes the work on to another operative who completes the cycle. The mean cycle time in the unpaced condition showed no significant change in length throughout the day, but the coefficient of variation (used as a measure of scatter) increased consistently and without exception, the change from the beginning to the end of the day being from 0.19 - 0.22, which is statistically significant at better than the .001 level. Under the paced condition with one operative completing the cycle, output was as good as in the unpaced condition. When the work was divided between two operatives output fell by about 12%. The partial failure of the original hypothesis is considered to depend, to some extent on certain unavoidable differences in the working conditions introduced when changing from unpaced to paced, but largely on the relationship between the cycle time distribution and the linear speed of the conveyor belt. R 3

3750

Kerslake, D. McK., Waddell, J.L. & Brebner, D.F. THE DIFFUSION OF WATER VAPOUR THROUGH HUMAN SKIN. FPRC 902, Nov. 1954, 5pp. RAF Institute of Aviation Medicine, Flying Personnel Research Committee, London, England.

Past observations of total skin water loss from non-sweating subjects have failed to agree quantitatively with the hypothesis that such water loss is due to a passive diffusion of water vapour through the epidermis. The errors may be ascribed to the inclusion in the weight loss of the sweat produced by constantly sweating areas and to possible inaccuracies in the estimation of pulmonary weight loss. When these factors are controlled it is shown that the rate of water loss is a simple function of the vapour pressure gradient from saturation at approximately skin temperature to ambient water vapour pressure. R 15

3751

Whiteside, T.C.D. VISION AT HIGH ALTITUDE. FPRC 910, Nov. 1954, 5pp. RAF Institute of Aviation Medicine, Flying Personnel Research Committee, London, England.

Visual problems at high altitude are caused by traversing or partly traversing the bright layer of atmosphere. This gives rise to: reversed light distribution (cloud floor, layers of haze below) -- veiling glare and dazzling glare; and empty visual field (absence of cloud or haze above the horizon or tropopause) -- empty field myopia, impaired judgment of size and distance, and impaired judgment of speed. (HEIAS) R 9

3749

Whiteside, T.C.D. VISION IN AN EMPTY VISUAL FIELD. THE RELATION OF THE EFFECTIVENESS OF A STIMULUS AT THE FAR POINT TO ITS ANGULAR DISTANCE FROM THE FOVEA. FPRC 898, Oct. 1954, 3pp. RAF Institute of Aviation Medicine, Flying Personnel Research Committee, London, England.

The presence in the field of view of a stimulus of detail which can be sharply focussed, prevents the involuntary focussing for near which takes place when the visual field is empty. The effectiveness of such a stimulus, however, depends on how near it is to the line of sight. When it is in the line of sight it is most effective and beyond 20 from the line of sight it rapidly becomes less effective in making the subject focus at infinity. It loses almost all its effect in making the subject focus at infinity by the time it is at 50 from the line of sight. The results show a striking similarity to the graph of visual acuity at various angular distances, from the fovea. This similarity is to be expected since the accommodation reflex is mediated through the stimulation of cones. R 2

3752

Bureau of Medicine & Surgery. AVIATION MEDICINE PRACTICE. NAVPERS 10629 A. 1955. 296pp. Bureau of Naval Personnel, Bureau of Medicine & Surgery, Washington, D.C.

The purpose of these monographs is to present discussions of some of the salient and most often encountered problems in the complex practice of aviation medicine. The contents of this text are drawn from many sources representing many specialized fields of medicine and dentistry and designed primarily for medical officers lacking special training in the ramifications of aviation medicine. Each chapter has been prepared by specialists in the particular field; these are as follows: the beginnings of aviation medicine, the problem of reduced barometric pressures, the problem of acceleration, ophthalmology in aviation, otolaryngology in aviation medicine, the cardiovascular system in aviation medicine, aviation psychology, psychology of adjustment, neuropsychiatry in relation to aviation medicine, aviation physical standards and general physical examination aviation dentistry, operational problems in aviation medicine, aviation safety and allied problems, and death procedures. At chapter endings.

3753

Lee, D.H.K. PHYSIOLOGICAL OBJECTIVES IN HOT WEATHER HOUSING. AN INTRODUCTION TO THE PRINCIPLES OF HOT WEATHER HOUSING DESIGN. June 1953, 75pp. US Department of State, Technical Cooperation Administration, Institute of Inter-American Affairs, Washington, D.C. (Johns Hopkins University, Baltimore, Md.).

This booklet presents principles of housing which in practice minimize the direct effect of hot environments upon man. To ensure that these principles are understandable, a simplified analysis of tropical and subtropical climates and their significance for man is first presented. The principles of housing are developed in some detail for a typical hot dry environment and contrasted with those applicable to a typical warm humid environment. Modifications of these principles are then discussed to meet more common combinations of climatic types and certain special cases. (HEIAS)
R 25

3754

McElroy, F.S. ACCIDENT CAUSES AND CAUSE CODING. NO. 1, Dec. 1954, 16pp. U.S. Department of Labor, Bureau of Labor Standards. (Prepared for the President's Conference on Occupational Safety).

This article is designed as an introduction to the principles and procedures embodied in the American Standard Method of Compiling Industrial Accident Causes as approved by the American Standards Association, 1941. In general, the most outstanding features of the Standard is its flexibility which permits its adaptation to the needs of any establishment, large or small. It may be used in its entirety as the basis for an elaborate accident-recording system. Because its elements are separable and designed for expansion or contraction, it may also serve as the basis for a very simple recording procedure.

3755

Miller, H.G. INVESTIGATION OF ACCIDENTS FOR CAUSE AND REMEDY. NO. 3, Dec. 1954, 6pp. U.S. Department of Labor, Bureau of Labor Standards. (Prepared for the President's Conference on Occupational Safety).

The principal purpose of accident investigation is to obtain information that will be of help in the prevention of accidents. To fulfill this purpose, investigations must be objective, factual, and free of disciplinary implications. Accident investigation is of such prime importance to the accident-prevention program that the device must be preserved exclusively for obtaining information on accident causes. If it is ever used, or if there is a feeling that it will be used to establish guilt, it will lose some, and maybe most, of its usefulness as a method of obtaining the full and complete facts about an accident.

3757

Bacon, W.M., Baldwin, E.M., Craig, J.H., Ditta, M.M., et al. SYSTEMS ENGINEERING RELATING TO COMMUNICATIONS FACILITIES FOR THE COMMON SYSTEM OF AIR TRAFFIC CONTROL. Contract DA 36 039 SC 64567, Task A Part 4, Task D Part 2, Task D Part 3, Interim Report, June 1956, 96pp. Bell Telephone Laboratories, Incorporated, N.Y.

3757

Task A, Part Four, seeks an optimum communications network to interconnect pilots, air traffic controllers, and other ground stations applied to conditions predicted for 1965. The system is to control tactical, training, and non-tactical flights. Task D, Part Two, describes investigation and determination of a high volume point-to-point weather information system capable of collecting and disseminating data under conditions predicted for 1965. Part Three reports the evaluation of some experimental systems for collection, processing and distribution of flight-plan data (sorting, editing or performing calculations) by persons or machines. Certain technical problems are treated in detail in seven appendices. T. G. I.

3756

US Executive Office of the President. TECHNIQUES FOR THE DEVELOPMENT OF A WORK MEASUREMENT SYSTEM. March 1950, 67pp. US Executive Office of the President, Washington, D.C.

3756

This manual is intended for the use of the management analyst responsible for the mechanics of installing a system of work measurement. It is limited to a detailed discussion of (1) how a work-measurement reporting system fits into the needs of an agency for various types of reporting systems, (2) selecting appropriate units for the quantitative measurement of work output, and (3) the design and installation of a standardized form of reporting to insure the collection, transmission, and analysis of data pertinent to adequate work measurement.
I.

3759

US Government Printing Office. TRAINER'S GUIDE TO THE WORK SIMPLIFICATION TRAINING SESSIONS. 1952, 7pp. US Government Printing Office, Superintendent of Documents, Washington, D.C.

3759

This is a guide to be used by trainers in industrial work simplification programs. It covers the following topics briefly: you and work simplification, what you are going to do, arrangements, tools and materials, introduction and the work simplification chart, the process chart, and the work count and work simplification roundup. It is illustrated with cartoons.

- 3760
Department of the Army. A TECHNIQUE FOR GRAPHIC PRODUCTION COORDINATION. DA Pamphlet 20 350, March 1952, 39pp. Department of the Army, Washington, D.C.
- 3760
This pamphlet presents and explains a graphic technique that focuses attention of management, either military or industrial, on the areas in procurement and production where greater planning and coordination are necessary. The technique assures, first, that there is a common understanding of the objective, visually portrays the basic plan for achieving the objective, shows results of measurement of actual progress with accompanying analysis of problems being encountered and provides knowledge of areas where corrective action is needed.
G.
- 3761
US Government Printing Office. VISUAL PRESENTATIONS FOR INTRODUCTORY AND TRAINING SESSIONS IN WORK SIMPLIFICATION. 1953, 68pp. US Government Printing Office, Washington, D.C.
- 3761
This is a set of charts to be used as visual aids in industrial work simplification programs.
I.
- 3762
US Government Printing Office. OUTLINES FOR THE TRAINER IN THE OBJECT OF WORK SIMPLIFICATION TRAINING SESSIONS. Aug. 1952, 91pp. US Government Printing Office, Washington, D.C.
- 3762
This is an outline for the trainer in an industrial work simplification program showing him how to conduct seven sessions with middle management personnel. Details are given under such headings as, "What You Do," "What You Say," and "How You Do It." Sample forms are appended.
I.
- 3763
USA Department of the Army. MULTIPLEX MAPPING. Tech. Manual 5 244, June 1954, 176pp. USA Department of the Army, Washington, D.C.
- 3763
This manual was prepared to serve as a guide for the operation of multiplex stereoscopic mapping equipment and its use in preparation of topographic map manuscripts. In scope, the manual covers theory, equipment, and techniques. It describes equipment, explains the fundamental principles, gives detailed instructions for operating the equipment, and discusses accuracies. A glossary of technical terms is included.
T. G. I. R 22
- 3764
Salomon, Ann D. VISUAL FIELD FACTORS IN THE PERCEPTION OF DIRECTION. *Amer. J. Psychol.*, Jan. 1947, LX, 68-88. (Duke University, Durham, N.C.).
- 3764
To investigate some factors in the perception of direction, a basic reference pattern (tilted straight line varying in length from 0.5 to 22 inches) determined a direction which the observer (N=10) indicated by moving a dot (presented at 3, 2.5, and 0.25 ft. from proximal end of line) so as to locate it along the perceived extension of the line. Precision of repeated localizations was measured by calculating the standard deviation of the settings from the mean and analyzed as functions of length of reference line and distance of dot from end of line. Methods of localization and training are discussed.
T. G. R 4
- 3765
Petherbridge, P., & Hopkinson, R.G. DISCOMFORT GLARE AND THE LIGHTING OF BUILDINGS. *Trans. Illum. Engng Soc., Lond.*, 1950, 15, 39-79. (Building Research Station, Garston, Watford, England.)
- 3765
To obtain more knowledge of the effects of glaring light sources on vision, a technique of subjective appraisal was used. The observer controlled a relevant physical variable to give, in turn, each of a series of precisely defined criteria of discomfort glare. Source intensity, shape and position, as well as contrast between source and surround were varied and the effects observed and evaluated. The effect of such factors as the displacement of a glare source from the general direction of view and the glare effect of a number of sources was also studied. The relation between the various physical factors is complex, but appreciation to problems of lighting design are made and discussed.
- 3766
Hopkinson, R.G. THE MULTIPLE CRITERION TECHNIQUE OF SUBJECTIVE APPRAISAL. *Quart. J. exp. Psychol.*, 1950, 2, 124-131. (Building Research Station, D.S.I.R.)
- 3766
To make quantitative assessments of subjective aspects of perceptual responses to the physical aspects of a stimulus situation, an experimental technique (Multiple-Criterion) is described whereby the subject controls one of the significant variables and sets it to correspond with a limited number of defined criteria relating to a subjective variable. A functional relationship can then be estimated, for example, glare-discomfort. Precautions to be taken in design of experiments and the uses to which this technique has been put are discussed.
T.G.R.75
- 3767
Hopkinson, R.G. & Petherbridge, P. TWO SUPPLEMENTARY STUDIES ON GLARE. *Trans. Illum. Engng Soc., Lond.*, 1954, 19, 220-224. (Building Research Station, Watford, Herts, Eng.)
- 3767
To study the validity of experimental procedures of assessment of glare discomfort and empirical formulae derived from model-scale studies, two experiments were performed: 1) full-scale and model-scale installations were compared; as the illuminance of the sources was increased the observer reported when each of four criteria of glare had been reached (just perceptible, just acceptable, just uncomfortable, and just intolerable); and 2) 70 Ss., representative of the general population, made glare judgments at three levels of source luminance; these readings were compared with those from an experienced team of observers.
- 3768
Collins, J.B., & Hopkinson, R.G. FLICKER DISCOMFORT IN RELATION TO THE LIGHTING OF BUILDINGS. *Trans. Illum. Engng Soc., Lond.*, 1954, 19, 135-158. (Building Research Station, Watford, Eng.)
- 3768
To investigate discomfort due to flicker in lighting installations, a series of experiments was conducted on a full scale with the whole field of view undergoing fluctuation of illumination. Observers were asked to report on four criteria of flicker: just perceptible, just obvious, just uncomfortable, and just intolerable as frequency of fluctuation was varied. Variables investigated and analyzed by this procedure were: individual variability, luminance of field, wave-form of light-time characteristics of the source, including modulation and dark-time ratio. The results were related to fluorescent lighting practices and recommended procedures were included.
T. G. I. R 14

3769

Hopkinson, R.G. INFLUENCE OF EXPERIENCE ON THE SENSITIVITY TO DISCOMFORT. *Nature*, Jan. 1952, 169, p40. (Building Research Station, Garston, Watford, England).

The sensitivity of a S to discomfort arising from his environment may be dependent in some degree on his familiarity with, or technical knowledge of the environment. This paper describes a study designed to test the existence of this sensitization using the apparatus of the 'control experiment' of a 'multiple criterion' study. 2 Ss also unfamiliar with lighting and glare technology were selected, along with other Ss who were familiar with the experiment and its technology. Under a series of conditions over a period of weeks, both groups were required to give assessments of personal discomfort due to glare. Although at first the assessments of the experienced Ss and the test Ss differed considerably, the test Ss being less sensitive to glare than the experienced Ss, as the test proceeded the test Ss developed a sensitivity which approached that of the experienced Ss. The experienced Ss held their criterion unchanged over the test period (in fact over a period of 2 years). (HEIAS)

R 4

3770

Hopkinson, R.G. THE BRIGHTNESS OF THE ENVIRONMENT AND ITS INFLUENCE ON VISUAL COMFORT AND EFFICIENCY. *Building Research Conference*, 1951. pp. 133-138. (Building Research Station, Watford, Eng.)

3770

This paper reviews a number of studies made in Great Britain of environmental brightness patterns in relation to visual comfort and efficiency. Assessments of the effects of various conditions of glare and non-uniformity of background brightness made by the "multiple criterion technique" are reported (see accession number 3766). Results of these studies are discussed and evaluated; implications for the lighting designer are pointed out.

G,I,R10.

3771

Harris, J.D. ON LATENT DAMAGE TO THE EAR. *J. Acoust. Soc. Amer.*, 1955, 27, 177-179. (USN Medical Research Lab., New London, Conn.)

The purpose of this communication is to serve as a warning to the now numerous people seeking to prevent partial deafness in ears subjected to loud noise. If the results here can be extended to the case of permanent threshold shifts, they may indicate that work periods should be set not only to allow the ear to recover to normal by audiometric test, but to provide in addition a time interval sufficient for the effects of latent damage to be dissipated.

R 3

3772

Pikier, A.G. & Harris, J.D. CHANNELS OF RECEPTION IN PITCH DISCRIMINATION. *J. Acoust. Soc. Amer.*, 1955, 27, 124-131. (USN Medical Research Lab., New London, Conn.)

Pitch discrimination was studied in 4 normal hearing subjects monaurally, binaurally, and in a variety of other channels of reception. No difference exists in sensitivity between the two normal ears of a subject, nor is there a difference between the sensitivity of the monaural channels and the binaural channel if all are matched for loudness. Also bone conduction was found to yield essentially equal pitch D's after loudness was matched. All channels, except successive interaural, are equivalent under matched conditions. Successive interaural channels (standard in the right, variable in the left, and vice versa) show some deterioration of sensitivity and some increase in variance which can be attributed to the monetary fluctuations of diplacusis. Similar fluctuations were found also with respect to a channel utilizing a monaural standard and a binaural variable stimulus, the two ears matched in loudness. Under these conditions, furthermore, a third pitch is sensed, a phenomenon we term "triplacusis." The authors suggest an interpretation of diplacusis and triplacusis as interaural interactions. In cases of perceptible hearing loss, however, the channels are not usually equivalent in pitch discrimination when matched for loudness. Evidently other principles must be sought for the pathological case.

R 20

3773

Allen, W.A., & Collins, J.B. FACTORY LIGHTING IN GREAT BRITAIN. *Building Research Conference*, 1951. pp. 148-150. (Building Research Station, Watford, Eng.)

3773

This is a brief review of factory lighting with consideration of what makes for good illumination, both natural and artificial. Visual comfort for the worker and the subjective impression created by the whole lighting installation, including decoration, are the criteria used for appraisal.

I,R6.

3775 USN Special Devices Center. PSYCHOLOGICAL STUDIES OF ADVANCED NAVAL AIR TRAINING: EVALUATION OF OPERATIONAL FLIGHT TRAINERS. RESEARCH RESULT. Proj. NR 780 011, SDC Proj. 20 A 8, SDC TR 959 1 1, Sept. 1950, 4pp. USN Special Devices Center, Port Washington, N.Y. (The Psychological Corporation, New York, N.Y.).

This report presents the results of an experimental evaluation of Operational Flight Trainers (OFT) conducted at the Naval Advanced Training Command at Corpus Christi, Texas. Primary interest of the study was in training time savings and quality potential (improving efficiency) with secondary interest on trainer design improvement. In general, it was concluded that flight time cannot be saved in the FAA stage by use of OFT's but in the INST, basic and advanced, some savings can be made. OFT training does make a difference in proficiency of students with fewer serious errors and fewer total errors on most maneuvers. The Trainer can be used more effectively in Advanced Training as a superior type of briefing. With regard to trainer design it was noted that "air work" tasks were not simulated as closely as procedural tasks and a suggestion is made that the specific purpose of the trainer be defined. Further recommended for study is the potential value of trainers for operational and reserve flight training. (HFIAS)

3776 Olenski, Z., & Goodden, N.W. CLEARNESS OF VIEW FROM DAY-FIGHTER AIRCRAFT (PART OF "ABILITY TO SEE"). Rep. Aero 1862, Oct. 1943, 54pp. Royal Aircraft Establishment, Farnborough, England.

3776 To clarify the nature of "operational clearness of view" in fighter aircraft and the main hindrances to its improvement, a qualitative study was conducted. The importance and nature of seeing in combat were defined; hindrances to clearness of view were investigated by observation, analyses of photographs, and shadow photography; estimation of probable effects on fighting efficiency of such hindrances was based on personal experience, interviews, and survey of the literature; polishing and maintenance problems were investigated by tests and observations. Improvements necessary for clearness of view are discussed together with a number of detailed recommendations.

T. G. I. R 31

3777 Bullock, D.H., & Meyer, Susan R. PARAMETERS OF A VISUAL MONITORING TASK. Contract AP 30(602)-574; Scientific Rep. 1, RADG-TN-55-67. University of Buffalo.

3777 To investigate some factors influencing visual monitoring, 28 subjects were required to discriminate whether the second of two film-presented spatial-temporal patterns (successive appearances of a single dot in a square grid) was the same or different from the first. The variables were: (1) information loading (two to seven dots per pattern, 25 or 36 cells per grid); (2) rate of presentation (16 and 24 frames per second); (3) three dot sizes; (4) over-all task complexity (two to six or three to seven dots per pattern); and (5) position of change of dot. Two experiments were conducted. The data (mean and median percent discriminations) were studied by analysis of variance techniques for differences due to the experimental conditions.

T. R 4

3782 MacLeod, S. STATE-OF-THE-ART IN OLFACTION. RADG-TN-56-199, June 1956, 14pp. RADC, Griffiss AFB, Rome, N.Y.

3782 This paper is a general survey of present day knowledge in the area of olfaction. Background information is presented regarding the nature of olfaction and pertinent olfactory phenomena. Existing analytical methods and theories of olfaction are discussed and appraised. The final section is devoted to a review of current civilian and military olfactory applications leading up to a final prospectus for future research and development.

R 15

3783 Hill, P.R. & Kennedy, T.L. FLIGHT TESTS OF A MAN STANDING ON A PLATFORM SUPPORTED BY A TEETERING ROTOR. NACA Res. Memo. 154212A, March 1954, 26pp. National Advisory Committee for Aeronautics, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).

3783 Following the lead given by successful flight tests of a man standing on a jet-supported platform, flight tests were made of a man standing on a teetering-rotor-supported platform. The rotor was seven feet in diameter and driven by compressed-air jets at the tips supplied to the machine by air hoses. Hovering and limited translational flights were made both indoors and outdoors. The stability and controllability of the machine and flyer combination were evaluated.

G. I. R 1

3784 Zimmerman, C.H., Hill, P.R., Kennedy, T.L. PRELIMINARY EXPERIMENTAL INVESTIGATION OF THE FLIGHT OF A PERSON SUPPORTED BY A JET THRUST DEVICE ATTACHED TO HIS FEET. NACA RM L52D10, Res. Memo., Jan. 1953, 33pp. NACA, Washington, D.C.

3784 To investigate man's ability to stabilize and control in space a platform attached to his feet and supported by a jet thrust, five subjects made several experimental flights. The device was a small platform rigidly connected to a jet nozzle having its thrust axis perpendicular to the platform and its thrust opposed by the pull of gravity. Suitable cleats and tie-down straps were used to keep the feet from slipping. Additional weights and a source of moderate gyroscopic effect were tested. Other additions included rigid landing gear, a seat, and a control stick. The basic principles involved and possible military applications are discussed.

T. I.

3785 Murnin, J.A., VanderMeer, A.W. & Vris, T. COMPARISON OF TRAINING MEDIA: TRAINEE MANIPULATION AND OBSERVATION OF FUNCTIONING ELECTRICAL SYSTEMS VERSUS TRAINEE DRAWING OF SCHEMATIC ELECTRICAL SYSTEMS. Contract N60NR 269, SDC Proj. 20 E 4, SDC TR 269 7 101, June 1954, 30pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

3785 To compare two training aids with instruction without aids in teaching basic electricity, 263 Naval trainees were divided into three groups with the following training conditions: 1) conventional training in D.C. circuitry without aids, 2) practice in making connections with individual wiring boards, and 3) practice in drawing connections on wiring diagrams. A written test on theory and practice with D.C. circuits was administered to all as a criterion measure. Results (test scores) are interpreted with regard to the effectiveness of devices in training in electricity, and the need for further research is discussed.

T. I.

3787

Whittingham, D.G.V., & Basherville, R.W. WET-COLD TRIALS IN SCOTLAND. FPRC. 903, Dec., 1954, 21 pp. Flying Personnel Res. Committee, Air Ministry.

3787

To test the effectiveness of a seat survival pack (type J personal pack) and other equipment, four subjects lived in a wet-cold environment under simulated survival conditions. Articles of clothing and other pieces of equipment were evaluated and recommendations were made in terms of thermal insulation, durability, necessity for survival, etc. I, R3.

3793

Duncan, C.P. & Underwood, B.J. TRANSFER OF TRAINING AFTER FIVE DAYS OF PRACTICE WITH ONE TASK OR WITH VARIOUS TASKS. Contract AF 33(616) 308, Proj. 7197, WADC TR 54 533, Dec. 1954, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Northwestern University, Evanston, Ill.).

3793

To investigate the effects of variety of practice on transfer of training, three groups of 45-56 college students practiced five days making manual settings of a lever appropriate to visually perceived forms. Practice conditions were: 1) concentration on one task, 2) ten tasks (different stimuli), and 3) ten variations of task. All groups then practiced four days with forms, nonsense syllables, and color patches as stimuli. Intergroup differences in correct responses on the final tasks are interpreted in terms of the effectiveness of the variety of prior practice. Implications for the design of training devices are discussed.

T. G. R 4

3788

Ministry of Works, Chief Scientific Adviser's Division. LITERATURE MAINLY CONCERNING FATAL HOME ACCIDENTS--BIBLIOGRAPHY. (APPENDIX 3 FROM AN INQUIRY INTO ACCIDENTS IN THE HOME). Jan. 1950, 6pp. Chief Scientific Adviser's Div., Ministry of Works, London, England.

This is a bibliography of 76 titles concerned with fatal home accidents, non-fatal accidents and accident prevention.

3789

Hopkinson, R.G. THE SELECTION OF SUITABLE CHALKBOARD COLOURS. Royal Inst. of Brit. Architects J., Aug. 1952, 52(10), p. 377.

3789

In seeking information on an optimum color for chalk-boards, 20 observers ranked 15 chalk-boards of different hue, saturation, and brightness containing identical white printed sentences from the point of view of "dazzle" effects and color "clash." The results are plotted on a Munsell color chart and are summarized in the form of five rules for the selection of chalk-board colors. G.

3790

Mason, H.M. A FURTHER STUDY OF EXPERIENCE-CENTERED AND REQUIREMENTS-CENTERED TESTS OF JOB KNOWLEDGE. J. appl. Psychol., 1956, 40, 14-16. APFTRC-TN-56-66, June 1956, APFTRC, San Antonio, Texas.

3790

To compare the validity of experience-centered and requirements-centered tests of job knowledge for use in placing men who enter the Air Force with previous experience or training that fits them for direct assignment to a job specialty, two tests based on actual job operations were developed and three tests were developed from items in formal statements of technical knowledge requirements. Test validities were determined by comparing test means for samples of mechanics (553) from three Air Force designated skill levels: apprentice, senior mechanic, and supervisor-technician. An analysis of variance design was used to determine the significance of relations between test means and criterion skills. Significant differences between pairs of tests in their relation to criterion levels were determined. T. R 3

3794
McGuire, J.C. APPARATUS FOR PRESENTATION AND CONTINUOUS MEASUREMENT OF ERROR IN A TWO-DIMENSIONAL COMPENSATORY TRACKING TASK. Contract AF 33(616) 135, Proj. 7185, WADC Tech. Rep. 54 335, Dec. 1954, 25pp. WADC, Air Research and Development Command, Aero Medical Lab., Wright-Patterson AFB, Ohio. (Washington University).

An electronic compensatory-tracking apparatus which utilizes a two-dimensional target locus is described together with its computing and recording circuits. The apparatus was designed to provide a standard task of variable difficulty for use in the study of attention. The target path used approximates the equation $\theta = \cos 2\theta$. This is a four-leaved rose curve. The stimulus spot is displayed on the face of a cathode ray oscilloscope (CRO). Control is exercised by the subject through manipulation of a joystick of very low mass and friction. Subject error, represented by the displacement of the stimulus spot from the intersection of a pair of crosshairs on the CRO screen, corresponds to $\sqrt{x^2 + y^2}$ where x and y are the input voltages to the CRO. The quantity $\sqrt{x^2 + y^2}$ is computed continuously by the electronic analog computer and recorded both as a function of time and as an integrated error score. R 8

3792

Royal Naval Personnel Research Committee. UNDERWATER PHYSIOLOGY SUB-COMMITTEE-MEMORANDUM FROM THE SUPERINTENDENT OF DIVING, SHALLOW WATER BLACKOUT. U.P.S. 145, June 1955, 1p. Royal Naval Personnel Research Committee, Medical Research Council, London, England).

This document is a memorandum to the Royal Navy Research Committee from the Superintendent of Diving. The superintendent expresses his wishes pertaining to the procurement of advice and assistance from the Underwater Physiology Sub-Committee concerning the phenomenon of shallow water blackout. A summary of work on the subject to this date and a description of the syndrome and its causes are included in the memorandum. (HEIAS)

R 2

3795

Rockway, M.R. THE EFFECT OF VARIATIONS IN CONTROL-DISPLAY RATIO AND EXPONENTIAL TIME DELAY ON TRACKING PERFORMANCE. Proj. 7197, Tech. Rep. 54-618, Dec. 1954, 20pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

3797

To demonstrate the interaction between control-display (C/D) ratio and exponential time delay on tracking performance, eight experienced operators performed a two-dimensional compensatory tracking task. Sixteen combinations of four C/D gear ratios (one degree of control movement produced either 3-, 6-, 15-, or 30-sixteenths inches of display movement) and four C/D exponential time delays (.3, .6, 1.5, and 3.0 seconds) were practiced by each subject on two different days. Mean percent time-on-target scores were studied by analysis of variance for differences due to ratios, delays, subjects and interactions. Graphic records of performance are presented for one typical subject.

T. G. I. R 7

3796

Ornstein, G.N., Nichols, I.A. & Flexman, R.E. EVALUATION OF A CONTACT FLIGHT SIMULATOR WHEN USED IN AN AIR FORCE PRIMARY PILOT TRAINING PROGRAM: PART II. EFFECTIVENESS OF TRAINING ON COMPONENT SKILLS. Proj. 7710, Task 77168, AFTRC TR 54 110, Dec. 1954, 12pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

3796

To evaluate the P-1 flight simulator as a training aid, 95 aviation cadets were divided into two groups, one of which received training in the simulator prior to each phase of T-6 training, the other having no simulator training. Records of flight performance in the T-6 for various maneuvers at each stage of training are compared for the two groups to evaluate the contribution of the simulator to subsequent performance. A description of the P-1 simulator and its operation is appended.

T. I. R 4

3797
Flyer, E.S., & Bigbee, L.R. THE LIGHT PLANE AS A PRE-PRIMARY SELECTION AND TRAINING DEVICE: III. ANALYSIS OF SELECTION DATA. Proj. 7701, Task 77023, Tech. Rep. AFTRC TR 54 125, Dec. 1954, 13pp. USAF Personnel and Training Research Center, Lackland AFB, Texas.

The present Technical Report deals with the possible use of the light plane as a selection device. This phase of the research sought to ascertain whether data on cadet performance in light plane training would add to the efficiency of existing selection procedures in the prediction of success in subsequent flying training. The light plane group (N=120) was given 25 hours of light plane flying during its six weeks of Pre-Flight Air Force Training prior to beginning Primary Pilot Training in the T-6 at Goodfellow Air Force Base. During light plane training numerous evaluative techniques were employed, and during subsequent training various performance criteria were collected. The major implication of this research is that evaluations of pilot proficiency made during light plane training are predictive of success in Primary and Basic Training and that the most effective prediction of performance during Primary and Basic is obtained when these measures are used in conjunction with the Pilot Stoline. It also is noteworthy that, the Pilot Stoline showed appreciable validity for the prediction of performance during light plane training.

R 3

3798

Ritterhouse, C.H. & Goldstein, M. TARGET FLIGHT CHARACTERISTICS AS DETERMINANTS OF TRAINING TRANSFER AND TASK DIFFICULTY IN FLEXIBLE GUNNERY. Proj. 7708, Task 77141, Res. Bull. AFTRC TR 54 90, Dec. 1954, 30pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

3798

To study the effects of characteristics of target attack patterns on training and transfer of training in flexible gunnery, 244 airmen practiced for three sessions on a modified B-29 Pedestal Sight Manipulation Test tracking and ranging on one target attack pattern, then two sessions on other patterns. Attack patterns involved combinations of various subpatterns in azimuth, elevation, range, and speed. Results (mean time on target) are analyzed for the contributions of various patterns in the target flight components to training difficulty and transfer.

T. G. R 4

3799

Gillinsky, Alberta S. PERCEPTION OF SIZE OF OBJECTS AT VARIOUS DISTANCES. Contract AF 18(600) 196, Proj. 7706, Task 77116, Res. Bull. AFTRC TR 54 92, Dec. 1954, 29pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo. (Columbia University, New York, N.Y.).

3799

To study the perception of size at long ranges (100 to 4000 ft.) under two contrasting observational sets (for matching "retinal" or "objective" size), standard stimulus objects, white isosceles triangles (42, 54, 66, and 78 inches base and altitude) were matched by varying the size of a comparison triangle 100 ft. from the observer. Over 30 observers made judgments under good conditions or outdoor visibility. Means and standard-deviations of size matches are analyzed as functions of "set" or instruction, distance, and size. The results are interpreted with respect to previous findings and to theory.

T. G. I. R 20

3800

Ritterhouse, C.H. & Goldstein, M. THE ROLE OF PRACTICE SCHEDULE IN PEDESTAL SIGHT GUNNERY PERFORMANCE. Proj. 7708, Task 77141, Res. Bull. AFTRC TR 54 97, Dec. 1954, 36pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

3800

To study the effects of practice scheduling on learning from pedestal sight gunnery simulators, 336 airmen were trained in groups having different schedules. Number of trials per day, duration of intertrial rests, total time of training, and total amount of practice were all varied in the course of four studies. Results (percent of maximum attainable time on target) are compared for the various groups for evidence of an optimum distribution of practice and rest periods.

T. G. R 10

- 3801 Haythorn, M.W. RELATIONSHIPS BETWEEN SOCIONETRIC MEASURES AND PERFORMANCE IN MEDIUM BOMBER CREWS IN COMBAT. Proj. 7713, Res. Bull. AFPTC TR 54 101, Dec. 1954, 20pp. AFTRC, Crew Research Laboratory, Randolph AFB, Tex.
- A battery of questionnaires including an attitude survey, a crew-description form, and a sociometric rating scale was administered to 102 medium bomber B-29 crews in combat over Korea. In this report the responses to the sociometric instrument were analyzed for their reliability and their relationships with the attitude scales, the crew-description form, and ratings of over-all crew effectiveness by superior officers (squadron and wing officers.) Significant correlations were found indicating that crew mean sociometric scores co-vary with crew mean attitude scores--particularly attitude scales related to pride in the crew--and with ratings of the crew by superior officers. The correlations between sociometric scores of individuals and the criterion measures were found to be to some degree a function of the formal crew position of the individual.
- R 8
- 3802 Crowder, M.A. PROFICIENCY OF Q-24 RADAR MECHANICS: V. LEVEL OF TROUBLE-SHOOTING PERFORMANCE OBSERVED. Proj. 7709, Task 77151, Res. Bull. AFPTC TR 54 102, Dec. 1954, 37pp. AFTRC, Air Research and Development Command, Armament Systems Personnel Research Lab., Lowry AFB, Colo.
- A Performance Trouble-Shooting Test on an operating Q-24 system was administered to 126 working line mechanics. Of 979 individual problem trials, the malfunction was found without any false diagnoses in 497. It was found after one or more false diagnoses in 316, and 166 problem trials resulted in failures. A total of 906 false diagnoses were made in the 979 trials. On problems requiring interpretation of data flow the mechanics' performances were not as good as those obtained over all problems. For problems involving qualitative understanding of devices such as synchros and servomechanisms the performance shown was quite poor. The mechanics appeared to work to a great extent by trial and error; they used test equipment in only 242 of 623 problem trials where it was definitely required for a systematic solution to the problem; and they made a sufficient confirmatory check before replacing a subunit in only 203 of 600 problem trials where such a check was possible and necessary. It is believed that these results do not in themselves justify major investment in maintenance systems which relieve the line mechanic of the necessity of trouble shooting, even supporting such were possible. Some remedial factors which may account for the relatively poor performance are discussed. These include inadequate training and practice in systematic trouble shooting, situational factors on the job which might encourage trial-and-error behavior, and inadequacies in the mechanics' reference materials. Specific suggestions for improvement of trouble-shooting performance are a) specific training in systematic trouble shooting; b) continuing training on the job, monitored by periodic proficiency evaluation; and c) the provision of job-oriented maintenance handbooks.
- R 3
- 3803 Klare, G.R., Makry, J.E. & Gustafson, L.M. THE RELATIONSHIP OF VERBAL COMMUNICATION VARIABLES TO IMMEDIATE AND DELAYED RETENTION AND TO ACCEPTABILITY OF TECHNICAL TRAINING MATERIALS. Contract AF 33(038) 25726, Proj. 557 011 0001, Res. Bull. AFPTC TR 54 103, Dec. 1954, 57pp. USAF Training Aids Research Lab., Chanute AFB, Ill. (University of Illinois, Urbana, Ill.).
- 3803 This is a report of 2 studies on the effects of style variations in verbal training material on immediate and delayed retention. A student study guide was prepared in several versions, varying difficulty of style, emphasis (underlining), and human interest (personal references to reader). These were read by groups of basic trainees and engine mechanic trainees. Data included reading time, amount read, comments on acceptability, and tests of immediate and delayed retention. Results are analyzed for effects of style on retention and acceptability, and implications for future research are discussed.
- T. R 31.
- 3806 Williams, A.C., Jr. & Adelson, M. SOME CONSIDERATIONS IN DECIDING ABOUT THE COMPLEXITY OF FLIGHT SIMULATORS. Contract AF 33(058) 25726, Proj. 508 016 0003, Task D, Res. Bull. AFPTC TR 54 106, Dec. 1954, 29pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex. (University of Illinois, Urbana, Ill.).
- 3806 This is a logical and mathematical development of the factors to be considered in making specifications for flight simulators for training. A "variable characteristic" simulator is proposed to permit systematic study of the factors considered, and an appendix contains specifications for achieving such a simulator through modifications of a T-33 simulator.
- T.
- 3808 Levi, M. & Higgins, A.C. A COMPARISON OF TWO METHODS OF CONDUCTING CRITIQUES. Proj. 7713, Task 57151, Res. Bull. AFPTC TR 54 108, Dec. 1954, 14pp. USAF Crew Research Lab., Randolph, Tex.
- 3808 This is a report of a study comparing two critique methods as aids in teaching problem solving. Forty-six combat crews (481 Ss) were divided among four groups. Two groups worked on a group problem-solving task followed by a critique of the task involving evaluation by the group for one group, by the instructor for the other. All were then given a survival problem to solve individually. (Control groups had the group and/or individual problems only, without a critique.). Scores on the survival problem are compared for effects of the critiques on individual solutions of a novel problem.
- T. I. R 6
- 3810 Parks, R.B. SOME ASPECTS OF PART AND WHOLE TASK PERFORMANCE IN FLEXIBLE GUNNERY PEDESTAL SIGHT MANIPULATION. Proj. 7708, Task 77141, Res. Bull. AFPTC TR 54 117, Dec. 1954, 8pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.
- 3810 To evaluate consistency of student performance on the Flexible Gunnery Proficiency Evaluator, 120 student airmen were given four days of practice trials, and their performance (time-in-error) was intercorrelated for the four days. An additional 30 airmen were given tasks involving only one or two of the three basic task components--range, azimuth, and elevation. Correlations and performance curves are interpreted regarding interday reliability of S performance on the device, and performance on component tasks as contrasted with whole-task performance.
- T. G. R 3

3811

Tolhurst, G.C., & Peters, R.W. THE EFFECT OF ATTENUATING ONE CHANNEL OF A DICHOIC CIRCUIT UPON THE WORD RECEPTION OF VOICE MESSAGES. Contract N6onr 22525, Proj. NM 001 064.G1.36, Dec. 1954, 16pp. USN School of Aviation Medicine, Pensacola, Florida. (Ohio State)

Dichotic-listener reception of simultaneous messages was studied as a function of attenuation of the signal level of one of the messages. Listeners, serving in panels, received two messages simultaneously through dichotic headset circuits. The signal level of one message was attenuated in five steps of three decibels each relative to the level of the other message. The simultaneous messages were groupings from the multiple-choice intelligibility tests. Listeners heard the messages under conditions of quiet and noise. The noise was simulated aircraft noise.

R 12

3812

Black, J.W. THE RELATIVE EFFECTIVENESS OF BRIEF INSTRUCTIONS TO ACHIEVE SLOW SPEED. Contract N6onr 22525, Proj. NM 001 064.G1, Rep. 37, Dec. 1954, 4pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

3812

To investigate the relative effect of various types of instruction upon eliciting changes in vocal sound pressure levels and voice intelligibility, 144 subjects received one of six types of instruction during an intelligibility test. The results are presented and discussed in terms of the most effective instruction in eliciting an increase in sound-pressure level without detriment to vocal intelligibility.

3813

Tolhurst, G.C. VARIABLES OF ENVIRONMENT AND PRINTED MATERIALS IN INTELLIGIBILITY TESTING. Contract N6onr 22525, Joint Proj. Rep. NM 001 064.G1.38, Dec. 1954, 10pp. USN School of Aviation Medicine, Pensacola, Florida. (Ohio State University)

Listeners and speakers in administrations of the multiple-choice intelligibility tests were exposed to comparison noises of two different spectra but of similar level. The noise recorded at the copilot's position in a twin-engine aircraft produced more masking of speaker intelligibility than the noise that simulated a single-engine spectrum. Recordings of two nine-member teams reading a form of the multiple-choice intelligibility tests in counter-balanced rotational order did not yield different intelligibility scores. Regular cross-out response forms for the multiple-choice intelligibility tests yielded higher scores than did forms prepared for IBM scoring. Listener variability was the same under both circumstances.

R 6

3814

Tolhurst, G.C. SOME EFFECTS OF CHANGING TIME PATTERNS AND ARTICULATION UPON INTELLIGIBILITY AND WORD RECEPTION. Contract N6onr 22525, Joint Proj. Rep. NM 001 104 500.40, Jan. 1955, 15pp. USN School of Aviation Medicine, Pensacola, Florida. (Ohio State University)

Multiple-choice intelligibility items were read by one voice successively in a prolonged, a normal, and a staccato manner of delivery. The listener judgments indicated a preference for the normal and prolonged delivery over staccato; they also accorded different intelligibility values to the three conditions. When other speakers heard and repeated to listeners the words that they had heard recorded by one voice, the speakers' intelligibility scores varied in keeping with the precision of articulation of the original stimulus. Listener judgments of recorded, paired test items indicated that they could tell, with significantly better than chance frequency, differences between items that were precisely, normally, and slovenly articulated as the speakers repeated the items they heard.

R 12

3815

Black, J.W. THE PERSISTENCE OF THE EFFECTS OF DELAYED SIDE-TONE. Contract N6onr 22525, Joint Proj. Rep. NM 001 104 500.39, Jan. 1955, 6pp. USN School of Aviation Medicine, Pensacola, Florida. (Ohio State University)

28 male experimental subjects read 10 lists of 5 5-syllable phrases, including one practice list. Lists 3 and 4 were read in the presence of 0.30-sec. delayed side-tone. A similar control group read with no delayed side-tone. Measurements were secured of reading rate and sound pressure level. The incremental effects of delayed side-tone upon sound pressure level was transitory; the retarding effect upon rate of reading persisted throughout the remaining reading time, 150 secs.

R 9

3817

Peters, R.W. VOICE INTELLIGIBILITY AS A FUNCTION OF SPEAKERS' KNOWLEDGE CONCERNING THE CONDITIONS UNDER WHICH THEIR TRANSMISSIONS WILL BE RECEIVED BY LISTENERS. Contract N60nr 22525, Joint Proj. Rep. NH 001 104 500-41, Feb. 1955, 7pp. USN School of Aviation Medicine, Pensacola, Florida. (Ohio State University)

Speakers read multiple-choice intelligibility test words immediately after receiving voice transmissions under conditions of quiet or under various levels of noise. The speakers were informed that these transmissions represented conditions under which listeners would hear their voices. Among the speakers employed was a group of speakers not experienced in military voice communication procedure and a group experienced in these procedures. Of the speakers used, only those who were inexperienced in communication procedures became more intelligible in response to information that listeners would hear their voices under conditions of noise as opposed to conditions of quiet. In no instance did voice intelligibility vary consistently as a function of the amount of noise accompanying transmissions to the speaker.

R 8

3816

Lloyd, V.V. A COMPARISON OF CRITICAL FUSION FREQUENCIES FOR DIFFERENT AREAS IN THE FOVEA AND PERIPHERY. *Amer. J. Psychol.*, 1952, 55, 346-357, Contract N60nr 271, Proj. NR 142 404, Task Order 9, 28p. (Columbia University)

An apparatus and procedure have been described for determining the critical fusion frequency as a function of intensity for the human eye. Areas with diameters of 1°, and 2° visual angle in the fovea and of 1°, 2°, 6°, and 14° visual angle centered 20° below the fovea have been investigated. The data for the foveal areas seem to indicate the functioning of a single receptor, i.e., cones. Those for the periphery fall into two parts which are probably due to rod and cone function, respectively, according to intensity-level. Both sets of data show that the critical fusion frequency increases with area of stimulation over a wide range of intensities. A comparison of results for the corresponding foveal and peripheral areas reveals that at low intensities the periphery is more sensitive to flicker than the fovea while for intermediate and moderately high brightness levels, the situation with comparable areas (1° and 2°) is reversed. The superiority of the periphery at low intensities is attributed to the greater sensitivity of the rods at these levels. At the very highest intensities the 1° and 2° foveal and peripheral areas show similar maximal critical fusion frequencies. Possible hypotheses to account for the higher maximal critical fusion frequency found with the 6° and 14° peripheral areas (as contrasted with the 1° and 2° foveal areas) are examined. It is concluded that either a) rods as well as cones contribute to flicker at high brightness levels, or b) peripheral cones have characteristics that differ from those of the foveal cones.

R 18

3818

Diamond, A.L. FOVEAL SIMULTANEOUS BRIGHTNESS CONTRAST AS A FUNCTION OF INDUCING- AND TEST-FIELD LUMINANCES. *J. exp. Psychol.*, May 1953, 45, 304-316. (Columbia University)

Simultaneous brightness contrast is investigated in the fovea as a function of the inducing- and test-field luminances. The inducing and the test fields are adjacent squares, each subtending 33' on a slide, and presented to S's right eye. A match-field of equal size is presented to S's left eye. The S's task is to set the luminance of the match field so that its brightness appears equal to that of the test field. As the inducing field is varied in luminance from below to above that of the test field, the apparent brightness of the test field, and thus the contrast effect, is measured by the actual luminance of the match field. The results show the contrast function to be of the following nature. The test-field apparent brightness is depressed only slightly for inducing-field luminances less than that of the test field. For inducing-field luminances greater than that of the test field the depression of the test-field apparent brightness seems directly proportional to the luminance of the inducing field. Thus, a "bend" in the function occurs when the inducing-field luminance is approximately equal to that of the test field. This relation is consistent over a large range of test-field luminances. A theoretical formulation based upon the relation of the test-field apparent brightness to the activity in the visual field completely surrounding the test field leads to an equation satisfactorily fitting the data. The physiological nature of this surround activity is undetermined. The possibility of binocular contrast effects between the inducing and the match fields was considered and shown to be insignificant in a control experiment.

R 10

3819

Lothridge, C.O. STEREOSCOPIC SETTINGS AS FUNCTIONS OF VERTICAL DISPARITY AND TARGET DECLINATION. *J. gen. Psychol.*, 1953, 49, 241-271. (Psychology Dept., Columbia University, New York, N.Y.). (ONR)

The purpose of the present experiment was to investigate the effect on stereoscopic settings of the introduction of vertical disparity and target declination. The dependent variable was measured in terms of the average and the variability of the settings made by the S. The independent variable, vertical disparity, is defined as a difference in the distance between the target and fiducial mark for the views presented to the right and left eyes. Target declination is defined as rotation of the target from the vertical position in the frontal plane. The stimuli, a vertical line (the target) and a circle (the fiducial mark), were stereoscopically presented to the S. 4 vertical disparities were introduced: 0, 3.8, 11.5, and 19.2 min., at each of the 4 target declinations: 0°, 30°, 60°, and 90°. The S adjusted the horizontal position of the right eye target until the fused target appeared in the same frontal plane as the fiducial circle. 4 experimental sessions were conducted for each of the 4 Ss. Conclusions were: Mean settings do not change systematically with vertical disparity. As the amount of vertical disparity increases, the precision of stereoscopic settings tends to decrease, as shown by an increase in variability. For a given vertical disparity, an increase in target declination up to 50° decreases the precision of stereoscopic settings, as shown by an increase in variability. For the horizontal target (90° target declination) a) variability decreases below that for the 30° and 60° declinations when 11.5 min. of vertical disparity is introduced; and b) at maximum disparity, 19.2 min., variability is between that found for the 30° and 60° declinations. The "unassociated tips" control experiment shows that values which are very close to those predicted by theory can be obtained under conditions where the tips are eliminated. When the distance factor (the distance between target and fiducial mark) was investigated with the vertical target, it was found that there was a decrease in precision when the distances between target and fiducial mark were used. R 19

3820

Grings, W.W. HUMAN FACTORS RELATED TO THE DESIGN AND USE OF ELECTRONICS EQUIPMENT. FINAL REPORT. Contract NOBSR 57435, Aug. 1953, 28pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

3820

This report contains four major sections: 1) The mission of the research contract - to investigate principles governing human interaction with electronic equipment in man-machine combinations, human engineering studies of the design and use of electronic equipment, and resultant recommendations for design and use of such equipment; 2) The procedures employed in conducting the research are described; 3) The work actually accomplished is summarized in the form of presentation of abstracts of projects completed; 4) A listing of formal reports and memoranda submitted under the contract is given.

R 49

3821
Davy, E. THE INTENSITY-TIME RELATION FOR MULTIPLE FLASHES OF LIGHT IN THE PERIPHERAL RETINA. J. Opt. Soc. Amer., Dec. 1952, 42(12), 937-941. (Columbia University, New York, N.Y.).

This study investigates the effect upon threshold of multiple light pulses, 0.01 sec. in duration, that fall on the peripheral retina. In one series of experiments a train of 1 to 5 such pulses is presented, the interval between pulses being 0.01 sec. The maximum duration of such a train of pulses is shorter than the critical duration for a single flash of light, found by Long to be 0.10 sec., under conditions similar to those that hold in the present investigation. In another series of experiments, threshold determinations are made for two such pulses separated by 4 temporal intervals less than, and by 6 temporal intervals greater than, critical duration. The results indicate that the breaking up of a light stimulus into separate flashes has no effect upon threshold provided these flashes occur within a critical duration. When 2 flashes are separated by temporal intervals greater than critical duration, threshold energy rises and, at a temporal separation of 0.5 sec., is the same for each of two flashes as it is for one flash. Under the latter circumstances the subject reports the existence of two flashes.

R 14

3822

Brown, J.L. EFFECT OF DIFFERENT PREADAPTING LUMINANCES ON THE RESOLUTION OF VISUAL DETAIL DURING DARK ADAPTATION. J. Opt. Soc. Amer., Jan., 1954, 44, 48-55. USAF Contract AF 33(038)-22616, Res. and Development Order 694-45, WADC, Psychology Branch of the Aero Medical Lab., Wright-Patterson AFB, Ohio. (Columbia Univ., Dept of Psychology, New York, N.Y.)

3822

Luminance thresholds for the resolution of various widths of grating line were determined during dark adaptation following light adaptation to luminances of 0.98, 100, 1290, and 11, 200 ml. for five minutes. Threshold curves were obtained for two observers for each of these preadaptation conditions using grating test objects which represented visual angles of 1.6, 4, and 24 minutes of arc as well as for light detection with no grating in the test field. The results are presented graphically for each subject and for each of the light-adapting luminances and are discussed in the text.

3823

Leibowitz, H. SOME OBSERVATION AND THEORY ON THE VARIATION OF VISUAL ACUITY WITH THE ORIENTATION OF THE TEST OBJECT. J. Opt. Soc. Amer., Oct. 1953, 43, 932-905. Contract #60nr-271, Proj. NR 142-404, Task Order IX, U.S. Office of Naval Research. (Univ. of Wisconsin, Madison, Wisconsin.)

3823

To study the effect of pupil diameter and luminance level on the differences which result in visual acuity measures as a function of the angle of orientation of a grating test object, the data of 2 subjects from a previous experiment were analyzed to isolate the effect of orientation. The results are presented in a table as the threshold angle of resolution in seconds of arc for various orientations, luminances, and pupil diameters and in a figure as log visual acuity plotted against log pupil diameter. The results are then used to evaluate two of the explanations which have been offered for the phenomenon under consideration.

3824

Leibowitz, H. THE EFFECT OF PUPIL SIZE ON VISUAL ACUITY FOR PHOTOMETRICALLY EQUALIZED TEST FIELDS AT VARIOUS LEVELS OF LUMINANCE. J. Opt. Soc. Amer., June, 1952, 42, 416-422. Contract #60nr-271, Task Order IX, ONR. (Columbia Univ., Psychol. Lab., New York, N.Y.)

3824

Visual acuity for a grating test object was determined for 2 subjects as a function of artificial pupil diameter at 5 luminance levels. In order to eliminate the effect of variation of retinal illuminance with pupil size changes as a factor in acuity, the luminance of the acuity test field as viewed through each artificial pupil was previously adjusted to match a reference field of constant luminance viewed by the other eye through a fixed pupil at 5 luminance values of the reference field. Selection of maximum artificial pupil size was made on the basis of photos of the natural pupil taken under conditions similar to that of the experiment. The acuity data are plotted to show the effect of pupil size as a parameter of the acuity-reference luminance function.

3825

Brown, J.L., Graham, C.H., Leibowitz, H. & Ranken, H.B. LUMINANCE THRESHOLDS FOR THE RESOLUTION OF VISUAL DETAIL DURING DARK ADAPTATION. J. Opt. Soc. Amer., March 1953, 43(3), 197-202. (Dept. of Psychology, Columbia University, New York, N.Y.).

3825

To study visual acuity during the course of dark adaptation, luminance thresholds for the visual resolution of five widths (visual acuity = 1.04, 0.62, 0.25, 0.083, and 0.042) of alternating light and dark lines were determined at various times during dark adaptation (two Ss). Threshold data for the different acuities were analyzed as function of time in the dark. Comparison was made with dark adaptation curves obtained with light detection thresholds.

T. G. R 12

3826

Brown, J.L. & Diamond, A.L. A DEVICE FOR SIMULATING THE VISUAL DISPLAYS OF PPI SCOPES. J. Opt. Soc. Amer., Dec. 1953, 43(2), 1143-1146. (Dept. of Psychology, Columbia University, New York, N.Y.).

3826

This article describes the development, design, and function of a device for simulating the visual displays of PPI scopes. The characteristics of the visual display as seen by the observer are discussed in detail along with specific aspects of target presentation such as the variability of luminance and contrast between target and background.

3827

Sleight, R.B., Bond, H.J. & Lerner, M.D. HUMAN ENGINEERING APPRAISAL OF MILITARY GENERAL PURPOSE WHEELED VEHICLES. FINAL REPORT. Contract DA 36 034 ORD 1597RD, DA Proj. 595 20 OG1, ORD Proj. T81 1000, Apr. 1955, 123pp. USAF Human Engineering Lab., Aberdeen Proving Ground, Md. (Applied Psychology Corporation, Washington, D.C.).

The purpose of this project was to make a broad analysis of truck cab design from the human engineering standpoint. Methods used were: a) interview and questionnaire, b) readability analysis, c) motion picture analysis, d) literature review, and e) application of known human engineering design principles. Modified designs of instruments, controls and their combination in the cab were suggested. The results indicated a need for simplifying the vocabulary and style of the technical manuals, relocating controls and instruments nearer the driver, adding and eliminating some controls, and improving visibility. Significant gaps in pertinent experimental literature were noted.

R 79

3831

Floyd, W.P., & Welford, A.T., Editors. SYMPOSIUM ON FATIGUE. London: H.K. Lewis & Co., Ltd., 1955. (The Ergonomics Res. Soc.)

3831

This book presents a number of contributions (twenty, to the problem of fatigue. The papers were first given at a symposium on Fatigue held by the Ergonomics Research Society (England) in 1952. Both physiological and psychological approaches are represented in laboratory and field reports. Since the majority of papers represent both approaches no attempt was made to categorize them on this basis. The complete program of the Symposium is included.

T. G. I. R 265

3832

Vernon, M.D. THE USE AND VALUE OF GRAPHICAL MATERIAL WITH A WRITTEN TEXT. Occup. Psychol., April 1952, XXVI(2), 96-100.

3832

This is a report of 2 experiments exploring the value of using graphs to amplify a written text. In one experiment 15 adolescent girls read a text and saw 5 pictorial charts illustrating the text either before, during, or after reading; they were then asked questions on the contents of the text. In the other experiment, 22 adolescent girls made oral statements of what they remembered of the contents of texts read to them, some with, some without graphical illustrations. Results are discussed regarding the contributions of graphs toward learning facts and toward understanding the general argument of written texts.

3833

Vernon, M.D. THE USE AND VALUE OF GRAPHICAL METHODS OF PRESENTING QUANTITATIVE DATA. Occup. Psychol., Jan. 1952, XXVI(1), 22-34.

3833

This paper presents a summary report of the first part of a systematic inquiry into the remembering and understanding of information presented in graphic form. Data relating to vital statistics and manpower, production, and consumption during World War II were presented by graph, pictorial chart, and table. People of widely varying types were asked to study them and respond to questions relating both to facts and generalized conclusions which could be drawn from the data. Analysis relates the data to intellectual and educational level as well as to the differences among the three forms of presentation.

T. G.

3834

Vernon, M.D. PERCEPTION AND UNDERSTANDING OF INSTRUCTIONAL TELEVISION PROGRAMMES. Brit. J. Psychol., May 1953, XLIV(2), 116-126.

3834

To study the effectiveness of instructional television programs, 99 Ss of varying educational achievement viewed selected programs in small groups (10-11). All Ss were asked to write a brief account of what they remembered of the programs immediately after seeing them. Responses were scored for accuracy and amount of recall, and individual statements were studied for indications of factors influencing interest and recall. Results are discussed in terms of interest, impressiveness, understanding, and remembering.

R 6

3835

Rock, R.T., Jr. TELEVISION EVALUATION PROJECT. SPECIAL REPORT. Contract N7ONR 475, SDC Proj. 20 E 54, Rep. 1, Oct. 1948, 11pp. USN Special Devices Center, Fort Washington, N.Y. (Fordham University, New York, N.Y.).

3835

This is an evaluation of an experimental instructional television program. Thirty-five naval and civilian staff members of the Special Devices Center viewed a 35-min. program on naval weapons, following which they filled out a 6-item questionnaire on their impressions of the program and added general comments. Frequency of choices on the multiple-choice items and the various comments are given. The data are neither analyzed nor interpreted.

3836

Weigandt, J.F., Murray, J.E. & Chanell, R.C. THE DEVELOPMENT OF SPECIFICATIONS OF A STANDARD DISPLAY BOARD FOR ARMY FIELD FORCES. Contract NONR 927 00; Proj. 29 EA 11, Feb. 1953, 60pp. USN Special Devices Center, Port Washington, N.Y. (Dunlap and Associates, Inc., Stamford, Conn.).

3836

This is a description of two recommended Standard Display Boards for military training units which combine features of bulletin boards, blackboards, and projection screens. In determining specifications, data on current aids were sought from manuals, classroom observation, interviews, and questionnaires, the results of which are summarized.

T. I.

3837

Reed, J.B. THE SPEED AND ACCURACY OF DISCRIMINATION DIFFERENCES IN NUMBER AND TEXTURE-DENSITY. Contract NONR 131 (01), SDC TR 131 1 3, July 1952, 26pp. USN Special Devices Center, Port Washington, N.Y. (Psychophysical Research Unit, Mount Holyoke College, South Hadley, Mass.).

3837

To investigate the speed and accuracy of discriminating visual symbols which differ in one of three aspects: "subitized" number (less than seven dots), estimated number (larger or smaller number of dots), and texture density (coarseness or fineness). Subjects (25) sorted packs of cards each containing two values of one of the three stimuli. The data (sorting time) are analyzed in terms of method and amount of stimulus difference. Implications for practical problems in coding are discussed.

T. G. I. R 5

3838

Stover, R.E. & Tear, D.G. EVALUATION OF TWO KINESCOPES. Contract N6ONR 269, Proj. 20 E 4, SDC TR 269 7 38, Oct. 1953, 21pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

3838

To evaluate two kinescope recordings of television programs, a panel of 12 Naval Reserve Officers (trained in film rating) viewed the kinescopes and rated them on a special film analysis form (copy appended). In addition, a panel of 15 members rated the various parts of the kinescope for teaching effectiveness (as they judged that an average "boot" would perceive them). Ratings are compared with similar ratings of regular training films for indications of the comparative effectiveness of kinescopes.

T. G. I.

3839

USN Special Devices Center. INSTRUCTIONAL FILM AND INSTRUCTIONAL TELEVISION TECHNICAL REPORTS. ca. 1955. 20pp. USN Special Devices Center, Port Washington, N.Y.

3839

This is a list of technical reports available on instructional films and instructional television, followed by a general summary of the findings of the research covered in the reports. Film information is arranged in sections for the curriculum planner, the film planner and producer, the instructor, and the student, with a separate section on instructional television. Curves are given for the determination of optimum equipment, optimum use, and class size.

G. R 50

3842

Carpenter, C.R. (Dir.). INSTRUCTIONAL FILM RESEARCH REPORTS. Contract N63MR 269, NAVEXOS P-1220, SDC TR 269 7 36, Jan. 1953, 300pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College; State College, Penn.).

3842

This is a compilation of reports SDC 269 7 1 through 35 (except no. 19) on research on improvement and use of instructional films. Reports are grouped under such headings as: theory and practice, film research tools, motor skill training, film utilization, attitudes and emotions, and film productions. Major findings are summarized for the curriculum planner, for the film planner and producer, for the instructor, and for the student. Individual report bibliographies are included.

T. G. I. R 35

3843

Adler, H.E., Brown, J.L., & Herrick, R.H. THE EFFECTS OF PUPIL SIZE AND FLASH DURATION ON ACUITY DURING DARK ADAPTATION. Contract AF 33(038)-22616, Proj. 7186, WADC Tech. Rep. 54-551, Nov. 1954, 11pp. WADC, Air Research and Development Command, Aero Medical Lab., Wright-Patterson AFB, Ohio. (Columbia University)

3843

To determine the effects of pupil size and flash duration on acuity measured during dark adaptation, the minimal luminances required for the resolution of each of three acuity gratings were obtained five seconds after the end of adaptation to each of four luminances and after thirty minutes of dark adaptation. The thresholds were found using either the natural pupil or a 3 mm artificial pupil in combination with a 0.016 or a 0.40 second test flash duration. Figures are presented showing log threshold luminances for three acuity levels 5 seconds and 30 minutes after light adaptation as a function of a) preadapting luminance and b) log visual acuity. Effects of pupil size and flash duration are analyzed.

3844

USA Department of the Army. LIST OF TRAINING AIDS RECOMMENDED FOR USE IN ARMY TRAINING PROGRAMS. (DRAFT). Pamph. 20, June 1952, 323pp. USA Department of the Army, Washington, D.C.

3844

This is a listing of training aids available to Army instructors. The listing covers aids grouped under 22 subject areas, giving the following information for each aid: training subject, scope of instruction, training aid type and title, training aid number, and purpose of aid. There is an alphabetically arranged index and a bibliography of manuals, catalogues, etc.

R 53

3845

USAF Operational Test Center. COMPARATIVE EVALUATION BETWEEN J-8, B-1A AND MX-1 ATTITUDE INDICATORS. FINAL REPORT. Proj. AFG/TAT/115-A, Feb. 1955, 23pp. USAF Operational Test Center, Eglin AFB, Fla.

3845

This report presents the results of a comparative evaluation between the J-8, B-1A and MX-1 Attitude Indicators. Each indicator was assessed for its relative accuracy, instrument presentation and sensitivity in presenting dive angle, attitude, and positive pitch information. Fifteen pilots were required to complete an appropriate questionnaire following a flight with each of the three instruments. The results are presented and discussed in terms of the relative suitability of each of the instruments for fighter type and transport aircraft.

T. I.

3848

Vernon, M.D. THE VISUAL PRESENTATION OF FACTUAL DATA. *Brit. J. Educ. Psychol.*, Nov. 1950, XX(III), 174-185.

3848

To investigate the relative effectiveness of different types of visual presentation of factual material, two experiments (39 and 16 adolescent Ss) were run. In the first, Ss saw data (vital population statistics) presented either as pictograms, graphs, or tables of figures and answered oral questions about the information contained in them. In the second, the graphic materials were accompanied by a written text. Responses to questions were interpreted regarding critical factors in the assimilation of factual information.

T. I.

3849

Vernon, M.D. THE VALUE OF PICTORIAL ILLUSTRATION. *Brit. J. Educ. Psychol.*, Nov. 1953, XXIII(III), 180-187.

3849

To study the effects of pictures accompanying text or learning and interest, two experiments (38 and 24 adolescent Ss) were run. In the first, Ss read two texts on causes of illness, varying in difficulty of style, with one illustrated by photographs, the other by graphs. After reading, Ss recalled orally what they had read and answered oral questions on content. In the second experiment, the major difference in conditions was that the more difficult text was not illustrated at all. Responses of Ss are interpreted regarding the contribution of illustrations to assimilation of material from the texts.

T. R few

3850

Rock, P.T., Jr., Duva, J.S. & Murray, J.F. THE EFFECTIVENESS OF TELEVISION INSTRUCTION IN TRAINING NAVAL AIR RESERVISTS. (RAPID MASS LEARNING). FINAL PROJECT REPORT. Contract N70NR 47602, Proj. NR 781 007, SDC Proj. 20 E 5A, SDC TR 476 02 S2, April 1951, 68pp. USN Special Devices Center, Port Washington, N.Y. (Television Evaluation Project, Fordham University, New York, N.Y.).

3850

To study the effectiveness of television as a training medium, instructional television programs were prepared on eight topics. These lessons were prepared in three forms: 1) broadcast, 2) kinescope of broadcast, 3) instruction session for which the instructor used the kinescope in preparing the session. About 100-120 officer pilots and enlisted airmen of the Naval Air Reserve saw each form of each lesson. Written tests on lesson content were administered before and after each presentation. Test scores, student and instructor comments, and lesson content analyses were interpreted regarding potential usefulness of television in rapid mass learning and need for further research.

T. G. I.

3851

Edgerton, H.A. (Princ. Investigator). HOW TO GET MORE OUT OF TRAINING AIDS. Contract N6ONR 38307, Proj. 20 A' 10A, SDC TR 383 7 1, March 1952, 9pp. USN Special Devices Center, Port Washington, N.Y. (Richardson, Bellows, Henry and Co., Inc., New York, N.Y.).

3851

This is a guide for the systematic study of the utilization of training aids. The following topics are covered: who should do the study, what instruments are used, and procedures for summarizing results and making recommendations. Sample student and instructor interview blanks and observer's check-list, the SDC-ONR Evaluation Procedure, and a manual for using the Procedure are appended.
I.

3852

VanderWeer, A.W. RELATIVE EFFECTIVENESS OF COLOR AND BLACK AND WHITE IN INSTRUCTIONAL FILMS. Contract N6 ONR 269, SDC TR 269 7 28, June 1952, 21pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

3852

To compare the relative effectiveness of color and black and white instructional films, five films in both versions were shown to 500 high school students (half saw color and half saw black and white versions). Tests were given immediately and after a period of six weeks. Classes were equated in final analysis of data. Four of the films were shown to 199 students in alternate groups. Preference ratings were also secured. Test scores for immediate and delayed recall were analyzed for differences between the two versions in learning and remembering. Preferences and sex differences are discussed.
T. R

3853

Jackson, R. VISUAL PRINCIPLES FOR TRAINING BY TELEVISION. SDC TR 20 TV 2, June 1953, 26pp. USN Special Devices Center, Port Washington, N.Y.

3853

To uncover factors affecting the visibility of training aids when shown on television, 12 employees of the Special Devices Center viewed 105 training devices on a television screen and rated them for visibility on 14 5-point scales. Ratings are summarized in the form of 31 visual principles in the following areas: organization, figure to ground, contrast, materials, size, detail, depth, and color.
G.

3854

Ash, P. & Jaspens, M. OPTIMUM PHYSICAL VIEWING CONDITIONS FOR A REAR PROJECTION DAYLIGHT SCREEN. Contract N6ONR 269, SDC Proj. 20 E 4, SDC TR 269 7 37, Oct. 1953, 17pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

3854

To study the effects of viewing conditions on learning with the aid of a cabinet type of projector, 721 naval trainees were shown a film on the assembly of the 40 mm. breech block and were then required to assemble breech blocks. The viewing conditions varied were angle of view (0°-60°), distance from screen (6-36 ft.), and room illumination (daylight and dark conditions). Mean speed scores from the assembly test are analyzed to determine optimum viewing conditions.
T. G. I. R 2

3855

Ash, P. & Jaspens, M. THE EFFECTS AND INTERACTIONS OF RATE OF DEVELOPMENT, REPEITION, PARTICIPATION AND ROOM ILLUMINATION ON LEARNING FROM A REAR-PROJECTED FILM. Contract N6ONR 269, Proj. 20 E 4, SDC TR 269 7 39, Oct. 1953, 20pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State College, State College, Penn.).

3855

To study the effects of several factors on learning from a rear-projected film, approximately 1100 naval trainees saw one version of a training film on assembling a 40-mm breech block, then were tested on the actual assembling of one. Variables were: 1) rate of development of instructions in the film (fast or slow), 2) repetition of film (one, two, or three showings), 3) audience participation (concurrent practice or not), and 4) room illumination (daylight or dark). Results (speed scores and percent passing assembly test) were analyzed for the effects of the variables, and implications for the design and use of films are discussed.
T. G. I. R 3

3856

Torkelson, G.M. THE COMPARATIVE EFFECTIVENESS OF A MOCKUP, CUTAWAY AND PROJECTED CHARTS IN TEACHING NOMENCLATURE AND FUNCTION OF THE 40MM ANTI-AIRCRAFT WEAPON AND THE MARK 13 TYPE TORPEDO. Contract N6 ONR 269, SDC Proj. 20 D 2, SDC TR 269 7 100, March 1954, 21pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

3856

To study the comparative effectiveness of different types of training aids, 75 NROTC students and 148 naval recruits were given instructions on two pieces of naval ordnance followed by written tests over the material 1-2 days and 5-6 weeks later. Aids used in the instruction varied for different groups among mockups or cutaways, illustrations from manuals, and projected black and white and colored transparencies. Test scores for the groups are compared for evidence of differences in the effectiveness of the various aids, and recommendations are made for application of the results and for further research.
T. I. G.

3857

Bitterman, M.E. & Krauskopf, J. SOME DETERMINANTS OF THE THRESHOLD FOR VISUAL FORM. Contract AF 33(616) 63, WADC TR 55-331, Sept. 1953, 34pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3857

Five experiments concerning visual discrimination of geometric form are reported. Purpose of the experiments was to test a diffusion model for visual form perception derived from the Kohler-Mallach theory of figural after-effects. The experiments measured foveal form and brightness thresholds for luminous figures which were briefly exposed in a dark room. Measurements were in terms of intensity of illumination. Results were discussed as they related to other models (e.g., a physical diffusion model, and the Osgood-Meyer Model). Methodology of the present as well as of previous studies was scrutinized.
T. G. I. R 21

3858

Morse, P.M. (Proj. Supervisor). M.I.T. PROJECT ON FUNDAMENTAL INVESTIGATIONS IN METHODS OF OPERATIONS RESEARCH, INTERIM TECHNICAL REPORT NO. 4 SEPTEMBER 1, 1955 THROUGH JUNE 30, 1956. Contract DA 19 020 ORD 2684, Proj. 599 01 004, Ordnance R & D Proj. TB 0001, OR Proj. 968 (rev), Proj. D.I.C. 7125, July 1956, 40pp. Massachusetts Institute of Technology, Cambridge, Mass.

3858

This report covers the third academic year of a project established to continue investigation of problems and techniques of Operations Research as applied to industrial and military problems. Active projects described are: waiting line handbook, a computer program for the transportation problem, an inventory and production control model, and the most economical number of work stations in a production line. Completed projects, given in full, are: a job-lot scheduling program, the revised simplex method, and modification of the Wilson formula when a sales forecast is available. Current publications and a list of seminar topics are included.
R 1

3859

Doidge, W.T. & Holtzman, W.H. INFLUENCE OF COLOR ON FORM PERCEPTION. Presented at: 1953 Meeting of American Psychological Association, Cleveland, Ohio, 10pp. (University of Texas, Austin, Tex.).

3859-

To investigate the influence of color on the perception of form, 12 drawings from the Holtzman Form-Recognition Test (incomplete line-drawings of familiar living creatures) were used to which were applied four colors (red, yellow, green, blue) in four different patterns (solid, splotted, striped, speckled). A second series included an achromatic version. Recognition time for each stimulus was measured for 128 Ss. The data were studied by analysis of variance procedures and discussed in terms of effect of color, pattern, and form on perception.

T.

3860

Twiford, L.C. FACTUAL ANALYSIS OF TRAINING. June 1955, 4pp. Pennsylvania State University, State College, Penn.

3860

As an aid to systematic analysis of training films, eight types of facts are presented and discussed as descriptive of film contents. The types of facts are: supporting or background, pertinent, learnable, important, retentive, motivational, quasi-motivational, and attractive. Learning profile analysis and listing of facts are discussed briefly as methods of factual analysis.

3861

Winick, D. & Tiffin, J. A COMPARISON OF TWO METHODS OF MEASURING THE ATTENTION-DRAWING POWER OF MAGAZINE ADVERTISEMENTS. June 1955, 6pp. Occupational Research Center, Purdue University, Lafayette, Ind.

3861

To compare methods for studying the eye appeal of advertisements, Ss were shown projected colored slides of pairs of magazine advertisements. In one presentation, 150 Ss indicated preferences for one advertisement in each of the possible pairings of ten viewed tachistoscopically. In a second presentation, eye movements of 36 Ss were recorded while viewing five pairs of advertisements. Results (preferences, first looks, and total viewing time) are compared to evaluate the tachistoscopic method relative to the method of recording eye movements.

3862

Kennedy, J.L. (Dir.). HANDBOOK OF HUMAN ENGINEERING DATA. SECOND EDITION. Contract N60RI 199 T.O. 1, Projs. NR 783.001 & HE 20 G 1, Rep. NAVEXOS P 643, Tech. Rep. SDC 199 1 2a, Nov. 1952, 300pp. USN Special Devices Center, Port Washington, N.Y. (Tufts University, Medford, Mass.).

This compilation of data is aimed primarily at providing the design engineer with quantitative measures of human capabilities and limitations and their application to machine design. The areas thus covered make up 9 main sections: the human machine - human engineering and experimental techniques; the human body - anthropometrics and functional use; vision - basic concepts and characteristics, factors influencing efficiency, and applications; audition - (same subdivisions as vision); skin sensitivity and proprioception - (same subdivisions as vision); motor performance - basic concepts, biological characteristics, task and job characteristics and efficient work arrangement; physiological conditions as determinants of efficiency - basic concepts and factors influencing; intelligence - summary; learning - basic concepts and processes, relevant characteristics, and training. A glossary of terms and author and subject indices complete the handbook. (HEIAS)

R Many

3864

National Academy of Sciences. BIBLIOGRAPHY OF THE SUBMARINE 1557-1953. Pub. 307, March 1954, 261pp. Office of Naval Research, Washington, D.C. & National Research Council, National Academy of Sciences, Committee on Undersea Warfare, Washington, D.C.

This annotated bibliography of submarine technical literature is broad in scope covering much of the pertinent literature from early days to date of publication (1954). Entries are arranged both chronologically and by topic. (HEIAS)

R approx. 3500

3865

Elbridge, F.R., Jr. (Dir.). TRANSMITTAL, PROGRESS REPORT, CONTROLS RESEARCH LABORATORY, THE JOHNS HOPKINS UNIVERSITY, OCTOBER THRU DECEMBER 1954. CONTRACT NOME 248(42), Feb. 1955, 15pp. Institute for Cooperative Research, Johns Hopkins University.

3865

This report details progress on a research project on the development of a means for transforming a pulse code into voice signals. The uses and advantages of a pulse receiving apparatus (Audible Data Receiver, ADAR) are discussed and a comparison of information transmission for ADAR and teletype bandwidths is presented. A proposed system employing transistor controls is presented with a design for a mechanical layout of a 128-word vocabulary ADAR. Problems needing investigation are discussed.

T. I.

3866

Eunt, D.P., & Craig, D.R. THE RELATIVE DISCRIMINABILITY OF THIRTY-ONE DIFFERENTLY SHAPED KNOBS. Proj. 7182, WADC Tech. Rep. 54-108, Dec., 1954, 16 pp. WADC, Air Research and Development Command, Aero Medical Lab., Wright-Patterson AFB, Ohio.

3866

To select tactually identifiable shapes that may be used to code control knobs, the subject (120) familiarized himself with 31 different knob shapes. With his right hand, he then made 13,560 paired comparisons between a knob shape which was felt and a three-quarter view picture of the knob. Each subject first made comparisons with the bare hand and then repeated comparisons while wearing a light-weight flying glove. Exposure was limited to 1.5 seconds; position of knob was varied systematically. Identification errors were tabulated for each knob and a number of identifiable shapes are presented and placed in one of three classes according to function. Suggestions are offered for application of these data.

T. I. R 13

3867
Gardner, J.F. SPEED AND ACCURACY OF RESPONSE TO FIVE DIFFERENT ATTITUDE INDICATORS. Proj. 7189, WADC Tech. Rep. 54-236, Dec., 1954, 22 pp. WADC, Air Research and Development Command, Aero Medical Lab., Wright-Patterson AFB, Ohio.

3867
To determine the optimal attitude indicator design from a field of five designs, response time and accuracy of 100 subjects (fifty experienced pilots, fifty college students) were tested. Two of the attitude indicators were of the "earth reference" type (moving element was the horizon), two were "airplane reference" type (moving element was the airplane) and one simulated a "stabilized sphere" type of presentation. Condition one required a corrective manual response with simulated control stick to deviations as presented on the instruments; condition two called for a corrective verbal response. The data (reversal errors and response times) were examined by analysis of variance for differences due to type of indicator, method of response, and subject group.
T. G. I. R 3

3868
Veterans Administration. DESIRABLE INFORMATION ON TACTILE STIMULATION. (Presented Dec. 29, 1949, during the Annual Meeting of the American Association for the Advancement of Science.) 4pp. Veterans Administration, Prosthetic & Sensory Aids Service, 252 Seventh Ave., New York 1, N.Y.

3868
This paper presents a number of considerations and design criteria in the development of tactile and electrical stimulators to be employed as communicators for the totally deaf, as the output channel of a guidance device for the blind, as a sense of touch for the arm amputee, or an artificial proprioceptive sense signalling the position of the joints of an artificial leg.
R.

3870
Kerroll, J.E., & Parsons, H.M. STUDIES IN CIRCULAR TAG POSITIONING. 1. EFFECTS OF DISTANCE AND ANGLE OF MOVEMENT M-3/A-II. Contract AF 30(120)-430, 1 July, 1955, 24 pp. Columbia University Engineering Center, Electronics Research Laboratories, Dept. of Electrical Engineering, 632 West 125th Street, New York 27, N.Y.

3870
To determine the speed and accuracy with which an operator can place an electronically-painted circular tag over a similarly presented short line with x-axis and y-axis controls, five subjects made a total of 540 positionings in which they had to move the tag 0.1, 0.3, or 0.5 inches along twelve angles from the center of a cathode-ray tube (CRT) display. The angles were increments of thirty degrees from 360 and were grouped to require both knobs to rotate in the same and in opposite directions, the preponderant use of the x or y knob, the use of a single knob, and positioning in the four quadrants. Time and error scores were studied for effects of distance and angle of movement on speed and accuracy.
T. G. R 2

3871
Nelson, W.H., & Webb, W.B. FACTORS INVOLVED IN CARRIER TRAINING ACCIDENTS IN THE NAVAL AIR BASIC TRAINING COMMAND. Special Rep. 56-8, March 1956, 8pp. U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

3871
To determine the major psychological factors present in accidents occurring in the carrier qualification phase of naval aviation training, approximately sixty students involved in an accident aboard a training carrier were interviewed. The interview was semi-structured with an effort made to gather information on specific aspects of the accident. The data were analyzed and classified as to major causes of carrier training accidents. Each classification is discussed and examples given. Recommendations for changes in manner and/or methods of instruction and training are made.

3872
Saul, E.V., & Jaffe, J. EFFECTS OF CLOTHING ON GROSS MOTOR PERFORMANCE. Contract DA44-109-qm-1124, Project Ref. 7-95-20-003B, June 1955, 33pp. Quartermaster Research and Development Center, Environmental Protection Division, Natick, Mass. (Tufts College)

3872
This report describes the effects of three different types of military clothing ensembles on the efficiency of gross motor performance. Fifteen college men were tested in each of 28 motor performance tests, including extent and flexibility of movement, coordination, and steadiness tests. The statistically-evaluated results pertained to differences in efficiency of motor activity obtained by wearing the three different types of clothing.
I, T, R23.

3875
Pattle, R.E. TOXIC EFFECTS WITH MIXTURES OF SULPHUR DIOXIDE AND SMOKE WITH AIR. Porton Tech Paper 525, Feb. 1956, 9pp. Chemical Defence Experimental Establishment, Directorate of Chemical Defence Research and Development, Ministry of Supply, London, England.

3876
To investigate the toxic effects of mixtures of sulphur dioxide and smoke with air, guinea pigs and/or mice were exposed under various conditions. The relative toxicities of sulphur dioxide-smoke mixtures and sulphur dioxide alone were determined; the effect of previous exposure to smoke before sulphur dioxide was assessed; and the effect of smoke which had been in contact with sulphur dioxide but the SO₂ had been removed from the gaseous environment was compared with ordinary smoke. The data were given in terms of "dosage up to death" and "dosage to 50 percent deaths". The findings are discussed in relation to lethality of atmospheric pollution.
T. R 5

3877
Biel, W.C. & Sweet, A.L. A FURTHER STUDY OF RADAR SCR 584 BURST SPOTTING ON TRIAL FIRE. Contract OEMsr 581, Proj. 505'6, OSD Rep. 5930, Rep. 16, Sept. 1945, 11pp. Office of Scientific Research and Development, Applied Psychology Panel, NDRC, Washington, D.C. (Tufts University, Medford, Mass.).
45 rounds of 90 mm gun trial fire were fired at each of 4 trial shot points, with a total of 180 rounds. The slant range of each burst was measured simultaneously by the following methods: a) photostereolites from 3 stations; b) visual observations using a B.C. Telescope at each of 2 flank stations and the spotting telescope on the antenna of a Radar SCR 584, thus providing range readings from 2 baselines 01-02, and 01-03; c) visual burst spotting from 2 radars - 9 operators in each set; d) photographic burst spotting with a light SCR 584; the fine range oscilloscope was photographed for each round and the films read later for range values. The operators doing the burst spotting, in general, were untrained in the method although they varied in previous burst spotting experience from none to a considerable amount. From the data it was concluded that: a) operator performance is an important variable in the accuracy of radar burst spotting of trial fire; b) radar measurement is of comparable accuracy to that of the B.C. Telescope technique if the operator is well trained, whereas with untrained operators, the radar method is less accurate.
R 3

3878 Gottsdanker, R. & Biel, W.C. A STUDY OF TRACKING ON DIRECTORS MSA2 AND MSA2E1. Contract OMSR 581, Proj. SOS 6, OSD Rep. 5929, Rep. 15, Sept. 1945, 23pp. USA Office of Scientific Research and Development, Washington, D.C. (Tufts University, Medford, Mass.).

On 24 airplane courses, photographic records were taken of tracking with 2 Directors, Director MSA2E1, with an aided tracking time constant of .143 sec., is slightly but reliably more effective in respect to tracking than Director MSA2, with an aided tracking time constant of .143 sec. A measure of tracking effectiveness adequate for comparing different instances of tracking on Director MSA2 or on Director MSA2E1 may be obtained by combining Tracking Variable Error and Rate of Change, giving each equal weight. For azimuth tracking with Director MSA2, rate of change of tracking error is more highly associated with prediction error than is amplitude of tracking error; for elevation tracking, the reverse is true for either director. For azimuth tracking with Director MSA2E1, the two factors are equally associated with prediction error. Amplitude of tracking error is lower for Director MSA2 in the case of azimuth tracking where rates are relatively high but lower for Director MSA2E1 in the case of elevation tracking where rates are relatively low.

3879 Rappaport, J.H., & Biel, W.C. A COMPARISON OF THREE SPEED RING METHODS AND THE COMPUTING SIGHT M7 IN ACCURACY OF FIRE CONTROL ON THE 40 MM GUN. Proj. SOS-6, Contract OMSR-581, OSD Rep. 5762, Rep. 14, Sept., 1945, 33 pp. OSD, NDRC, Applied Psychology Panel. (Tufts College, Medford, Mass.)

3879 To study the effectiveness of three methods (constant, discrete, and continuous) of aiming with the three speed ring sight for the 40 mm gun, and to compare this sight with the Computing Sight M7, 13 crews had varying degrees of training with various combinations of methods and sights over a six-week period. Firing accuracy is compared for the various conditions with regard to comparative accuracy of the methods and sights and also with regard to ease of teaching and learning.
T. G. I. R

3880 Biel, W.C., Brown, G.E., Jr. & Griffiths, W.J. STUDIES WITH THE VARIABLE DRIVE T-18, FOR 40 MM GUN CARRIAGE M2A1. Contract OMSR 581, Proj. SOS 6, Rep. 13, & OSD Rep. 5736, Sept. 1945, 22pp. Applied Psychology Panel, NDRC, Washington, D.C.

3880 This report describes two experiments conducted in an attempt to evaluate the Variable Drive T-18 (a mechanical-hydraulic device, adaptable to the 40 millimeter Gun Carriage M2A1, providing means for varying the handwheel-gun traverse speed ratio in infinitely small steps by foot-operated control) as a tracking mechanism, when used as the azimuth drive. 1) The gun, equipped with the T-18, was compared to a standard gun for ease and accuracy of tracking short-range fast moving targets. The adaptability of the gun pointers in learning to use the drive was also studied. 2) A further study was made to determine whether the mechanical-hydraulic drive itself contributed to superior tracking performance.
T. G.

3881 Henry, R.N., Biel, W.C., Brown, G.E., Jr., Gottsdanker, R.M., et al. RESEARCH ON PROJECT SOS-6: STUDY OF OPERATOR PERFORMANCE ON ALL TYPES OF ANTI-AIRCRAFT EQUIPMENT. FINAL REPORT. Contract OMSR 581, OSD Rep. 5931, Rep. 17, Sept. 1945, 17pp. Applied Psychology Panel, NDRC, Washington, D.C. (Tufts University, Medford, Mass.).

3881 This is a summary report of a 2-year (1943-1945) project on operator performance on all types of anti-aircraft artillery. Findings are summarized for the following general areas: (1) criteria of accuracy of performance, (2) developing and testing training methods, techniques, and devices, (3) personnel selection, (4) equipment suitability, (5) effectiveness of operating techniques, and (6) assisting in instructional procedures.
R 13

3882 Clark, R.E., Hoffman, A.C., Hudson, B.B., Mead, L.C., et al. THE EFFECTS OF SLEEP LOSS ON PERFORMANCE OF A COMPLEX TASK. Contract OMSR 581, OSD Rep. 5153, Memo 3, Sept. 1943, 9pp. Applied Psychology Panel, NDRC, Washington, D.C. (Tufts University, Medford, Mass.).

This memorandum presents the results of experiments in which Ss were required to go without sleep for 50 hrs. Because only 3 Ss could be tested at a time, the experiment was repeated 3 times. The experiment is regarded as a preliminary test of the hypothesis that observers would show signs of fatigue (decrement in efficiency of performance) when periodically tested in the performance of a psychologically complex task during a period of sleep deprivation. Graphical representation of the performance of the 9 Ss tested indicates a decrement in efficiency. Efficiency in performance of complex psychological tasks suffered a significant decline during the course of 50 hrs. wakefulness.

3883 Richards, W.J., Shuford, E.H. & Bickle, A.J. PART I - REACTION TIME; PART II - INTENSITY; PART III - VISUAL REACTION; PART IV - PROPOSED FUTURE WORK. Contract DA 23 072 ORD 472, TAI 59901 04, Tech. Rep. 22, 1951, 27pp. Ordark Research Project, University of Arkansas, Fayetteville, Ark.

3883 Three studies are reported. 1) The relationship between the intensity of white stimulus light and the reaction time of human Ss under two conditions of adaptation was determined. A total of 400 trials was given to each of four Ss, using ten intensities of the stimulus under conditions of both light and dark adaptation. 2) The relationship between the intensity of chromatic stimuli and reaction time was studied. A total of 1200 trials was given to each of four light-adapted Ss, using ten intensities of stimulus for each of five chromatic stimuli and one white stimulus. 3) The effect of variations in size of a white stimulus (diameter varied from 1 degree, 12 minutes to 45 degrees, 14 minutes) was studied.
G. R 22

3884

Rosenblith, W.A., Stevens, K.N. & Bolt Beranek and Newman Inc. HANDBOOK OF ACOUSTIC NOISE CONTROL. VOLUME II. NOISE AND MAN. Contract AF 33(038) 20572, Phase II, Suppl. Agree. 1, CO 2, MADC TR 52 204, June 1953, 262pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3884

The Handbook of Acoustic Noise Control comprises two volumes and intends to provide an overall view of the noise control problem. Volume II includes as its subject matter several ways in which acoustic noise can be undesirable: producing pain and personnel damage, interfering with speech communication, and causing annoyance and general degradation of work and relaxation environments. The subjective responses are analyzed and correlated with properties of the physical stimuli.

T. G. I. R 240

3888

Clark, B., & Nicholas, Marjorie A. AVIATOR'S VERTIGO: A CAUSE OF PILOT ERROR IN NAVAL AVIATION STUDENTS. Rep. NM 001 059.01.37, Aug. 1953, 10pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

3888

To obtain information regarding the incidence and types of visual vertigo (disorientation) experiences which are encountered by flight students, a questionnaire (descriptions of experiences and check list) was administered to 226 basic students and 276 advanced students in the Naval Air Training Command. The analysis of data consisted of a frequency count of checked items with the written descriptions affording detailed information as to types of experiences. Implications for flight training and safety are discussed.

T. R 8

3892
Haber, F. ESCAPE AND SURVIVAL AT HIGH ALTITUDE. Proj. 21 1209 0006, Sept. 1953, 11pp.
USAF School of Aviation Medicine, Randolph Field, Tex.

The purpose of this paper is to give a survey of the problems of escape at these altitudes which have not yet been attained by aircraft, and to show that the emphasis of the different problems during and after bailout will shift from escape to free fall. The speed of future aircraft will be limited by the temperatures caused by aerodynamic heating. Thermal considerations call for high altitudes if flying speed is increased. At the high altitudes required, windblast and dangers of escape proper will be reduced. The phase of free fall should last much longer after bailouts. High speeds attained in such falls create decelerations which could be dangerous.

R 4

3889

Ambler, Rosalie K. PRELIMINARY EVALUATION OF TWO FORMS OF THE SPATIAL APPERCEPTION TEST. Proj. NM 001.057.04.04, May 1953, 5pp. USN School of Aviation Medicine, Pensacola, Fla.

2 forms of the Spatial Apperception Test were administered to 565 Naval Aviation Cadets. Each test item required the identification of the correct airplane drawing of a group of 5 from which a given view of a shore line is visible. Each S took both forms. Half of them had Form I first and the other half had Form II first. Analysis of results revealed that Form II is significantly more difficult than Form I. Correlation between forms is .70. Significant practice effect is in operation. Certain aspects of its proposed use in the Flight Aptitude Rating battery are discussed.

R 3

3890

McCord, F. THE MEASUREMENT OF ADJUSTIVE EYE MOVEMENTS. Contract N7onr 434, T.O.1, Proj. NM 001 063.01.31, Joint Rep. 3, June 1953, 7pp. USN School of Aviation Medicine, ONR, Washington, D.C. & Psychology Dept., Tulane University, New Orleans, La.

Many methods have been used in the measurement of the adjustive eye-rolling reflex which occurs with body tilt. In the present paper, a method involving the use of after-images was studied. This method proved to be relatively simple. It yields results which are internally consistent and also in good agreement with results obtained by more complicated methods. Measures of the reflex were made with 6 normal adults at body tilts of 0°, 10° and 45°. It was found that magnitude of the adjustive eye-rolling reflex increased as tilt increased.

R 13

3891

Ristenbatt, M.P. SURVEY OF TECHNIQUES FOR COLLECTION, REDUCTION AND ANALYSIS OF COMMUNICATIONS TRAFFIC ENGINEERING DATA. Contract DA 49-025-SC-150, DA Proj. DA-3-99-01-001, SC Proj. 102E, SC Tech. Requirements SCCL-2101 E, Haller, Raymond & Brown, Inc. Proj. 57, Feb. 1956, 90pp. Haller, Raymond and Brown, Inc., State College, Penn.

3891

This technical memorandum presents the results of a survey of communication data collection and reduction methods for voice radio and telephone systems. Two major systems are considered: a switching system and a party line system. Instrumentation for manual, semi-automatic, and automatic methods for data collection, reduction and analysis are developed for both major systems. The factors of frequency of use and amount of data to be collected are discussed in relation to an economic comparison of the proposed methods for achieving a desired objective. Appendices include a description of two systems developed for the Army to be used during Exercise Sagebrush.

T. I.

3893 Atkinson, C.J. RATE AND SOUND PRESSURE LEVEL OF SPEAKING AS AFFECTED BY SPECTRUM CHANGES IN AMPLIFIED SIDETONE. Contract DA 36 039 sc 42562, Suppl. Rep. 1, July 1953, 14pp. Iowa State University, Iowa City, Iowa.

2 experiments, with 50 Ss in each, were performed in an attempt to assess the effect of the spectrum of sidetone on some of the aspects of speech. Sidetone, either filtered or not filtered, was returned to the ear of the talker. Rate was found to be affected slightly from one condition to another in 1 experiment and not in the other experiment. Sound pressure level was found to be changed by the sidetone conditions. It was lowest for the normal sidetone condition, higher for high-pass, and highest for low-pass conditions. Differences between the sound pressure level measures of speech during filtered and unfiltered sidetone were not numerically great, but the differences were statistically significant ($p < .01$). (HEIAS)
R 11

3894 Carhart, R. & Lightfoot, C. EFFICIENCY OF IMPAIRED EARS IN NOISE. B. THE DISCRIMINATION OF CHANGES IN INTENSITY. Contract AF 33(038) 22645, Proj. 21 1203 0001, Rep. 5, Sept. 1953, 9pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Northwestern University, Evanston, Ill.).

3894 The effect of noise on the ability to perceive changes in sound intensity was investigated as part of a general study of auditory efficiency in noise. Subjects were 31 normal listeners and 77 cases of hearing losses representing a range of etiologic types. Difference limens were measured for intensity change in quiet and in two levels of "white" noise for five different frequencies (250, 500, 1000, 2000, and 4000 cps). The over-all noise levels for normal and half of the hard-of-hearing Ss was 60 and 80 db; 80 and 95 db were used for the remaining Ss.
T. G. I. R 8

3895 Chinn, H.I., Strickland, B.A., Jr., Waltrip, O.H. & McGeary, I.D. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. STUDIES DURING ROUTINE TRAINING FLIGHTS. Proj. 21 1208 0012, Rep. 1, Sept. 1953, 3pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

3895 To determine the effectiveness of various medications in preventing airsickness during training flights, two tests were conducted. In the first, navigation trainees were used as Ss during their regular training flights with the following preparations: placebo; Parsidol, 25 mg; Benadryl, 25 mg, with scopolamine, 35 mg; and the Benadryl-scopolamine mixture with dextrodine, 5.0 mg. Flights ranged from 2 to 12 hours duration. The second group, consisting of student officers and airmen flying as passengers on a one- to two-hour flight, were treated as above. Questionnaires were completed immediately after landing concerning nausea, vomiting, drowsiness, or fatigue. The significance of adding an analeptic drug to combat sedation effects was discussed.
T. R 6

3896 Chinn, H.I., Dugi, A.J. & Milch, L.J. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. COMPARISON OF SCOPOLAMINE, POSTAFENE, AND PHENERGAN. Proj. 21 1208 0012, Rep. 2, Sept. 1953, 2pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

3896 To compare the effectiveness and side effects of certain promising air-sickness preventives (scopolamine, postafene, and phenergan) directly in the air, approximately 400 young airmen were studied. The procedure consisted of exposing 20 Ss simultaneously to an hour's flight of standardized turbulence. The medications (placebo and the three drugs) were randomly distributed on each flight. Each S received a capsule 24 hours before flight and a second, of identical appearance, one hour before. The incidence of vomiting was recorded by observers during flight, while all other side effects (dizziness, nervousness, sweating, dry mouth, excessive fatigue) were obtained through individual questionnaires.
T. R 9

3897 Gerathewohl, S.J. INVESTIGATION OF PERCEPTUAL FACTORS INVOLVED IN THE INTERPRETATION OF PPI-SCOPE PRESENTATIONS. FORM DISCRIMINATION UNDER CONDITIONS OF HEAVY VIDEO-NOISE. Proj. 21 1205 0004, Rep. 1, July 1953, 5pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

3897 To investigate the relative form discriminability of four regularly shaped targets (triangle, circle, square, cross) under conditions of impaired visibility (heavy background video-noise), each target was presented in a radar trainer at three simulated distances (10, 20, 50 miles) to 24 untrained observers. Differences in discriminability of the forms at each distance are analyzed and compared with discrimination judgments under normal conditions. Application is made to radar scope interpretation.
T. G. I. R 5

3898 O'Brien, B. A STUDY OF NIGHT MYOPIA. Contract W33(038) F18317, WADC TR 53 206, May 1953, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Rochester, Rochester, N.Y.).

3898 The literature on night myopia is reviewed in some detail and a critical evaluation of certain outstanding papers is presented. The effects of chromatic aberration, the Purkinje shift, spherical aberration, and involuntary accommodation in producing the myopia are considered. Two sets of experiments are described in which vision is restricted to cone vision thus eliminating the Purkinje shift. In one set both natural and ring aperture pupils distinguish between spherical aberration and involuntary accommodation. In the other, a ballistic flash technique prevents any accommodation after test target is displayed.
T. G. I. R 37

3899 Stogdill, R.M. ASPECTS OF LEADERSHIP AND ORGANIZATION STUDIES IN NAVAL LEADERSHIP. Contract N6ori 17, T.O. 3, Tech. Rep. NR-171 123, ca. 1953, 77pp. Personnel Research Board, Ohio State University, Columbus, Ohio.

3899 The following topics are discussed: a) The reliability of measures of organization structure and leadership behavior; b) Estimated work performance compared with loggers performance; c) Personal vs. situational determinants of leadership; d) Leadership in secondary education; e) Differences between military and industrial organizations; f) Patterns of performance within organizations; g) Specialization of function at different echelons; h) Responsibility and authority relationships; i) Leader behavior and the operational readiness of ships; j) The relationship between time on the job and department effectiveness and leadership; k) Rationale for a method of scoring sociometric data which permits comparability between groups.
(HEIAS)

3912

Reynolds, C.L. ANALYSIS OF 30-INCH DIRECT VIEW PLAN POSITION INDICATOR PPI-30-1 FOR AIR TRAFFIC CONTROL OPERATIONS. Proj. R-201-11. WADC TR 55-508, Sept. 1955, 25pp. Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio.

3912

To evaluate experimental techniques in the use of large-size radar displays for air traffic control, Radar Indicator PPI 30-1 was installed at Wright-Patterson Air Force Base and used as a supervisory monitor for a period of one year. No formal operational evaluation was made but observational data of the limitations and advantages of the Indicator were noted. A photographic evaluation was conducted in a light-proof tent and these data are given. Recommendations for further evaluational studies are made.

I.

3913

Slade, J.J., Jr., Fich, S., Molony, D.A., Manni, L.F., et al. THEORETICAL AND EXPERIMENTAL RESEARCH IN COMMUNICATION THEORY AND APPLICATION. Contract DA 36 039 SC 15314, Projs. 3 99 12 022 & 17 132 B O, Prog. Rep. 8, July 1953, 11pp. Bureau of Engineering Research, Rutgers University, New Brunswick, N.J.

3913

This progress report summarizes research and development on communication theory and application. A continuation of the theoretical analysis of the effects of noise upon the detection of pulses by moments and the design of auxiliary equipment for the synthesis of sound are summarized briefly.

I. R 2

3915

Pride, A.M. EVALUATION OF MARK 6B LIGHTED CHART BOARD. Proj. TED PTR AE 9118, TT34 96, R 52 1348 1, Nov. 1952, 8pp. USN Air Test Center, Naval Air Station, Md.

3915

To evaluate the Mark 6B lighted chartboard in terms of suitability for day and night use in VA and VS type aircraft that perform missions requiring accurate navigation, the chartboard was used by 12 pilots during day and night flights. The results of these trials are summarized with recommendations.

I. R 1

3916

Bass, D.E., Kleeman, C.R., Quinn, M., Maliszewski, T.F., et al. MECHANISMS OF ACCLIMATIZATION TO HEAT IN MAN: THE EFFECT OF PROLONGED HEAT EXPOSURE ON BODY WATER DISTRIBUTION AND ELECTROLYTE AND NITROGEN METABOLISM. Rep. 214, June 1953, 72pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

3916

Five healthy young soldiers were acclimatized to heat by living and working under controlled conditions for 14 consecutive days in a chamber maintained at 120 degrees F during 12 daytime hours and at 100 degrees F during the night. The following measurements were made: antipyrene, thiocyanate, and T-1824 spaces; sweat concentrations of Na, Cl, K, N, and creatinine; nitrogen and electrolyte balances; indices of adrenocortical activity (circulating eosinophils and urinary 17-ketosteroids); pulse rates and rectal temperatures during exercise. Progressive dehydration and salt deficiency were minimized by replacing salt and water losses with 0.2 percent saline. Major physiologic adaptations were discussed.

I. G. R 97

3919

Fuch, F.L. INCIDENTS OF LEADERSHIP IN COMBAT. VOLUME V. ADMINISTRATION AND SUPERVISION OF DUTIES. Contract AF 18(600) 468, Res. Memo. 3, April 1953, 53pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (Psychological Services, Inc., Los Angeles, Calif.).

3919

A series of incidents demonstrating effective and ineffective leadership in the combat zone by Air Force officers was presented. These reports were obtained through personal interviews with officers on active duty in the Far Eastern Air Force. Fictitious names have been used but the ranks, types of units, and surrounding situational conditions were reported. All incidents represented some aspect of leadership behavior in the general area of administration and supervision of duties and were grouped under the following categories: 1) utilizing material and personnel, 2) delegating authority, 3) administering punishment or corrective action, and 4) employing verbal devices to affect harmony and motivation.

3920

Fuch, F.L. INCIDENTS OF LEADERSHIP IN COMBAT. VOLUME VI. EXECUTION OF DUTIES. Contract AF 18(600) 468, Res. Memo. 3, Feb. 1953, 51pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (Psychological Services, Inc., Los Angeles, Calif.).

3920

This report contained a series of incidents demonstrating effective and ineffective leadership in the combat zone by Air Force officers. These reports of actual situations were obtained through personal interviews with officers on active duty in the Far Eastern Air Force. In all cases names of individuals in the incidents remained anonymous to the interviewers; fictitious names have been added to the text. Ranks, types of units and surrounding situational conditions were reported. The incidents represented some aspect of Air Force leadership behavior in the general area of Execution of Duties.

3921

Dolch, J.P. AN INVESTIGATION OF SOME PHASE AND INTENSITY RELATIONSHIPS IN THE INTERFERENCE OF BONE- AND AIR-CONDUCTED SOUND. SUPPLEMENTARY REPORT NO. 2. Contract DA 36 039 SC 42562, Aug. 1953, 65pp. State University of Iowa, Iowa City, Iowa.

3921

To investigate some of the phase and intensity relationships in the interference of pure tones simultaneously transmitted through air and bone conduction channels, an apparatus was constructed to provide three separate pure tone channels of exactly the same audio frequency with independent phase and amplitude controls in two of the channels. A method of phase shifting provided continuously variable phase shifts of 360 degrees with substantially no variation in the amplitude of the audio signal output. With the bone conduction receiver placed in the middle of the forehead, the subjects adjusted the phase and intensity of air conducted tones at each ear to the point where the bone-conducted tone was cancelled. Application of the findings to interphone communications were discussed.

3922 Robinson, E.J. & Coules, J. AN EXPERIMENTAL STUDY OF THE EFFECT OF PHOTOMETRIC BRIGHTNESS ON THE JUDGMENT OF DISTANCE AND SIZE. Contract AF 33(616)J2, Tech. Note 101, Sep. 1, 1953, 40pp. Opt'cal Research Lab., Ballston-Spa, N.Y.

The effect of brightness on judgments of size and distance under binocular and monocular conditions has been investigated. An apparatus was constructed which permitted the presentation of 2 homogeneous discs of light to a subject. Particular attention was paid to control of the stimuli likely to influence judgments, in the size experiments, psychophysical relationships were obtained between brightness and size and the percentage of "smaller" responses. The curves clearly indicated that brightness operated systematically to make the brighter object appear larger. This relationship was evident under binocular as well as monocular conditions. It was also indicated that as the absolute level of brightness increased, the effect of the brighter object in any particular brightness ratio decreased. In the distance experiments, the data indicated that a) brightness is a factor in judgments of distance under binocular and monocular conditions and b) under binocular conditions judgments of distance are a function of the actual distance of the object. It was also indicated that the effect of brightness on distance judgments is related to the psychophysical method used.

3923 Myers, M.D., McKee, R.R., Simmons, R.F. & Rodman, I.L. AN INDEX OF ACCIDENT EXPOSURE FOR FLYING IN USAF. REPT. Rep. 39, July 1953, 70pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C.

3923 A report is given on the initial phase of a research program designed to develop a method of evaluating flying experience which would reflect differences in exposure to accident hazard more accurately than does the simple summation of flying hours. The following operations were undertaken to develop the Index of Accident Exposure: 1) a unit of measurement combining hours and flights was developed to measure amount of experience, 2) measures of relative accident hazard for different kinds of flying experience were obtained, and 3) tentative weights for kinds of experience were developed and tested for accuracy of prediction from one sample to another. Pilot estimates of hazards were compared to estimates from accident data and pilot attitude was measured with regard to both methods of evaluating flying experience. T. G. I.

3924 Daniels, G.S., Meyers, H.C., Jr. & Morrill, Sheryl H. ANTHROPOMETRY OF USAF BASIC TRAINEES. Contract AF 18 (600) 30, WADC TR 53 12, July 1953, 103pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio.

3924 Body size data for 63 measurements of 852 Women's Air Force basic trainees are presented for use by the designers of Air Force equipment. The statistics reported for each measurement include the mean, standard deviation, coefficient of variation, standard errors of these statistics, range, and selected percentiles from the first to the 99th. In general, these statistics are reported in both the metric and the English values. A complete description of the anthropometric techniques used is presented. T. I.

3925 Morrison, F.A. & Hill, J.E. DISCREPANCY FACTOR PRESENTING OF STUDENT ACCIDENTS. Contract AF 18(600) 137, HPRC. Rep. 38, Aug. 1953, 10pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C. (Institute for Research in Human Relations, Philadelphia, Penn.).

3925 An exploratory study of a new approach to prediction of accidents attributable to pilot error is reported. A survey of 50 instrument pilots located at seven Air Training Command bases was made. They were interviewed to determine whether, in their experience, they had expected certain of their students to have accidents, and whether their expectations had actually been borne out by subsequent events. The percentage of student accidents thus "predicted" was calculated and the reasons or behaviors which led to these "predictions" were tabulated. A search of accidents in relation to those pilots brought before Flying Instruction Boards was made. Further research is recommended. T. R. 2

3926 Woodcock, A.R. WEI - OLD II: A THEORETICAL EXPERIMENTATION OF THE CAUSATION OF LUMP GOLF EXPERIENCED BY CLOTHED MAN. Rep. 199, Feb. 1953, 40pp. USAF Human Factors Operations Research Lab., Lawrence, Mass.

3926 A theoretical interpretation of why there is a sensation of coldness associated with high humidities near the freezing point is discussed. An earlier theory of heat transfer through wet insulation has been extended to include the theory of heat transfer through insulation when moisture is evaporated from the warmer boundary. This extension has been applied with varying external conditions of temperature and humidity, moisture permeability of the clothing, and solar or external radiation. Recommendations are made. T. G. R. 11

3927 Cohen, J. & Sanders, Virginia L. AN EXPERIMENT ON DIAL CODING. Contract AF 18(600) 50, WADC TR 52 709, Nov. 1953, 16pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

3927 To determine whether shape or color coding of dials would affect the speed and accuracy of locating particular dials in a display, three equated groups of Ss were tested over a five-day period on their ability to locate and check-read an instrument on a simulated instrument panel. On the sixth day, the locations of the instruments on the panel were changed, and the Ss were required to locate them. The three groups worked on different panels on which instruments were identified by: 1) labels only, 2) labels and color codes, and 3) labels and shape codes. The time to locate a given instrument and the accuracy of reading the direction of the pointer, as well as correct identification, were analyzed for effects of the coding. T. G. R. 4

3930 Tomodori, J., Brogan, F.A. & Washburn, D.D. AUDITORY DIFFERENCE LIMEN OF INTENSITY IN NORMAL-HEARING SUBJECTS. Rep. 55 31, Aug. 1955, 18pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

3930 This paper is concerned with the validation of a method of regular modulation, used to obtain auditory difference limens of intensity, on normal hearing subjects. Several stimulus parameters were investigated: 1) ascending and descending mode of testing, 2) frequency and intensity of the carrier, 3) pattern and frequency of modulation. Averages and ranges of distribution were established. In addition, an attempt was made to correlate results from loudness-balance with those from difference limen measurements. T. G. I. R. 17

- 3931
Campbell, C.L. DEVELOPMENT OF A WORKSPACE MEASURING DEVICE. WADC TR 52 33, March 1953, 4pp. USAF Human Factors Lab., Wright-Patterson AFB, Ohio.
- 3932
A workspace measuring device was described. It was developed to determine the median, minimum, and optimum space requirements of Air Force pilots when seated in the cockpit, and to simulate in the laboratory existing or proposed cockpit designs with an eye to proper space utilization.
T. R 2
- 3933
Buckley, Barbara B., Eaves, R.W. & Davis, J. SEARCH AREA AND TARGET VISIBILITY ON A TWO COGNITIVE-TASK TREE. Contract AF 33(622) 22640, WADC TR 52 303, April 1953, 14pp. USAF Human Factors Lab., Wright-Patterson AFB, Ohio. (Ohio State University, Columbus, OH.).
- 3934
This experiment tested the possibility that detectability (thresholds) for small targets on a radar scope could be improved by having observers search part of the scope rather than all of it. Possible ways of assigning two observers to watch the same incoming data were of particular concern. Three methods of assigning the search area were tested: whole, left-right halves, and outer-inner annulus. In three separate experiments, thresholds for 24 Ss were obtained under these conditions: 1) only the search area was visible, 2) the entire scope was visible, and 3) pairs of observers searched different parts of the scope. In the first two experiments, single observers were used.
T. R 4
- 3935
Campbell, D.T. A STUDY OF LEADERSHIP AMONG SEAWARD OFFICERS. Contract N60017, 1953, 20pp. Ohio State University Research Foundation, Columbus, Ohio.
- 3936
This report is concerned with the problem of the criteria in leadership studies and the relation of these criteria to a number of variables which describe what the leaders do and how they do it. The study is one of a series devoted particularly to the area of Naval leadership. Following a detailed analysis of the concept of leadership, the conditions under which the data were collected from 68 officers and 600 enlisted men comprising the crew of ten submarines are detailed. Following chapters describe the types of data on ship effectiveness and ship morale, the analysis of such data to establish leadership characteristics, and other measures used along with the analysis of resulting data.
T. R 56
- 3937
Holt, G.C., Modigliani, V., & Kuth, J.P. DERIVATION AND COMPUTATION OF LINEAR DECISION RULES FOR PRODUCTION AND EMPLOYMENT SCHEDULING. Prepared under Contract Nonr-76001, Proj. NR 047001, Res. Memo; 36, Oct. 1955, 31pp. Graduate School of Industrial Administration, Carnegie Institute of Technology.
- 3938
This is a detailed and technical article concerned with the derivation and computation of linear decision rules for production and employment scheduling. The decision problem is expressed symbolically and analyzed in terms of determining the sequences of decisions as a function of certainty equivalence. The proposed equations for obtaining two decision rules are computed and their validity is evaluated.
T. R 6
- 3939
Ellefsen, M.J. & Orr, F.D. CLINICAL EFFECTS OF PROLONGED INSULATED RUBBER BOOT WEAR. Proj. 6'64 12 C28, Subtask WEL S 8, Rep. 115, May 1953, 74pp. USA Medical Research Lab., Fort Knox, Ky.
- 3940
To determine the clinical effects of prolonged insulated rubber boot wear, a total of 36 men were studied while also undergoing a nutrition study at the Army White Forest, Fort Monmouth Military Reservation, New Jersey, from 5 January to 23 March 1953. The foot study was performed during a period when the Ss were exposed to cold and activity. Four groups were formed: 1) continuous wear of insulated boots for 12 hours, 2) same conditions for leather combat boots, 3) insulated rubber boots with normal foot hygiene, and 4) same conditions for leather combat boots. Two separate studies were performed: both subjective appraisal by the Ss and foot examinations conducted twice each day were made. Recommendations for fit, foot hygiene, and improvements to the boots were made.
T. R 21
- 3941
Dennis, T. AGE AND BEHAVIOR. A SURVEY OF THE LITERATURE. Proj. 21-023-0005, Rep. 1, May 1953, 146pp. USAF School of Aviation Medicine, Randolph Field, Texas. (American Institute of Research).
- Microcard also.
- 3942
This is a selective review of studies dealing with the relationship between age and behavior which concerns itself primarily with information pertaining to job fitness as a function of age and the research techniques and needs in this area. Studies are presented in the general areas of: (1) social behavior and personality (e.g., resistance to change, reading interests, etc.); (2) mental abilities and mental achievement (e.g., studies of learning, memory, intelligence, etc.); (3) psychomotor abilities and skills (e.g., strength, reaction time, accidents, etc.); (4) sensory and perceptual abilities (e.g., vision, audition, etc.).
T. G. R 193
- 3943
Troxel, D.B. SOME MULTIPLE DECISION PROBLEMS. Contract D6002 520, Proj. NR 042 038, Task II, Tech. Rep. 16, June 1953, 20pp. Laboratory of Statistical Research, Dept. of Mathematics, University of Washington, Seattle, Wash.
- 3944
A statistical procedure is presented which will aid the experimenter who is faced with the task of deciding if the variability within several classes is uniform throughout the classes or, if not, which class exhibits the greatest amount of variability. The assumption is made that the distributions in each category are normally and independently distributed. Multiple decision problems discussed include comparison of several experimental categories with a control 1) when dealing with means and 2) when dealing with variances.
T. R 7
- 3945
Terrance, E.P. CREW PERFORMANCE IN A TEST SITUATION AS A PREDICTOR OF FIELD AND COMBAT PERFORMANCE. HROEL Rep. 33, March 1953, 43pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C.
- 3946
A battery of crew performance tests was devised for analyzing the difficulties which combat air crews experience in working together and for training these crews to function more effectively as teams. Procedures were developed for administering the tests, for observing test performance, and for interpreting results and predicting field performance on the basis of these results. Preliminary case study and statistical procedures yielded evidences of the validity of the procedures in predicting field performance under simulated survival conditions and combat performance over Korea.
T. I. R 25

3346
Maguire, C. SEQUENTIAL DECISIONS INVOLVING THE CHOICE OF EXPERIMENTS. Contract N000121, Tech. Rep. 19, July 1963, 33pp. Department of Statistics, Stanford University, Stanford, California.

3346
The general problem of the sequential decision: a statistician must make in the choice of taking an action without experimenting or performing an experiment is described first in verbal terms and then is formulated mathematically. An iterative method for obtaining Bayes solutions is given. The optimum sequential decision procedure for the problem under consideration is shown to be characterized as follows: If, at any stage of experimentation, there is a continuation which has smaller risk than the optimum stopping risk for that stage, the first experiment is performed. If there is no such continuation, an optimal terminal action (no experiment) is taken.
R 4

3347
National Defense Research Council. MANUAL ON USE OF CHECK SIGHT KIT IN TRAINING ARMED GUN POINTERS USING THE COMPUTING SIGHT KIT (PRELIMINARY DRAFT). Proj. SWS 6, 22pp. National Defense Research Council, Washington, D.C.

3347
This is a preliminary draft of a manual on the use of a check sight kit for evaluating performance in pointing a 40 mm gun. Topics include contents of the kit, testing gun pointing performance, and training and improving gun pointing performance.
R 4

3349
Brown, J.L., Ehmke, Margaret P., & Adler, H.F. THE RELATION OF THRESHOLD CRITERION TO THE FUNCTIONAL RECEPTORS OF THE EYE. Contract AF 33(033)-22616, Proj. 7186, Task 71544, WADC TR 57-442, Aug. 1957, 22pp. Aero Medical Lab., WADC, AFSC, Wright-Patterson AFB, Ohio. (Columbia University).

3349
To investigate the relationship between visual acuity and luminance when the eye remains dark adapted, luminance thresholds were obtained for the resolution of a series of grating test patterns (visual acuity range from 0.042 to 0.625). Measurements were made for each of 8 selected color filters and with thirteen neutral tint filters. Threshold values (logarithms of luminance) were analyzed as function of visual acuity required for the resolution of the grating test objects for each spectral condition. The results are interpreted in relation to rod and cone receptors of the eye. Implications for practical situations wherein the observer is adapted to low luminance levels and must periodically rate acuity discriminations of visual displays are discussed.
A. C. R 19

3349
Gibbs, C.B., & Hiney, J.M. CONTROL DISTURBANCES IN A TRACKING TASK DUE TO OPERATING PUSH BUTTONS ON THE CONTROL LEVER. Spp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

3349
To evaluate the control disturbances in tracking which arise when operating a spring loaded push button that is mounted directly on the joy stick, twelve practiced operators performed a compensatory tracking task. A buzzer, sounding at twelve minute intervals, was the signal to press the push button. Each subject undertook 2 1/2 minutes of tracking with and without an arm support, pressing buttons with finger or with foot. Spikes errors that occurred immediately after the finger or foot push were converted to minutes of arc and analyzed for differences due to use of arm support and mode of operating the switch. Implications for design of controls are discussed.
T. R 1

3350
Gregory, R.L. A PSYCHOLOGICAL STUDY OF GUN-TOWER ESCAPE FROM SUBMARINES. R.N.P. 53/744, O.R.S. 31, March 1963, 5pp. Medical Research Council, Naval Naval Personnel Research Committee, Applied Psychological Research Unit, Cambridge, England.
An experiment was undertaken to investigate psychological deterioration likely to prejudice gun tower escape in conditions of atmospheric deterioration to be expected in a submarine which is unable to surface. Simulated submarine conditions were used in which CO2 was elevated and O2 was lowered. Dummy escape gear was worked by 20 ss in pairs, with on 'escape' made every 15 min. over a 3-hr. period. Errors in the various steps of the operations were recorded. There was no sign of a systematic increase in error during the trials with CO2 of 3 and 4% and O2 of 17 to 16%. Some physiological changes were encountered and are to be reported elsewhere. (HEIAS)

3351
Loveless, M.E. MANUAL TRACKING ON HORIZONTAL AND VERTICAL LINEAR SCALES. FRAC 914, March 1955, 16pp. Flying Personnel Research Committee, London, England. (Nuffield Dept. of Industrial Health, University of Durham, King's College, Newcastle-upon-Tyne, England.)
In a compensatory tracking task, ss were required to control the pointer on a linear scale by means of a control knob placed vertically below it. With a horizontal scale, speed and accuracy were greater when a clockwise control movement caused the pointer to move to the right. With a vertical scale, speed and accuracy were greater when a clockwise control movement caused the pointer to move upwards. These direction-of-motion relationships are the same as those which have been shown to occur on the circular scale; they also correspond with the ss' preferences. Performance on the horizontal scale was superior to that on the vertical, and comparable to that obtained on the circular scale under optimal conditions (direct drive, target in top or left-hand quadrant). Performance on the horizontal scale is more consistent than on any other arrangement, and linear scales might be considered preferable to circular scales in circumstances where the ambiguous control-display relationships of the latter are undesirable.

3952

Smith, R.J. A GRAPHICAL RECORDER FOR SYNCHRONOUS LINEAR REGISTRATION OF SEVERAL MECHANICAL MOVEMENTS. NACAC Proj. AC 94, Memo. 3, OSRD Contract CEMR 1171, Rep. 5337, Sept. 1945, 15pp. Applied Psychology Panel, OSRD, NRC, Washington, D.C. (University of Wisconsin, Madison, Wisc.).

This memorandum describes the specifications of construction, principles of operation, and directions for operating a graphical recorder of new design. Several special features of the instrument may be noted: a) it permits simultaneous linear registration of 4 different mechanical movements; b) each of the 4 records traverse the entire chart width; c) the 4 records are exactly superimposed in time on the chart; i.e., they have the same time-point reference on the recording paper; d) great flexibility is provided in the degree of expansion of the record with reference to the actuating movement; e) the recording is accomplished electrically. The recorder has been designed primarily to be used in conjunction with selsyn and servo follow-up systems to record simultaneously the various components of gunner performance in tracking, framing, and triggering flexible gun sights. In addition, the instrument may be employed for various other recording purposes. It is especially adapted to a) system analysis of electro-mechanical units with several moving output shafts, e.g., sighting systems or radar systems, b) remote recording of mechanical changes which may be indicated primarily by means of selsyns, c) graphical recording of instrument control, d) registration of error or the pattern of performance in the operation of training or test devices, and e) time scaled graphical recording of performance for experimental job analysis and job study.

3955

Berry, R.N., Brown, R.H., Mead, L.C., Nafe, J.F., et al. GROSS ERRORS IN READING SCALES OF PANORAMIC TELESCOPES. NRC Proj. SOS 11, Rep. 1, OSRD Contract CEMR 521, Rep. 4334, April 1945, 15pp. US Office of Scientific Research and Development, NRC, Applied Psychology Panel, Washington, D.C. (Tufts University, Medford, Mass.).

Compared with other instruments used in this study it was found that gross errors in reading the scales of the M-12 panoramic sight are excessive. Most of these errors can be accounted for either a) in the use of a coarse azimuth scale or b) in the design and manufacture of the coarse azimuth scale and other parts of the instrument. That the use of a scale for coarse azimuth readings is the primary factor in the occurrence of 100 μ m errors is demonstrated by the few such errors made with the use of the A.M.R.L. modified M-12 sight in which a scale is not used for coarse azimuth readings. The 5s who made 105 100 μ m errors in reading the scales of their own M-12 sight, after 4 practice trials made only 8 such errors on the A.M.R.L. modified M-12 sight, and after 10 practice trials made no gross errors at all. The effects of good design and manufacture may be seen in the results with the German sight. Other large errors, although not specifically remedied in the A.M.R.L. and German sights, tend to disappear with their use. This indicates that, with instruments easier to use, these errors will occur less often.

3956

Berry, R.N., Brown, R.H., Mead, L.C., Nafe, J.P., et al. ERRORS IN READING SCALES AND CHANGING DEFLECTIONS OF PANORAMIC TELESCOPES. OSRD Contract CEMR 521, NRC Proj. SOS 11, Repts. 4 & 5070, May 1945, 15pp. Applied Psychology Panel, OSRD, NRC, Washington, D.C. (Tufts University, Medford, Mass.).

This report includes all errors of 5 μ m or greater made in 5500 tests in reading the scales and setting deflection shifts on panoramic sights. 25 gunners were used and the sights, mounted on 105 mm. howitzers, were: a) a standard M-12; b) an M-12 with modified coarse azimuth scale; and c) an M-5. There were 654 errors observed. Of these roughly two thirds are errors in reading and one third are errors in setting. About half as many errors were made on the M-5 as on the M-12 sight. Specific factors in instruments and procedures which make for errors were sought. The nature of the errors made in reading the scales of these sights indicate that the use of dual scales, and the design and construction of the scales, are the important factors in the occurrence of errors. The design of the sight also makes deflection shifts so complex a problem that errors must be expected. The number of errors that occur may be increased or decreased by altering certain features of the sights used and by altering the procedures essential to their use. Suggestions are made as to the elimination of excessive errors.

R 2

3957

Hoff, E.C. & Greenbaum, L.J., Jr. A BIBLIOGRAPHICAL SOURCEBOOK OF COMPRESSED AIR, DIVING AND SUBMARINE MEDICINE. VOL. II. NAMED P 5033, Nov. 1954, 368pp. Office of Naval Research, Bureau of Medicine & Surgery, Navy Dept., Washington, D.C.

This is a source book of references to the literature in medical problems of diving, compressed-air work, and submarine operations. Citations comprise unclassified reports and documents as well as books, monographs and papers appearing between 1 January 1946 and 31 December 1951. Some references not available for Volume I (1946) are included. The contents are classified as to general studies of submarine medical problems, technical procedures and research apparatus, special anatomy, physiology, and biochemistry, biology of very high hydrostatic pressures, diseases and accidents in personnel, protection and preservation of personnel, selection and training of personnel, special psychological and psychiatric problems and special problems of swim-diving. Indices of authors, sources for unpublished reports, and of subjects are included.

R 3867

3958

USN Electronics Lab. HUMAN ENGINEERING: A BIBLIOGRAPHY. April 1955, 464pp. USN Electronics Lab., Bureau of Ships, San Diego, Calif.

An unannotated bibliography of human engineering literature, released in April 1955, is presented. This bibliography is topically organized around 4 main topic headings: a) human engineering practices; b) human operating characteristics; c) factors affecting the efficiency of the human operator; and d) body measurements. Subtopics are used to organize the articles under these main topic headings. (HEIAS)

R many

3959

Erikson, C.W. PARTITIONING AND SATURATION OF THE PERCEPTUAL FIELD AND EFFICIENCY OF VISUAL SEARCH. Contract AF 33(038) 22642, WADC TR 54 161, April 1954, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3959

This report described a series of experiments on the effects of various conditions of display upon visual search. The time required to locate a constant number of signals in a square display was determined 1) where the number of irrelevant signals was varied from 10 to 70 and 2) when the number of partitions of the display was varied by the use of grid lines. Grid lines were used to partition the display into a 9x9, a 13x13, and a 16x16 matrix. Search times obtained under the various conditions were analyzed for effects of saturation, partitions, display size, and subjects.

T. G. R 5

3960

Mohr, M.V. & Erikson, C.W. EFFECT OF THE NUMBER OF PERMISSIBLE RESPONSE CATEGORIES ON THE LEARNING OF A CONSTANT NUMBER OF VISUAL STIMULI. Contract AF33(038) 22642, Tech. Rep. 54 163, April 1954, 26pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Johns Hopkins University, Baltimore, Md.).

90 Ss were required to learn to apply either 2, 4 or 8 irrelevant labels to a set of 16 similar and previously unfamiliar complex visual patterns. Immediately following practice in this task, Ss were required to learn to identify the patterns again using a different set of irrelevant verbal labels which were either 2, 4 or 8 in number. The relative performance of Ss in the second phase was found to be significantly affected by the number of labels used in that phase but not by the number of labels which had been used in the initial phase. The amount of positive transfer effect found in the second phase was independent of the specificity of the labeling activity experienced in the first phase. The extent to which each S correctly labeled each pattern in the first phase was not indicative to any important degree of his relative success in labeling each pattern in the second phase. The performance of each S during the first phase, relative to the other Ss in each group, was indicative of relative performance within each group during the second phase. It was suggested that these results, which minimize the importance of the label-pattern associations formed during labeling practice, may be expected only in the case where relatively meaningless or indistinctive labels are employed. A definition of the distinctiveness of verbal labels was suggested in terms of the extensional meanings of the labels acquired in practice in identifying objects.

R 13

3964

Long, E.R. & Lee, M.A. THE INFLUENCE OF SPECIFIC STIMULUS CUEING ON LOCATION RESPONSES. THE THIRD OF A SERIES OF REPORTS ON "SET" AS A DETERMINER OF PERCEPTUAL RESPONSES. Contract N33(038) AC 21269, WADC TR 53 314, Dec. 1953, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Virginia, Charlottesville, Va.).

3964

This study is the third in a series of laboratory investigations designed to explore the concept of set and its applicability to the perception of stimuli against background "clutter." The present experiment sought to learn whether and under what conditions stimulus location would be benefitted by providing the observer with setting cues relative to the shape or contour of the critical stimulus figure to be detected, without any spatial location cuing. The following variables were studied: amount of areal clutter (number of confusion figures), degree of figural restriction (figural contour cuing), and temporal position of figural cuing with respect to stimulus presentation.

3966

Christensen, J.M. QUANTITATIVE INSTRUMENT READING AS A FUNCTION OF DIAL DESIGN, EXPOSURE TIME, PREPARATORY FIXATION, AND PRACTICE. WADC 694 15, Tech. Rep. 52 116, Sept. 1952, 51pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

The present experiment is the first of a series undertaken in an effort to determine the nature and significance of certain variables involved in the reading of dials. The Ss were required to read various types of dials at selected exposure times without knowledge of which one of the various dials used in the experiment would be exposed next. 6 variables were considered in this experiment, viz., Ss, Exposure time, Practice, Moving Pointer vs Moving Scale Clockwise vs Counterclockwise Rotation, and Point of Fixation. All effects were significant singly and/or in combination with other effects. Ss interacted with all other variables, either singly or in combination. Exposure time was shown to be an exceedingly powerful and important factor. Relationships discovered at one exposure time became insignificant or even reversed at other exposure times. This interaction between dial type and exposure time casts serious doubt on the practice of inducing errors in dial reading experiments by the expedient of reducing exposure time. Some of the interactions changed with practice, showing the importance of level of training in experiments of this nature. Moving pointer dials were better than moving scale dials at exposure times of the same order as those used by pilots in actual flying situations. Dials with clockwise scales were generally superior to dials with counterclockwise scales.

R 23

3967

Long, E.R. & Lee, M.A. THE ROLE OF SPATIAL CUEING AS A RESPONSE-LOCATOR FOR LOCATION RESPONSES. THE SECOND OF A SERIES OF REPORTS ON "SET" AS A DETERMINER OF PERCEPTUAL RESPONSES. Contract N33(038) AC 21269, WADC TR 53 312, Dec. 1953, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Virginia, Charlottesville, Va.).

3967

This is the second in a series of investigations into the nature of perceptual set and its possible application to the process of data assimilation. Subjects were required to locate a single geometrical figure added to a 64-cell square matrix already containing 16 or 32 geometrical figures as confusion figures or clutter. In aid of location, the space in which the figure appeared was heavily outlined; this areal cuing was varied by enclosing different amounts of the matrix. Subjects were allowed to observe the outlined area 1) both before and after or 2) only after stimulus presentation. Frequencies of correct locations were analyzed to determine if perceptual error existed and if areal cuing increased location accuracy.

T. I. R 1

3968

Long, E.R., Bendeman, P.R. & Reid, L.S. THEORETICAL CONSIDERATIONS AND EMPIRICAL INVESTIGATION OF "SET" AS RESPONSE RESTRICTION. Contract N33(038) AC 21269, WADC TR 53 311, Dec. 1953, 24pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Virginia, Charlottesville, Va.).

3968

This report is the first of a series relating to laboratory experiments designed to examine the nature of perceptual "set" and its application to human operator efficiency in the communication process. An analysis of message reception in the communication process lead to statements of the assumptions for a theoretical model of set and predictions derived from the model. An initial exploratory experiment was described which entailed the manipulation of three variables in a complex perceptual task requiring the Ss to locate and identify single distorted geometrical figures that had been added to a 64-cell square matrix already containing 16 other figures as "clutter." The variables were: 1) type of setting limitation, 2) degree of setting, and 3) type of response.

T. I. R 5

3969

Erikson, C.W. MULTIDIMENSIONAL STIMULUS DIFFERENCES AND ACCURACY OF DISCRIMINATION. Contract AF 33(033) 22542, Tech. Rep. 54 165, June 1954, 11pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Johns Hopkins University, Baltimore, Md.).

The present report is concerned with the effect of stimulus variation in several dimensions simultaneously upon the accuracy of discrimination in absolute judgment. The dimensions were size, hue and brightness. The discrimination measures for these dimensions were obtained separately and were compared with discrimination measures obtained by compounding these dimensions in various ways. Discriminability was better for the multidimensional series of stimuli than for any of the compounded dimensions used alone. It was further shown that the discrimination accuracy for a compounded or multidimensional series can be predicted if the discrimination accuracy of the separate dimensions is known. This prediction is based on the assumption that the accuracy of discrimination on the several dimensions is independent when simultaneously judged.

R 9

3970

O'Brien, B. & Miller, Norma D. A STUDY OF THE MECHANISM OF VISUAL ADAPTATION IN THE CONE RETINA. Contract AF 33(033) 22542, Tech. Rep. 54 165, June 1954, 5pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3970

A series of investigations were reported on the physics and physiology of vision involving a resolution of fine detail. In each study a method was found that yielded results to clear cut that no statistical analysis of the data was required. Measurements of transverse sections of human retinas yielded precise cone spacing data from center to edge of fovea. Measurements with an electronic wave model confirmed the mechanism concentrating and isolating light by each cone. These histological data were correlated with measured ability to show effects of cone spacing. A new ballistic flash technique was used to measure cone thresholds, eye movements, and double star ability. Accuracy of fixation was demonstrated by a new technique. Resolving power of the retina was finally studied. T. G. I. R 19

3972

Hixson, W.C., Barter, G.A., & Warren, C.E. A RADAR SIMULATOR FOR USE IN AIR TRAFFIC CONTROL STUDIES. Contract AF 33(616)-43, RDO 694-43, Tech. Rep. 53-418, Jan. 1954, 23pp. WADC, Air Research and Development Command, Wright-Patterson AFB, Ohio. (Ohio State U. Res. Foundation)

3972

This report describes a radar simulator for the study of air-traffic control problems. It is a 12-inch electronic deflection CRT capable of simulating thirty moving aircraft targets on a plan-position indicator. Control of target heading, velocity, position and turn rate will be available at each aircraft target operating station. Other features are reported. Diagram and illustration are included. I.

3974

Fry, G.A. & Alpern, M. EFFECT OF FLASHES OF LIGHT ON NIGHT VISUAL ACUITY. Contract AF33(038) 15630, E.O. 696 67, Tech. Rep. 52 10, Part 1, Nov. 1951, 44pp. USAF Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

The purpose of the study was to determine the ability of the eye to see a dark object against a sky background at night after the eye has been exposed to a flash of light, or a series of flashes. The brightness of flashes and the S's visual acuity were measured. Results from the 3 Ss show that the following principles operate: a) the adaptation of any given part of the retina can be regarded as being independent of adaptation processes in other parts of the retina; b) reciprocity between time and intensity can be assumed to hold at least over a 3-sec. interval; c) the effect of a flash displaced from that part of the retina which is used in viewing an object can be accounted for in terms of stray light. The amount of stray light falling at any given part of the retina can be computed from the Stiles-Holladay equation. (HEIAS)

R 7

3975

Fry, G.A. & Ihrig, N. EFFECT OF FLASHES OF LIGHT THROUGH THE CLOSED EYELID. II. USE OF DARK GREASE ON THE CLOSED EYELIDS AS A MEANS OF PRESERVING DARK ADAPTATION DURING A FLASH OF LIGHT. Contract AF33(038) 15630, RDO 696 67, Tech. Rep. 53 159, Part 2, Feb. 1953, 11pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

This study was undertaken to determine the value of applying dark grease to the closed eyelids in preserving a state of dark adaptation during a flash of light. Max Factor's Dark Negro Grease Paint was the grease used and was applied to the upper and lower lids and the skin out beyond the margins of the orbit. The most important part to cover is the area of the lids directly in front of the pupil. An after-image technique has been used to determine the retinal illuminance produced by light falling on the closed eyelids. The results indicate that the grease reduces the light transmission through the eyelid to approximately 1/3 of the value obtained without the grease. This factor has been found to be approximately the same whether the lids are closed tightly or passively so that the advantage gained by using dark grease is added to that gained by tightly closing the eyelids. The security classification of the title of this report is UNCLASSIFIED.

R 2

3976 Brown, J.L., Diamond, A.L., & Miller, H.L. THE EFFECT OF DURATION OF LIGHT ADAPTATION ON TIME REQUIRED FOR DETECTION OF A TARGET ON A SIMULATED PPI SCOPE. Contract AF 33(030)22616, RDO 594-45, Tech. Rep. 52 259, Dec. 1952, 23pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.).

Times required for the detection of a target on a simulated PPI scope were determined for various scope luminances after different durations of light adaptation to a luminance of 3100 millilamberts. Increased duration of light adaptation results in increased detection time up to a maximum value which varies with scope luminance. In general, detection time decreases with either an increase in target luminance or a decrease in background luminance for a given duration of light adaptation. Within the range of luminances investigated changes in target luminance result in a greater change in detection time than comparable changes in background luminance. The implication for radar scope viewing after adaptation to a high luminance is that optimum visibility will be obtained with maximum gain and as much negative bias as is possible without appreciable reduction of target luminance.

R 11

3977

Herrick, R.M., Diamond, A.L. & Kubrs, Margaret P. LUMINANCE THRESHOLDS DURING DARK ADAPTATION FOLLOWING PREADAPTATION TO CATHODE RAY TUBE DISPLAYS. Contract AF 33(038) 22616, RDO 694 45, Tech. Rep. 52 260, Dec. 1952, 11pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.).

With the identification of the position of a luminous dial pointer at the threshold criterion, luminance thresholds were determined at various times during dark adaptation following preadaptation to Cathode Ray Tube Displays. Each display consisted of a vertical trace line which traversed the Cathode Ray Tube screen at one of three rates. Dark adaptation curves, obtained for the 2 Ss after adaptation to the different displays are superimposed; initial thresholds are relatively low ($-2.0 \log$ millilamberts); and dark adaptation is essentially complete in 5 mins. The findings are interpreted to indicate that in certain Air Force applications, viewing such displays causes a definite temporary loss in the observer's ability to read instrument dials and to perceive objects external to the aircraft.

R 23

3978

Erikson, C.W. & Maki, H.W. ABSOLUTE JUDGMENTS AS A FUNCTION OF THE STIMULUS RANGE AND THE NUMBER OF STIMULUS AND RESPONSE CATEGORIES. Contract AF 33(038) 22642, RDO 694 45, Tech. Rep. 54 162, April 1954, 15pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Johns Hopkins University, Baltimore, Md.).

In the psychophysical method of absolute judgment, Ss are required to identify by a name, number or other value each member of a set of individually presented stimuli. Since the method does not provide any explicit standard for comparison, the S is required to base his judgments upon some subjective standard or reference point. This is essentially the condition under which we make many important judgments during our daily activities. The effects of 5 variables upon judgmental accuracy under the absolute method were studied. These were: the range on a stimulus dimension over which stimulus categories were selected for judgment, the number of stimulus categories presented for judgment, and the number of response categories available to the S for expressing his judgments. Doubling of the stimulus dimension produced some increase in judgmental accuracy, but the increase was slight. Judgmental accuracy remained constant as the number of stimulus and response categories was increased, with size of stimulus dimension held constant, provided that the number of response categories equaled or exceeded the number of stimulus categories. There was a loss in discrimination ability when the number of response categories was less than the number of stimuli to be judged. It was suggested that both of these results could be attributed to the end or anchor effects which appear to characterize the absolute method.

R 8

3979

O'Neill, J.J. A COMPARATIVE STUDY OF INTELLIGIBILITY VALUES: FORMS A AND B. Contract W60NR 22525, Proj. NR 145 993 & BuMedSurg Proj. NR 001 104 500 47, Joint Proj. Rep. 47, April 1955, 24pp. USN School of Aviation Medicine, Naval Air Station, Fla.

2 panels of 37 listeners each were presented words from Forms A and B of the multiple-choice intelligibility test. The words were presented either in their original form or as write-down items. The values obtained for the 2 types of tests were compared statistically. There was a correlation of $r = .43$ between the write-down and multiple-choice values of Form A, and a correlation of $r = .26$ between the 2 sets of values for Form B. The obtained item values as well as values obtained by 3 other investigators are presented for use in future research which would utilize similar experimental conditions.

R 10

3980

Brown, J.L. THE EFFECT OF DIFFERENT PREADAPTING LUMINANCES ON THE RESOLUTION OF VISUAL DETAIL DURING DARK ADAPTATION. Contract AF 33(038) 22616, RDO 694 45, Tech. Rep. 52 14, July 1952, 27pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.).

Luminance thresholds for the resolution of various widths of grating line were determined during dark adaptation following light adaptation to luminances of 0.50, 100, 1290, and 11,200 millilamberts. The dark adaptation curves for the finest gratings, representing high visual acuity, start at a high initial luminance and drop to a final steady level after 5 to 10 minutes in the dark, as is characteristic of cone function. Curves for coarser gratings may display both cone and rod portions, or after light adaptation to low luminances may represent rod function only. The higher the degree of resolution required, the higher the position of the dark-adaptation curve on the log threshold luminance axis. Increasing the level of light adaptation results in higher initial threshold luminances and a more gradual decline to a final steady value. The final steady value of threshold luminance for a given grating size is little influenced by the level of light adaptation.

R 16

3981

Diamond, A.L. & Gillinsky, Alberta S. LUMINANCE THRESHOLDS FOR THE RESOLUTION OF VISUAL DETAIL DURING DARK ADAPTATION FOLLOWING DIFFERENT DURATIONS OF LIGHT ADAPTATION. Contract AF 33(038) 22616, RDO 694 45, Tech. Rep. 52 257, April 1952, 21pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.).

Dark adaptation curves representing 3 levels of visual acuity have been determined for 2 Ss following preadaptation for from 1 second to 10 minutes to a constant luminance of 1000 ml. a) At all acuity levels, the initial thresholds rise, and the speed of dark adaptation decreases as duration of preadapting light increases from 1 second to approximately 5 minutes. These effects are less pronounced at the highest acuity investigated, 0.62. A threshold response at this level represents cone adaptation exclusively. b) At lower acuities, 0.083 and 0.042, an additional effect occurs as a function of duration. The shorter the period of light adaptation, the less prominent is the primary cone dark adaptation, and the sooner does the rod dark adaptation appear. c) Duration of light adaptation has a marked effect upon the level of threshold luminance early in the course of dark adaptation. The effect becomes progressively reduced as time in the dark increases. d) As the level of acuity increases, the threshold luminance also increases, depending upon the amount of change in acuity and the pre-adapting duration.

R 10

3982
Sivinski, A.J. THE FACTORS OF TASK COMPLEXITY AND PREVIOUS PRACTICE ON A PATTERNED COMPONENT. Contract W3J(038) AC 21269, ADD 694 37, Tech. Rep. 53 313, Dec. 1953, 21pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Virginia, Charlottesville, Va.).

The present report covers a laboratory experiment attempting to relate independently the following variables to proficiency of performance in a complex task situation: a) previous practice on a patterned component of the total task; b) task complexity (defined as the number of discrimination-response units composing the task); and c) intercomponent stimulus similarity. The results indicated that previous practice on the patterned component and task complexity were significantly and independently related to total task proficiency, the former tending to increase proficiency, the latter tending to reduce it. Stimulus similarity approached significance as a factor contributing to overall task proficiency.

3983
Spragg, S.D.S. & Milfack, J.W. VISUAL PERFORMANCE AS A FUNCTION OF THE BRIGHTNESS OF AN IMMEDIATELY PRECEDING VISUAL TASK. Contract W3S(038) AC 18317, WADC TR 52 265, Dec. 1953, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Rochester, Rochester, N.Y.).

3983
To investigate the effect on visual performance at low photopic brightness levels of the brightness of an immediately preceding visual task, a group of Ss performed two successive tasks: 1) reading banks of instrument dials (photographic reproductions) at 27 inches with brightness levels of 2.9, 0.083, 0.005 ft.-L and 2) reading banks of Landolt rings with periscope viewing at 18 ft. and 6.0, 0.076, 0.01, 0.007, and 0.0035 ft.-L. A second group performed in reverse order. The analysis of data was primarily in terms of time scores. Implications for instrument dial brightness for night flying and other night visual tasks requiring vision of details were discussed.

3984
Jenkins, W.L. & Karr, A.C. THE USE OF A JOY STICK IN MAKING SETTINGS ON A SIMULATED SCOPE FACE. Contract AF 18(600) 24, WADC TR 53 430, March 1954, 7pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Lehigh University, Bethlehem, Penn.).

3984
To determine the significance of certain variables in the use of a joystick to make settings in two dimensions on a simulated scope face, a series of experiments were conducted using apparatus where the movement of the joystick was translated directly into displacement of the cursor in approximately a linear fashion. Variables were: 1) length of joystick (12, 18, 24, and 30 inches); 2) ratio between joystick tip and movement of cursor (2, 2.5, and 3); 3) reversed operation (cursor moving down when stick is pushed away from operator); and 4) position of S's switch (in hand not operating joystick, pushbutton in top of switch, and foot pedal). Setting time, variability of settings, and missettings were analyzed for effect of variables on accuracy of settings.

3985
Ehles, F.H., Jr. REMINISCENCE IN MOTOR LEARNING. Ph.D. Dissertation, June 1956, 26pp. University of Texas, Austin, Tex.

3985
To determine simultaneously the effect of the type of pre-rest practice, initial level of mastery, and test-retest interval on reminiscence in motor learning, 270 subjects were tested. Under pre-rest practice conditions three inter-trial rests of 10, 35, and 60 seconds were used; pre-rest practice was discontinued when subjects reached either the 5, 25, or 45 percent mastery-levels; and subjects were given either an immediate retest or were tested for recall after a delay of 30 or 60 minutes. Ten subjects were assigned randomly to each of the 27 experimental conditions and administered the SAM Rotary Pursuit Task. The data were analyzed by several methods for differences that could be attributed to the experimental conditions.

3986
Cole, E.L., Milton, J.L. & McIntosh, B.B. ROUTINE MANEUVERS UNDER DAY AND NIGHT CONDITIONS, USING AN EXPERIMENTAL PANEL ARRANGEMENT. THE NINTH OF A SERIES OF REPORTS ON EYE FIXATIONS OF AIRCRAFT PILOTS. WADC TR 53 220, March 1954, 50pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3986
This is the ninth report in a series of investigations of eye movements of pilots during instrument flight. The frequency, duration, and sequences of eye movements made by 15 pilots when flying day and night maneuvers with a new panel arrangement were summarized and compared. Also, for comparison of standard and experimental panel arrangements, data previously obtained using the standard air force panel during routine maneuvers under day conditions were included. The data were analyzed in terms of the most frequently used instruments, differences between day and night flights, and differences between panels. Efficient panel arrangement was discussed.

3987
Gardner, J.F. & Lacey, R.J. AN EXPERIMENTAL COMPARISON OF FIVE DIFFERENT ATTITUDE INDICATORS. WADC TR 54 32, May 1954, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3987
To compare two principles of aircraft attitude indication (earth reference with moving element representing horizon and airplane reference with moving element representing the aircraft), simulated indicators were "flown" in a Link Trainer by experienced pilots and by college students with no flight experience. Four indicators were used representing the two principles defined above and a fifth one provided a "stabilized sphere" type of presentation. Records of pilot performance for a variety of flight maneuvers, control reversals following rough air-gusts, and pilot preferences were recorded and analyzed.

3988
Hunt, D.P. THE CODING OF AIRCRAFT CONTROLS. ADD 694 17, Tech. Rep. 53 221, Aug. 1953, 26pp. USAF Wright Air Development Center, Aero Medical Laboratory, Wright-Patterson AFB, Ohio.

3988
This report summarizes the available information concerning several techniques of control coding which seem to be of value to the design engineers. Five methods of coding are discussed: shape, size, location, color, and mode-of-operation. Information is given concerning each technique so that the design engineer can apply these methods as the need arises. Many of the advantages and disadvantages are pointed out and the question when to code and the type of coding to use are discussed.

3989
Adler, H.E., Johns, Margaret P. & Brown, J.L. MASKING OF CATHODE RAY TUBE DISPLAYS BY AMBIENT ILLUMINATION. Contract AF 33(038) 22616, WADC TR 53 266, Nov. 1953, 24pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.).

3989
To define the character of the relation between the luminance of a signal on a cathode ray scope and the approximate minimum ambient luminance which is effective in masking the signal, masking thresholds of ambient illumination were determined for a steady horizontal trace line displayed on a cathode ray oscilloscope. Ambient illumination was presented as a veiling luminance and also combined with three levels of direct illumination reflected from the tube face. Seven trace luminances were investigated at each of two trace widths, one and two mm. Implications for tolerable ambient illumination for radar operator workplaces are discussed.
T. G. I. R 16

3990
Deese, J. & Ormond, Elizabeth. STUDIES OF DETECTABILITY DURING CONTINUOUS VISUAL SEARCH. Contract AF 33(038) 22642, WADC TR 53 8, Sept. 1953, 48pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

3990
This report describes a series of experiments concerned with the problem of fluctuations in the detectability of weak signals during prolonged visual search. The task was a search for isolated targets that appeared from time to time on a single sweep of a PPI-type CRT. These targets were brighter than the background noise, well above the differential threshold, and they were varied in time and location. Variables studied were rate of target appearance, intertarget time interval, spatial distribution, length of search period, and observer's knowledge of length of period.
T. G. R 12

3991
Burke, C.J., Harasimban, R. & Benepe, O.J. SOME PROBLEMS IN THE SPECTRAL ANALYSIS OF HUMAN BEHAVIOR RECORDS. Contract AF 18(600) 16, R00 694 39, Tech. Rep. 53 27, July 1953, 6pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Indiana University, Bloomington, Ind.).

The theory of spectral analysis assumes an infinite length record. However, only finite records are ever available to the experimenter. In analyzing samples of human performance this limitation may be particularly acute since length records cannot be obtained without involving the risk of violating, due to fatigue and learning effects, the assumption of a stationary time series. The report describes, mathematically, the effects of finite length of record upon the spectral analysis of function with and without unsystematic components. The lack of an analytic mathematical basis for spectral analysis of human behavior is demonstrated, and the necessity of empirical investigation to establish its validity is pointed out.
R 5

3992
Lofbrowitz, H.W. VISUAL FACTORS INFLUENCING THE PRECISION OF ADJUSTMENT OF RETICLE PATTERNS. Contract AF 18(600) 54, R00 694 49, Tech. Rep. 53 200, April 1953, 13pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

Vernier acuity refers to the ability to detect a discontinuity in a contour, or to line up straight edges so as to appear continuous. It is specified as the measure of variability of repeated attempts to make coincidence settings. The smaller the variability, the higher the acuity. The standard deviation for aligning dark bars on light, or light bars on dark background at one millilambert or greater illumination was 6 to 11 seconds of arc. As luminance is lowered below one millilambert, variability increases slowly at first, then more rapidly. At all luminance values, variability is increased about 20% if the components to be aligned are set obliquely. No improvement in acuity with practice was observed. Where precise vernier settings or readings are required, it is recommended that the stimulus components be aligned either vertically or horizontally and that a luminance of at least one millilambert be maintained. This minimum luminance will produce maximum vernier acuity, and preserve, as much as possible, the dark adaptation of the observer. (HIC/AS)
R 14

3993
Fry, G.A. & Ihsig, W. EFFECT OF FLASHES OF LIGHT THROUGH THE CLOSED EYELID. PART I. PRESERVATION OF DARK ADAPTATION DURING A FLASH BY CLOSING THE EYELIDS. Contract AF 33(038) 15630, WADC TR 53 159, Part I, March 1953, 35pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

3993
The major objective of this study was to investigate means of protecting one of the eyes during a short flash of light in order to preserve its dark adaptation. The second eye was used for critical seeing during the flash and the protected eye took over after the flash. The effect of a typical flash (125 ft.-c for a three-second period) upon dark adaptation of the passively closed eyes was measured by tracing the recovery of the ability to see. An afterimage method was devised for measuring retinal illuminance produced by light incident on the closed eyelid and was used to make a comparison of protection provided by closing the eyelid passively and tightly.
T. G. I.

4003
Massachusetts Institute of Technology. NOTES FROM MIT
SUMMER COURSE ON OPERATIONS RESEARCH. JUNE 16-JULY 3,
1953. 176pp. Massachusetts Institute of Technology,
Cambridge, Mass.

4003
This is a set of notes taken during lectures of the
Massachusetts Institute of Technology's summer course in
Operations Research in 1953. Operations research is de-
fined as an activity by which trained advice can be given
to management on quantitative matters that can be handled
scientifically. The various lectures include the follow-
ing topics: probability--fundamental concepts, distribu-
tions, ordered statistics, and mathematical models; time
series; waiting lines; Monte Carlo applications; linear
programming; operational experiments; transport, railroads
applications to stock market prediction--a business problem
and a bus problem; review, differential equation approach,
and game theory.
T. G. I. R 70 (approx.)

4004
Slade, I.M. CLOTHING FOR PROTECTION AGAINST RADIANT
HEAT. Research, May 1955, 8, 178-182. INF/4/55.
(British Iron & Steel Research Association, London,
England).

4004
Clothing for protection against radiant heat, such
as in a steelworks, is discussed (see also 3525). The
method of heat reflection from the outer surface of the
garment is detailed. Various materials have been coated
with aluminum and tested for their protective values.
The particular situations in which each type might be
used are suggested along with the design of the clothing.
A thermofoil reflecting headgear is illustrated.
I. R 5

4005
Comfort, Elizabeth & Gillespie, K.W. RESPIRATORY
RESPONSE TO OXYGEN BREATHING WITH A FULL-HEAD OXYGEN
MASK. WADC TR 53 130, April 1953, 13pp. USAF Aero Medi-
cal Lab., Wright-Patterson AFB, Ohio.

4005
An investigation was conducted to determine the ex-
tent to which dead space affects use and operation of
full-head oxygen masks. Quantitative measurements of gas
flow into the mask (k-1 helmet) during a single breathing
cycle at various levels of mask pressure were compared
with similar data recorded at a level of mask pressure
considered by the S to represent optimum breathing com-
fort. Probable concentration of carbon dioxide in in-
spired air during breathing was estimated by applying re-
sults of Haldane analyses of gas samples of mask air to
data resulting from analyses of oscillographic tracings
of breathing patterns. Ten Ss were studied. Physiological
and subjective acceptability of this type of mask
were discussed.
G. I. R 4

4006
Barger, D.M. & Roush, R.G. A VELOCITY MODULATED RASTER
DISPLAY FOR BRIGHTNESS DISCRIMINATION STUDIES. Contract
AF 33(038) 22642, WADC TR 53 249, Aug. 1953, 6pp. USAF
Aero Medical Lab., Wright-Patterson AFB, Ohio. (Johns
Hopkins University, Baltimore, Md.).

4006
A research instrument for the study of human bright-
ness discrimination is described. Two standard and one
modified oscilloscopes are used to produce a rectangular
light field consisting of a raster of vertical sweep lines
on a cathode ray tube face. Independent control of the
brightness of each vertical sweep line in the raster per-
mits study of observer ability in detecting differences
in brightness in the light field as a function of bright-
ness differences between adjacent homogeneous fields, the
relative size of adjacent fields, and the brightness con-
tour or gradient which exists between two fields homogene-
ous in brightness. Block and schematic diagrams are in-
cluded.
T.

4007
Soloyants, G. & Corso, J.F. THE EFFECTS OF SOUND ON AUTO-
KINETIC MOVEMENT. Contract AF 33(038) 786, WADC TR 53
447, June 1953, 17pp. USAF Aero Medical Lab., Wright-
Patterson AFB, Ohio. (Pennsylvania State College, State
College, Penn.).

4007
To determine the effects of monaural and binaural
pure tone stimulation (1000 cps) on the total magnitude
and horizontal directional displacement of autokinetic
movement, 21 subjects were tested. Eight experimental
conditions (six of differential auditory stimulation, two
of equal binaural stimulation) and three control condi-
tions (pretest, within test, post test) were used with a
total of 4620 judgments made in all. The data were ana-
lyzed through rank order and analysis of variance tech-
niques for effects of auditory stimulation on the visual
illusion of apparent movement. In addition, the effects
of repeated light exposures (visual saturation) on mag-
nitude of apparent movement were determined.
T. G. R 18

4008
Brown, R.H. & Baldwin, A.W. APPARATUS FOR RESEARCH ON
THE DISCRIMINATION OF VELOCITY. RDB Proj. NR 513 050,
NRL Rep. 4283, Dec. 1953, 6pp. USN Research Lab.,
Washington, D.C.

4008
This report describes an apparatus for research on
the discrimination of velocity. A target moving at con-
trolled velocity (direction and speed) is provided. It
is also possible to vary independently the brightness of
the test spot and the interval of time during which it is
seen. Experimental arrangements, the optical system,
control of exposure time and stimulus movement, and cali-
bration data are given. The above equipment was develop-
ed to be used in a program of basic research in tracking,
specifically in the study of the visual processes used by
the tracker in predicting the motion of a target.
T. I. R 4

4009
Hast, G.M. RADAR TARGET FOLDER VIEWER. FINAL REPORT.
Contract AF 33(600) 15271, July 1953, 15pp. Hast
Development Company, Inc., Davenport, Iowa.

4009
A means for presenting to the navigator of a bomber
the data from the radar target folder (marked paper
prints of real or synthetic radar returns from the target
approach and target area) in close proximity to his radar
screen is described. The Radar Target Folder Viewer pre-
sents comparison radar target pictures from a 35 mm film
strip in a manner that provides for minimum visual re-
adaptation and permits convenient comparison of scope
returns.
I.

4010
Lightfoot, C., Carhart, R. & Gaeth, J.H. EFFICIENCY OF
IMPAIRED EARS IN NOISE. A. THRESHOLDS FOR PURE TONES
AND FOR SPEECH. Contract AF 33(038) 22645, Proj. 21 1203
0001, Rep. 4, Sept. 1953, 18pp. USAF School of Aviation
Medicine, Brooks AFB, Tex. (Northwestern University,
Evanston, Ill.).

4010
To determine the influence of noise on the auditory
efficiency of persons with impaired hearing, an audio-
metric study was made of the effects of thermal noise on
the monaural air-conduction thresholds of 31 subjects of
normal hearing and of 76 persons with various types and
degrees of hearing loss. Pure-tone thresholds and speech
(spondaic words) thresholds were obtained for quiet condi-
tions and for noise conditions. Over-all noise levels
for the controls and for 36 of the hard-of-hearing were
60 and 80 decibels, and for the remaining 40 subjects the
levels were 80 and 95 decibels. Results were analyzed
in terms of comparisons between the two groups and also
against the background of knowledge regarding masking in
the normal ear.
T. G. R 12

4012

Pepler, R.D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. A REPORT ON THE FIRST TWO YEARS' PSYCHOLOGICAL EXPERIMENTS AT SINGAPORE. R.N.P. 53/765, C.E.S. 394, T.R.U. 22/51, Feb. 1953, 8pp. Climatic Efficiency Subcommittee, RNPCC, London, England. (Royal Naval Tropical Research Unit, University of Malaya, Singapore).

4012

The purpose of the work described here is primarily to validate, by experiment on men living in the tropics, the findings from a series of experiments carried out in England using a number of skilled tasks performed in warm and humid indoor climates. The subjects in England had been given short daily exposures to the hot climates for several weeks prior to the experiments. Two experiments on pointer alignment, one on Morse Code reception, and two on visual vigilance are described briefly together with the main findings. The extent to which they agree with findings from the experiments in England is discussed. The relative humidity of the climates, level of skill and of motivation of subjects, and task difficulty are identified as qualifying conditions.
R 10

4013

Pepler, R.D. THE EFFECTS OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. 4. A TASK OF PROLONGED VISUAL VIGILANCE. Rep. AFU 156/53, Mar. 1953; 24pp. Royal Naval Personnel Research Committee, Great Britain.

4013

To investigate the effect of living for extended periods in the tropics on performance of skilled tasks, vigilance during a prolonged visual task (24 naval ratings who had been living in the tropics for at least 12 months) was measured. The Cambridge Clock Test was used, the subject reporting small and infrequent changes in the display over a period of two hours; six different climatic conditions were tested. Physiological measurements of heat stress were taken (heart rate and rectal temperature). The experiment was repeated with some modifications by 18 subjects. Incidence of missed signals was analyzed for effect of the different climates. Physiological measures were studied in relation to performance. All results were compared to a similar experiment done in temperate zone. T. G. I. R 4

4014

McMahan, C.A., Folger, J. & Feltis, S.W. GRADUATES OF THE AIR CORPS TACTICAL SCHOOL, 1921-1940. A DEMOGRAPHIC ANALYSIS OF THE POPULATION OF GRADUATES AND AN INQUIRY INTO THE RELATIONSHIP BETWEEN ACADEMIC PERFORMANCE AND CAREER DEVELOPMENT. Tech. Res. Rep. 15, April 1953, 57pp. USAF Human Resources Research Institute, Maxwell AFB, Ala.

4014

This is a study of the members of the classes which graduated annually from the Air Corps Tactical School throughout the 20-year period from 1921 to 1940. The data used were those readily obtainable from official military sources; the principal sources were the Official Army Register and the Official School Board Proceedings. It consists of a description and an analysis—a description of the population at time of graduation and as of December 1947 with respect to age, rank, educational background, rating, corps, and other characteristics; and an analysis of the factors relating to academic performance at the ATCS as well as the relationship between academic performance at the school and later career development. Strengths and weaknesses of the study are discussed. T. G.
111 - 427

4015

Smith, A.A., & Boyes, G.E. RADAR TARGET DETECTABILITY AS A FUNCTION OF SEARCH AREA AND RANGE. DRML Proj. 163, Rep. 163-8, FCC D77-94-20-22, H.R. 128, June 1956, 5pp. Defence Research Board, Department of National Defence, Canada.

4015

To investigate some factors affecting target detectability on radar screens, threshold measurements were made by six subjects (target signal voltage increased until subject pointed to target). Using a twelve-inch cathode-ray tube display, three search areas (full-scope, half-scope, and quarter-scope), targets were presented at positions distributed equally in azimuth and ranging from 2/10 to 9/10 radius on a noise-free background. Visibility thresholds were also measured at ranges of 2/10, 4/10, 6/10 and 8/10 radius and azimuths of 45 and 225 degrees. The threshold data were analyzed as functions of search area and range and related to the practical problems of the radar operator.
T. G. R 2

4016

Williams, S.B. (Proj. Dir.). OPERATOR EFFICIENCY AS A FUNCTION OF SCOPE SIZE. Contract AF 30(602)-578, Prog. Rep. 1, Sept. 1953, 5pp. Dept. of Psychology, College of William and Mary, Williamsburg, Va.

4016

This first progress report of research on radar operator efficiency as a function of scope size describes the apparatus (a simulated radar scope) that has been designed. The theory and design of the experiment are discussed.

4017

King-Elisson, Patricia & Jenkins, J.J. THE ROLE OF LANGUAGE IN BEHAVIOR. VISUAL DURATION THRESHOLD AS A FUNCTION OF WORD FREQUENCY. A REPLICATION. Contract N80NR 66216, Tech. Rep. 6, ca. 1952, 7pp. University of Minnesota, Minneapolis, Minn.

4017

To examine the relationship between perception time and word frequency, ten experimental words (five-letter "paralogs") were selected. A pack of 100 cards, each bearing one word, was made up for each of 15-Ss. In each pack two of the words appeared 25 times; two appeared ten times; two appeared five times; two appeared twice; and two appeared once. Dummy cards (14) were added. Each S was told that the words were Turkish words and was required to spell and pronounce the words on each card in the deck. After 20 minutes of unrelated reading, the ten words were exposed tachistoscopically, beginning with 30 msec. and increasing with successive exposures, until correct identifications were made. Mean exposure time at recognition was analyzed in relation to frequency of appearance in the pack. T. G. R 9

4018

Vanderplas, J.M. SOME PERCEPTUAL FACTORS INVOLVED IN THE DESIGN OF OBSTACLE WARNING DISPLAYS FOR AIRCRAFT. RDO 694-45, Tech. Note WCRD-TN-54-9, March 1954, 14pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

4018

This report constitutes a discussion of some perceptual problems involved in visually presenting information for spatial and geographic orientation of the pilot in flight and in the design of an aircraft display for obstacle warning. A summary is presented of general principles of visual perception of space, along with a discussion of how these principles may be applied in several representative designs of a pictorial or symbolic display for geographic orientation and obstacle warning. Several types of displays, both pictorial and symbolic, are discussed as examples of application of the principles, and suggestions are presented for their application to an obstacle warning display method.
R 8

4020

Coxe, J.F. THE EFFECTS OF NOISE ON SPIN BEHAVIOR. Contract AF 33(616) T6, WDC 28 33 25, Dec. 1955, 40pp. Naval Air Medical Lab., Wright-Patterson AFB, Ohio. (Pennsylvania State College, State College, Penn.).

4021

This report is a comprehensive summary of a program of research on the effects of high intensity noise on human behavior. Six major studies were conducted and are reviewed. The following information is provided for each: abstract, purpose, procedure, results and conclusions, and a summary statement. The various studies are: 1) loudness and mental performance, 2) individual differences under the stress of high intensity noise, 3) personality characteristics under stress of high intensity noise, 4) interference effects on retention of learned material, 5) effects on certain psychological variables and 6) interference effects on retention.

T. G. I. R 72

4022

Richards, D.L. & Sheeme, J.K. MEASUREMENT OF SPEECH LEVELS. SUMMARY OF RELATIONSHIPS BETWEEN MEASUREMENTS USING DIFFERENT METERS. Res. Rep. 12676, Nov. 1952, 6pp. Post Office Engineering Dept., Research Station, Collier Hill, London, England.

4023

The indication of a speech voltmeter is influenced by the mechanical and electrical characteristics of the meters; however, simple relations exist between the readings of most voltmeters. Data are assembled from five studies which enable the calculation of the relation between the readings of most speech voltmeters of known characteristics. In addition, the readings can be referred to a quantity independent of a particular meter--the percentage of time during which the instantaneous power of a speech signal does not exceed the meter reading. Some data on readings taken on logotons are included although the above relations do not hold in these cases.

T. G. I. R 9

4024

Richards, D.L. & Sheeme, J.K. SOME MEASUREMENTS OF THE POWER DISTRIBUTION OF SPEECH SIGNALS. Res. Rep. 12677, May 1953, 6pp. Post Office Research Station, London, England.

4025

In the course of various investigations, measurements have been made of the distribution in time of the instantaneous power of several types of speech signal. The results of these measurements are collected in this report for reference. They include measurements on commercial quality and high quality speech signals and on logotone signals. In addition to the instantaneous power distributions, some data are given on the distribution of mean power averaged over a given period.

T. G.

4026

Wing, J.F. OPTIMAL POSITIONS AND MOTIONS OF THE M46 RAY HANDWEELS FOR TWO-HANDED TRACKING. Proj. TNA 4470, Rep. 5 5258, Human Ergog. Rep. 17, Dec. 1956, 5pp. USA Frankford Arsenal, Picatinny Laboratories, Philadelphia, Penn.

4027

To determine optimal locations and motions of the azimuth and elevation handweels for two-handed tracking with the M46 millimeter Rifle, M46 RAY system, the equipment was examined for problems affecting two-handed tracking and pertinent literature reviewed to determine optimal parameters for handweel positions and motions. Problems of seat width, seat height, and hand clearance were also reviewed. The findings are presented and discussed for: 1) position of handweels due to lay of weapon, 2) assignment of tasks on gunner's hands, 3) planes and directions of movement of handweels, and 4) coordination of handweels during tracking. Deficiencies, requirements, and recommendations are given.

T. I. R 9

4028

Daniels, F., Jr., Tannville, J.H. & Edwards, C.C. ENERGY COST OF CARRYING THREE LOAD DISTRIBUTIONS ON A TREADMILL. Rep. 203, March 1952, 24pp. USA Environmental Protection Research Div., ON Research & Engineering Center, Watlik, Mass.

4029

The energy cost of carrying loads of 27 to 78 lbs. on a horizontal, motor-driven treadmill at 3.5 mph (53.67 meters a minute) was determined for six test Ss. The loads were distributed in three positions: high on a packboard, low on a packboard, and around the waist as "saddle bags." Empirical formulae were developed from the data for predicting total energy output for carrying loads up to 80 lbs. in these three positions. The meaning of these formulae in terms of body mechanics is not known. Method of carrying loads was also evaluated in terms of subjective preference of the Ss. The rationale for basic studies in load carrying is discussed at some length.

T. G. I. R 21

4024

Coxe, D.R. PROBLEM ANALYSIS OF A GENERAL PURPOSE EJECTABLE AIRCRAFT SEAT CAPSULE. Sept. 1952, 8pp. Goodyear Aircraft Corporation, Akron, Ohio.

The report represents a brief summary of some of the important aspects of a program conducted to investigate the feasibility of providing a safe means of personnel escape from aircraft flying at extreme altitude and speeds. The device was to be a versatile escape unit for a single occupant and to be used for multi-place and single-place aircraft. Due to problems greater emphasis was directed toward the multi-place installation. The dynamic, aerodynamic, and structural aspects of the escape problem were investigated. It was concluded that escape from high-speed aircraft at extreme altitudes by means of a general-purpose ejectable aircraft seat capsule appears to be feasible and practicable. (HEIAS)

4427

Landolt, E. & Miller, J.W. A STUDY OF DYNAMIC VISUAL ACUITY. Contract NMR 58600, Proj. Rep. 1 & NR 001 075.91.01, March 1953, 5pp. US School of Aviation Medicine, Pensacola, Fla. (Kresge Eye Institute, Detroit, Mich.).

Experiments were performed to ascertain the manner in which visual acuity deteriorates when the angular velocity of the test object moving in a horizontal plane is varied between 10°/sec. and 170°/sec. When visual acuity is tested with a moving object the acuity deteriorates markedly as the angular velocity of the test object relative to the eye is increased. The visual acuity of an individual may be evaluated in terms of 2 coefficients of which the first is a measure of the static value of visual acuity analogous to that determined by the classical methods. Static acuity is employed chiefly for such special purposes as reading and searching a static visual environment with the head motionless. The second coefficient is a measure of the visual acuity when the eyes are moving. This latter ability may be called dynamic visual acuity; it is employed for most normal functions of the eye. It is shown that individuals with substantially the same static acuity may differ markedly and significantly in their dynamic acuity.

R 4

4429

Evans, R.H. & Smith, L.J. A STUDY OF PERFORMANCE MEASURES OF PEOPLE OPERATING REMOTE IN ELECTRONIC EQUIPMENT. Contract DA36-0742, Proj. NR 153 104, Oct. 1953 138pp. College of Education, University of Illinois, Urbana, Ill.

4430

Kentler, H.E. EXPERIMENTAL ANALYSIS OF PROBLEM-SOLVING BEHAVIOR. Contract NMR 18700, Proj. NR 150 044, Tech. Rep. 1, Nov. 1953, 38pp. Dept. of Psychology, University College of Arts & Sciences, New York University, New York, N.Y.

4431

To learn more about technician effectiveness, research was conducted to develop and study suitable performance test measures for use with electronic technicians. The administration of performance tests for electronic technicians was also investigated. A criterion measure of trouble-shooting was obtained through administration of individual trouble-shooting performance tests to 57 subjects using the 50-1b surface search radar. Each subject also was administered a battery of reference tests and a paper form of a trouble-shooting test, the "Tab Test." Data on inter-observer reliability, inter-scores reliability, internal consistency reliability, face validity, and test acceptability were reported.

T. 1. B 1

4432

A research program, explanatory in nature, dealing with factors influencing problem-solving behavior is described. Basic to all the experiments is an attempt to extend conditioning theory to problem-solving behavior. The results of the experiments are presented in five chapters, four of which report the studies of a particular problem area--tests of the extinction hypothesis, verbal learning in concept formation, the acquisition of flexibility in problem-solving situations, and frequency of reinforcement in concept formation behavior. The fifth chapter presents the general rationale of the research program.

T. 2. B 2

4433

Jenness, A.F. & Rouse, R.D. OPERATOR CAPACITY TO PREDICT TARGET POSITION. Contract AF 30 (582)566, Progress Rep. 2, Dec. 1953, 3pp. Williams College, Williamstown, Mass.

The quarter has been spent in redesigning and modifying apparatus. Numerous technical difficulties have been overcome, but further changes are necessary before routine experimentation can be begun. Preliminary data, gathered by the use of a transitional model of the apparatus, with the investigators as Ss, shows evidence of constant errors in the expected direction. After about 4 settings for the straight lines, average errors and variability show little change. Experience of the investigators, serving as Ss, suggests that after the main experiment is finished, emphasis should be directed to studying the effect of training on the improvement of judgments. Because of difficulty with the apparatus, no naive Ss have been employed as yet. 1

4434

Eckhardt, R.T. & Hedberg, R.D. CONTROLS AND DISPLAYS II: THE DETECTABILITY OF ERRORS IN CERTAIN GEOMETRICAL CONFIGURATIONS. Proj. TBI 1000 & TBI 15 C11, Memo Rep. NR 580, NE Rep. 2, Jan. 1954, 4pp. USA Frankford Arsenal, Pitman-Dun Labs., Philadelphia, Penn.

15 Ss were used to evaluate the ability of Ss to determine whether all or all but 1 of 9 lights were on. Ss were tested individually on each of the following 3 configurations: a) a square; b) a circle; and c) a straight line. The data indicated that it was easier to detect the malfunctioning light in a square configuration of lights than it is in a straight line or circular configuration. The circular pattern was read with more difficulty, than either the square or straight line presentation. Further, there was often a discrepancy between how S performed and how he thought he performed. (MEIAS)

R 1

4434

Conway, T.J. 2ND ANNUAL ARMY ENGINEERING PSYCHOLOGY CONFERENCE. Conference Rep., 7, 8, 9 Nov. 1956, 90pp. AMRL, Fort Knox, Ky.

4437

Bridges, D.B.J., Davis, J.E., Holmes, D.W., McMaster, R.C., et al. ELEMENTS OF A MECHANIZED SUPPLY INFORMATION FLOW SYSTEM. Contract AF 33(616) 2183, EO R 468 3 SR 12, WADC TR 53 504, Dec. 1953, 66pp. USAF Aeronautical Research Lab., Wright-Patterson AFB, Ohio. (Battelle Memorial Institute, Columbus, Ohio).

4434

This report is the record of the second annual Army Human Engineering Conference, 7-9 November 1956, held to provide for interchange of information between working level scientists from Army Research and Development facilities and representatives of user services. Summaries of research accomplishments of the technical services since the previous conference are presented together with future plans. The discussion and recommendations of three conference working groups (Joint Service Steering Committee on the Human Engineering Guide for Design Engineers, training of army officers in engineering psychology, and human factors in design of equipment for use in Arctic climates) are summarized.

4437

A description of the flow of information between the user of materiel and Base Supply is given for a typical Air Force base. The issue cycle for expedited and routine requisitions is covered. A preliminary functional description is given of the Materiel Information Flow Device to be applied to the information-flow problem. The description is based on the logical design as of November 15, 1953. An introduction to digital computer practice is appended.

T. 1.

4039
Hall, F.G. THE ROLE OF CARBON MONOXIDE IN ALTITUDE
INTOXICATION. *UNIVERSITY OF CHICAGO*, 1933, 1934, 1935, 1936,
March 1933, 1934, 1935, 1936. *Wright-Patterson AFB, Ohio*.
Patterson AFB, Ohio. (Duke University, Durham, N.C.).

4040
Tiffin, J. (Prof. Dir.). THE DEVELOPMENT AND ESTIMATION
OF A METHODOLOGY FOR ESTABLISHING VISUAL REQUIREMENTS FOR
NAVAL PERSONNEL. *FINAL REPORT*. Contract N0001-39-001,
Prof. M. 132 129, Tech. Bull. 24 7, Oct. 1953, 1954pp.
Naval Research Foundation, *Naval University, Lafayette,
Ind.*

4039
This study is reported on the role that carbon di-
oxide (CO₂) plays in human Se at altitude. 1) The rela-
tive influence of hypoxia and CO₂ stimuli upon pulmonary
ventilation in the postoperative hypoxic state was determined
using ten Se at simulated altitudes of 25,000 ft. 2) The
effect of adding CO₂ to inspired air on the duration of
useful consciousness at 33,000 and 35,000 ft. simulated
altitudes was studied on nine Se. 3) CO₂ and respiratory
regulation were studied on 14 Se at simulated altitude of
27,000 ft. breathing gas mixtures with varying concentra-
tions of CO₂. 4) The effect of adding CO₂ to inspired air
on the elimination of nitrogen was made on seven Se ex-
posed to simulated altitude of 20,000 ft.
T. G. 2 20

4040
A methodology was developed that provides a feasible
means of establishing visual requirements for battle
station assignments. The methodology consisted of deter-
mining the relationship between performance of Se on a
job-sample test and various levels of artificially in-
duced vision. To evaluate the method, a job-sample test
was constructed and the relationship between performance
and near visual acuity was determined by rather complex
statistical procedures and also by simple graphical pro-
cedures. The results were discussed in terms of the
manner in which the necessary data can be gathered and
analyzed in the practical situation.
T. G. 2 23

4040
Chambers, E.G. DESIGN AND USE OF SCALES,
DIALS, AND INDICATORS. A.P.U. 254/56, Oct.
1956, 39pp. Applied Psychology Research Unit,
Medical Research Council, Cambridge, England.

4040
This report summarizes the results of research on
the design and use of scales, dials, and indicators for
presenting visual displays of information, either quali-
tative or quantitative. The introduction deals briefly
with the functions and types of displays. Other topics
treated are: methods of investigation; scale design;
graduation and number systems; manuals; pointers;
scale reading errors; position of scale; color; illumi-
nation; viewing angle and distance; display-control
relationships; controls, setting, check controlling and
marking; multi-scale instruments; effects of environ-
ment on scale reading; vibration, noise, vigilance, and
fatigue; and warning devices. General conclusions
thought to be useful as guides for industry are given.
R 72

4045
DeHaven, H., Tourin, B. C. Macri, S. AIRCRAFT SAFETY BELTS: THEIR INJURY EFFECT ON THE HUMAN
BODY. Contract N6001 26412, July 1953, 55pp. *Crash Injury Research, Cornell University,
Medical College, Ithaca, N.Y.*

A study of 1039 survivors of 117 plane crashes - ranging from moderate to extremely
severe in nature - has been made in order to factually evaluate the injury effects of 2 in.
lap-type safety belts with a loop-holding capacity from 1000 to 2000 pounds. The statistical
findings demonstrate that: a) the safety belt is not "dangerous"; b) the safety belt provides
protection for the body in crashes; and c) injuries which may seem related to safety belts
directly actually are determined by other factors such as safety belt installation failures
and vertically acting forces in accidents. The findings indicate that a significant decrease
in exposure to crash injuries in small planes can be achieved by: a) providing safety belt
installations (webbing, hardware, carry-through and anchorage points) which will hold oc-
cupants in place under conditions of crash force which leave cockpit and cabin structures
reasonably intact; b) wearing safety belts; c) using shoulder harness to prevent forcible
contact of the head and upper torso with structures of objects having dangerous injury poten-
tials; d) designing the landing gear, fuselage, floor and test structures to progressively
absorb vertically acting crash force.

4041
Comfort, Elizabeth, AIRCRAFT EMERGENCY PRESSURE CELL. Tech. Note WARD 53 141, Dec. 1953, 8pp.
Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

Experimental long-term protection against incapacitating effects of decompression sick-
ness has been developed in the form of a pressurized one-piece capsule consisting of vinyl
coated nylon covered by an outer shell of inelastic urethane nylon. The equipment described
in this report represents a functional laboratory model capable of effectively lowering the
altitude around an occupant of a depressurized aircraft from 50,000 to 24,000 feet, or from
65,000 to 28,000 feet. It has the additional characteristics of being lightweight, stowable
and of minimal size.
R 7

4047 Harrison, J.M. & Phoenix, C. THE EFFECT OF VISUAL ANGLE AND DEGREE OF IMPERFECTION UPON THE RECOGNITION OF OBJECTS. Contract AF 33(616)432, Tech. Note 104, Sept. 1953, 9pp. Optical Research Lab., Boston University, Boston, Mass.

A study was conducted to measure the recognizability of imperfect images as a function of visual angle and the degree of imperfection. Test objects were artificial "photographs" of semicircles and isosceles triangles. The "grain" was a grid of squares upon which the semicircles and triangles were superimposed such that those squares more than half enclosed by the object were painted black and the rest left white. By using different size squares, varying object area-square area (O/S) ratios were obtained. Visual angle was altered by varying the distance between the S and the stimulus. The S was asked to judge whether each stimulus was a semicircle or a triangle. For visual angles in the range 25-155 minutes, the number of correct responses increased as the O/S ratio increased. At visual angles less than 25 minutes an increase in recognition was obtained for all O/S ratios that had not previously yielded 100% recognition.

4046

Henry, F.M. THE EQUIVALENT "BENDS" ALTITUDE OF THE Y-1 PARTIAL PRESSURE UNIT. Contract AF 18(600)30, WADC Tech. Rep. 53-276, June 1953, 9pp. University of California, Berkeley, Calif.

The equivalent aviator's "bends" altitude of the Y-1 partial pressure suit has been determined by obtaining the critical altitude for appearance and disappearance of pre-established bends pains of various intensities. This was done by lowering and raising the decompression chamber altitude with the men wearing the unpressurized suit, and then by holding the chamber at a constant high altitude while the pain was relieved and caused to return by pressurizing and depressurizing the contents of the suit. The experiments were performed in the altitude chamber of the University of California (Berkeley). In 33 measurements on 17 men, the equivalent altitude of the suit averaged 1509 ft lower than the direct altitude chamber figure. A third of the cases showed no difference. The critical altitude for pre-established bends was 24,300 ft for mild and 31,400 ft for moderately severe pains. A table is presented to show the probability of relieving bends pain with the Y-1 suit. The average case of bends would be reduced to a tolerable intensity with 14 psi on the capstan at 46,000 ft cabin altitude. Wrist and ankle pains were relieved as effectively as shoulder, elbow and knee pains.

R.7

4048

Reichman, M. THE INFLUENCE OF SIZE AND SHAPE ON THE VISUAL THRESHOLD OF THE DETECTABILITY OF TARGETS. Contract AF 33(616) 432, Tech. Note 109, Dec. 1953, 5pp. Optical Research Lab., Boston University, Boston, Mass.

4049

To test predictions made from a theory proposed by James, Hecht, Shlaer, and Smith that the constant (21%) required to detect a rectangular target was a positive function of the area within 1.5 minutes from the edge (defined as the useful area) of the target, 200 experiments were conducted. Differential thresholds of detectability were obtained for a series of 24 rectangles which varied in area, useful area, and perimeter. The second study also obtained differential thresholds of detectability for a series of seven stimuli composed of pairs of rectangles. Threshold data were analyzed as functions of area, perimeter, useful area, and separation distance between rectangles.

R. 1152

4049 Ruch, F.L. BIBLIOGRAPHY ON MILITARY LEADERSHIP. ANNOTATIONS OF SELECTED STUDIES FROM SCIENTIFIC, TECHNICAL, AND RELATED PUBLICATIONS. Contract AF 505(03)90001, NML Tech. Rep. Rep. 18, June 1953, 90pp. Psychological Services, Inc., Los Angeles, Calif.

An annotated bibliography of 1152 articles, of military leadership, is presented. All available references published prior to 1 Sept. 1952, were screened for relevant articles. The articles are listed alphabetically by author's surname and a subject matter index is included. (HEAS)

R 1152

4050

Courtney, D. (Proj. DIF.). PSYCHOLOGY AND GROUND SAFETY. Contract AF 18(600) 301, HFCRL Rep. 43, Aug. 1953, 146pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C. (Institute for Research in Human Relations, Philadelphia, Penn.).

4050

This report presents an analysis of the Ground Safety Director's job together with pertinent psychological literature. Based upon library research and field visits to representative Air Force bases, the functions and areas of knowledge important in the work of the Ground Safety Director are outlined. These areas are then reorganized into six topics for intensive treatment (the results of which are presented in this report): psychological factors in accident causation, safety promotion procedures, principles of driver training, principles and procedures of driver evaluation, practical principles of effective interviewing, and human relations and safety.

R 565

4051

Wilson, C.L., Nuckie, R.H. & Buckner, D.N. RESEARCH ON THE DEVELOPMENT OF SHIPBOARD PERFORMANCE MEASURES. III. THE USE OF PERFORMANCE CHECK LISTS IN THE MEASUREMENT OF SHIPBOARD PERFORMANCE OF EXISTING NAVAL PERSONNEL. Contract N0001, Feb. 1954, 42pp. Office of Naval Research, Washington, D.C. & Marketing Research Corporation, Los Angeles, Calif.

This report describes the development and experimental use of performance check lists in evaluating the performance of Electrician's Mates and Engineers serving aboard submarines. In addition to information concerning the development and administration of the check lists, and estimates of interrater agreement in using them, this report contains discussions of the relationship between scores on the check lists and scores on the performance rating scale and practical performance tests.

R 2

4054

Crook, H.N. & Baxter, Frances S. THE DESIGN OF DIGITS. Contract W33 038 ac 14552, ADD 694 51, WADC Tech. Rep. 54-262, June 1954, 65pp. USAF Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.

This report presents the results of a series of experiments on the design of dial type numerals and reviews a number of related studies by other investigators. Design characteristics of transilluminated numerals in the Air Force-Navy Aeronautical style at very low brightness were investigated. The experimental results indicate narrow stroke widths and close spacing were unfavorable. With area held constant, the effect of height/width ratio varied from digit to digit. Configurational characteristics could not readily be improved, but a round-tipped "3" in an open style was found to be superior to the standard flat-topped design. Data on confusions among both intact digits and digits with small stroke defects showed reasonable degrees of consistency. A number of special observations for which the test situation was well suited threw light on problems of experimental technique. From an analysis of the literature it was concluded that most of the contradictions on digits by different investigators can be resolved and the data fitted into a coherent pattern. The principles given can be used as guide lines for charts and checklist designs to give better readability.

R 47

4055

Memmenan, R.H. & Long, E.R. A COMPARISON OF THE VISUAL AND AUDITORY SENSES AS CHANNELS FOR DATA PRESENTATION. Contract W33(038) ac 21259, Proj. 7152, Tech. Rep. 54-253, Aug. 1954, 38pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio.

It is the contention of the present report that the choice between the eyes and the ears as sense channels for the presentation of information to the human operator rests upon the specific demands of various operational data, some of which have implications for visual or auditory presentation. These 3 sets of demands are: a) demands imposed by response variables (e.g., orientation in space, fine quantitative comparison, rapid referability); b) demands imposed by operator variables (e.g., previous habits, fatigue, motivation); c) demands imposed by special environmental conditions favoring one or the other sense channel (e.g., ambient noise, sudden changes of illumination, excessive vibration). The stimulus properties of light and sound differ; the receptor characteristics of vision and audition also differ. It is possible, by matching these distinguishing sense characteristics with specific demands of particular situations, to suggest some "division of labor" between the 2 sense channels for purposes of data presentation. 4 principal categories of demands for informational input have been proposed as follows: a) typical demands for visual presentation; b) typical demands for auditory presentation; c) typical demands served by either sense alone; d) typical demands for dual audio-visual presentation.

R 75

4056

Cohen, J. & Webb, Ilse B. AN EXPERIMENT ON THE CODING OF NUMERALS FOR TAPE PRESENTATION. Contract AF 18(600) 50, ADD 694 31, WADC Tech. Rep. 54-86, Dec. 1953, 14pp. USAF Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

One way of transmitting information to aircraft crews would be to automatically punch or print numerical information on tape in the airplane in response to radio or radar signals. The tape may be scanned by a device to take control action and also be monitored by people. A compromise system of marking the tape has to be worked out which is efficient for both mechanical and human scanning. 24 Ss were tested to determine the speed and accuracy with which they could read Arabic numerals and 5 systems of coded numerals. The experiment provides preliminary information about the applicability of certain principles of coding in the selection of numeral representations for the punch or printed tape method of presenting information to airborne personnel. All Ss were fastest and most accurate with the Arabic numerals and all but 3 were slowest with the code based on the position of a single dot on a grid. The fastest and most accurately read numeral system, excepting the Arabic, was the symbolic Arabic code which resembles the Arabic, but the numerals are printed with 6 straight line elements. The 3 codes based on the number of dots or lines were intermediate in terms of reading speed.

R 3

4057

Conrad, R. SOME EFFECTS ON PERFORMANCE OF CHANGES IN PERCEPTUAL LOAD. A.P.U. 210/54, June 1954, 18pp. Medical Research Council, Applied Psychology Research Unit, London, England.

The perceptual load was systematically varied for each of 12 practiced Ss. From an analysis of performance records it was found that: a) Errors occurred when signals requiring action were bunched. It was pointed out that with load changes the errors arising from this source would change in certain skills, but not in all. b) Errors occurred when Ss failed to determine the correct signal order. These errors only occurred when the interval between successive signals was short. Increasing the load had the effect of increasing the frequency of such errors, and of increasing the maximum interval between 2 signals likely to result in such error. A subsidiary experiment showed an association between the incidence of this type of error and a general shortage of time. c) With load increases, errors were more likely to arise in event-sequences of identical temporal structure, even when an essential element of the sequence was an event which occurred after the error. d) Recovery from error took longer with greater loads. e) Even under the condition of greatest stress, attention was apparently distributed strictly according to display demands rather than in accord with either a spatial or a signal-frequency pattern.

R 16

4059

Leonard, J.A. THE EFFECT OF PARTIAL ADVANCE INFORMATION. A.P.U. 217/54, June 1954, 23pp. Medical Research Council, Applied Psychology Research Unit, London, England.

An experiment was carried out to study the effects of partial advance information. In successive tests spread over 8 months it was found that a) it was possible to produce reaction times or rates of gain under the experimental conditions which were comparable with those obtained under the 3 choice condition. b) it was possible to produce reaction times or rates of gain under the experimental condition which were better than those obtained under the 3 choice condition. c) The main effect of the forewarning in reducing the reaction time to the specific signal in the experimental condition was obtained with forewarning lasting .10 secs. although considerably more time had to be allowed to obtain the maximum effect. d) There is some evidence that the full effect of the warning signal was retarded when the duration of forewarning was .20 secs. e) It seems just possible that performance under the experimental condition with a forewarning lasting .04 secs. is at least as good as performance under the 6 choice condition, provided one adds the .04 sec. to the reaction time obtained under the experimental condition. f) A difference between performance under the 6 choice and the 3 choice condition was maintained although that difference was not as large as had been expected.

R 8

4058

Siddall, G.J. VARIATIONS IN MOVEMENT TIME IN AN INDUSTRIAL REPETITIVE TASK. A.P.U. 216/54, Aug. 1954, 13pp. Medical Research Council, Applied Psychology Research Unit, London, England.

An industrial repetitive task was filmed under conditions of normal production. From by frame analysis was carried out to determine what variations in the times of the component elements might exist a) between cycles of different duration b) within cycles of constant duration. It was found that as the duration of the cycle increased, the manipulative movement contributed proportionately more and more, and the travel movements proportionately less and less to the total cycle time. A movement which combined both manipulative and travel characteristics provided an approximately constant proportion of the cycle time. 2 possible explanations of these relative differences are briefly discussed. Variations in the component element values of cycles of constant duration were found which were considered to relate to variations in the moment to moment demands of the skill sequence in achieving the aims of the skill.

R 8

4069

Sanders, Virginia L. & Cohen, J. THE EFFECTS OF ABSOLUTE AND CONDITIONAL PROBABILITY DISTRIBUTIONS OF INSTRUMENT SETTINGS ON A SCALE READING: REPEATED EXPOSURES OF THE SAME SETTING. Contract AF 18(600) 50, RDR 694 31, WADC Tech. Rep. 54 253, Oct. 1954, 45pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

The first of a series of experiments designed to investigate the effect on scale reading of the sequence of pointer settings, and responses to them, is reported. This paper analyzes response sequences in the limiting case in which repeated successive exposures of the same stimulus are administered. Under these conditions information transmitted from scale settings to responses increases, with exposure number in a manner approximately described by a growth function. When the same stimuli are presented in random sequence, only a very slight, approximately linear increase in transmitted information is found. Increasing the exposure time or the number of graduations on the scale increases the amount of information transmitted, and increasing the exposure time also increases the rate of gain of information. Mean square error decreases with successive exposures, and the correlation between the logarithm of this measure and information transmitted is -.86. A research program to investigate the effects of different kinds of absolute and conditional probability distributions on instrument reading is proposed.

R 14

4060

Gibbs, C.B. SERVO PRINCIPLES IN SENSORY ORGANIZATION AND THE TRANSFER OF SKILL. A.P.U. 128/54, July 1954, 11pp. Medical Research Council, Applied Psychology Research Unit, London, England.

This paper investigates the possibilities of utilizing servo theory in describing the nature of certain kinds of human behavior. Certain reports in physiology and zoology are reviewed for supporting evidence, and a hypothetical servo model of tracking skill is developed and evaluated for consistency with known characteristics of skill-transfer. The potential contribution of servo theory to the understanding of the human operator is discussed.

G. I. R 11

4063

Tanner, W.P., Jr. & Swets, J.A. A NEW THEORY OF VISUAL DETECTION. Contract DA 36 039 SC 15358, DA Proj. 3 99 04 642 & Signal Corps Proj. 29 1943 G 2 Proj. 3970, Task 1203, Tech. Rep. 18, Sept. 1953, 33pp. Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

4063

A new theory of visual detection is presented. The theory is based on the theory of signal detection of Peterson and Birdsall, who consider the problem as that of evaluating statistical hypotheses. Predictions based on the theory are compared with predictions based on conventional psychophysical theory. Some experimental data are reported.

T. G. I. R 3

4065

Rogers, C.M., Kaplan, S.J., Gentry, G., & Auxier, J.A. SOME EFFECTS OF CUMULATIVE DOSES OF X-RADIATION UPON LEARNING AND RETENTION IN THE RHESUS MONKEY. Proj. 21-3501-003, Rpt. no. 11, Nov. 1954, 14pp. USAF School of Aviation Medicine, Randolph Field, Texas.

4065

Twelve rhesus monkeys were tested for ability to retain memory for a multiple discrimination task and eleven color discrimination tasks. They were tested also for ability to learn new color discrimination tasks after radiation. Six of the subjects were exposed to approximately 100 r of x-radiation once a week during the experiment. Results indicate that up to the point where they no longer responded to stimuli the subjects showed no effects of cumulative exposures to x-radiation.

4070

Merrick, R.M. FOCAL LUMINANCE DISCRIMINATION AS A FUNCTION OF THE DURATION OF THE DECREMENT OR INCREMENT IN LUMINANCE. Contract AF 33(038) 22616, Task 71544, Tech. Rep. 54 463, Oct. 1954, 16pp. Aero Medical Lab., USAF Wright Air Development Center, Dayton, Ohio.

The minimum observable change in brightness (luminance) as a function of a) the original adapting brightness and b) the duration of the change was investigated. The brightness of a centrally fixated adapting field was varied from .01 to 1000 millilamberts. The duration of the increment was varied from .0035 to 2.035 seconds. It was found that the longer the duration of the change in brightness, up to a critical point, the less the change in brightness required to be detected. Up to this critical point, the change in brightness (ΔI) multiplied by its duration (t) equaled a constant ($\Delta I \times t = K$). For longer durations the just-detectable change in brightness is constant ($\Delta I = K$). The critical duration varies inversely as a function of the adapting brightness—the higher the brightness the shorter the critical time over which the relationship $\Delta I \times t = K$ holds. These findings agree with the Bunsen-Roscoe law and indicate further that this law holds for a decrement as well as for an increment in brightness. These results are important in a great number of Air Force situations, especially those in which an observer must obtain information based on momentary increases or decreases in a field of light. For example, the results show that a very weak signal on a CRT screen may be detected if it persists long enough to allow the eye to integrate the energy emitted. The results also indicate that the integration time of the eye as well as the minimum luminance of the signal required for detection will depend upon the background luminance of the CRT screen. Analogous interpretations apply when the dark-trace CRT screen is employed as the detection device. Another example of the practical use of the data concerns blinker or beacon signal systems. The findings of the experiment permit one to estimate the minimum durations required between successive flashes of light for the detection of discrete flashes. R 19

4071

Simon, C.W. THE PRESENCE OF A DUEL PERCEPTUAL SET FOR CERTAIN PERCEPTUAL MOTOR TASKS. Contract W33 038 ac 19816, RPO 694 31, WADC Tech. Rep. 54 286, June 1954, 27pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio.)

2 independent groups of 24 female college students acted as subjects in an experiment using a single, compensatory pursuit task. One group used a knob control; the other, a lever. In both studies, the zero position of the pointer and the motion relation between pointer and control were varied. Time-on-target performance scores were measured with the pointer in a 12 or 6 o'clock zero position and with the direction of movement of the pointer and control either agreeing or disagreeing. The pointer dial and the control were aligned vertically in the same plane; and arc of pointer movement was considerably less than 45 degrees on either side of the zero position. The major conclusions drawn were that a) performance is affected by an interaction between the pointer position and the pointer-control motion relation, b) subjects behave as if they perceive the rotary mechanical movements both linearly and curvilinearly, c) the motion agreement principle operates in both perceptual sets and performance is a result of the effects of both sets combined. R 23

4072

Bradley, J.V. CONTROL-DISPLAY ASSOCIATION PREFERENCES FOR GANGED CONTROLS. Proj. 7182, WADC Tech. Rep. 54 379, Aug. 1954, 12pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

75 male college students and 25 human engineering psychologists were given a questionnaire presenting diagrams consisting of 3 concentrically ganged knobs and 3 dials which they were told the knobs operate. They were asked which dial they thought should be operated by each of the 3 knobs. Knob-dial associations were obtained with dials in horizontal and vertical arrays above, below, to the left of, and to the right of the knobs, and with dials differing in size, shape and distance from the knob axis. Knob-dial associations were found to be influenced by all of these factors except dial shape. Associations which were both strong and relatively unrivaled were found for dial position in a horizontal array (except when the array is to the left of the knobs), and for dial size. Subjects associated the spatial knob progression, front knob to back knob with the spatial dial progression, left dial to right dial and with the dial size progression, smallest dial to largest dial. Strong, but strongly rivaled, associations were found for dial position in a vertical array and for dial distance from the knob axis.

4073

Sleight, R.B. & Duvoisin, Grace. AN ANNOTATED BIBLIOGRAPHY OF FORM PERCEPTION. Contract NSGRI 166, T.O.I., Proj. NR 507 470, Rep. 166 1 153, 1952, 28pp. ONR, Special Devices Center, Johns Hopkins University, Baltimore, Md.

An annotated bibliography on shape and form discrimination is given. References are listed alphabetically and cover the period of 1926-1950. This bibliography is weighted with studies producing quantitative data on comparisons of the relative efficiency of various geometric shapes when perceived visually. In general, studies which attempt to define and explain the nature of perceptual processes involved in form discrimination are excluded. (HEIAS)
R 28

4074

Thompson, M.E. STUDY OF RELIABILITIES OF SELECTED GROSS MUSCULAR COORDINATION TEST ITEMS. Contract AF 33(038) 22948, Proj. 509 020 0005, Res. Bull. 52 29, Oct. 1952, 11pp. Perceptual and Motor Skills Research Lab., USAF Human Resources Research Center, Lackland AFB, Tex. (University of Arkansas, Fayetteville, Ark.)

This study was concerned primarily with the development of a number of test items of gross muscular coordination which utilized simple apparatus and which could be scored on a pass-fail basis. Another aspect of the study involved the determination of test-retest reliability coefficients of each item which was administered to at least 100 college students. The reliability coefficients ranged from 0.16 to 0.95 with 56 per cent of the coefficients falling at 0.60, or above. Ninety-one per cent of the test items showed a practice effect in terms of a larger per cent of subjects passing the test on the second trial than the per cent passing on the first trial. Nine per cent of the test items showed the effects of fatigue as the per cent of subjects passing these items on the second trial was lower than the per cent passing on the first trial.

4076
Brown, R.H. THE VISUAL DISCRIMINATION OF VELOCITY AS A FUNCTION OF STIMULUS DURATION AND LUMINANCE. Proj. NR 554 010, IRL Prob. NC4 01, IRL Rep. 4272, May 1954, 10pp. USN Research Lab., Washington, D.C.

4080
Holstetter, H.W. OPTOMETRIC CONTRIBUTIONS IN ACCOMMODATION AND CONVERGENCE STUDIES. J. Amer. Optom. Ass., March 1954, 25(8), 431-439. (Div. of Optometry, Indiana University, Bloomington, Ind.).

4075
As one of a series of studies conducted to determine how man discriminates velocity and acceleration, four observers discriminated velocity at eight speeds for each of eight exposure times. The observer presented with a spot, travelling at a controlled speed was required to give an unequivocal response to the visual movement—direction of travel. The minimal luminance required for the discrimination was determined for each condition. Threshold data were analyzed for sources of variation: duration of stimulus, rate of stimulus, and observer effects. The significance of the findings for understanding the visual processes of a tracker in predicting motion of a target was discussed.
T. G. R 14

4080
This paper considers the accommodation-convergence relationship as a product of cooperative optometric study and research by men in various fields. Graphical presentation of established facts and relationships are used to show working units for each function and their relationship, accepted zones within which clear and single binocular vision can be presented by all possible combinations of accommodation and convergence, various methods for establishing the limits of clear binocular vision clinically, and some actual cases. The relationship between visual training and accommodation-convergence is discussed.
G.

4088
Sloan, Louise, & Habel, Adelaide. COLOR SIGNAL SYSTEMS FOR THE RED-GREEN COLOR BLIND, AN EXPERIMENTAL TEST OF THE THREE-COLOR SIGNAL SYSTEM PROPOSED BY JUDD. Rep. 55-20, Feb. 1955, 8pp. USAF School of Aviation Medicine, Randolph Field, Texas.

4088
An experimental investigation is made of Judd's proposed three-color code for instrument panel lights. The adequacy of these specifications is tested using both normal and color deficient subjects. It is shown that if certain specific limiting conditions are met as to the luminance, subtense, and chromaticity of the signals, all normal observers and a majority of color deficient observers can make the necessary identifications. The possible explanations for the poor performance of some, but not all prototypes are discussed.

4090
Atkinson, C.J. AN ESTIMATE OF THE SPECTRUM OF BODY-CONDUCTED SIDETONE FOR THE VOWEL (I). Contract DA 36-039 SC 63144, Suppl. Rep. 3, Sept. 1955, 32pp. State University of Iowa, Iowa City, Iowa.

4090
This report presents the results of a series of studies designed to assess, to a first approximation, the spectrum and level of bone-conducted side tone. The method used was a test (for short exposures and for several frequencies and durations of a probe tone) of the threshold shifts produced by the voice (loud vocalization of the vowel /I/ and by random noise. The two kinds of threshold shifts were compared through the concept of critical bands. Tables and figures of threshold shifts as functions of time and of frequency are included for both kinds of stimuli.
T. G. R 9-

4079
Helson, H., Judd, D.B. & Warren, Martha H. OBJECT-COLOR CHANGES FROM DAYLIGHT TO INCANDESCENT FILAMENT ILLUMINATION. Illum. Engng., 1952, 47, 221-233.

4094
Maid, H.O. EFFECT OF CHROMATIC ADAPTATION UPON NORMAL COLOR VISION. FINAL REPORT, PHASE I. Contract NOME 1066(5J), Proj. NR 140 061, March 1954, 41pp. Ohio State University Research Foundation, Columbus, Ohio.

4079
To evaluate the influence of chromatic adaptation in passing from daylight to incandescent filament illumination, six observers (adjusted to a given criterion) made estimates of hue and saturation of Munsell color chips viewed successively against each of three non-selective backgrounds under two sources of illumination (illuminant C, daylight, illuminant A, incandescent). Observed estimates are compared with theoretical predictions and discussed in light of color theory with practical suggestions for the illuminating engineer.
T. I. R 24

4094
An apparatus for investigating chromatic adaptation is described. It consists of a monochromator for presenting adapting stimuli to the left eye of the observer; a colorimeter for presenting monochromatic test stimuli to the same eye while permitting measurement of chromaticity and brightness matches by means of a tristimulus match with monochromatic components presented to the right eye. The test procedures are given in detail and procedures used in calibrating the wavelength and luminance controls are described. The various stimulus components are comprised of narrow bands of the spectrum. Luminance controls are explained.
G. I. R 6

4095

Fry, G.A. & Ward, K.O. EFFECT OF CHROMATIC ADAPTATION UPON NORMAL COLOR VISION. FINAL REPORT. PHASE 2. Contract Monr 1066(00), Proj. NR 140 061, AF Proj. 537, March 1954, 22pp. Office of Naval Research, Washington, D.C. (Ohio State University Research Foundation, Columbus, Ohio).

The effect of adaptation to monochromatic stimuli of wavelengths 435, 490, 524, 573 and 741 mμ on the brightness and chromaticness of various monochromatic test stimuli has been investigated. In the course of this study, it has been discovered that at an intensity level of 27.1 c/m² with an artificial pupil having an area of 1.28 cm², the zone of the color mixture triangle bounded by lines between 436, 470 and 650 mμ is dichromatic. Isochromatic lines stretch across this zone. The importance of the knowledge of the existence of these isochromatic lines for chromatic-adaptation experiments has been discussed. Special attention has been paid to the role played by the Bezold-Brücke phenomenon in chromatic-adaptation experiments. The results indicate that adaptation to various monochromatic stimuli will reduce the brightness of various test stimuli and will also produce a measurable change in the form of the luminosity curve. Evidence from both the color-mixture data and the chromatic-adaptation data indicates that the straight-line portions of the spectrum locus represent legs of the polygon of fundamental colors.

R 5

4096

Fry, G.A. EFFECT OF CHROMATIC ADAPTATION UPON NORMAL COLOR VISION. FINAL REPORT. PHASE 3. Contract Monr 1066(00), Proj. NR 140 061, AF Proj. 537, March 1954, 10pp. Office of Naval Research, Washington, D.C. (Ohio State University Research Foundation, Columbus, Ohio).

This report describes special adaptation experiments to determine the displacement of the red and green fundamental colors along the red-green leg of the polygon of fundamental colors and also to demonstrate whether stimuli at the red and violet ends of the spectrum lie on the red-green and violet-cyan legs of the polygon of fundamental colors. The fact that the green fundamental does not fall at the intersection of the violet-cyan and red-green legs of the polygon proves that the polygon has at least 4 sides. The theoretical implications of a 4-cornered polygon for color-mixture and chromatic-adaptation phenomena have been discussed.

R 3

4097

Fry, G.A. EFFECT OF CHROMATIC ADAPTATION UPON NORMAL COLOR VISION. FINAL REPORT. PHASE 4. Contract Monr 1066(00), Proj. NR 140 061, AF Proj. 537, March 1954, 6pp. Office of Naval Research, Washington, D.C. (Ohio State University Research Foundation, Columbus, Ohio).

This report describes experiments related to the chromatism in the zone along the blue-red leg of the mixture diagram. The isochromatic lines in this zone appear to be extensions of the lines of constant hue that are found in the trichromatic region of the color-mixture diagram. The recognition of the existence of isochromatic lines in the dichromatic zone is important in connection with the interpretation color-mixture and chromatic-adaptation data.

R 2

4098

Zeller, A.F., Harvey, E.S., Jr. & Burke, J.M. A STUDY OF UNDERSHOOT - OVERSHOOT NON-EMERGENCY ACCIDENTS, 1 JANUARY 1953 THROUGH 31 DECEMBER 1954. AFR 190 16, Aug. 1955, 49pp. USAF Directorate of Flight Safety Research, Norton AFB, Calif.

4098

During the calendar years of 1953 and 1954, the United States Air Force experienced 313 accidents in which the pilot undershot, and 135 accidents in which the pilot overshot the runway when he had the option of a normal landing with an aircraft in mechanically adequate condition. An analysis of factors that might be contributing causes of the accidents was made and recommendations for corrective action were made.

T. G.

4100

Loveless, N.E. MANUAL TRACKING IN THE FOUR QUADRANTS OF A CIRCULAR SCALE. II. UPPER AND LOWER QUADRANTS. FPRC 867, March 1954, 11pp. Flying Personnel Research Committee, London England; (Nuffield Dept. of Industrial Health, University of Durham, King's College, Newcastle-on-Tyne, England).

In a compensatory tracking task, Ss were required to control the pointer on a circular scale by means of a control knob. 2 targets, and 2 control-displays consisting of direct drive and reversed drive were used. Each S was tested under all 4 experimental conditions. Speed and accuracy were greatest with direct drive and with the target at the top of the scale. Direct drive with the target at the bottom of the scale ranked second, while performance was poorest under the 2 reversed drive conditions. Ss tend to respond to a deviation of the pointer with a control movement of the opposite sense. Ss respond primarily to angular displacements of the pointer. There is also a subsidiary tendency to respond to quasi-linear displacements of the pointer. These 2 tendencies may be present together, and will summate or conflict according to the choice of drive and target. (HEIAS)

R 4

4101

Hurvich, L.M. & Jameson, Dorothea. SPECTRAL SENSITIVITY OF THE FOVEA. III. HETEROCHROMATIC BRIGHTNESS AND CHROMATIC ADAPTATION. J. opt. soc. Amer., March 1954, 44(3), 213-222. (Eastman Kodak Company, Rochester, N.Y.).

A series of experiments is reported that extends an earlier study of the foveal threshold luminosity function and its dependence on chromatic adaptation. Heterochromatic brightness matches were made by a large-step, equality-of-brightness method at 3 luminance levels: 10 mL, 20 mL, and 40 mL. Results are compared for chromatically neutral white, and blue, green, yellow and red adapting-surround fields at 3 levels of adapting luminance: 10 mL, 20 mL, and 40 mL. The results for suprathreshold photometric equations confirm the dependence of foveal luminosity on chromatic adaptation demonstrated earlier for threshold sensitivities. The foveal (1°) luminosity function is shown to undergo regular and consistent changes with changes in chromatic adaptation and to be further dependent on the ratio of surround/standard luminance. Implications of these results for the CIE system are touched upon.

R 12

4103

Mouty, G.T. & Payne, R.B. EFFECTS OF WORK PROLONGATION UPON COMPONENTS OF A PERCEPTUAL-MOTOR TASK. Proj. 21 1601 0004, Rep. 6, Oct. 1954, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

168 Ss, having received preliminary training on a compensatory pursuit task involving simulated aircraft instruments and controls, were randomly assigned for the 42 combinations of 7 pharmacological conditions, 3 systems of presenting information of performance adequacy, and 2 differing proximities of goal, and then required to perform the task for 7 hours. Measures of proficiency were taken. It was concluded that: a) The instruments marginally located on the instrument panel evidenced no more decrement in proficiency of control than did those instruments located centrally; b) In one comparison where the principal difference was occasioned by hand vs. feet operated controls, achieved proficiencies throughout the work period were not significantly different; c) Experimentally induced changes in the perceptual requirements of the task did not alter significantly the near equal rates of deterioration in the control of the central and marginal instruments. (NEIAS)

R 9

4104

Dale, H.C.A. THE EFFECT ON PERFORMANCE OF VARIATIONS IN CERTAIN SPATIAL AND TEMPORAL PROPERTIES OF A MEL-TI-DIAL DISPLAY. A.P.U. 212/54, 1954, 13pp. Applied Psychology Research Unit, MRC, Cambridge, England.

4106

Lincoln, R.S. VISUAL TRACKING: III. THE INSTRUMENTAL DIMENSION OF MOTION IN RELATION TO TRACKING ACCURACY. J. Appl. Psychol., Dec. 1953, 37(6), 489-493. (Johns Hopkins University, Baltimore, Md.).

4104

To investigate the effect of spatial arrangements of and various speed rates of multiple-dial displays on performance, displays of six dials were prepared, half of which were spatially scattered and the other half arranged in a compact group. Pointer rotation was similar for all dials in series of trials and dissimilar in a replication. The task of the six subjects was to keep the pointer moving by operating a toggle switch at appropriate times. Performance data (total time pointers were stationary) were studied by analysis of variance for differences in the display properties.

4106

To study the transfer of skills as a function of the number of common instrumental relationships between tasks, three groups of 18 Ss practiced six days (ten trials per day) on either direct, velocity, or aided tracking. On the seventh day, six members of each group transferred to each of the two different tasks, the remaining six in each group continuing the original task. The course of learning each task is examined for the six training days, and amount of transfer is interpreted as a function of common instrumental relationships (translation, transformation, and integration) between tasks.

T. G. R 7

4105

Brown, J.L. & Lechner, Marian. ACCELERATION AND HUMAN PERFORMANCE: A SURVEY OF RESEARCH. Proj. NH 001 111, Study NH 00 111, Task 300, WADC MA 5503, Rep. 1, March 1955, 39pp. USN Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.

This report summarizes the important research which has been conducted to date on the problem of human performance under acceleration. The material has been grouped according to 5 major headings: the senses, simple motor behavior, complex tasks, cognitive processes, and psychological effects. Research relevant to each of these classifications is reviewed, important questions which appear to remain unanswered are raised, and suggestions are made regarding desirable lines for future research. It appears that only a very limited amount of research has been conducted relating to actual performance sequences which may be required of pilots exposed to acceleration.

R 98

4107

Conrad, R. MISSED SIGNALS IN A SENSORI-MOTOR SKILL. APU 187/53, Feb. 1953, 16pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

To explain why speed increases in the demanded rate of work in a sensori-motor skill led to a disproportionate deterioration in performance, specific association was sought between signals omitted and definable temporal relationships occurring as a result of continuous display changes. The distribution of the time intervals between the signals presented was such that some relationships occurred many times more often than others, the frequency being determined by the mean signal speed. A detailed examination of performance in these terms revealed that omissions occurred close to the nearest response more often than would be expected by chance, and they were as likely to occur just before the response as just after. Furthermore, the probability that a signal would be omitted when it occurred a constant time interval from a response increased linearly with mean speed. The effect of increasing the signal speed was twofold. Firstly, it increased the chances that a signal would occur close to a response, thus subjecting it to a hazardous temporal situation. Secondly, if a signal did occur close to a response it increased the chances that it would be omitted.

R 13

4116

Koppard, W.L. & Smith, W.M. A PRELIMINARY EXPERIMENT ON THE EFFECT OF DIAL ORIENTATION AND DIAL SIZE ON THE SPEED AND ACCURACY OF DIAL READING. *Annals N.Y. Acad. Sci.*, Jan. 1951, 52, 1272-1277. (Psychology Dept., Princeton University, Princeton, N.J.).

Results of a preliminary experiment involving six Ss, 8 different dial designs, and 2 sizes of dials have been reported. Measures of reading time and error frequency were taken. The data obtained must be interpreted in the light of the fact that the subjects were graduate students reading at their own pace under instructions to be as accurate as possible. It was observed that frequency of dial reading error was primarily a function of the arc length in inches covered by one scale unit. For maximum reading accuracy, about 0.25 in. per scale unit seems to be required, although this distance may depend in part on whether the scale is graduated by 5s or by 10s. Regarding speed of reading, it was observed that speed depended most on the regular representation of each scale unit on the dial circumference. Reading speed was, therefore, relatively independent of dial size within the size limits studied, but varied markedly with the total number of units portrayed on the scale.

R 5

4117

Wayne University. THE HUMAN ELEMENT IN CONTROL TOWER OPERATION. SITUATION SURVEY. Contract AF 18(600)470, NPAW Rep. 41, July 1953, 75pp. Human Factors Operations Research Lab., Wayne University, Personnel Research Center, Detroit, Mich.

An operational survey of the aircraft control tower operator's work was undertaken in an attempt to bring out major points that must be considered in understanding the job and the one who handle it. Visits were made to 12 Air Force control towers to observe the demands, requirements, and setting of the job; an on-the-job training check list, job information questionnaire, job-attitude scale, proficiency ratings, and interviews were used to obtain data. Recommendations as to personnel assignment procedures, job training, and proficiency measures are given. (MIA5)

R 7

4118

USN Air Test Center. INSTALLATION AND EVALUATION OF THE NAVY COMPOSITE APPROACH LIGHTING SYSTEM. Proj. LED FOR AE 10007.1, ES211 461, Rep. 1, Dec. 1952, 13pp. Electronics Test Div., USN Air Test Center, Naval Air Station, Mt.

4118

To evaluate the Navy Composite Approach Lighting System, the System was installed at Naval Air Station, Patuxent River, Maryland. This System combines the best features of various approach systems previously evaluated. Eleven scheduled flights (each included at least three passes at the lights) were made on the System in various types of airplanes during both visual and instrument weather. Pilots completed questionnaires after each flight. Recommendations are included.

S. R 4

4120

Aeronautical Research Council. THE BIOLOGY OF FLYING. REPORT OF A SYMPOSIUM HELD AT THE BRITISH ASSOCIATION MEETING IN BELFAST, SEPTEMBER, 1952. EP 240, May 1953, 15pp. Engineering Physics Sub-Committee, Aeronautical Research Council, London, England.

4120

A report of a symposium on the biology of flying is presented. Dr. K.G. Bergin, Medical Superintendent, RAC, London Airport, dealt with some of the physiological and biological problems met with in civil air transport. Group Captain W.K. Stewart, of the Royal Air Force Institute of Aviation Medicine, considered the physiological problems of high performance military aircraft. Dr. W.E. Hicks, of Cambridge University spoke on skill and the airman, and Mr. G.A. Bendel, of the Royal Aircraft Establishment, Farnborough, discussed the engineering problems of conditioning aircraft for human occupation and control. Each talk is reported at some length.

4122

Duane, T.D., Beckman, E.L., Ziegler, J.E. & Hunter, H.M. SOME OBSERVATIONS ON HUMAN TOLERANCE TO EXPOSURES OF 15 TRANSVERSE G. Proj. NM 001 060.10.04, Rep. NADC NA 5305, July 1952, 26pp. USN Aviation Medical Acceleration Lab., Air Development Center, Johnsville, Tenn.

5 subjects were exposed to 15 transverse G for 5 seconds in the supine position. Also, 5 subjects were placed in the prone position and exposed to the same accelerative conditions. Blackout and unconsciousness did not occur and the physiological effects produced were of a transient nature. An adequately stressed seat was sufficient protection for the supine position. Since the conventional shoulder harness and lap belt were not suitable for levels above 7 G when the stress was applied in the prone position, additional thorax and leg barriers were employed.

R 8

4123

Deutsch, S. THREE EXPLOITED TESTS IN RELATIVE MOTION. NED Rep. 127, June 1954, 13pp. NED Electronics Lab., San Diego, Calif.

4123

This paper reports a study of the World War II Relative Movement Test (measure of ability to visualize relative motion from various forms of data) and an effort to adapt it for use by ocean operators. The original test was administered to a sample of 244 recruits, representative of the untrained Navy population. Test results were analyzed in terms of relative difficulty of test, of test items, and causes of difficulty. Three versions were then developed which were considered suitable for use with enlisted men and were administered experimentally. Recommendations for further development are made.

T. G. R 3

4124

Spector, P. A SURVEY OF THE AIRWAYS AND AIR COMMUNICATION SERVICE ELECTRONICS MAINTENANCE SYSTEM. Contract AF 33(602) 24, RADC TN 55 388, June 1955, 22pp. American Institute for Research, Pittsburgh, Penn.

4124

A field survey of the Airways and Air Communications Service maintenance system was made. Particular emphasis was placed on the new periodic maintenance procedures. A sample of 11 AACS squadrons were visited. Maintenance of radio, radar, and teletype equipment was observed, with maintenance procedures being examined as they took place in the normal daily activity. Data were collected from direct observation and from interviews with officers and airmen. The findings are presented with a brief analysis where appropriate and a recommendation for alleviating difficulties found.

4125 USA Electronic Proving Ground. OPERATIONAL EVALUATION OF PILOT-ASSIST DEVICES: APPLICATION OF PILOT-ASSIST DEVICES TO ARMY AIRCRAFT. FINAL REPORT. Rep. AEPG 519 910 15. AEPG Task 6084, March 1956, 37pp. Aviation and Meteorological Dept., USA Electronic Proving Ground, Fort Huachuca, Ariz.

6 different types of commercial pilot-assist devices were procured and flight tested in the L-19 Army aircraft to determine which of the several techniques employed in these devices is most suitable for Army use. The devices were tested for course holding ability, speed of response during a stall, transient response, and roll-out characteristics. An analysis of the results of these tests revealed that the Lear AECOM Pilot-assist device performed the most satisfactorily. An L-19 Army aircraft in which the Lear AECOM was installed was flown to 3 other Army installations. Pilots from these installations flew the aircraft and completed questionnaires concerning desirability of the system, including their evaluation and comments on its performance. It was concluded from an analysis of pilot opinion questionnaires that a single-axis pilot-assist device is desirable in Army liaison type aircraft. A large majority of experienced Army aviators who evaluated the device expressed the opinion that such a device is desirable and necessary in this type aircraft. R 4

4126 McIntosh, E.B. THE INFORMATION-HANDLING CAPACITY OF THE HUMAN AS A FUNCTION OF CERTAIN CHARACTERISTICS OF THE STIMULUS SET. M.A. Thesis, 1953, 37pp. Ohio State University, Columbus, Ohio.

4126

To study the effects of patterns formed by stimulus lights and the probabilities of occurrence of various lights on the human's information handling capacity, seven stimulus sets were used which varied in 1) number of stimuli on panel, 2) spatial relations between these stimuli, and 3) frequency of occurrence of each stimulus within the set. The stimuli were presented randomly at a prescribed rate for each of the stimulus sets and the two Ss responded by pressing one of the matched response keys. The results were analyzed in terms of frequency and type of response to each of the stimuli, the number of no responses, and the amount of information transfer per second from each stimulus set. T. G. I. R 8

4127

Bridgman, C.S. & Wade, E.A. SENSITIVITY TO CHANGES IN STIMULUS SIZE. REACTION TIME AS A FUNCTION OF RATE OF CHANGE. Contract AF 18(600) 54, WADC TR 53 199, April 1953, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc. & Tufts University, Medford, Mass.).

4127

To determine the relation between rate of stimulus size change and reaction time, ten subjects were required to respond to size changes in a circular target by pushing a lever forward when the target decreased and pulling it back when an increase was observed. The initial target size was 42 millimeters subtending an angle of one-half degree at observer's eye; rates of change in target diameter ranged from six to one millimeter-per second, corresponding to angular rates of 4.2, 3.5, 2.8, 2.1, 1.4, and 0.7 minutes of arc per second. Reaction times were analyzed as a function of rate of target size change. The results are discussed with reference to their use as a "third dimension" (range) on a visual indicator such as a radar scope. T. G. I. R 2

4128 Beckman, E.L.; Avance, T.D.; Ziegler, J.G. & Munter, M.N. HUMAN TOLERANCE TO HIGH POSITIVE G APPLIED AT A RATE OF 5 TO 10 G PER SECOND. PHASE IV. Proj. TED AEC AT 630, Rep. WADC MA 5302, BuMed Rep. WFO 060.10.03, June 1953, 15pp. USAF Development Center, Aviation Medical Acceleration Lab., Johnsville, Penn.

11 Ss were exposed to high positive G loads and the durations of the loads required to produce unconsciousness were measured. Measurements were made on 5 Ss at 15, 10, and 6G, and upon 7 Ss at 8G. Unconsciousness was determined by subjective experiences, and objectively by S's failure to respond to visual and auditory stimuli. The time during which Ss was exposed to the accelerative load until the onset of unconsciousness or confusion varied at different magnitudes of acceleration, and was longer at low levels of acceleration and shorter at high levels of acceleration. From this data it was concluded that, with respect to normal human adult males: a) Ss can be safely exposed to accelerative loads of 15 positive G for durations of 1 to 1.8 seconds if the load is applied at a maximum rate of 8 to 10 G per sec.; b) when Ss are exposed to accelerative loads of 15 G applied at a rate of 8 G per sec., unconsciousness may be produced if the duration of the maximum load is greater than 0.5 sec.; c) the visual symptoms of impending unconsciousness when the accelerative load is 8 positive G or more applied at a rate of 7 G per sec. or more; d) unconsciousness produced as a result of accelerative loads of 8 to 15 positive G applied at a rate of 7 to 8 G per sec. does not produce clinically demonstrable sequelae. (HFIAS) R 13

4129

D'Amico, L.A., Fattu, M.A. & Stanclee, L.S. AN ANNOTATED BIBLIOGRAPHY OF ADULT LITERACY TRAINING MATERIALS. Contract NOME 908(01), 1954, 90pp. Institute of Educational Research, Indiana University, Bloomington, Ind.

4129

This is an annotated bibliography of materials and references related to the literacy training of adults. There are 144 annotations of materials, references, and other bibliographies. The annotations are indexed for materials suitable for beginning, intermediate, and advanced levels of training and for teachers' guides. There is a list of publishing companies, and three general references are cited. R 147

4132

Callup, H.F., Hambacher, W.O. & Dolby, J.R. HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL WARNING AND CAUTION SYSTEMS. THE ATTENTION-GETTING VALUE OF A STEADY LIGHT AS A FUNCTION OF BRIGHTNESS, WITH RESPECT TO RAPIDITY AND RELIABILITY. TED NAM EL 52004, Part 9, WADC ACEL 301, Oct. 1956, 15pp. USN Air Crew Equipment Lab., WADC, Philadelphia, Penn.

4132

To determine the brightness required of a steady light to make it an attention-getting as both alternating and flashing lights, one subject sat in a cockpit mock-up, outside of which was mounted a tracking task. The task was to perform the tracking task and press a response key as rapidly as possible when a stimulus light appeared. Both night and day illumination conditions were tested using ten brightness levels (randomly presented) for each. The onset of the light occurred outside the subject's visual field and was automatically moved into the visual field after a delay of five seconds. Reaction times and no responses were analyzed and compared for the three types of stimuli used: steady, flashing, alternating. T. G. I. R 3

4133

Ferguson, E. INVESTIGATION OF THE ACCELERATION AND JOLT HISTORIES DURING ESCAPE FROM HIGH SPEED AIRCRAFT. WDC TR 52 278, Suppl. 1, Sept. 1953, 24pp. USAF Experimental Research Lab., Wright-Patterson AFB, Ohio.

4133

In an earlier report upper bound acceleration-time curves are exhibited showing upper bounds to the magnitudes of accelerations that may occur after a given time, t_0 , of escape from an aircraft. These curves depend only on escape speed and a minimum altitude for the first half sec. and only on escape speed thereafter. This report presents the results found by replacing the previously assumed constant drag coefficient by a uniform one-step drag coefficient to account for the sharp drag coefficient change expected as the escape unit passes through each speed cone. In this report the algebraic sign of the acceleration is not suppressed at the end and hence it will refer to lower bounds of negative accelerations rather than upper bounds.

G. R 4

4134

Duerfeldt, C.H. EVALUATION OF "MOVING AIRPLANE" DISPLAY. Proj. TED PTR AE-7058.3, Rep. 1, Final Rep., Nov. 1956, 7pp. Naval Air Test Center, U.S. Naval Air Station, Patuxent River, Md.

4134

This document presents the results of an evaluation of a "moving airplane" attitude display, the model 1035 Flight Attitude Indicator (FAI). With the display installed in a T-2 airplane, a total of 14 pilots flew a series of practice, instruction, and performance check flights. These flights included the following aspects: instrument take-off, yoke pattern, half-cuban eight, maneuver, turn and reversals, etc. In addition to flight performance measures, each pilot completed a questionnaire which assessed his reactions to the display. The results are discussed in terms of the suitability of the display for all weather flight, its compatibility with required maneuvers, and finally, the training an experienced pilot would require for transition to this display.

T. I.

4136

Elkind, J.I. TRACKING RESPONSE CHARACTERISTICS OF THE HUMAN OPERATOR. Contract AF 18(600) 322, HFCRL Memo. 40, PRP 2, Sept. 1953, 13pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C.

4136

Mathematical relations are developed for use in determining and expressing the system characteristics of the human operator when he is tracking a randomly moving target. An experimental tracking problem is described and experimentally determined system characteristics are presented. Effects upon the system characteristics of varying the width of the stimulus power spectrum are shown.

T. G. I. R 15

4138

Meehan, J.P., Stoll, Alice M. & Hardy, J.D. THE CUTANEOUS PAIN THRESHOLD IN THE NATIVE ALASKAN INDIAN AND ESKIMO. Proj. 22 1301 0002, Rep. 9, Dec. 1953, 14pp. USAF Arctic Aero-medical Lab., Alaskan Air Command, Ladd AFB, Alaska.

Cutaneous pain thresholds (thermal radiation method) were measured for 26 Alaskan Indians, 37 Eskimos, and 32 Whites. As no significant difference in pain threshold was found to exist between the Indian, Eskimo, and White subjects, it must be concluded that a) In these groups cultural differences are not such as to affect the pain threshold as determined by this method; and b) the ability of the Alaskan Indian and Eskimo to expose his skin to extreme cold without injury is not associated with an elevation of this threshold. It is possible, however, that exposure to cold stimulation might reveal a relative elevation of the "cold" pain threshold in the Alaskan Indian and Eskimo as compared to the populations of warmer climates. Information on this point is not available at this time. Also, the similarity of the pain thresholds in the three groups does not mean that reactions to situations in which pain is a prominent feature will be similar.

R 9

4139

Dickel, L.R. A RATIONAL CURVE RELATING LENGTH OF REST PERIOD AND LENGTH OF SUBSEQUENT WORK PERIOD FOR AN ERGONOMIC EXPERIMENT. Contract N6008 270 20, Proj. NR 150 088, March 1954, 14pp. Princeton University, Princeton, N.J. & Educational Testing Service, Princeton, N.J.

4139

A rational function was developed relating the length of a rest period and length of subsequent work period in an ergographic experiment. Simple energy relations were postulated and used for a critical organ or neuromuscular structure whose performance failure would terminate the work period. Three subjects used a finger ergograph with a block limiting the excursion of the finger tip. The rate of finger contractions was one per second; failure to make a complete stroke ended each work period. Each of the selected rest periods was used once at each session. Mean length of work periods following each length of rest period was determined for each S.

T. G. R 3

4140

Roff, M., Payne, R.S. & Moore, E.M. A STATISTICAL ANALYSIS OF THE PARAMETERS OF MOTOR LEARNING. Proj. 21 0202 0001, Rep. 1, Feb. 1954, 24pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (University of Minnesota, Minneapolis, Minn.).

4140

In seeking information on the various learning abilities present in motor learning, 175 airmen were administered the Complex Coordination, Multidimensional Pursuit, and Rotary Pursuit tests as well as 13 written tests from the Airmen Classification Battery. Performance scores at various stages of learning in the psychomotor tests and written test scores are intercorrelated (52 variables) and subjected to a multiple factor analysis. Also, a technique is developed and used for obtaining the correlation between learning gains in two different situations. Results are discussed regarding their applicability to learning research.

T. R 1

4141

Balke, B. GAS EXCHANGE AND CARDIOVASCULAR FUNCTIONS AT REST AND IN EXERCISE UNDER THE EFFECTS OF EXTRINSIC AND INTRINSIC FATIGUE FACTORS. B. THE INFLUENCE OF PHYSICAL FATIGUE UPON WORK CAPACITY. Proj. 21 1201 0014, Rep. 2, Feb. 1954, 17pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4141

To investigate the influence of physical fatigue upon physical performance, optimal work capacity was determined during exercise on the treadmill. Heart rate, blood pressure, and respiratory gas exchange in response to gradually increasing work were used as criteria of performance. Physical fatigue of various degrees was induced by steady state work on the treadmill over a given time period at different work load levels. After a resting period, work capacity was tested again.

T. G. R 8

4142

McClary, R.A. & Johnson, R.H. PSYCHOPHYSIOLOGICAL EFFECTS OF COLD: II. THE ROLE OF ALCOHOL INGESTION AND COMPLEXION IN MANUAL PERFORMANCE DECREMENT. Proj. 21 1202 0004, Rep. 2, March 1954, 9pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4142

To evaluate the effect of ingesting a moderate amount of alcohol on subsequent manual performance in the cold and to recheck a previous report concerning the role of complexion differences in cold weather efficiency, 64 Ss were timed on a manual performance test at four different ambient temperatures (0, -10, -20, and -40 degrees F) after ingestion of 60 cc of 40 percent (by volume) alcohol. About half the group were blondes and half brunettes. The data from this experiment were compared with those from a previous experiment in which no alcohol was ingested in terms of working time, warm-up time (stopping to warm hands), and total time. Differences in complexion were evaluated.

4144

Hasty, G.T. & Payne, R.B. METHODS FOR THE MITIGATION OF WORK DECREMENT. Proj. 21 1601 0004, Rep. 4, Dec. 1953, 14pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4144

To determine the relative and joint effects of pharmacological, task simplification, and motivational methods for mitigation of decrement resulting from prolonged work, 168 Ss were given preliminary training on a compensatory pursuit task involving simulated aircraft instruments and controls. They then performed the task for seven hours after having been randomly assigned to the 42 combinations of seven pharmacological conditions, three systems of presenting information concerning performance adequacy, and two differing proximities of goals. The single and joint effects of these conditions were appraised at critical points throughout the work period. At the conclusion, the Ss performed a dissimilar perceptual-motor task for 16 minutes to test transfer effects. T. G. R 12

4145

Chinn, H.I. & Redmond, R.F. EFFECT OF DRUGS ON AIRBORNE PERSONNEL I. PRIMAQUINE AND HYPOXIA TOLERANCE. Proj. 21 1208 0009, Rep. 1, April 1954, 3pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4145

To determine whether the dose of primaquine used in malaria therapy will affect hypoxia tolerance, the following experiment was performed. The time of useful consciousness (T.U.C.) for each S breathing an oxygen-nitrogen mixture was determined. When the S made gross errors on a standard writing test, counting backwards from 1000, he was asked to write his name; the clock was stopped when the writing became illegible. Blood samples were analyzed for hemoglobin and methoglobin. Then 14 Ss received 15 mg of primaquine daily for 14 days. Blood samples were again analyzed for hemoglobin and methoglobin and the T.U.C. was determined. The significance of the findings on aerial transportation of medicated passengers was discussed. T. R 3

4146

Taylor, H.L., Henschel, A., Mickelsen, O. & Keys, A. SOME EFFECTS OF ACUTE STARVATION WITH HARD WORK ON BODY WEIGHT, BODY FLUIDS, AND METABOLISM. Contract AF 33(038) 21914, Proj. 21 32 004, Rep. 5, March 1954, 9pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (University of Minnesota, Minneapolis, Minn.).

Data were reported on body weight and metabolism of healthy young men undergoing starvation with hard work. Experiments are reported in which men starved from 2.5 to 4.5 days while performing work on the motor-driven treadmill in amounts that resulted in a total daily caloric expenditure of 3500 to 4000 calories a day. The effects of acute starvation with and without work were compared by collecting data from the literature on men who had merely starved for five days. Cf. 4152. T. G. R 24

4147

Hasty, G.T. THE EFFECTS OF DRUGS UPON THE COMPONENTS OF HAND STEADINESS. Proj. 21 1601 0004, Rep. 5, June 1954, 9pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4147

To appraise possible differential effects of analeptic and sedative drugs upon coarse and fine manual tremor, 66 male, basic, airman volunteers were given practice on an apparatus designed to measure the two components of hand steadiness. The Ss were then assigned randomly to six groups receiving different dosages of analeptic and sedative drugs. An hour following drug administration, three successive measurements of hand steadiness were obtained at hour intervals. The data were treated by analysis of variance techniques to appraise differential effects of the drug treatments on fine tremor and coordinative activities. T. G. I. R 14

4148 Sherrick, C.E., Jr. VARIABLES AFFECTING SENSITIVITY OF THE HUMAN SKIN TO MECHANICAL VIBRATION. J. exp. Psychol., May 1953, 45(5), 273-282. (University of Virginia, Charlottesville, Va.).

An examination was made of the role of the skin as a mechanical system in producing the usual U-shaped sensitivity curve to vibration as a function of frequency. Conclusions: a) Both skin and bony tissue may have resonant points within the usual frequency range of vibrotactile investigation. b) The conductivity of skin is maximal at the frequency of greatest vibratory sensitivity, and bony tissue is more efficient in the propagation of disturbances. c) Mechanical impedance is minimal at the frequency of greatest sensitivity, and bony tissue shows a more sharply tuned resonance curve than relatively bone-free areas. The results of other investigators were discussed in the light of the present study, and it was concluded that more extensive research on sensitivity of pressure spots and on the physical characteristics of the skin may reveal the cause of the lack of agreement of results at present. (NCIAS) R 26

4149

Vernon, J.A. CUTANEOUS INTERACTION RESULTING FROM SIMULTANEOUS ELECTRICAL AND MECHANICAL VIBRATORY STIMULATION. J. exp. Psychol., May 1953, 45(5), 283-297. (University of Virginia, Charlottesville, Va.).

The simultaneous application of electrical and mechanical vibratory forces to a common locus on the fingertip was demonstrated to produce a cutaneous interaction. This interaction, as indicated by the detection of cutaneous beats, was best produced in the narrow frequency range of about 280- to 310-. The magnitude of the cutaneous interaction was measured by determining the effect of simultaneous subliminal electrical stimuli upon mechanical vibratory thresholds. When the 2 forces were presented in one phase relation (the absolute value was unknown), the mechanical vibratory thresholds were greatly lowered as compared with normal mechanical vibratory thresholds, but when the 2 forces were presented in a phase relation 180 degrees different from the first, there was little or no departure from normal thresholds. The evidence shows that electrical stimuli do not stimulate the skin by first producing mechanical movements in the skin. In that an interaction between electrical and mechanical vibratory stimuli has been demonstrated, even under limited conditions, it now appears fruitful to plan future work. The investigation is being extended by the use of continuous phase variation.

R 10

4150

Training Analysis and Development Directorate, DCS/O Headquarters Technical Training Air Force. AN EVALUATION OF TRAINER-TESTERS. 1956, 45pp. Technical Training Air Force, Gulfport, Miss.

To evaluate the effectiveness of Trainer-Testers (a commercially developed paper and pencil troubleshooting simulator), tests were conducted at three Air Force Bases. Procedures included 1) a parallel groups controlled learning experiment for students in Basic Electronic Training with groups using the Trainers, actual equipment, both or neither; 2) the use of the Trainer-Testers in as many types of training situations as possible; 3) questionnaires to both students and instructors; and 4) various attempts to determine the usefulness of the Tester-Trainers as measuring devices. The findings are summarized in relation to effectiveness in teaching troubleshooting techniques, in testing student performance and as a partial substitute for real equipment; and in relation to its motivational value and as a teaching medium.

T.

4151

Javitz, A.E. HUMAN ENGINEERING IN CONTROL SYSTEMS. Elect. Mfg., March 1954, 100-111.

The perceptual and response mechanisms of the operator should be evaluated, stated, and designed into the end product concurrently with the design of the electrical, electronic and mechanical element. The human element also plays a part in systems performance and system maintenance. Human engineering extends in 3 directions with respect to equipment design: a) direct, e.g. medical equipment; b) indirect, e.g. machine tools, where human engineer controls are built into production machines; c) facility type controls built into aircraft control panels. Several examples are given on how control systems (e.g., airborne radar control) are designed bearing human engineering principles in mind. (HEIAS)

R 8

4157

Beals, L.S., Jr. THE CHALLENGE OF AIR SAFETY TO HUMAN ENGINEERING. (Report from: Washington Section, Institute of Aeronautical Sciences meeting, May 1951, 6pp.)-- The Daniel & Florence Guggenheim Aviation Safety Center at Cornell University, New York, N.Y.

4157

This paper points out a number of areas within the field of Human Engineering from which contributions to air safety could be logically expected if Human Engineering services were ever desired or sought by the aviation industry. The paper is directed at operators and engineers in the aviation industry. It points out problem areas particular to each group and suggests ways in which Human Engineering can be of specific service in these problem areas. (HEIAS)

4152

Henshel, A., Taylor, H.L. & Keys, A. PERFORMANCE CAPACITY IN ACUTE STARVATION WITH HARD WORK. Contract AF 33(038) 21914, Rep. 6, March 1954, 8pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (University of Minnesota, Minneapolis, Minn.).

4152

The performance of healthy young men during starvation with hard work was studied under carefully controlled conditions in two experiments. Four men were Ss for a 2.5-day fast and 12 men for a five-day fast. The men walked at 3.5 mph on a ten percent grade (average expenditure of 550 calories per hour) for four hours each day in the shorter fast period and for three hours daily in the longer period. Recovery of performance was studied after four and after five days of refeeding.

Cf. 4146.
T. G. R 14

4164

Holmen, M.G., Katter, R.V., Jones, Ann M. & Richardson, I.F. AN ASSESSMENT PROGRAM FOR OCS APPLICANTS. HUMRRO TR 26, Feb. 1956, 50pp. Human Resources Research Office, George Washington University, Washington, D.C.

4164

To find out whether controlled rating situations used at the basic training center level could predict Officer Candidate School (OCS) success and failure well enough to be used as a screening device, records were obtained of the OCS disposition of 201 candidates who had been processed through experimental assessment programs prior to attending OCS. Since this assessment in no way influenced standard OCS selection procedures for these men, the relationship between their performance during assessment and subject disposition in OCS were analyzed. An objective description of candidates who pass and those who fail OCS was attempted.

T. R 16

4165

Gregory, R.L. VARIATIONS IN BLINK RATE DURING NON-VISUAL TASKS. Quart. J. exp. Psychol., Nov. 1952, 4(Part 4), 165-169. (Medical Research Council Applied Psychology Unit, Cambridge, England).

4165

Blinking was recorded electrically, and related to various features of three non-visual tasks. A new type of suction electrode was developed for this purpose. Blink rate fell below the normal resting rate during the learning of a stylus maze, and during a special audio-tracking task. During pauses between each trial, blink rate was above the resting rate. There was a significant tendency for those subjects who showed the greatest difference in blink rate during the trials and the pauses between each trial to make the fewest errors per run of the stylus maze. In the audio-tracking task the Ss followed a changing note with a second oscillator. Blink rate was found to be inversely related to the rate of change of the course tone. R 4

4166

White, C.E. MEMORANDUM ON NOISE MEASUREMENTS. Proj. MX 003 041-34, Memo. Rep. 53 11, July 1953, 11pp. Sound Branch, USN Medical Research Lab., Naval Submarine Base, Conn.

4166

This memorandum was written to answer some primary problems in the measurement of noise and in the interpretation of resultant data. The main areas dealt with were: 1) methods of measuring noise levels encountered in working areas and in audiometric testing spaces; 2) noise limits for these areas; 3) information on the frequency spectrum of noise; and 4) design and/or treatment of audiometric testing areas. A selected list of current publications which could be of assistance in studying and controlling noise conditions was appended. R 14

4167 Knowles, M.B., Garvey, M.D. & Newlin, E.P. THE EFFECT OF SPEED AND LOAD ON DISPLAY-CONTROL RELATIONSHIPS. J. exp. Psychol., Aug. 1953, 46(2), 65-75. (USN Research Lab., ONR, Washington, D.C.).

3 displays--light matrix, window, and auditory--and 3 push-button controls--matrix, row and column, and double column--were used in the experiment. There were significant interactions between the controls and displays. Altering the size of the combinations did not alter the display-control relationships appreciably. Under the forced-pacing conditions the error vs. speed trends for the various combinations were different; performance deteriorated less on the matrix-matrix combination. Presenting information at equivalent rates on the 2 forms of the matrix-matrix combination did not lead to equivalent error functions on the matrix-matrix and the window-row and column combinations. Performance in the self-pacing mode of operation was superior to performance in the forced-pacing mode. The results were discussed relative to compatibility, implications for design practice, and communication theory. R 5

4169

Broadbent, D.E. MISCELLANEA: A NOTE ON BINAUDAL FUSION. Quart. J. exp. Psychol., 1955, 7(Part 1), 46-47. APN 25, 5/55. (Applied Psychology Unit, Medical Research Council, Cambridge, England).

4169

To investigate some conditions of binaural fusion, 18 subjects were presented with recorded speech through two headphones with a filter eliminating the low frequency components (500 cycles per second) on one ear and another eliminating high frequency components (2000 cycles per second) for the other. Subjects reported number of voices heard. A further series included: 1) metronome, 2) speech with a time lag of 0.25 seconds at one ear, 3) pure tones of 3000 and 500 cycles per second to the separate ears, and 4) a steady vowel sound (i). After reports were made subjects were informed of the nature of the stimuli and asked to distinguish which ear received the low-pitched stimulus. The relation of fusion to hearing theories is noted. R 8

4171 Hembree, H.W. CRITERIA OF SOLDIER ACCEPTANCE. Rep. 229, May 1954, 31pp. USA Quartermaster Research and Development Center, Environmental Protection Div., Natick, Mass.

An attempt was made to develop a generalized method for attacking criterion problems. The theoretical approach taken was that the logical first step in the establishment of a predictive system is an analysis of the behavior the system is designed to predict. A general method was developed for isolating and defining dimensions or criteria of user acceptance and was applied to the problem of establishing a workable criterion system for predicting acceptance of Quartermaster equipment. 18 dimensions of criteria of soldiers acceptance were isolated and defined. It was concluded that: a) a general method of attacking criterion problems was developed and its usefulness demonstrated; b) that soldier acceptance is a complex multidimensional attitude which can be broken down into at least 18 components; c) that a pattern of components is required to evaluate the acceptance of any given item of clothing and equipment; and d) that soldier acceptance is subject to variations from individual differences among Ss, from variations attributable to the items being judged and to the different conditions under which items are used. (HEIAS) R 33

4173

Windle, C., Sidman, M. & Keller, F.S. STUDIES IN RADIOTELEGRAPHY. ca. 1953, 48pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C.

4173

This is a review and integration of the literature on experimental studies of the use of Morse code. Topics discussed include standardization of terminology, improvements in standard practices, learning to receive, learning to send, and code aptitude. Attention is given to the results of the application of psychological principles in training methods. R 101

4174
 Browne, R.C. DISORIENTATION IN FLIGHT. FPRC 862, Jan. 1954, 2pp. Flying Personnel Research Committee, London, England. (King's College, The Medical School, Newcastle-on-Tyne, England).

Orientation becomes impaired when the head of the pilot is placed at an angle to the neck and body, or when vision is wholly or partially eliminated. Movements of the eye-ball are often interpreted as movements or oscillations of the object of regard. Any conflict arising from the input of the various balancing mechanisms produces disorientation. Suggestions are made for a solution to this problem. A simple could be made to demonstrate the difficulties of orientation and uncertainty of certain "feelings". Pilots should be taught to trust their instruments, not their feelings. Disorientation and its handling should be demonstrated to all pilots in a dual aircraft in cloud. Attitude indicators should be unmistakable, making use of attitude indicators which give a clear upside-down indication, and using a non-rolling gyroscope. Experiments are suggested in a centrifuge to study orientation when gravity is not active in the true vertical of the body. (NEIAS)

4178
 Burrows, A.A. & Jackson, K.F. PRELIMINARY DESCRIPTION OF AN ANOXIA-SENSITIVE PSYCHO-MOTOR TEST. FPRC 859, Dec. 1953, 11pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

4178
 A description is given of a new apparatus primarily designed to be sensitive to stress situations generally but applied in the first case to the stress of high altitude anoxia.
 T. G. I. R 6

4186
 Broadbent, D.E. LISTENING BETWEEN AND DURING PRACTISED AUDITORY DISTRACTIONS. APU 208/54, 1954, 11pp. Applied Psychology Research Unit, MRC, Cambridge, England.

4186
 To study conditions affecting degree of auditory distraction, eight groups of 10-12 Naval Ratings answered a stream (four runs of 24) of questions, with a buzzer sounding during every fifth question. Each group had different instructions regarding the buzzer, such as: ignore, press key on hearing, press key or stamp foot in response to other cues, etc. In addition, some groups had had prior practice in key-pressing or selective listening, others had not. Errors are analyzed (separately for those occurring during buzzes and those between buzzes) for evidence of the effectiveness of prior practice in reducing distraction effects.
 T. G. I. R 13

4187
 Fepler, R.D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. 6. A TASK OF CONTINUOUS-POINTER ALIGNMENT AT TWO LEVELS OF INCENTIVE. TRU 28/52, CES 436, EXP 54/795, Nov. 1953, 17pp. Climatic Efficiency Subcommittee, RFRAC, London, England. (Royal Naval Tropical Research Unit, University of Malaya, Singapore).

4187
 To determine whether the effects of warm climates on the performance of a task requiring skilled movements would be similar at two levels of incentive, 16 fit young men who had been living in the tropics were tested in four indoor climates. Under high incentive, the men received information on their performance and verbal encouragement, while under low incentive no information nor encouragement were offered. The dry and wet bulb temperatures of the four climates were 85/75, 90/80, 95/85, and 100/90 degrees F. The task was to keep a pointer aligned with a moving pointer; two speeds of the moving pointer were used. Error scores were analyzed for changes in performance due to the experimental variables.
 T. G. I. R 11

4188
 Broadbent, D.E. THE TWENTY DIALS AND TWENTY LIGHTS TEST UNDER NOISE CONDITIONS. A.P.U. 160/51, Oct. 1951, 8pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.
 The 20 Dials Test described in a previous report (Broadbent 1950) was given to 10 Ss each on 5 successive days according to the sequence quiet, quiet, noise, noise, quiet. Performance on the 'noise' days was worse than that on the quiet ones preceding and following, the degree of impairment amounting (on the score used) to about a third of the level of performance on quiet. The dials were then replaced by 20 small lamps, the S's task being to watch for the lighting of a lamp. 10 Ss received the routine used previously on the Dials, and 10 the sequence noise, noise, quiet, quiet. This task was much easier than the Dials, and did not show the practice effect usual on the other test. Nor did it show an overall effect of noise. Those individuals, however, who did show a practice effect also showed an effect of noise. The apparent absence of effect when all Ss are pooled on the 20 lights may be due to compensatory activity introduced by some Ss to overcome a felt impairment. This view is supported by the fact that the second run under noise conditions is worse compared to the preceding run than is the second run under quiet conditions; as would be expected if a compensatory effect could not be kept up. Further the second noise run is significantly worse than the second quiet run when scores are used which detect impairment in one part of the task.
 R 9

4189

Broadbent, D.E. PAVLOVIAN CONDITIONING AND VIGILANCE TASKS. A.P.U. 175/52, July 1952, 10pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

Evidence both from mathematical considerations and from experiment favours the view that only certain aspects of the total stimulus situation can initiate complex responses at one time; and stimuli possessing intensity, biological importance, and novelty are most likely to be selected at any time. These principles enable us to account for many phenomena of classical conditioning, including some which are usually neglected, and give an explanation of extinction (in terms of competing stimuli rather than competing responses) which has advantages over existing theories. They further provide a rational interpretation of certain experiments on human beings which are usually regarded as being of purely industrial importance: for example, the piling of factory work by the speed of the machine prevents occasional shifts in selection and so by the novelty principle increases apparent fatigue. They do not include an account of learning, as a permanent change in response to a particular stimulus, but are intended to remove certain confusing phenomena from the field to make way for future theories of learning. It is suggested that Pavlovian conditioning is of importance as making an account of these phenomena possible; and that further experiment on such matters as Pavlovian "induction" is highly desirable.

R 27

4190

Nick, W.E. WHY THE HUMAN OPERATOR? A.P.U. 181/52, 1952, 17pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

The question of whether to employ a human operator or an automatic device to perform some function is discussed in this article. The powers and limitations of the human operator are outlined under such topics as a) reliability, versatility, and flexibility, b) rate of gain of information, and c) coding and the human channel. (HEIAS)

R 4

4191

Baehrick, H.P., Fitts, P.M. & Rankin, R.E. EFFECT OF INCENTIVES UPON REACTIONS TO PERIPHERAL STIMULI. *J. exp. Psychol.*, Dec. 1952, 44, 400-406. (Ohio Wesleyan University, Delaware, Ohio & Ohio State University, Columbus, Ohio).

The experiment tested the hypothesis that an increase in incentive results in increased perceptual selectiveness favoring those parts of the stimulus field which are interpreted by the Ss as most relevant to the expected reward. A modified Buxton pursuit apparatus was used as a continuous central-tracking task. 3 kinds of intermittent peripheral stimuli, differing both in the amount of relevance to reward expectations and in the facility with which they could be detected in peripheral vision, were employed. 2 incentive conditions were used. The low-incentive condition was produced by telling Ss that the trials were practice trials. The high-incentive condition was produced by offering a sliding-scale bonus, which ranged from 5 cents to 3 dollars, for good performance. Results are in good agreement with the prediction that a condition of high incentive facilitates performance of a central task, but, in general, interferes with the performance of peripheral tasks. The detrimental results of the bonus upon responses to peripheral stimuli were greatest on the peripheral task in which expectation of reward can be assumed to have been the least.

R 5

4192

Fitts, P.M. & Simon, C.W. SOME RELATIONS BETWEEN STIMULUS PATTERNS AND PERFORMANCE IN A CONTINUOUS DUAL PURSUIT TASK. *J. exp. Psychol.*, June 1952, 43, 428-436. (Ohio State University, Columbus, Ohio).

Various visual stimulus patterns formed by different arrangements of instruments and pointers were studied by means of a continuous, dual-pursuit task in which Ss adjusted 2 control knobs in order to keep 2 pointers within designated limits. 3 experiments indicate that Ss perform significantly better when instruments are a) close together, and b) aligned horizontally. With instrument alignment factors eliminated, pointer alignment in the 9 and 12 o'clock sectors gave significantly better performance than did alignment at 3 and 6 o'clock. With instrument alignment interacting with pointer alignment, performance was superior when pointers were aligned at 9 o'clock for horizontally-separated instruments, at 12 o'clock for vertically-separated instruments, or when the pointers were counterpoised. Hypotheses were proposed to account for a) the superiority of pointer alignment over non-alignment, and b) the superiority of performance when pointers are aligned in the left and upper sectors.

(HEIAS)

R 19

4194

Pollack, I., Pickett, J.M. & Sumby, W.H. ON THE IDENTIFICATION OF SPEAKERS BY VOICE. *J. acoust. Soc. Amer.*, May 1954, 26(3), 403-406. (USAF Human Factors Operations Research Labs., Washington, D.C.).

The effect of several factors upon voice identification was examined. These factors were the size of the class of possible voices, the duration of the speech signal, the frequency range of the speech signal, voicing vs nonvoicing speech characteristics, and the simultaneous presentation of several voices. One of the most effective factors for speaker identification was the duration of the speech signal. Duration, as such, appears to be important, however, only insofar as it admits a smaller or larger statistical sampling of the speaker's speech repertoire.

R 2

4196

Forbes, T.W. CONTRIBUTIONS BY PSYCHOLOGISTS TO THE REDUCTION OF HIGHWAY TRAFFIC ACCIDENTS IN THE UNITED STATES OF AMERICA. A Paper presented at the Congress of the Association Internationale de Psychotechnique, Paris, France, July 1953, 17pp. National Academy of Sciences, NML, Committee on Highway Safety Research, Washington, D.C.

This paper represents an attempt to summarize contributions by psychologists during the last 15 yr. to the reduction of highway traffic accidents in the United States. Work has been classified as follows: development of criteria of safe driving, studies of selection and of supervisory factors in commercial fleets, of accident reports, of driver characteristics in relation to accidents, of driver characteristics in relation to engineering design, of offenders and law violators, and a discussion of theories of accident causation. The wide range of studies by many psychologists is briefly outlined with a few studies as illustrations. No claim is made for completeness, since undoubtedly many omitted studies are of importance equal to those included. (HEIAS)

R 49

4198

Howland, D. & Noble, R.E. THE EFFECT OF PHYSICAL CONSTANTS OF A CONTROL ON TRACKING PERFORMANCE. *J. exp. Psychol.*, Nov. 1953, 46(5), 353-360. (Ohio State University, Columbus, Ohio).

The effects of various proprioceptive factors on learning and performance in a continuous compensatory tracking task were investigated by varying 8 combinations of 3 system constants, a spring of stiffness K, a damping element of viscosity B, and moment of inertia of value J. The Ss were required to apply a compensatory torque to a rotary control shaft so as to hold a cursor, which was describing simple harmonic motion, in alignment with a stationary target. The target and cursor were displayed as 2 vertical lines on the face of a 5-in. cathode ray tube. When they were in alignment they formed a single continuous line. In Part I, 8 experimental groups of 10 novice Ss each received 20 1-min. trials under a particular combination of system constants. In Part II, one practiced S was given 3 1-min. trials per day on each of the 8 conditions for 24 days. Time-on-target scores were taken for 3 different error tolerances. Different system constants in the control resulted in significant differences in mean time-on-target performance. In general, performance was best for the conditions containing the spring and poorest for those containing the moment of inertia. Variations in the control parameters influenced initial performance and these differences appeared to increase during the first 20 practice sessions in Part I. For the one S in Part II the effects appeared to decrease slightly as he became more skillful in the tracking task. Graphic recordings of hand-control position as a function of time were also taken. These records indicated distinctive movement patterns for the various conditions, particularly early in practice. These distinctive patterns tended to disappear with practice, so that the final records taken for the practiced S closely approximated the desired waveform regardless of the combination of parameters employed. Explanations of these results in terms of amount of physical work and augmentation of proprioceptive factors were considered.

R 6

4199

Sperry Gyroscope Company. AIR TRAFFIC CONTROL. Contract W28 099 AC 189, Monthly Progress Report 20, (Final Report), March 1948, 54pp. Sperry Gyroscope Company, Great Neck, N.Y.

4199

In researching toward a new microwave omnidirectional azimuth and distance indicating system (air traffic control system), a new technique for measuring azimuth and distance was developed and new antenna techniques were employed. A method for accurate and automatic pictorial navigational information in a form for both human and automatic pilot use was developed and subjected to flight testing with both engineers and pilots present. Numerous illustrations of operational results with this system are included.

I.

4202

Broadbent, D.E. A MECHANICAL MODEL FOR HUMAN ATTENTION AND IMMEDIATE MEMORY. A.P.U. 242/56, Sept. 1956, 13pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

4202

This paper describes a simple model of the human perceptual system to serve as an easy introduction to a formal theory in information flow terms and also as a convenient mnemonic device for the results of a number of experiments. Construction of the basic model is described and the similarities of its behavior to that of man (reception of information from various stimuli and the response: attention) is discussed. Additional complications to the model are made to account for the theory of immediate memory. The limitations and uses of such a model are pointed out.

I. R 38

4203

Fepler, R.D. THE EFFECT OF CLIMATIC FACTORS ON THE PERFORMANCE OF SKILLED TASKS BY YOUNG EUROPEAN MEN LIVING IN THE TROPICS. A REPORT ON THE THIRD YEAR'S PSYCHOLOGICAL EXPERIMENTS AT SINGAPORE. APU 199/53, Jan. 1954, 8pp. Applied Psychology Research Unit, MRC, Cambridge, England. (Royal Naval Tropical Research Unit University of Malaya, Singapore).

4203

To investigate further the factors that had previously been found to affect performance in hot climates with particular reference to offsetting adverse climatic effects by changed incentive conditions, three experiments were conducted. Two of the experiments employed a complex mental task and one used a continuous pointer-alignment task. Two levels of incentive--knowledge of results and encouragement versus no information or encouragement--were used in two of the experiments, while speed stress was used in the third. The principle findings are reported.

R 15

4204 Poulton, E.C. THE EFFECT ON PERFORMANCE OF BREATHING PURE OXYGEN AT ATMOSPHERIC PRESSURE FOR A SHORT PERIOD. A.P.U. 203/53, Oct. 1953, 6pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

A controlled experiment was performed to determine the effect, upon a task involving immediate memory, of breathing pure oxygen at atmospheric pressure for up to 8 min. 12 Ss performed the task under conditions of no mask, air through mask and oxygen through mask. Mean error of response and the S.D.s were analyzed for the effect of these three conditions; no effect was found. (HEIAS)

R 2

4205 Broadbent, D.E. ATTENTION AND MEMORY IN LISTENING TO SPEECH. A.P.U. 207/54, Jan. 1954, 7pp. Medical Research Council, Applied Psychology Research Unit, Cambridge, England.

This is a short paper read at a Symposium on Analysis, Recognition, and Synthesis of Speech, London, 1954. The author defines his interest in speech as lying in that field when a stream of speech arrives at a particular listener on a particular occasion, in addition to sensory discrimination, perceptual analysis and the recognition of familiar phonemes, there must appear certain further functions which organize the material, produce what in ordinary language we call understanding and initiate a more or less appropriate response, functions lying in the above-defined field, attention and memory are discussed in some detail. (HEIAS)

R 18

4206

Lange, C.J., Rittenhouse, C.H. & Atkinson, R.C. FILMS AND GROUP DISCUSSIONS AS A MEANS OF TRAINING LEADERS. HUMRO TR 27, March 1956, 41pp. Human Resources Research Office, George Washington University, Washington, D.C.

4206

To increase the realism of leadership problems presented to students and to provide each student with maximum opportunity to participate in solving problems, a group film-discussion technique was developed and evaluated experimentally: ten films depicting military officer problems were produced. The problems were based on descriptions of leadership problem situations collected from junior officers, non-commissioned officers, and data from Korea. Small group discussions followed a film-showing with one representative from each group then participating in a panel discussion. Three officer classes were trained by this technique and evaluated in several ways to study the effect on leadership training.

T. R 9

4209
Gibbs, C.B., & Brown, I.D. INCREASED PRODUCTION FROM THE INFORMATION INCENTIVE IN A REPETITIVE TASK. A.P.U. 230, Mar. 1955, 11pp. Medical Research Council, AFPU, Cambridge, England.

NRL 147537

4209
To assess the effect of "information incentive" on output of an uninteresting and repetitive task, sixteen young men copied documents under conditions of knowledge of results on productivity and also related to the effects of other forms of incentive on productivity.
1, 116.
NRL 147537.

4210
Conrad, R. SETTING THE PACE. A.P.U. 235/55, March 1955, 8pp. Medical Research Council, AFPU, Cambridge, England.

NRL 147536

4210
The efficiency of a biomechanical process, or man-machine system, is dealt with theoretically and statistically in terms of one of its aspects - that of tempo or pace. Variations in "repetitive" work, a forced-pace system, a semi-forced-pace system with time margins, a system with queues (wherein work may be allowed to pile up), and an operative-to-operative system (wherein the output of one operative is dependent upon his precursor) are discussed.

NRL 147536

4211
Kelley, H.P. A FACTOR ANALYSIS OF MEMORY ABILITY. Contract N6ONR-270-20, Proj. NR 150 088, Reb. RB 54, 7, April 1954, 75pp. Princeton University, Princeton, N.J. & Educational Testing Service, Princeton, N.J.

4211
To investigate the factorial structure in the part of the area of memory involving relative immediate intentional retention, 24 tests of memory were constructed to include such types of memory as: rote, meaningful, span, and visual. These tests were administered to 100 pilot cadets. The results of the tests were intercorrelated and the resulting matrix factor-analyzed. The relation of 11 factors to immediate memory function is discussed in detail.
T. G. I. R-78

4212
Altman, J.W. & Taylor, M.V. DEVELOPMENT OF A RECORD FORM FOR EVALUATING RESEARCH THROUGH THE REPORT. THE FIFTH IN A SERIES OF REPORTS DEALING WITH THE EVALUATION AND MEASUREMENT OF RESEARCH PERFORMANCE. Proj. NR 153 146, Jan. 1954, 41pp. American Institute for Research, Pittsburgh, Penn.

4212
This report describes the development of a procedure for evaluating research through the report of the job performances of research personnel. Utilizing the critical incident technique to define items reflecting effective and ineffective research performance, a final record form of 20 items was developed. Suggestions regarding the application of this record form are presented along with estimates of reliability and validity.
T. G. R 8

4213
Brozek, J. & Taylor, H.L. TESTS OF MOTOR FUNCTIONS IN LABORATORY INVESTIGATIONS ON FITNESS. Contract AF 33 (338) 21914, Proj. 21 32 004, Rep. 4, May 1954, 20pp. School of Aviation Medicine, Randolph AFB, Tex. (Laboratory of Physiological Hygiene, University of Minnesota, Minneapolis, Minn.).

4213
A battery of tests of motor functions was used in the study of human fitness and of changes in fitness under a variety of biological stresses (hard work, heat and lack of sleep under conditions of acute and semistarvation). Employed were two tests of strength, three tests of speed, and one test of coordination. Examples are presented to show that the test battery, plus physiological indices of the ability to do hard physical work, measures deterioration in the presence of stress better than either approach alone and provides a more meaningful basis for analysis of fitness deterioration.
T. G. I. R 62

4214
Meister, D. ECHO DETECTION AND DOPPLER RECOGNITION AS A FUNCTION OF TRAINING WITH STIMULI OF VARYING DIFFICULTY. Rep. 393, Aug. 1953, 9pp. USN Electronics Lab., San Diego, Calif.

4214
This report evaluates three methods of training student anti-submarine sonar operators in weak echo detection and doppler recognition. Each method consisted of a different level of stimulus difficulty obtained by varying the amounts of doppler and attenuation. Sixty-four male college students, selected on the basis of sonar operator standards, were trained by each method, and a test administered before, during, and after training. Results are expressed in terms of statistical comparison of the groups, systematic errors, learning rate, and reliability of tests. Recommendations for sonar training programs and future research are made.
T. R 4.

4215
Harris, J.D. EFFECT ON AUDITORY ACUITY OF SHORT EXPOSURES TO SUBMARINE ENGINE NOISE. Proj. NM 003 041. 34, Memo. 52 12, Dec. 1952, 5pp. USN Medical Research Lab., New London Submarine Base, Conn.

4215
To evaluate the effect of short exposures to submarine engine noise upon auditory acuity, groups of men were placed for 30 min. in a noise of 95, 100, 105, or 110 db sound pressure level (tape recorded noise of submarine engine room). Pre- and postexperimental audiograms were taken and the results are discussed in terms of the amount of auditory loss at various noise levels and the consequent implications for speech communication in such environments.
G.

4217
Bailey, M. EVALUATION OF NEW UNIVERSAL MILITARY LAST AND EXPERIMENTAL NAVY OXFORD. Proj. NT001 018, BUSANDA Symbol 3950 2, Aug. 1955, 15pp. USN Clothing & Textile Office, Bureau of Supplies & Accounts, Brooklyn, N.Y.

4217
A shoe and last evaluation was conducted aboard the USS Antietam in order to determine the suitability of a new universal military last and the wear and fit characteristics of oxford built over it. The evaluation was divided into three parts: 1) a service evaluation which indicated the fit and comfort of the new last and shoes, 2) a comparative evaluation of counters and insoles used in the standard Navy shoe and in the test shoe, and 3) a fitting evaluation which determined the effectiveness of a Brannock shoe fitting device adjusted to the sizing system of the new last.
T. I.

4218

McGuire, F.L. AN ANALYSIS OF AUTOMOBILE ACCIDENTS INVOLVING MILITARY PERSONNEL. Res. Proj. MM 005 052.33.01, June 1954, 49pp. USM Medical Field Research Lab., Camp Lejeune, N.C.

707 reports on automobile accidents involving Camp Lejeune personnel were gathered and analyzed, covering the complete calendar year of 1951. In addition, data were gathered concerning specific phases of these reports whenever the reported data were not adequate or a base-line or control group was needed. The factors analyzed and discussed were: a) Age and rank, b) Length of driving experience, c) Violations, d) What drivers were doing at time of accident, e) Physical condition of the driver (S), f) Use of alcohol, g) Vehicle defects, i) Light and weather conditions, j) Roadway character and visibility, k) Time (month of year, day of week, and hour of day). Implications of this analysis are discussed and suggestions for action are noted.

R 9

4219

Moser, H.M., Dreher, J.J. & Adler, S. TWO-DIGIT NUMBER TRANSMISSION BY VOLUNTARY STUTTERING. Contract AF18(600)316, RF Proj. 519, AFRC, TN 54 82, Rep. 12, Sept. 1954, 7pp. USAF Air Research and Development Command, Andrews AFB, Washington, D.C. (Ohio State Research Foundation, Columbus, Ohio).

Information theory implies that redundancy should strengthen transmitted information which has low intelligibility values. Some evidence has been presented to show that this can be accomplished by phonetic repetition in monaural delay. The purpose of this study is to explore a method whereby partial repetition is effected at the beginning of a word by voluntary stuttering. Foreign and American listeners heard two-digit numbers transmitted in two different ways; (1) normal delivery (one-two), and (2) voluntary stuttering (wuh-one--tuh-two). The signals were presented at five different S/N ratios and the articulation scores were compared for differences (1) at noise levels and (2) between methods. In both methods American listeners achieved significantly higher articulation scores than foreign listeners at four of the noise levels. Voluntary stuttering gave both groups significantly better results, with score improvement relatively increased as the S/N ratio made listening more difficult.

4220

Hesbrook, A.H. CRASH-INJURY STUDY OF THE NORTHEAST AIRLINES CONVAIR 240 ACCIDENT AT LAGUARDIA AIRPORT ON JANUARY 14, 1952. Informative Accident Release 14, Aug. 1952, 36pp. Crash Injury Research, Cornell University Medical College, Ithaca, N.Y.

This report describes the basic accident-injury finds of the Northeast Airlines Convair 240 crash, in Flushing Bay, near La Guardia Airport, on January 15, 1952. Relationships between crash force, seats, safety belts, structures and injuries are discussed and summarized in order to provide useful information for future considerations of crashworthy design. (HEIAS)

4222

Hilgard, E.R., Edgren, R.D. & Irvine, R.P. ERRORS IN TRANSFER FOLLOWING LEARNING WITH UNDERSTANDING: FURTHER STUDIES WITH KATONA'S CARD-TRICK EXPERIMENTS. J. exp. Psychol., June 1954, 47(6), 457-464. (Stanford University, Stanford, Calif.).

4222

To investigate the effects of various kinds and degrees of understanding on transfer of training, five groups of 30 high school students were taught how to prearrange packs of eight playing cards for various sequences in dealing. All groups were taught two tasks, then were tested for transfer to four other tasks, but each group was taught a different method for solving its problems (utilizing various diagrams, slips of paper, or working the problem backward). Results (percent successful in tasks and number making various errors) were analyzed for the effects of the various teaching methods and for the nature of the most frequent errors. T. R 6

4223

Lawrence, D.H. & Coles, G.R. ACCURACY OF RECOGNITION WITH ALTERNATIVES BEFORE AND AFTER THE STIMULUS. J. exp. Psychol., March 1954, 47(3), 208-214. (Stanford University, Stanford, Calif.).

4223

To study the nature of the facilitative effect of presenting alternatives including the correct response on the rapid visual perception of objects, three groups of 20 college students were asked to identify 50 familiar objects presented tachistoscopically. Two groups were given lists of four alternatives for each object, one group before each exposure, the other immediately after; the control group had no alternatives. Alternatives varied between groups of four similar objects and groups of four perceptually discrete objects, and exposure times varied (.02 to .50 sec.). Results (percent correctly identified) were analyzed for the effects of the nature and time of presentation of alternatives.

T. G. R 3

4223

Adams, R.E. & Taylor, D.W. FUNCTIONAL FIXEDNESS AS RELATED TO ELAPSED TIME AND TO SET. J. exp. Psychol., Feb. 1954, 47(2), 122-126. (Carleton College, Northfield, Minn. & Stanford University, Stanford, Calif.).

5 groups including a total of 67 Ss participated in Exp. 1 designed to test the hypothesis that functional fixedness decreases as a function of time. All Ss were first given the task of constructing an electric circuit. For half of the Ss in each group, the circuit employed a microswitch and for the other half a small relay. Following an interval of uncontrolled activity, all Ss were given Haier's 2-string problem. Among the objects available for possible use as a pendulum weight, the only 2 which would work were the microswitch and the relay. The purpose was to determine which of the 2 objects would be used in solving the problem. The length of the interval between the initial task and the 2-string problem varied, being 1 min., 1/2 hr., 1 hr., 1 day and 1 week for the 5 groups, respectively. Functional fixedness, as measured by the percentage of the Ss using as a pendulum weight the object not used in the initial task, did decrease as a function of time. The relation was significant at the .02 level. In Exp. II, concerned with the relation of functional fixedness to set, 45 Ss from the first 3 groups in Exp. I were given a Luchins series of water-jar problems. Problems 2 to 6 are all solved by the same indirect method. Performance on Problems 7 and 8, which can be solved either by this indirect method or by a more direct method, was used as the criterion of susceptibility to set. Performance on Problem 9, which can be solved only by a direct method, served as the criterion of inability to overcome set. Susceptibility to functional fixedness, as defined by the Haier 2-string problem, was found to have a significant relation to inability to overcome set, but no relation to susceptibility to set, as defined by the Luchins problem series.

R 8

4225

Underwood, B.J. INTRALIST SIMILARITY IN VERBAL LEARNING AND RETENTION. *Psychol. Bull.*, May 1954, 61(3), 160-166. (Northwestern University, Evanston, Ill.).

4226

This paper proposes a broadening of the interpretation of Gibson's theory of verbal learning to accommodate the author's findings regarding the interference effects of intralist similarity in verbal learning and retention. A general hypothesis is developed from experimental data, and several deductions are tested.
T. G. R 10

4226

Underwood, B.J. STUDIES OF DISTRIBUTED PRACTICE: XII. RETENTION FOLLOWING VARYING DEGREES OF ORIGINAL LEARNING. *J. exp. Psychol.*, 1954, 47(5), 294-300. (Northwestern University, Evanston, Ill.).

4226

To study the effects of degree of learning on retention, two 36-subject groups learned serial lists of 14 syllables; two 24-subject groups learned ten-pair lists of adjectives, one group for each list using massed practice (four-sec. intervals), the other using distributed (30-sec. intervals). Each group learned three lists to different degrees (one half list learned to seven trials overlearning). Retention was tested 24 hours after learning each list, half the Ss employing massed, half spaced practice. Mean trials for original learning and mean correct responses at recall are discussed regarding the effect of degree of original learning on recall under the various learning conditions.
G. R 7

4227

Underwood, B.J. SPEED OF LEARNING AND AMOUNT RETAINED: A CONSIDERATION OF METHODOLOGY. *Psychol. Bull.*, May 1954, 51(3), 275-282. (Northwestern University, Evanston, Ill.).

4227

This is a theoretical discussion of the relationship between rate of learning and rate of forgetting. First demonstrating the inadequacies of previous techniques for comparing slow and fast learning groups, the author develops a method for equating the associative strength of learned material for fast and slow groups. Using data obtained from experiments reported elsewhere, the author obtains the empirical probability of a correct response as a function of number of previous reinforcements for each group, using these functions to determine equivalent base lines for plotting retention curves. Implications for theories of retention are discussed.
G. R 12

4228

Crossman, E.R.F.W. ENTROPY AND CHOICE TIME: THE EFFECT OF FREQUENCY UNBALANCE ON CHOICE-RESPONSE. *Quart. J. exp. Psychol.*, June 1953, 5(Part 2), 41-51. (Medical Research Council Applied Psychology Unit, Cambridge, England).

A human subject making a sequence of choice-responses is considered as a channel transmitting information. Earlier work suggests that the rate of transmission is limited, and so that response time is proportional to the "entropy" of the source of signals. Entropy is reduced by unbalance in the relative frequency of the possible signals according to the formula, $\sum (p \log p)$. Unbalance should therefore reduce average response time. This prediction is tested in a card-sorting task. The Ss sorted playing-cards into classes in various ways; times taken were proportional to calculated entropy-per-card. Departures from the expected results occurred and were found to be due to differences in perceptual difficulty of discriminations. Some incidental results are mentioned.

R 3

4231

Cooper, F.S., Delattre, P.C., Liberman, A.M., Borst, J.H., et al. SOME EXPERIMENTS ON THE PERCEPTION OF SYNTHETIC SPEECH SOUNDS. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 597-606. (Haskins Laboratories, New York, N.Y.).

This paper represents an examination of the methods, results, and working hypotheses of recent systematic exploration of the acoustic cues to the perception of some of the consonant sounds, which has been permitted by the use of synthetic methods applied to isolated syllables. (HEIAS)

R 10

4232

San Diego State College Foundation. APPLICATION OF THE FLESCH CRITERIA OF READABILITY AND HUMAN INTEREST TO HUMAN ENGINEERING DATA. Contract NONT-1268(C1), April 1955, 12pp. San Diego State College Foundation, San Diego, Calif.

4234

To evaluate the reading ease and interest level of two works on human engineering (Woodson, W.E., *Human Engineering Guide for Equipment Designers*, and Baker, C.A. and Grether, W.F., *Visual Presentation of Information*), the two formulas developed by Rudolph Flesch were applied to random samples of 100 words taken from each text. In addition, qualitative comparisons were made between the two works and between these two and other material on human engineering. Possibilities for improving readability and interest were proposed.
T. R 8

4233

Pollack, I. ASSIMILATION OF SEQUENTIALLY-ENCODED INFORMATION. IV. THE INFORMATIONAL CONTRIBUTION OF "WRONG" RESPONSES. Memo. 26, Sept. 1952, 9pp. USAF Human Resources Research Labs., Bolling AFB, Washington, D.C.

4233

To study the informational contribution of "wrong" responses in immediate recall, 25 Ss reproduced 280 messages read to them. Messages were composed of comments and numbers and varied in message length (4-24 units) and alternatives per message-unit (2-30). After each first reproduction, the S was told the location of his first error and required to guess (up to four times) among alternatives until the message-unit was correctly identified. This procedure was repeated for each error. After showing that correct responses were more frequent than would be predicted by chance, an analysis of the informational contribution of the "wrong" responses was made.

G. R few

4235

Pollock, I. THE ASSIMILATION OF SEQUENTIALLY ENCODED INFORMATION. II. EFFECT OF RATE OF INFORMATION PRESENTATION. NML Mon Rep. 25, Sept. 1952, 27pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C.

The effect of three experimental variables upon immediate recall performance is considered. The three variables, which are suggested by the methodology of the theory of information, are: the rate of presentation of the recall materials; the length of the materials and the number of possible alternatives per unit of the materials. The recall materials employed were spoken messages with each unit of a given message selected independently from a defined class of possible alternatives. Two aspects of recall performance were selected for analysis: average proficiency of performance and the variability in performance among subjects. Systematic changes are obtained in both the proficiency and the variability measures as a function of the three variables. In terms of both measures, effects of rate of message presentation and of the informational content per message-unit (number of possible alternatives) are secondary to the effect upon recall performance of message-length (over the ranges considered). The findings are interpreted to indicate a defined "informational limit" for recall performance which is a function of the encoding procedures employed. It is suggested that the systematic changes in variability reflect changes in the range of encoding procedures employed by the experimental subjects.

R 7

4236

Pollock, I. THE ASSIMILATION OF SEQUENTIALLY ENCODED INFORMATION. I. METHODOLOGY AND AN ILLUSTRATIVE EXPERIMENT. NML Mon Rep. 25, Sept. 1952, 27pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C.

This paper presents a methodology for verbal learning based on the theory of information. The approach allows an objective quantification, in units not specified to the particular experimental operations considered, of: a) the learning materials employed (the informational input); b) the information lost (the error output); and c) the information gained (the difference between the informational input and information lost). The units are sufficiently general to allow for comparison of the results of a diversity of experiments. An illustrative experiment in short-time retention was designed to fulfill the requirements of the methodology. The major finding of the study is that the encoding of the learning materials for retention is an important determinant of the amount of information which can be retained. Specifically, for messages of a given length, the percentage of information gained or lost (relative to the information presented) is independent of the informational content per message-unit. For messages of a given informational input, however, the amount of information gained is greater for short messages with a high informational content per message-unit than for long messages with a low informational content per message-unit.

R 20

4237

Hosbrook, A.M. CRASH SURVIVAL STUDY: NATIONAL AIRLINES DC-6 ACCIDENT AT ELIZABETH, N.J. ON FEBRUARY 11, 1952. Informative Accident Release 15, Oct. 1953, 65pp. Crash Injury Research, Cornell University Medical College, Ithaca, N.Y.

Crash survival details of a 140 mph crash involving a Douglas DC-6 transport aircraft, in which 32 of the 59 passengers survived, are presented and analyzed. Information is given on impact speed and attitude, directions of principal impact force, kinematic behavior of the fuselage, damage to cabin and seats, and injuries sustained in relation to passenger location; photographs and diagrams are shown. Findings are discussed and recommendations are made relative to crash survival design in future transport aircraft.

4240

Anderson, J.V. A DETERMINATION OF THE STABILITY OF THE RELATIONSHIPS AMONG APTITUDE, SCHOOL, AND SHIPBOARD MEASURES OF ANTI-SUBMARINE SONARMAN PERFORMANCE. Proj. P5a 52, Rep. FR 4, April 1953, 22pp. USN Personnel Research Unit, San Diego, Calif.

This study is a replication and extension of the investigation reported in a previous study, "Relationships Among Aptitude, School, and Shipboard Measures for Sonarmen". Its primary purpose was to determine the stability of the findings of that study. A secondary purpose was to determine whether measures of auditory acuity for the poorer ear and better ear are comparable. Data from an additional 123 shipboard rating scales and matching student record cards were analyzed by correlational methods. The results were compared with those obtained in the previous study. In general, correlations obtained in the new study were not significantly different from those obtained previously. Within the range of hearing loss considered in the two studies, there appears to be no relationship between auditory acuity at high frequencies and anti-submarine sonarman performance. Attack Teacher grades seem to be consistent predictors of shipboard ratings. The negative relationships between the Mechanical Test scores and shipboard measures obtained in the previous study did not recur in the current study. High intercorrelations among items in the shipboard rating scale occurred in both studies and appear to be a characteristic of the type of rating scale employed. Auditory acuity scores for poorer and better ears do not differ to any appreciable extent in their relationships to other measures.

R 7

4242

Johnson, Laverne, C. SPEED AND CONFIDENCE OF JUDGMENT AS PSYCHOLOGICAL VARIABLES. Contract Nonr 225(01), NR 150 087, Tech. Rep. 4, June 1954, 32pp. Office of Naval Research, Washington, D.C. (Psychology Dept., Stanford University, Stanford, Calif.).

The generality of speed and confidence was investigated by intercorrelating the decision times on 7 tasks and the confidence scores on 6 tasks. The results show that speed and confidence in one task are significantly associated with speed and confidence in another. The findings also suggest that confidence has a relatively greater degree of generality than speed. The second part of this study was an investigation relating a total score of decision speed and/or total score of confidence to certain personality measures: manifest anxiety, ego-control, authoritarianism, and achievement. No relationship was found between any of these personality measures and speed and/or confidence of judgment. A measure of behavioral confidence was also related to decision speed, to stated confidence, and to the four personality measures. The only measures significantly related to behavioral confidence were total decision time and the measure of achievement. Three additional problems were investigated. One, variability on decision tasks was studied in relation to the four personality measures. No relationship was significant here. The other two problems were the relationship of speed and of confidence of judgment to a measure of defensiveness and a categorization score in the object sorting task. The only relationship found was a positive one between total decision time and the number of categories.

R 15

4243

Winder, C.L. & Mertz, K.R. SOME EFFECTS OF INDUCED SUCCESS AND FAILURE ON JUDGMENT BEHAVIOR. Contract NMR 225 (01), Proj. NR 150 067, Tech. Rep. 5, Aug. 1954, 24pp. Dept. of Psychology, Stanford University, Stanford, Calif.

4243

Judgment or decision-making was studied within the general framework of ego-psychology which focuses attention on this aspect of human behavior. The success-failure dimension of the psycho-social situation was manipulated by verbal confirmation of success or failure or by no evaluation being given. Two types of tasks were employed: 1) judgments based on S's experience with no stimulus material immediately present, and 2) judgments based on objective stimulus material. The effects of the variation in the psycho-social situation on judgment behavior was measured by speed, confidence, and stability of choice.

T. R 22

4244

Winder, C.L. & Mertz, K.R. A STUDY OF PERSONALITY CORRELATES OF JUDGMENT BEHAVIOR. Contract NMR 225(01), NR 150 067, Tech. Rep. 6, Aug. 1954, 20pp. Office of Naval Research, Washington, D.C. (Psychology Dept., Stanford University, Stanford, Calif.).

The goal of this study was to explore the proposition that aspects of decision behavior which have a satisfactory degree of generality from situation to situation and task to task are related to so-called personality characteristics. The dimensions of speed and confidence of judgment were selected for study since they have been shown to be stable intraindividual characteristics. The personality measures employed were the MMPI and the Adjective Check List. The sample of subjects was divided into a fast and a slow group on the basis of overall judgment speed. The fast group appears to be more impulsive and less conventional than the slow group. They seem to be overproductive in thought and action as compared with the slow group. The fast group checked more adjectives as being descriptive of themselves than did the slow group and the items which were checked differentially suggest that the fast group are more active and lazy, self-centered, and expensive in interpersonal relationships. The sample was also divided into high confidence, warranted confidence, and low confidence groups. The MMPI did not differentiate the high and warranted groups, but the low group was revealed as being rather anxious, introspective, and concerned with problems.

R19

4245

Dean, S.J. THE GENERALITY OF EXPECTANCY LEVEL AS A FUNCTION OF SET. Contract NMR 225 (01), Proj. NR 150 067, Tech. Rep. 7, Aug. 1954, 17pp. Dept. of Psychology, Stanford University, Stanford, Calif.

4245

To investigate differences in the generality of expectancy level on two tasks as a function of differential instructions concerning the nature of the tasks, two groups of college students were given the same two tasks and asked to try to predict their scores prior to each trial. The first task was to write down as many words as possible beginning with eight letters of the alphabet; the second was card sorting. Group I was told that both tasks were intelligence tests, while Group II was told that the first task was an intelligence test and the second was a perceptual-motor speed test. Number of trials, scoring units, and shape of performance curves were identical for both tasks and all Ss received the same set of predetermined scores. Differences between the groups were analyzed. R 22

4247

Parker, W.C., Jr. EVALUATION AND TEST OF THE "MIDGETAPE" AND "MINIFON" MINIATURE VOICE RECORDERS FOR PERFORMING VISUAL RECONNAISSANCE TASKS; REPORT OF. Proj. 7-1170, Nov. 1955, 11pp. Marine Corps Equipment Board, Marine Corps Development Center, Marine Corps Schools, Quantico, Va.

4247

This report presents the results of an evaluation of the "Midgetape" and "Minifon" miniature voice recorders in their utilization as aids in performing visual reconnaissance tasks. Tests concerned with the following factors were conducted: general suitability in various types of aircraft, the physical characteristics, ease of operation, materials and workmanship, performance, maintenance, functional employment, comparison with similar equipment, and desirable modifications. The results of these tests provide a basis for conclusions and recommendations concerning the merits and suitability of this equipment.

T. I.

4248

V. Jov, V.I. THE IMPROVEMENT OF EXTENSION INSTRUCTION. Contract DA 49 183 USA 360 1 D 15 222, Proj. 29564000, 723 Tech. Res. Memo. 54 18, May 1954. Educational Research Commission, Cambridge, Mass.

4248

This is a report of the experimental evaluation of a revision of an Army extension (correspondence) course in quarrying. The experimental course was designed to conform with objectives arrived at in a series of conferences and based on psychological principles. The returned lessons and examinations of 250 students on the experimental course are compared with similar data from 250 students taking the regular course. Results lead to conclusions regarding student time, success on examinations, ability to perform decision-making exercises, and implications for the preparation of further extension courses.

T. G.

4254

Ward, Barbara and Mollenkopf, W.G. SELECTION AND CLASSIFICATION TESTS FOR WOMEN. A REVIEW OF THE LITERATURE. Contract NMR 694(00), Tech. Bull. 54 11, June 1954, 64pp. NSV Classification & Survey Research Branch, Bureau of Naval Personnel, Washington, D.C. (Educational Testing Service, Princeton, N.J.).

4254

This review of literature examines the appropriateness of using with women the same selection and classification procedures that are used with men in situations where both sexes are selected for the same job. Particular attention is paid to reports of the selection of women for jobs similar to billets in the USN. Two valuable sources of information proved to be USAF reports of selection of personnel for Air Force technical schools and British reports on the selection of women for the Auxiliary Territorial Service during World War II. Most industrial studies are found to be based on one sex. Implications of the findings are discussed.

T. R 194

4255

Grings, W.W., Rigney, J.W., Bond, N.A., Jr., & Summers, S.A. STUDY OF ELECTRONICS TROUBLE SHOOTING SKILL: II. INTERCOMPARISONS OF THE MASTS TEST, A JOB SAMPLE TEST, AND TEN REFERENCE TESTS ADMINISTERED TO FLEET ELECTRONICS TECHNICIANS. Contract NMR 228(02), Proj. NR 153 093, Tech. Rep. 10, Aug. 1953, 34pp. Psychology Dept., University of Southern California, Los Angeles, Calif.

4255

This study was concerned with the development of a symbolic representation of certain aspects of the electronics trouble shooting task, the MASTS Test, and with the relation of the scores obtained from this instrument to other, more conventional measures. Among these were a job-sample equipment test, electronics reference tests, ability reference tests, and supervisor ratings. The extremely long testing time required per subject for the two trouble shooting tests precluded their administration to the number of subjects originally planned, which would have been more satisfactory for correlational analyses as well as for other comparative analyses.

4257

Blackie, R.R., Morehouse, L., & Clegg, D.A.
MEASUREMENT OF FORCES AFFECTING HUMAN BODIES
IN AIRCRAFT ACCIDENTS: A STUDY OF THE CRASHES
OF FOUR INSTRUMENTED PUP DRONE AIRCRAFT.
Contract Four 1527(00), Proj. ME 118-361,
Tech. Rep. 3, April 1956, 87pp. ONR,
Human Factors Research, Inc., Los Angeles,
Calif.

4257

To develop a method for recording accelerative
forces in airplane crashes, accelerometers were placed
in PUP drone aircraft used by the Navy for missile
testing. The instrument was mounted in the seat of the
aircraft prior to take-off. The design of the accelera-
tor was such that exposure to a force of 8 g or more
started the instrument and the pattern of forces was
recorded in two dimensions for 8 seconds. In event of
a crash, efforts were made to recover the instrument and
take pictures of the airplane; a crash history record
was made. Data on four crashes are presented with re-
commendations for future research.
I. B. 11

4259
Cronbach, L.J., A CONSIDERATION OF INFORMATION THEORY AND UTILITY THEORY AS TOOLS FOR PSYCHO-
METRIC PROBLEMS. Contract N60r1 07146, Tech. Rep. 1, Nov. 1953, 64pp. Office of Naval Re-
search, Washington, D.C. (College of Education, University of Illinois, Urbana, Ill.).

The present report presents 5 papers concerned with recent mathematical models applicable
to testing. Section I describes the communication model and shows that the test may be view-
ed as a communication system. This is a purely verbal presentation. Section II presents the
formulas for analyzing information according to Shannon's assumptions, and clarifies the
meaning of those formulas. Section III presents the formulas for analyzing information by
arithmetic averages. While these formulas will be replaced by a more adequate system eventu-
ally, they are somewhat closer in conception to utility theory than Shannon's. Section IV
discusses briefly the essential concepts of utility theory, together with the reasons for
preferring this schema to the formulations presented in II and III. Section V is a study by
means of utility theory of one particular test, intended for psychiatric screening of re-
cruits. (HEIAS)
R 31

4261
Goldard, F.A., MILITARY PSYCHOLOGY: SCIENCE OR TECHNOLOGY? Amer. J. Psychol., July 1953, 56
(3), 335-348. (University of Virginia, Charlottesville, Va.).

A survey of military psychology is presented. The contents of military psychology are
discussed under 6 major categories: a) manpower resources; b) personnel selection and classi-
fication; c) human engineering; d) military training; e) proficiency measurement; and f) hu-
man relations. The question: "Is military psychology technology or science?" is discussed.
(HEIAS)

4269

Gibbs, C.B., THE CONTINUOUS REGULATION OF SKILLED RE-
SPONSE BY KINESTHETIC FEED-BACK, A.P.U. 190/53, March,
1953, 14pp. Applied Psychology Research Unit, Medical
Research Unit, The Psychol. Lab., Cambridge.

4269

The experiments reported were undertaken to eval-
uate the contribution of kinesthetic feedback in
skilled motor response by varying the response and
proprioceptive discharge in a visual-motor task.
Ninety-five normal subjects and one tabetic patient
used two types of joystick to control the output of
a velocity control servo-mechanism. One was a free-
moving lever; the other had strong spring centering
but could be deflected slightly by applying pressure.
Data reported are speed and accuracy of response,
learning curves, and transfer effects with the two
types of control.
T.F.R.17.

4272
Jeffrey, T.E. & Thurstone, L.L., A FACTORIAL ANALYSIS OF FOOT MEASUREMENTS. Contract DA
44 109 qn 1125, Tech. Rep. EP 10, July 1955, 26pp. USA Quartermaster Research and Develo-
ment Center, Natick, Mass.

This report gives the results of a methodological study carried out for the purpose of
investigating the nature of some of the critical factors determining the size of feet in
Army personnel. 29 measures taken from the anthropometric data collected in the Fort Knox
Foot Survey were factor analyzed. 10 factors were extracted accounting for the intercorre-
lations between these 29 measures with relatively small residuals. The absolute size of the
residual correlations after the extraction of the 10 factors was less than or equal to .06.
8 of the 10 rotated factors have been interpreted. This interpretation for each factor des-
cribes the nature of the underlying parameter responsible for the concomitant variation of
the measures with large projections on the factor. 2 factors were not interpreted. The
amount of the total variance for each measure accounted for by the 10 factors varied from
about 100 percent down to 11 percent. This indicates that at least one measure (100 per-
cent) shares all of its variance with one or more of the remaining 28 measures, and, conse-
quently, could be relatively unimportant in the determination of shoe lasts. On the other
hand, measures which share only 10 to 15 percent of their variance with other measures would
have to be considered specifically in the proper fitting of shoes.

4273
Lukasik, S.J. & Nolle, A.W. (Eds.), HANDBOOK OF ACOUSTIC NOISE CONTROL, VOL. 1. PHYSICAL
ACOUSTICS: SUPPLEMENT. Contract AF 33 (600) 23901, RDO 695 63, WADC Tech. Rep. 52 204,
April 1955, 308pp. USAF Aero Medical Lab., Wright Air Development Center, Wright-Patterson,
AFB, Ohio. (Bolt Beranek and Newman, Inc., Cambridge, Mass.).

The Handbook of Acoustic Noise Control is intended to provide an overall view of the
problem of the control of acoustic noise. Since the publication of the first 2 volumes, the
need for their revision has become apparent. In some cases, material has been added to en-
large the coverage of original sections. In others, sections have been completely re-written
to present the latest experimental or theoretical information available. With ever-increas-
ing interest and activity in acoustic noise control, published procedures must, of necessity,
lag behind the newest thinking in the field. There are few areas of the noise control prob-
lem where the present answers are the "best." As the operational requirements for noise
control devices changes and as new or more powerful sound sources appear in our advancing
technology, better answers will have to be found. In presenting these revised sections,
an attempt is being made to keep up with our expanding knowledge. This supplement contains
additions and revisions to Volume I which treated the generation and control of various
types of noise sources. Similarly, Volume II, which analyzed the interaction between noise
and man, is being supplemented. These supplements, together with the unchanged sections of
Volume I and II, provide a unified view of noise control problems. cf. 3467
R 77

4275

Marsh, B.W. (Chm.). NIGHT VISIBILITY. Bull. 56, Jan. 1952, 77pp. Highway Research Board, National Academy of Sciences, National Research Council, Washington, D.C.

4275

This bulletin contains five papers: (1) Determination of Windshield levels requisite for driving visibility; (2) Effect of Exposure to Sunlight on Night-Driven Visibility, which contains recommendations concerning use of sunglasses; (3) Effect of Pattern Distribution on Perception of Relative Motion in Low Levels of Illumination, which test the hypothesis that driving speed is a factor in discrimination of relative speeds; (4) Vision at Levels of Night Road Illumination, which considers several problems including dark adaptation, glare reduction, use of spectacles, and visual training; (5) Spherical Lens Optics Applied to Retrodirective Reflection describes the application of elementary optical principles to evaluation of reflectors for highway signs.

T. G. I. R 117

4276 Bitterman, M.E., Holtzman, W.H. & Barry, J.R. PSYCHIATRIC SCREENING OF FLYING PERSONNEL. CONDITIONING AND EXTINCTION OF THE GALVANIC SKIN RESPONSE AS A FUNCTION OF ADJUSTMENT TO COMBAT CREW TRAINING. Rep. 55 29, Feb. 1955, 9pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A group of 208 pilots assigned to Combat Crew Training were tested in a conditioning situation and their subsequent adjustment to training was independently evaluated. Conditioning variables were selected on the basis of factor analyses for correlation with the criterion evaluations of adjustment. No significant relation was found between the 2 sets of measures. Although an earlier study of 37 university men produced positive findings under laboratory conditions, the present research fails to support the laboratory findings with trained pilots entering Combat Crew Training.

R 17

4279

Rhine, R.J. THE EFFECT ON PROBLEM SOLVING OF SUCCESS OR FAILURE AS A FUNCTION OF CUE SPECIFICITY. Contract HSOAR 25125, Proj. MR 150 149, Tech. Rep. 8, Feb. 1955, 57pp. Department of Psychology, Stanford University, Stanford, Calif.

4279

This report describes two experiments investigating the effects of success and failure (and their interactions with other variables) on problem-solving. In both experiments, five groups of 31-40 college students solved anagrams (in one case, alternated with number series) of varying degrees of difficulty under the expectation of getting half correct, with a final test of all groups on anagrams of moderate difficulty. Success on the final test was analyzed with regard to the effects of success or failure in completing half the experimental anagrams, similarity of experimental and test anagrams, sex differences, and need for achievement.

T. I. R 65

4280 Gottsdanker, R.M. PREDICTION-SPAN, SPEED OF RESPONSE, SMOOTHNESS, AND ACCURACY IN TRACKING. Lab. Note SCRL 55 6, April 1955, 22pp. USAF Skill Components Research Lab., Lackland AFB, Tex.

In a tracking task, a group of 7 Ss was given trials on a course which had a smooth path of motion and relatively few reversals of direction (low-frequency target), while a second group of 6 Ss used a course with few smooth portions and many unexpected changes (high-frequency target). Speed of response to error was independent of the course being tracked and thus did not have a relation of balance with prediction-span. It too did not appear to be influenced by practice on a given type of course. There were indications that reaction time may be used to predict differential proficiency in tracking on a high-frequency course. Further, the relation between reaction time and skill in tracking appears to diminish as the target motion becomes smoother.

R 6

4277

Freedman, A., Kirkpatrick, C.M. & Huntington, E.C. FIRST PARTIAL REPORT ON SURVEY OF FOOT MEASUREMENTS AND THE PROPER FIT OF ARMY SHOES. SUBJECT: STUDY OF FACTORS BEARING ON THE ESTABLISHMENT OF SIZE TARIFFS, ON SIZE DESIGNATIONS AND ON SHOE FITTING. Proj. T 13, Dec. 1945, 4pp. USA Armored Medical Research Lab., Fort Knox, Ky.

This report represents a study of factors relevant to the establishment of shoe sizes and shoe fitting. It defines: a) the relationship of shoe size to the incidence of and type of foot casualties; b) the influence of marching and weight bearing on foot size; c) the role of socks in determining foot size; d) the importance of the wearer's judgment of fit on the selection of shoes. Conclusions reached pertain to the findings that the utility and casualty risk associated with the wearing of shoes too small in size is less than the utility and casualty risk associated with the wearing of shoes which are too large. Conclusions were also made concerning the tolerances and dimensional intervals between sizes. (HEIAS)

4278

Freedman, A. FOURTH PARTIAL REPORT ON ANALYSIS OF CHARACTERISTICS OF FOOTGEAR FOR ARMY FIELD USE. Proj. T 13, March 1946, 5pp. USA Armored Medical Research Lab., Fort Knox, Ky.

Recent studies have revealed the need for reconsideration of boot design for the Army. 4 general characteristics of or specifications for an all purpose, army combat boot are discussed: a) provide thermal protection; b) provide physical protection; c) provide maximal flotation and traction; and d) not prove a source of injury. These principles are incorporated in the design of field boots. An experimental boot design believed to possess the most suitable features for Army field use under a wide variety of terrain and climatic conditions is proposed. This proposed design is probably not suitable for garrison use. (HEIAS)

R 9

4280
Kenchington, K.W.L. & Stockbridge, M.C.W. AN INVESTIGATION OF THE TEXTILE FACTORS RESPONSIBLE FOR FABRIC "ROUGHNESS". (PART I: SUBJECTIVE ASSESSMENT BY FINGER TOUCH). NOV., 1951 - APR. 1952. Rep. 17, Sept. 1952, 12pp. Ministry of Supply, Directorate of Physiological & Biological Res., Clothing & Equipment Physiological Res. Establishment, London, England.

4281
Six subjects were asked to rank by touch the "roughness" of fabrics in order to establish the degree of consistency and unanimity of subjective judgments. Eight fabrics were presented two at a time in the 28 possible pairings and for each pair the subject judged which fabric would cause greater discomfort if worn next to the skin. Subjects were retested after a two week interval. G. T. R

4283
Holding, D.N., & Dennis, J. HEARING IN THE COMBAT CAP. Rep. 37, Sept., 1953-June, 1954, 16 pp. Ministry of Supply, Directorate of Physiological and Biological Research, Clothing and Equipment Physiological Res. Establishment.

4283
To measure the effects of wearing military-type hats with ear flaps on hearing loss, seven caps, eight military subjects, pure-tone audiometric techniques, and the method-of-limits were used in a series of experiments. The reported results are threshold values under the various experimental conditions. The relevance of head movement and masking wind noise within the cap to hearing loss is also discussed. T.G.I.R12.

4284
Newman, R.W. & Baker, P.T. SPATIAL REQUIREMENTS OF THE NECK-SHOULDER REGION. Proj. Ref. 7 79 10 COIG, EP Tech. Rep. 15, July 1955, 15pp. USA Environmental Protection Research Div., Quartermaster Research & Engineering Command, Natick, Mass.

4284
To point out the potential areas available on the neck and shoulder region (erect man with shoulders level, head upright and looking forward) for load carrying, dimensional analyses were performed on a sample of U.S. Army soldiers selected on the basis of body build. Measurements of neck-height, neck-shoulder angle, acromial width, shoulder width, and a calculation of the square inches involved in two triangles, the shoulder and acromial triangles, were computed from photographs. Statistical tables of the four measured dimensions and two calculated areas are presented in the form of reference data with cut-out models of the averages and statistical extremes. Loss of available space through the addition of clothing was calculated and discussed. T. I.

4285
Krulow, G.K. HUMAN FACTORS IN ELECTRONICS RELIABILITY. Contract NONR 494(03), Rep. 1954 494 03 14, 73pp. Tufts University, Medford, Mass.

4285
This is a review of the literature on human factors affecting the reliability of naval electronics equipment. Under "Human Factors in Fleet Reliability" are discussed such topics as simplified diagnostic procedures, formal training of electronics personnel, effective utilization of shipboard training opportunities and morale and shipboard efficiency. "Effective Utilization of Failure Data" covers problems in the analysis of failure data and reliability models of complex systems. T. G. I. R 124

4286
Krulow, G.K. & Weisz, A. STUDIES IN THE VISUAL DISCRIMINATION OF MULTIPLE UNIT DISPLAYS. Contract N ONR 494 (03), Proj. NR 145 088, Rep. 1954 494 03 23, Aug. 1954, 14pp. Tufts University, Medford, Mass.

4286
Four experiments were conducted on the determination of distance thresholds for one-, two-, and three-digit displays as a function of the number of alternative possibilities in each position of the display. In the first experiment, eight categories were defined in terms of one-, two-, and three-digit codes using different choices of elemental symbols to define three such sets of codes. In the second, thresholds were obtained for several binary choices used both as one- and three-digit displays. In the final two experiments, an alphabet of 32 symbols was used to investigate the relation of threshold magnitude to amount of information with single-position displays. T. R 3

4287
Christie, L.S. ORGANIZATION AND INFORMATION PROCESSING. Contract Nonr-494(03), Rep. 1954-494 03 25, 20pp. Office of Naval Research, Washington, D.C. (Tufts University, Medford, Mass.).

A theoretical analysis of systems organization as the management of information flow has been made. This analysis indicates that the action effectiveness of a system depends upon the efficiency of internal communication. Internal information handling necessitates decisions of 4 k.ods: routing, filtering, coding, and scheduling. The organization of these functions is affected by these factors: imposition of rules by outside authority, the rational pre-existing behavioral tendencies of the human components, learning, the exertion of control by authority within the group. Data from an experimental program designed to study the organization of routing, particularly with respect to the effect of rules for routing expressed as communication networks, was analyzed. This empirical analysis demonstrated the vital importance of so designing the system by the rules imposed that a basis for rational behavior is provided for the men in the system and so designing it that behavior optimized with respect to that basis will be optimum for total system performance. R 1

4288 Shephard, R.J. THE PLACE OF THE PNEUMOTACHOGRAPH IN THE MEASUREMENT OF BREATHING CAPACITY. PRNC 916, May 1955, 15pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, England).

The physical characteristics of a pneumotachograph system suited to the investigation of breathing capacity are described. A trial of the apparatus in 8 normal Ss yielded M.B.C. values similar to those previously reported for low resistance systems. The sensitive recording system allowed further investigation of the theoretical background of the M.B.C. and "fast vital capacity" tests. There was wide personal variation in the optimum respiratory rate for the performance of the M.B.C. test, and most Ss showed some decline of maximum inspiratory velocity during the last few seconds of the test. The "fast vital capacity" tracings do not always conform to smooth exponential curves. Owing to the speed of delivery and volume delivered is less than the true vital capacity, particularly during inspiration. Although theoretical grounds suggest the prediction of the M.B.C. from a 30 sec fraction of the vital capacity tracing, in practice a better correlation is obtained from the entire fast inspiratory and expiratory vital capacity curves. This anomaly appears related to the considerable variations of peak gas velocity during the performance of fast vital capacity tests.

R 22

4289 USN Special Devices Center. SPECIAL DEVICES GUIDE. NAVEXOS P 530 1, Feb. 1953, 195pp. USN Special Devices Center, Port Washington, N.Y.

4289 This is a handbook containing pictures and descriptions of the various training aids and devices developed by the Special Devices Center. It covers aids in the following categories: special devices, films, automatic reader cards, charts and posters, and instructional recordings. Appendices include information on installation, maintenance, and disposal of devices, on training courses, and on Training Devices Men. There is a listing of publications, an alphabetical subject index, and a numerical index to devices.

I. R 310

4290 USN Chief of Naval Operations. COLD WEATHER MEDICINE. SERIES OF OPERATIONAL BRIEFS. Proj. OP 0303, March 1954, 32pp. USN Office of the Chief of Naval Operations, Department of the Navy, Washington, D.C.

4290 This brief is an analysis, briefing, correlation, and synthesis of voluminous material on specific phases of Arctic operations in relation to medical problems. Phases of physiological, psychological, and dental medicine are mentioned and treated only insofar as they represent definite information on a specifically cold weather problem. Supplements are planned as soon as more definite knowledge becomes available. Physiological medical problems treated here are hypothermia (cold-injury), carbon monoxide poisoning, snow blindness, insect control, and parasitic worms; and psychological problems are indoctrination, training, and recreation. Dental problems are not treated in detail.

R 20

4291 Banet, L. & Prescia, P.A. REPORT OF INVESTIGATION ON IMPROVED COVER GOGGLES FOR CHIPPERS AND WELDERS. FINAL REPORT. Proj. 5468 3, Rep. NS 181 013, June 1954, 16pp. USN Material Lab., Brooklyn, N.Y.

4291 Improved chippers and welders cover goggles of three manufacturers were evaluated in laboratory and service tests. The goggles were worn by shipyard welders, chippers, and caulkers during actual shipbuilding operations and by other Naval personnel during welding and grinding operations. The laboratory study included determination of field of view provided by symmetrical and unsymmetrical goggles as well as wearing tests. Favorable and unfavorable comments from the user's tests were tabulated and discussed.

T.I. R-10

4292 USN Air Development Center. EFFECT OF REFLECTION PLOTTER ON SIGNAL DISCERNIBILITY ON AIRBORNE RADAR INDICATORS. TED Proj. ADC EL 8202, Rep. NADC EL 153 73, SDC TR 166 I 119, May 1953, 7pp. USN Air Development Center, Johnsville, Penn.

4292 To determine the effect on signal discernibility of the insertion of a reflection plotter between the crt of the radar and the operator, two pieces of equipment were set up for testing, one with a reflection plotter and one without. The Ss, who did not know which indicator was equipped with the plotter, were required to identify a series of targets on both indicators by calling out the bearing as soon as it was seen and to continue identification as long as possible as the signal level was reduced. Each S was given six rotations of the sweep on each azimuth setting and four azimuth settings for each signal level. The average number of missed targets was plotted against target attenuation and compared for the two conditions.

G. I.

4293 Hendler, E. & Evans, R.G. TEST AND EVALUATION OF MODEL R3Y DITCHING SEAT. Proj. TED NAM AC 6302, May 1954, 15pp. USN Air Experimental Station, Aeronautical Medical Equipment Lab., Philadelphia, Penn.

11 shots were made using the HG 1 catapult and an anthropomorphic dummy to test and evaluate an aft-facing ditching seat for Model R3Y aircraft. In the catapult tests, the seat was mounted either along the direct line of catapult thrust (0 degrees) or at 20° to the left of this thrust line. The seat was designed to restrain personnel during a 0° (head-on) or a 20° ditching on water. The catapult car, on which the ditching seat was mounted, received an approximate square wave of acceleration, which was varied from an average acceleration of 5.8 G of 0.31 sec duration to 25.4 G of 0.154 sec. The ditching seat showed no major failures in any test. During the simulated 0° ditchings, there was no indication that physiologically dangerous forces were applied to the dummy. In the simulated 20° ditchings, the rotation of the unrestrained legs with respect to the relatively stationary torso did seem to apply dangerous forces to the dummy. This rotation could probably be prevented or minimized by securing the legs and modifying the lateral edges of the seat by the addition of material or straps.

R 5

4295 Crumley, L.H. & Atkinson, W. HUMAN ENGINEERING INVESTIGATION OF THE EXTERIOR LIGHTING OF NAVAL AIRCRAFT. PART I. A STUDY OF THE EFFECT OF FLASH RATE AND ON/OFF RATIO ON THE DETECTABILITY OF FLASHING LIGHTS. Rep. TED NAH EL 52003, Part I, Sept. 1954, 21pp. USN Air Test Center, Patuxent River Air Station, Patuxent River Medical Equipment Lab., Philadelphia, Penn.

The effect on detection time of flash rate, on/off ratio and subject differences was investigated in a factorially designed experiment involving 5 flash rates (40, 60, 80, 100 and 120 flashes per minute), 5 on/off ratios (1/2, 1/1, 2/1, 3/1, 4/1), 15 stimulus positions and 5 Ss. The experiment was conducted in an experimental situation which simulated red and green wing-tip lights as they would appear to a pilot about 2 miles removed from a plane which was approaching him head-on. Results of an analysis of variance performed on the averages of the 45 times each flash rate X on/off ratio combination appeared for 4 Ss (one S was dropped as atypical) indicated that flash rate was not a factor in the detection time but that there was significant subject X flash rate interaction; that subject was a significant factor and that on/off ratio was significant with ratios below 2/1 better than those above 2/1.
R 7

4296 Pride, A.M. FLIGHT TESTS OF APPROACH LIGHT SYSTEMS. FINAL REPORT. Proj. PTR AE 827, Rep. 2, Aug. 1952, 61pp. USN Air Test Center, Patuxent River Air Station, Md.

4296 To determine the most desirable configuration among three approach light systems (Slopedline, British, and French) a comparative evaluation was made under weather conditions which in many cases were severe enough to close the air station to normal instrument flights. Recommendations are included.
T. G. I. R 11

4297 Hyland, J.J. TURN AND BANK INDICATOR WITH WHITE BALL AND WHITE CENTER MARKINGS, EVALUATION OF; LETTER REPORT #1, FINAL REPORT. Proj. TED PTR AE 7359.39, May 1953, 7pp. USN Air Test Center, Naval Air Station, Md.

4297 Tests were conducted to determine the readability of a turn and bank indicator with white ball and white center markings under day, night, and simulated and actual instrument flight conditions. The test instrument was installed in the cockpit of F9F, BuNo 12540, in place of the radio altimeter. The standard air-driven turn and bank indicator remained in normal position as a comparison instrument. All instruments were illuminated by means of red false panel lighting. The instruments were observed by seven pilots during a total flight time of 21 hours, six night hours, five simulated instrument hours, and two actual instrument conditions.
I. R 3

4298 House, H.A. COMPARISON OF TAXI LIGHT SYSTEMS FOR VP AND VR AIRCRAFT, FINAL REPORT. Proj. PTR EL 52018, Rep. 1, June 1954, 13pp. USN Air Test Center, Patuxent River Air Station, Md.

4298 To determine the taxi lighting system most suitable for VP and VR aircraft, five possible means of supplying lighting were compared: 1) a separate taxi light on the nose or nose wheel of the plane, 2) a controllable multi-purpose light, 3) intermittent use of regular landing lights, 4) landing lights having a second low wattage filament for taxiing, and 5) an oscillating taxi light. In addition, different wattage lamps and one versus two lamps were compared. Lights were installed in a test airplane and pilots were requested to operate and evaluate the lights while taxiing in unlighted areas at night.
T. I. R 4

4299 USN Air Test Center, INSTALLATION AND EVALUATION OF THE NAVY COMPOSITE APPROACH LIGHTING SYSTEM. Proj. TED PTR AE 10007.1, Serial ET311 161, Final Rep. 2, April 1954, 4pp. USN Air Test Center, Patuxent River, Md.

Test results indicate that the Composite Approach Lighting System is an improvement over the present Navy standard slopedline system and is satisfactory for use by all types of naval aircraft. The omission of any of the guidance features of the composite system, although these features are not necessary in all instances, is not considered advisable. Their need increases greatly with a decrease in visibility. Results indicate the need for full voltage (110 volts) or slight overvoltage (120 volts) at the red and green light fixtures to ensure brightness comparable to the white lights. Satisfactory flash-type runway lights are needed to accomplish the changeover from approach to runway light guidance. Such a light would eliminate the dark areas at runway and taxiway intersections. This is important especially on the instrument runway.
R 2

4300 Djerfeldt, C.H. INDICATOR FOR AIRPLANE ATTITUDE IN TAKE-OFF, EVALUATION OF REPORT 1, FINAL REPORT. Proj. PTR AD 346, Oct. 1954, USN Air Test Center, Patuxent River Air Station, Md.

4300 Windshield markings were evaluated to determine their usefulness in assisting the pilot to obtain a desired airplane attitude during take-off and landing. The markings were used during normal field take-offs, catapult launchings, FCLP, and normal field landings. Results were based upon the opinions of five experienced jet pilots.
I.

4301

Webster, J.C. HISTORY AND USE OF AUDIOMETRY IN THE SELECTION OF SONARMEN FOR THE US NAVY DURING AND SUBSEQUENT TO WORLD WAR II. NEL Rep. 381, May 1953, 8pp. USN Electronics Lab., San Diego, Calif.

The research conducted during World War II and thereafter on audiometry as related to the selection of sonarman leads to the following conclusions: a) sonar listening is composed of many auditory factors, which are relatively independent of each other; b) high validity between audiometer scores and sonar operation at sea has not been shown, except for a negative relationship between high-frequency hearing loss and prosubmarine performance involving high frequency acuity; c) low positive relationships generally have been found between audiometer scores and sonar school grades; d) the present standards for initial selection of sonar operators seem justified by this survey; e) the standards for transferring antisubmarine men out of the sonar specialty are more strict than seems justified; f) there is insufficient information on justification of standards for transferring prosubmarine men out of sonar in regard to: extent to which experience counteracts hearing handicap in sonar listening, and relationship of hearing loss to general performance of the sonarman's duties.

R 28

4302

Hicks, G.T. VISIBILITY AND USES OF SELF-LUMINOUS MARKERS. INTERIM REPORT. NRL Memo 284, April 1954, 5pp. USN Research Lab., Washington, D.C.

Luminescence measurements were performed on phosphors excited to luminescence with the radio isotope strontium-90. Using these luminescence measurements, threshold visibilities of different colored phosphors were determined. Some military uses are suggested, e.g., marking ammunition.

R 4

4309

Trumbull, R., Meltor, R.S. & Hollander, E.P. CHANGES IN PERSONALITY CHARACTERISTICS OF NAVAL AVIATION CADETS: I. INDOCTRINATION WEEK TO COMPLETION OF PRE-FLIGHT. Research Rep. NM 001 058.26.01, May 1954, 7pp. Naval School of Aviation Medicine, Pensacola, Fla.

4309

In order to evaluate the amount and nature of the personality modifications which take place during the four-month Naval pre-flight program, 316 cadets were administered the Guilford, Guilford-Martin series of personality tests at the beginning and following completion of the program. The results are presented and discussed in terms of those aspects of personality which reflected the greatest degree of change following completion of the training program. The implications of these findings for selection and training procedures are also discussed.

4310

Clark, B., Nicholson, Marjorie A. & Graybiel, A. "FASCINATION:" A CAUSE OF PILOT ERROR. Proj. NM 001 059.01.35, May 1953, 18pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

4310

This report enlarged the definition of "fascination" (target fixation) and determined some of the various types as it occurs in naval flight students. Twenty-five flight instructors were interviewed and a questionnaire was administered to 502 flight students. A content analysis of experiences with fascination was made and the relationship between experiences with fascination and accidents and unsatisfactory flights in training was determined. Several suggestions were advanced for reducing this flying hazard.

T. R 2

4311

Schaefer, H.J. THEORY OF PROTECTION OF MAN IN THE REGION OF THE PRIMARY COSMIC RADIATION. Proj. NM 001 059.13.06, Aug. 1952, 17pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

4311

The potential hazards to humans from exposure to the primary cosmic radiation in flight at extreme altitudes centers upon the heavy nuclei component of the primary radiation. In two preceding reports the microspatial determination of the ionization dosage along a heavy nucleus track in tissue was derived in quantitative terms in its radial and longitudinal component. It was shown that in the terminal section of the tracks (the thin-down part) the dosage reaches excessively high values. In this report the actual number of the thin-down hits per hour in a "standard man" for all altitudes and all latitudes and for all components of a heavy spectrum is derived. Relationships between number of hits and thickness of shielding layers are graphically presented.

G. I. R 6

4312
McLaughlin, S.C., Jr. THE EFFECT OF RED LIGHT ON THE ABSOLUTE VISUAL THRESHOLD. Proj. NM 001 059.28.02, Aug. 1953, 7pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

An hypothesis is advanced which may account for the appearance or non-appearance of red-light photosensitization in closely similar experimental situations in terms of the psychophysical method of threshold determination which is employed. This hypothesis, if valid, explains the appearance in the literature on vision of several sets of conflicting data during the past 10 years. Data are presented in support of this hypothesis, and these data appear to demonstrate, independently of the validity of the subject hypothesis, that the red-light photosensitization phenomenon previously reported from this laboratory should be regarded as nonexistent for purposes of operational application.

R 14

4313

Guedry, F.E., Jr. THE RETENTION OF EFFECTS OF 'MASSSED' AND 'DISTRIBUTED' VESTIBULAR STIMULATION AS INDICATED BY THE DURATION OF THE OCULOGYRAL ILLUSION. Contract N7onr 434, Proj. NM 001 063.01.33, T.O. 1, Joint Rep. 33, July 1953, 20pp. USN School of Aviation Medicine, Pensacola Air Station, Fla. (Tulane University, New Orleans, La.).

An investigation was made of the effects of a 'masssed' and a 'distributed' rotation series on 2 aspects of habituation: a) the decrement in response duration within the habituation series, b) the retention of habituation. Following preliminary indoctrination, 2 groups of 10 Ss received 39 separate rotation trials in which the rotational and post-rotational durations of the oculogyral illusion were reported. This series of trials, which constituted the habituation series, was 'masssed' into a single period with 1 group, while with the other group, it was 'distributed' over 4 half-hr., daily sessions. Tests of retention were made 7 days after completion of the habituation series. Within the limits of this experiment, the response decrement produced by a 'masssed' series is at least as great as that yielded by a 'distributed' series. However if there is a systematic difference in the retention produced by these two series, it is the 'distributed' series which yields the greater retention.

R-19

4314

Guedry, F.E., Jr. THE TRANSFER OF HABITUATION TO ROTATION WITH RESPECT TO THE MAGNITUDE OF THE VESTIBULAR STIMULUS. Contract N7onr 434, Proj. NM 001 063.01.34, Joint Rep. 34, July 1953, 19pp. USN School of Aviation Medicine, Pensacola Air Station, Fla. (Tulane University, New Orleans, La.).

This experiment is a study of the transfer of habituation with regard to the magnitude of the vestibular stimulus. Twenty human subjects received tests of the duration of the oculogyral illusion under two angular velocities before and after a series of 39 rotation trials in which an intermediate angular velocity was employed. The following inferences were made from the results: (1) Habituation is not specific to the 'practiced' angular velocity. (2) Habituation to a given intermediate stimulus will produce greater response reduction to stimuli of lesser magnitude and lesser response reduction to stimuli of greater magnitude than is obtained with the intermediate stimulus. This means that although the responses are reduced by the habituation series, the responses are indicative of a greater sensitivity to differences in vestibular stimuli after than before the habituation series. (3) Comparisons of the results prior to the habituation series have implications for theories of the vestibular end-organ which are discussed briefly. (4) Comparison of the rotational and postrotational results suggests that visual stimulation such as that produced by full room illumination has an habituatory effect which does not generalize to vestibular stimuli with opposite directional components.

R-15

4319

Peters, R.W. THE EFFECT OF HIGH-PASS AND LOW-PASS FILTERING OF SIDE TONE UPON SPEAKER INTELLIGIBILITY. Joint Proj. Rep. 25, Aug. 1954, 9pp. USN School of Aviation Medicine, Pensacola Air Station, Fla. & Ohio State University Research Foundation, Columbus, Ohio.

Forty-eight speakers read multiple-choice intelligibility test lists under conditions of either low-pass or high-pass filtering of side-tone. The sound pressure level of the side-tone was kept constant for all band-pass conditions. The results indicate that speaker intelligibility improves significantly when the frequencies above 600 cps are attenuated in the side-tone circuit.

R9

4320

Sendroy, J., Jr. & Cecchini, L.P. THE DETERMINATION OF HUMAN BODY SURFACE AREA FROM HEIGHT AND WEIGHT. Res. Rep. 12:385 410, Oct. 1954, 24pp. USN Medical Research Institute, Bethesda, Md.

A simple, rapid, and accurate method of estimating human body surface area from height and weight has been developed. From the empirical relationships of height plus weight (in cm. and kg. respectively), and the "shape" factor of the ratio of weight to height, a chart has been constructed for the graphical estimation of surface area values in the range from 0.05 to 3.0 m. From this master chart a diagram has been constructed, whereby surface areas may be obtained with the same accuracy and more conveniently, from values of height and weight alone. A comparative evaluation and a statistical analysis of the method applied to 252 measurements of surface area have been made. The results indicate a margin of superiority in respect to accuracy, especially in the case of abnormal body types, for the present graphical method as compared with the well-known Du Bois height-weight formula. The self-adjusting power equation of Boyd has been found to give results generally comparable to those obtained by our diagram. According to these tests, the equation of Preitmann has been found to be biased and not sufficiently accurate to merit consideration for further use. All factors considered, the presently proposed graphical method would seem to be generally superior to other methods of obtaining a value for surface area from the simple physical measurements of height and weight.

R32

4322

USN Personnel Analysis Div. ANNUAL REPORT-FISCAL YEAR 1954, 46pp. USN Personnel Analysis Div., Bureau of Naval Personnel, Washington, D.C.

4322

This is an annual report of the Bureau of Naval Personnel, Personnel Analysis Division for the final year 1954. A summary of accomplishments and on-going studies within various problem areas is presented. Some of these areas are as follows: guided missiles, anti-submarine warfare, mine warfare, training for specific types of tasks and duties, and so forth.

4323

Kimble, G.A., & Wulff, J.J. THE EFFECT OF RESPONSE GUIDANCE ON THE VALUE OF AUDIENCE PARTICIPATION IN TRAINING FILM INSTRUCTION. Contract AF 33(038)134678, HFORL Rep. 34, April 1953, 8pp. Yale University, New Haven, Conn.

4323

This study was designed to test the effectiveness of "response guidance" in audience participation during training film instruction. Two groups of 330 Ss (basic trainees) underwent practice sessions interspersed between sections of a film on the reading of scales on a slide rule. For one group, the practice questions included hints or "guidance cues" to assist in obtaining the correct answer. The other group answered the same questions without the "guidance cues." Performances on a post-film test of proficiency, which included new as well as old problems, are compared.
T. I.

4330

Huggins, W.H. A THEORY OF HEARING. AFRC TR 53-14, May 1953, 124pp. USAF Electronics Research Directorate, AFRC, Bedford, Mass.

4330

A model of the inner ear has been developed which combines into a simple, plausible mechanism the mechanical, dynamical, anatomical, and neurological details of the cochlear structure. The mechanism adequately accounts for the results of a variety of physical and psychological experiments. It suggests a functional purpose for certain anatomical details of the cochlear partition and it unifies into a single consistent construct the experimental facts concerning hearing.
T. G. I. R 24.

4324

Fitzpatrick, R., Vasilas, J.W. & Peterson, R.O. PERSONNEL AND TRAINING FACTORS IN FIGHTER AIRCRAFT ACCIDENTS. Contract AF 33(038)13260, HFORL Rep. 37, April 1953, 36pp. American Institute for Research, Pittsburgh, Penn.

Data were collected for a large, relatively homogeneous sample of pilots, and this sample was subdivided into groups still more homogeneous with regard to assignment and experience. The relationships between accidents and scores on a number of tests were determined. The tests used were: Arithmetic Reasoning, Biographical Data (Pilot), Two Hand Coordination, Finger Dexterity, Dial and Table Reading, Speed of Identification and Discrimination Reaction Time. The results implied that it was not theoretically possible from a knowledge of certain of his test scores to predict the number of accidents a pilot may incur. There was a very slight indication that if a pilot obtains a low score on the printed classification test in Arithmetic Reasoning, he is more likely to have accidents of a judgment cause than a pilot who obtains a high score on the same test. No such relationships were obtained for any of the other tests or causes analyzed. (HEIAS)
R 2

4325

Berrien, F.K. & Sammons, H. A STUDY OF CHECK-OUT PROCEDURE IN JET AIRCRAFT. Contract AF 18(600) 137, HFORL Rep. 40, Aug. 1953, 43pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C. (Institute for Research in Human Relations, Philadelphia, Penn.).

4325

To investigate the relation between check-out procedures (an examination of a pilot to determine whether he is competent to fly a particular type of aircraft) and accident frequency, a rating procedure was developed through use of an interview and data blank. After pre-testing the data blank in the field, data collection from 14 operational jet squadrons was accomplished. Ratings of completeness of check-out procedures were studied in relation to pilot error accidents and accident frequency over a four-month period. Recommendations were made for improving the check-out procedures.
T. G. I.

4326

Torrance, E.P. SURVIVAL PSYCHOLOGY, SOME THINGS THE COMBAT AIRCREWMAN SHOULD KNOW ABOUT. THE PSYCHOLOGICAL ASPECTS OF SURVIVAL. HFORL Memo Rep. 42, Dec. 1953, 42pp. Human Factors Operations Research Lab., ARDC, Washington, D.C.

It may be some time before an adequate set of psychological principles for survival can be established. But meanwhile aircrewmembers are facing emergencies, surviving or not surviving. Some are not surviving because they are unable to use the equipment and technical training which they have been given. Some of those who do survive suffer needlessly for the same reason. The survival experiences of hundreds of Air Force personnel downed during World War II and the Korean combat have been studied to determine the mental and emotional problems arising under conditions of survival and the most practical steps to take in order to avoid or satisfactorily solve these problems. From this study came the principles listed in this booklet. Each is followed by typical examples quoted from actual survival reports, and under 'What To Do' you will find suggestions for applying the principles to training and actual survival situations.

4328

Howard, R.A. SUN-SAND AND SURVIVAL. AN ANALYSIS OF SURVIVAL EXPERIENCES IN DESERT AREAS. ADTIC Pub. D 102, Jan. 1953, 42pp. Arctic, Desert, Tropic Information Center, USAF Air University, Maxwell AFB, Ala.

This study of desert survival episodes is not intended to be a statistical study of experiences or chances of survival. It is instead a report of the nature and range of experiences of military personnel isolated in desert areas during wartime. The analysis covers 382 individual successful survival episodes. Involved in this study are accounts of 142 additional men who were lost, strayed, or died en route. It is impossible to determine what percentage this might represent of the total number of men who went down. The stories were taken from the period of 1940 to 1943 and operations in North Africa. Only a few stories occurred after 1943. (HEIAS)

4332 Moser, H.M., Dreher, J.J. & Adler, S. THREE-DIGIT NUMBER TELLING AND REPETITION METHODS. Contract AF18(600) 316, AFRC TR 54 81, Rep. 11, Aug. 1954, 5pp. Ohio State University Research Foundation, Columbus, Ohio.

Three types of three-digit number telling were investigated: a) single digit (e.g., 3-1-4); b) group (e.g., 3-1-4); c) full word form (e.g., 314). The safest general rule to follow in telling three-digit numbers is to pronounce them as single units (a). Under favorable listening conditions and when Americans are on both ends of the communication link, either the form (b) or full word form (c) does as well, but only under these two conditions. As soon as a moderate amount of noise is present or when foreign speakers are involved, the single-digit telling method is required for maximum efficiency. Repeating a number does virtually no good if the repetition is in the same form (viz. 3-1-4, I say again, 3-1-4). Changing the form of the repeated number helps if the single-digit and group style is coupled in either sequence (AC or CA). In general telling method B is definitely to be avoided. In only one condition does it perform satisfactorily, namely, when it follows method C in a repeated message. (Method B alone, repeated, or in combination with any other form, results in poor listener reception.) The performance of international listeners on repeat methods is consistent regardless of the nationalities of listener or speaker.

4331 Moser, H.M., Dreher, J.J. & Patterson, R.E. SENTENCE ELEMENTS AND LISTENER RESPONSE. Contract AF18(600) 316, AFRC TR 54 80, Rep. 10, Aug. 1954, 18pp. Ohio State University Research Foundation, Columbus, Ohio.

The experiment investigated the intelligibility of various sentence elements in air language usage. The stimulus material consisted of 61 sentences using information that could be expected before and 52 sentences after a plane is airborne and was read by 6 speakers of various nationalities. 17 listeners of various nationalities heard the sentences at a 9 db S/N ratio, each sentence followed by a pause during which a verbatim repeat was attempted. The listener was simultaneously occupied with a minor manipulation task providing motor distraction. Accuracy of responses was calculated and analyzed as follows. No statistical superiority resulted from prefixing order with the word "please". A correlation of 0.95 exists between verbatim and paraphrase scores, making the more useful paraphrase a sufficient measure of listener reception of connected discourse. A list of paraphrase scores yielding superior response is given. No differences in articulation scores can be related to a word's root (Latin vs. Anglo-Saxon). The mode of utterance (command, question, or statement) does not affect its reception. Command words are as effective without tag words as with them. A low but significant correlation existed between sentence length and successful reception. (NEIAS)

4333 Lorge, I., Davitz, J., Fox, D. & Herrold, K. EVALUATION OF INSTRUCTION IN STAFF ACTION AND DECISION-MAKING. Contract AF 33(038) 28792, Tech. Res. Rep. 16, Dec. 1953, 70pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (Institute of Psychological Research, Columbia University, New York, N.Y.).

4333 The Quality Point Score (QPS) method for evaluating written decisions (see 4334) was employed to assess the effectiveness of instruction in staff action and decision-making at the Air Command and Staff School. The 55, 473 officer students, were required to submit solutions to problems and plans of action as individuals and as small ad hoc groups before and after receiving instruction. Scores on the written decision (pre- and post-course) are compared for individuals and groups. T.

4334 Lorge, I., Davitz, J., Fox, D., Herrold, K. et al. MANUAL FOR EVALUATING WRITTEN DECISIONS: THE QPS METHOD. Contract AF 33(038) 28792, Res. Memo. 20, Oct. 1953, 115pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (Columbia University, New York, N.Y.).

4334 A method for evaluating written decisions of Air Force students is described. A content analysis was performed on 300 written decisions on four problems in human relations. Discrete ideas were classified and were rated by four judges on a four-point scale for the amount of credit each deserved. Directions for scoring decisions and obtaining Quality Point Scores are given. Reliability of the method was measured by the correlation between independent scorings. Validity was measured by correlation between ranked judgments by advanced psychology students and Air Force officers of 60 statements. T.

4335 Findley, W.G., Frederikson, N.O. & Saunders, D.R. AN ANALYSIS OF THE OBJECTIVES OF AN EXECUTIVE-LEVEL EDUCATIONAL PROGRAM. Contract AF 33(600) 5833, Tech. Res. Rep. 22, Jan. 1954, 34pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (Educational Testing Service, Inc., Princeton, N.J.).

4335 This study was designed to ascertain the objectives of instruction in the Field Officer Course. As an initial step in the development of a battery of tests to evaluate executive skills in Air Force officers, 502 statements on desired outcome of training were gathered from instructors and were classified into 12 functional categories, e.g., "flexibility," "foresight," "team organization," and "effective evaluation of data." T.

4337 Ford, T.R. OFFICER AFFILIATION WITH THE AIR FORCE RESERVE TRAINING PROGRAM, 1953. Res. Memo. 24, Jan. 1954, 24pp. USAF Human Resources Research Institute, Maxwell AFB, Ala.

4337 This report presents an analysis of demographic data pertaining to 1,234 inactive duty Air Force Reserve officers residing in selected areas of Alabama and Georgia. Attention is focused on the relationships existing between various characteristics (age, rank, number of dependents, education, aeronautical rating, civilian occupation, and Air Force occupational specialty) of these officers and affiliation or non-affiliation with an Air Force Reserve training program. T. G.

4342

Timberlake, P.W. COMPARATIVE EVALUATION OF THREE PRESENTATIONS OF THE LEAR VERTICAL GYRO REMOTE ATTITUDE INDICATOR. Proj. APG/ADA/19 A, June 1953, 13pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

4342

To make a comparative evaluation of three presentations of the B-1A Lear attitude indicator for use in current jet aircraft, a total of 82 missions were flown in both fighter and bomber type airplanes by pilots with various degrees of previous experience with the standard Lear attitude indicator. The test indicators were used in simulated instrument flight during take-off, maximum climb, level flight at low and high altitude, recovery from unusual positions, maximum slowdown, range orientation, Ground Control Approach recovery and go-around. Recommendations are included.

T. I.

4343

Timberlake, P.W. EVALUATION OF GRADUATES OF THE AIRCRAFT CONTROL AND WARNING OPERATOR COURSE. Proj. APG/ADA/69 A, Oct. 1953, 21pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

4343

To evaluate the ability of the graduates of the Aircraft Control and Warning Operator Course to perform the job for which they were trained, four airmen test students, selected to provide an academic cross section of the class, were brought to Eglin Air Force Base immediately after graduation. They were used as regular replacements in a radar control unit during a 60-day test period. Each graduate was assigned to a supervisor who made his daily work assignments and rated his performance. Interviews were also held with graduates and supervisors in an attempt to determine basic causes of observed weaknesses. Data were tabulated and discussed in terms of advisable changes in the training course.

T.

4359

Putnam, W.L. OPERATIONAL SUITABILITY TEST OF THE MF-1 ATTITUDE INDICATOR. TERMINATION REPORT. Proj. APG/TAT/103 A, March 1954, 10pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

4359

To evaluate the MF-1 Attitude Indicator as a flight instrument and to determine its suitability as a dive angle indicator for use in dive bombing, flight tests were conducted. Approximately 40 hours flying time were accomplished with the instrument installed in the rear seat instrument panel of a T-33 jet trainer (instrument flying phase). The dive bombing phase was accomplished with the indicator mounted in the instrument panel of an F-86F aircraft with runs made at various angles between 20 and 70 degrees at altitudes ranging from 10,000 to 20,000 feet. Pilot opinions were gathered and assessed.

I.

4361

Fleishman, E.A. A FACTORIAL STUDY OF PSYCHOMOTOR ABILITIES. Res. Bull. AFPTRC TR 54-15, May 1954, 43pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

The present paper has described a large-scale factor analysis study of performance in the relatively unexplored aptitude area of psychomotor skill. A large number of apparatus and printed psychomotor tests were selected or specifically designed to measure certain ability categories hypothesized to exist from the results of previous research in this area. After extensive pretesting, the tests were assembled into a battery and administered to 400 Ss. The correlations among scores on these tests were then subjected to a Thurstone centroid factor analysis. The results of the study appear to confirm the existence of the following relatively independent factors in psychomotor skill: a) wrist-finger speed; b) finger dexterity; c) rate of arm movement; d) manual dexterity; e) steadiness; f) reaction time; g) aiming; h) psychomotor coordination; i) postural discrimination; j) spatial relations. 2 additional factors were isolated but their interpretation or significance remains doubtful. The results were discussed with respect to the factor composition of individual tests, the utility of certain printed tests designed to reproduce apparatus test variances, and the contribution of these factors to certain kinds of more complex psychomotor performance.

A 13

4362

Lesiw, W. A COMPARISON OF METHODS FOR ACHIEVING TRIGGER BURST CONTROL. Proj. 7708, Task 77141, AFPTRC TR 54-17, May 1954, 28pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

4362

To make a comparative evaluation of two methods for achieving burst-interburst interval control of triggering in the flexible gunner's task, 129 flexible gunnery students in a stage of training preceding air-to-air instruction were studied. Two methods of training for burst control were used: a counting method and a buzzer-synchronizing method. Five days of practice on one of the two methods was given to each S followed by a retest six days after the last practice day. Changes in burst estimates with practice and retention after six days were analyzed for effect of method.

T. G. I. R 6.

4364

Brandenburg, R.E. FLIGHT TEST EVALUATION OF THE SPECIALTIES AND KOLLSMAN ANGLE OF ATTACK INDICATORS. Tech. Note WCT 53 77, Rep. R.653 1605, Feb. 1954, 23pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

4364

To evaluate two different angle of attack indicators (Specialties and Kollsman) in terms of their practicability during landing approach and in cruise control, flight tests were conducted on T-33A jet trainer aircraft. Both indicators were installed in the same plane and tested simultaneously. Level flight runs were flown at 2,000, 6,000, 8,000, and 25,000 feet throughout the entire speed range of the aircraft at each altitude. Accelerated and unaccelerated stalls were flown at 10,000 and 30,000 feet; two climbs were made to approximately 36,000 feet; simulated cruise conditions and ground control approach runs were made. Repeatability and effect of turbulent air conditions on accuracy are discussed. Recommendations are included.

T. G. I.

4367

Schultz, E.W. & O'Connor, L.J. PRINCIPLES AND PROBLEMS OF AIRCRAFT INSTRUMENT DESIGN AND EVALUATION. Tech. Note NCT 44, May 1954, 18pp. Wright-Patterson AFB, Directorate of Flight and All-Weather Testing, Ohio.

This report represents an attempt to define and analyze the aircraft instrument and flight system presentation, design and evaluation problem. It organizes and clarifies the problems associated with design and evaluation and shows how they may be individually treated and collectively resolved. It recommends establishment of organizational procedure to insure against the pitfalls of past practices and procedures.

4369

Daniels, G.S., Meyers, H.C. & Churchill, E. ANTHROPOMETRY OF NALE BASIC TRAINEES. Contract AF 18(600) 30, WADC TR 53 49, July 1953, 99pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

4369

Body size data for 63 measurements of over 3,000 USAF male basic trainees are presented for use by aircraft and equipment designers. The statistics reported for each measurement are the mean, standard deviation, coefficient of variation, standard errors of these statistics, range, and selected percentiles from the first to the 99th. In general, the statistics are reported in both the metric and English values. A complete description of the anthropometric techniques used is included.
T. I. 2 4

4371

Sanders, Virginia L. & Cohen, J. THE INFLUENCE OF METHODOLOGY ON RESEARCH ON INSTRUMENT DISPLAYS. Contract AF 18(600) 50, WADC TR 53 93, April 1953, 32pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

4371

The research that has been done on instrument displays (61 studies) is reviewed in terms of the methodology used, the philosophy underlying its use, the ways in which the choice of a method has limited the problems to be studied, and the limits placed by the method upon the validity (applicability) of the results. The findings are presented in tabular form and discussed critically. Three classes of future research are briefly outlined.
G. I. 2 64

4373
Henry, F.A. AVIATORS "BENDS" PAIN AS INFLUENCED AT ALTITUDE AND IN FLIGHT DENITROGENATION. Contract AF 18(600) 20, WADC Tech. Rep. 53 227, March 1953, 48pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (University of California, Berkeley, Calif.).

Experiments in the altitude chamber of the University of California (Berkeley) show that descent to a cabin altitude of 31,600 ft. reduces the pain of aviator's "bends" to moderate severity. Below 28,000 ft. the pain is mild; it disappears (on the average) at 21,900 ft. Cases of bends kept at 10,000 or 15,000 ft. show a reduction in aerobolism directly related to "storage" time; in 3 hrs. there is a 13,000 ft. gain in critical altitude. Frequently repeated ascent and descent does not change the critical altitude. With "storage" at 20,000 or 25,000 ft. the pain altitude changes very little within 3 hrs. presumably because there is growth of sub-clinical tissue bubbles. In-flight denitrogenation for the prevention of aerobolism symptoms should therefore be carried out at 10,000-15,000 ft. Oxygen economy can be aided by breathing cabin air at 10,000 ft. during the first hour of a longer denitrogenation period on full oxygen at 15,000 ft. without sacrifice of protection. Available preoxygenation tables give valid predictions of physical exertion is mild; with heavy work, considerably more denitrogenation is required. Protection is achieved by reducing symptom intensity rather than delaying onset of aerobolism. Denitrogenation progresses as the mirror image of denitrogenation.
R 10

4374

Simmons, C.F. BOWEN FACTORS IN PERSONAL EQUIPMENT FAILURES. WADC TR 53 244, Dec. 1953, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

4374

A review of the "In Service" conditions pertaining to the effectiveness of the standard Air Force personal equipment is presented using as an example detailed conditions of the Type F-3 Protective Helmet. The manner in which the safety of the airman is affected by the headgear is shown to the extent that too many of the deaths resulting from attempts to escape from the aircraft by seat ejection may be attributed to conditions reported. An outline is provided presenting corrective action considered necessary to achieve maximum protection possible from the equipment provided. Photographs illustrate the conditions described.
I. 2 3

4375

Hall, J.F., Jr., Polte, J.W., Kelley, R.L. & Edwards, J., Jr. COOLING OF CLOTHED SUBJECTS IMMersed IN COLD WATER. WADC TR 53 323, April 1953, 34pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

4375

To determine 1) the amount of body insulation or clothing that would provide maximal cold-water protection without impractical restrictions due to bulk, 2) the effect of body insulation on hand and foot cooling, and 3) the effect of sudden cold-water immersion upon the metabolic rates of Ss wearing the indicated types of insulation, a series of 26 experiments using seven Ss was conducted. Hand, foot, average skin temperatures, and metabolism were measured before and during immersion (up to the neck) in cold water (32-39 degrees F). Underlying clothing of 2.3, 3.7, and 4.7 clo insulation was worn under an outer water-impermeable, anti-exposure suit. Average skin and extremity cooling rates were calculated.
T. G. I. 2 14

4376

Crook, M.H., Hanson, J.A. & Weisz, A. LEGIBILITY OF TYPE AS DETERMINED BY THE COMBINED EFFECT OF TYPOGRAPHICAL VARIABLES AND REFLECTANCE OF BACKGROUND. Contracts W33 038 AC 14559 & AF 33(616) 2018, WADC TR 53 441, March 1954, 24pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.).

4376

To investigate factors affecting legibility (recognition of individual letters) of capital letters, 12 Ss performed an oral reading task under red illumination (0.082 ft.-c). Experimental type approximating a size range from 4- to 8 1/2-point Gothic type, three stroke widths, and three spacings were printed on three papers with red light reflectances of 87, 49, and 26 percent. The data (speed and accuracy scores) are analyzed as functions of the variables and their interactions. Application of the data to the design and legibility of aeronautical charts was noted.
T. G. I. 2 5

4377 Morrison, Nina K. & Schaefer, L.A. GROUND STUDY OF THE NONEJECTION METHODS OF ESCAPE FROM B-47B AIRCRAFT. Phase I of Evaluation of Methods of Crew Escape from B-47B Aircraft. WADC Tech. Rep. 54-6, April 1954, 16pp. USAF Aero Medical Lab., Wright-Patterson Center, Wright-Patterson AFB, Ohio.

This report covers Phase I, a ground study of the nonejection methods of escape from B-47B aircraft. Because the cabin space available to the crew members is so limited, it was necessary to make a thorough investigation of these body positions and movements at the disposal of the crew when evacuating the aircraft. This study, done at the Wright-Patterson Air Force Base, led to the establishment of optimum procedures to be followed by each man when leaving his station and reaching the possible escape exits, and the most feasible body positions for leaving the aircraft. Time studies of crew evacuations were conducted at Lockbourne Air Force Base utilizing the procedures presented in this report. These studies covered crew escape through the ventral hatch, with and without the use of an escape bracket, and through the crawlway to the bomb bay. 8 crews participated in the ventral hatch tests and 6 crews in the bomb bay tests. Ground studies of egress through the navigator's ditching hatch and canopy were limited to the timing of individuals making personal leads disconnects and standing at their stations. The feasibility of using these exits will have to be determined during the Air Study Phase. Analysis of the data thus accumulated indicates that the optimum method of nonejection escape from this aircraft is through the ventral hatch in a feet-first, facing-aft position utilizing the Barco escape bracket.

4380 Hote, F.A., Biersdorf, W.R., Kent, G.W. & Myers, J. VISUAL CONTRAST DISCRIMINATION AS A FUNCTION OF PRE-EXPOSURE TO LIGHT. Rep. on Human Engineering Research for Fire Control and Missile Control Systems. Contract AF 18(600)54, WADC Tech. Rep. 54-80, Feb. 1954, 12pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

The just discriminable brightness contrast threshold was measured for 12 Ss (6 using the natural pupils, 6 with 2 mm artificial pupils) at 3 values of target luminance following pre-exposure to a constant intensity for 3 durations. Each S went through all 9 combinations of conditions 5 times. The duration of pre-exposure had little effect upon contrast sensitivity when the highest target luminance was used. At the middle value of target luminance, the longer the pre-exposure the higher the contrast threshold upon termination of pre-exposure and the slower the recovery of maximum sensitivity. When the lowest target luminance was used (a value near the dark adapted threshold for the fovea), the effect of pre-exposure was marked. For all durations when artificial pupils were used, the initial threshold following pre-exposure was high and the speed of recovery depended upon the duration; the longer the duration, the slower the speed. When natural pupils were used the initial threshold contrast ratio was about 0.3 and recovery of maximum sensitivity was rapid. At the 2 longer durations there was a delay of the order of 15-50 seconds before an initial setting could be made at maximum contrast (0.5) and the recovery of maximum sensitivity was greatly retarded.

4378 Imber, B.M., Stern, I.D. & Vanderplas, J.W. VISUAL FIELD RESTRICTION AND APPARENT SIZE OF DISTANT OBJECTS. WADC TR 54-23, Jan. 1954, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

4378 To investigate the effect of reduced visual field size upon the apparent size of distant objects when the factors inherent in optical systems are eliminated from the situation, four observers made judgments comparing the apparent size of a variable-sized white square, set at a distance of 500 ft. and viewed monocularly through an aperture, with the apparent size of a standard 20-inch square viewed binocularly at a distance of 30 ft. Aperture sizes from five to 60 degrees were used to restrict the visual field. The findings are discussed in relation to the large decreases in apparent size of objects when viewed through a telescope.

T. G. I. R 11

4379 Wyckoff, L.S., Bridgman, C.S. & Tabory, L. THE EFFECT OF AN IMPROVED ORIENTATION AID ON TARGET ACQUISITION WITH THE HEMISPHERIC SIGHT. Contract AF 18(600) 54, WADC TR 54-67, Jan. 1954, 6pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

4379 To test the effect of a simple orientation aid on the speed of slowing and acquiring targets that have been spotted outside the periscopic type sight, subjects were tested using velocity hand controls. The aid consisted of eight illuminated lines radiating from the center of the target space and stationary with respect to this space. Such an aid could be incorporated as a moving reticle in the focal plane of sight. Two groups of subjects were tested for a period of eight daily sessions, one with and one without the sight. Cumulative time for acquiring the target was recorded for each run of 38 targets and the two groups were compared at each stage of practice.

T. G.

4381 Archer, E.J. IDENTIFICATION OF TARGET CONCEPTS AS A FUNCTION OF INFORMATION LOAD. Contract AF 18(600) 54, WADC TR 54-202, March 1954, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

4381 To investigate the effect of information load on response time, 12 groups of six Ss each served in an experiment on target identification. The groups corresponded to the cells of a three by four factorial design having one to four bits of relevant and zero to two bits of irrelevant information presented to the S by a single stimulus source. The task was to identify oscilloscope patterns by positioning four lever-action switches and to test identification by pressing a push-button. The response measure was the time required to identify 32 consecutive patterns. Errors were also recorded. Time to respond was analyzed as a function of relevant and irrelevant information load.

T. C. R 4

4382 Hirsh, I.J. STUDIES ON AUDITORY MASKING, FATIGUE, AND SPEECH INTELLIGIBILITY. Contract AF 11(600) 131, WADC TR 54-203, June 1954, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Central Institute for the Deaf, St. Louis, Mo.).

4382 To specify more precisely the kind of impairment suffered during exposure to loud noise, four experiments were performed. In the first study the threshold of intelligibility (level at which 50 percent of the words in a list are recognized) for spondaic words as a function of the level of 11 bands of noise was measured. In the second study the definition that a critical band of noise should have the same absolute threshold as a pure tone in the center of the band was tested. The third experiment studied masking of different speech materials (four 200-item lists) with the same speakers and listeners. Finally, the effect of filtering on different speech materials was studied. Incomplete research was discussed, and recommendations were included.

R 13

4383

Howes, D.H. ON THE INTERPRETATION OF WORD FREQUENCY AS A VARIABLE AFFECTING SPEED OF RECOGNITION. WADC TR 54 282, June 1954, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

4386

Lacey, R.J. SUITABILITY OF THE GRAY INSTRUMENT PANEL FOR USE IN USAF AIRCRAFT. WADC TR 54 12, April 1954, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

4353

An interpretation of the inverse relationship between the duration threshold of a word and its frequency of occurrence is outlined in which the frequency of a word in the Thorndike-Lorge tables serves as an estimate of the frequency with which college students would have used that word at the time the duration thresholds were measured. The validity of this estimate is tested by three experiments based on a rank-correlation procedure with additional experiments providing a check on the method. Some reasons for preferring the proposed interpretations to others that have been suggested are mentioned.

T. R 12

4384 Lebowitz, H.W. & Lomont, J.F. THE EFFECT OF LUMINANCE AND EXPOSURE TIME UPON PERCEPTION OF MOTION. Contract AF 18(600)54, WADC Tech. Rep. 54 780, March 1954, 9pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

The isochronal threshold velocity is defined as the minimum rate of target displacement necessary for the detection of movement at a constant duration of exposure. Threshold values were obtained for a wide range of luminance values in foveal vision at various durations of exposure. The function relating motion perception to luminance decreases as luminance is increased, rapidly at first and then more slowly, as the data approach a limiting value. The effect of an increase in exposure time is to shift the entire function to lower threshold values as well as to minimize the effect of luminance in decreasing the threshold velocity. The perception of movement is more precise the higher the luminance and the longer the exposure time. The lowest thresholds, however, are obtained at the longer durations, and it is recommended that exposures of more than 2 seconds be employed when detection of target motion is important. Such long exposures produce the lowest thresholds even under poor conditions of luminance.

R 8

4385

Downing, A.L. THE EVALUATION OF VU-GRAPH TECHNIQUES FOR GCI PLOTTING APPLICATIONS. WADC TR 54 37, July 1954, 18pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

In a Ground Controlled Intercept Station, the present system of data presentation is that of reading the radar-derived data from a PPI scope and telephoning the information to plotter at a large transparent plotting board where it is written (in reverse) on the back of the board. A recommendation to replace the slow teller-plotter links with a standard Vu-graph, a special type of transparency projector enabling an operator to write or draw and have the image he creates projected on a screen, was made and this study evaluates its use. On the basis of various tests, it is recommended that expected difficulties in keeping permanent records by this means would outweigh the possible saving in time and manpower. (HEIAS)

4386

Dunlap and Associates, Inc. A HUMAN ENGINEERING REVIEW OF THE TACTICAL AIR CONTROL PARTY COMMUNICATIONS VEHICLE AN/MRC 43. Contract AF30(602) 21 5, WADC Tech. Note 54 45, Oct. 1953, 7pp. USAF Rome Air Development Center, Griffiss AFB, N.Y. (Dunlap and Associates, Inc., Stamford, Conn.).

The specifications for the AN/MRC-43 state that presently available communications equipment must be utilized and that modifications or redesign of the equipment components is not permitted. Accordingly, a recommended arrangement of the presently available control components is presented. However, any arrangement of these components involves certain undesirable features. Consequently a design is presented which avoids the difficulties but requires some modification of the control units only. This arrangement should be adopted provided modification of these units is permissible.

4388

To determine the functional suitability of a gray instrument panel for use in USAF aircraft, two aircraft were equipped with a gray instrument panel and gray cockpit surround, including right and left consoles and floor. No instruments or control positions were changed. Pilots (33) were randomly assigned for flights in each aircraft; upon completion of each flight, the pilot completed a questionnaire designed to evaluate the functional suitability, visual adaptation, and appearance of the gray panel. Various Air Force Base and one aircraft manufacturer were asked to comment regarding acceptability of gray panels. Recommendations were included.

T. R 2

4387

Coakley, J.D. & Fucigna, J.T. A HUMAN ENGINEERING REVIEW OF THE CONTROL TOWER CONSOLE, AN/FRC-19. Contract AF 30 (602) 215, Task 04, WADC TR 54 16, Dec. 1953, 19pp. Dunlap & Associates, Inc., Stamford, Conn.

4387

This report presents the findings resulting from a human engineering review of the Control Tower Console AN/FRC-19, conducted at the Radio Receptor Corporation, Brooklyn, New York, and Mitchell Air Force Base, Minneapolis, New York. The Control Tower Console is a system for consolidating equipment necessary for effective control of air traffic by an airfield control tower. In addition to the general evaluation, with recommendations included, appendices contain an evaluation of the details of separate components of the system and the functions of personnel who utilize the console.

T. 1.

4385 Haber, H. THE PHYSICAL ENVIRONMENT OF THE FLYER. ca. 1954, 179pp. USAF School of Aviation Medicine, Randolph Field, Tex.

This manual on the physical factors of the flyer's environment is designed to a) serve as a guide to the aeromedical research worker, and b) serve as a source of instruction to the student of aviation medicine. Chapters are included on: a) The gaseous state of matter; b) General physics of the atmosphere; c) Geochemistry of the atmosphere; d) The atmosphere in the field of solar radiation; e) Atmospheric scattering and the light of the sky; f) Visibility in meteorology and aviation; g) The stratification of the atmosphere; h) Mechanical and thermal aspects of flight; i) The aerospace. (MIA) R-162

4390 Schmidt, I. & Bingel, A.G.A. EFFECT OF OXYGEN DEFICIENCY AND VARIOUS OTHER FACTORS ON COLOR SATURATION THRESHOLDS. Proj. 21 31 002, April 1953, 21pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4390 The effects of oxygen deficiency, alcohol, and coffee on color saturation thresholds were studied. The colors tested were red, green, and blue presented, by the use of filters, to one half of a circular white test area of foveal size. The subject observed the test area with a neutral-adapted eye and named the color of the mixture half if he perceived a color difference. Color was added in an amount close to the color saturation threshold. Percentage of correct response, determined before and after an agent (hypoxia, alcohol, caffeine) was effective, served as an indicator of color sensitivity. Conclusions drawn from the standpoint of aviation medicine are presented. T.G. I. R 22

4391 Gerathwohl, S.J. CONSPICUITY OF FLASHING LIGHT SIGNALS. EFFECTS OF VARIATION AMONG FREQUENCY, DURATION, AND CONTRAST OF THE SIGNALS. Proj. 21 1205 0012, Rep. 1, June 1954, 7pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4391 To test the conspicuity (signal effectiveness) of flashing light signals in a complex situation designed to simulate that of a person engaged in present-day practical signal problems, two experiments were conducted. A multiple reaction test in which the observer had to respond successively to a complex pattern of light and sound signals over a relatively long period of time was used. In the first experiment, conspicuity of signals of a relatively slow frequency and long duration were compared with that of a relatively fast frequency and short duration at different brightness contrasts. In the second experiment, the separate and joint effects of flash frequency, duration, and brightness contrasts were evaluated. T. G. R 8

4392 Payne, R.B. & Hauty, G.T. THE PHARMACOLOGICAL CONTROL OF WORK OUTPUT DURING PROLONGED TASKS. Proj. 21 1601 0004, Rep. 2, May 1953, 13pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4392 To determine the relative and joint effects of a motivational technique (different levels of indoctrination as to significance of the study for an important operational problem of the Air Force) and an analeptic drug upon prolonged performance of a perceptual-motor task, preliminary training was given to 80 Ss on a complicated compensatory pursuit task involving simulated aircraft instruments and controls. The Ss then worked for four hours under the various motivational and pharmacological conditions (two analeptic drugs, a sedative, and a placebo). The treatment effects were appraised in terms of general course of performance, terminal levels attained, and the attitudes and feelings generated in the experimental setting. T. G. R 20

4393 Payne, R.B. & Hauty, G.T. THE EFFECTS OF MOTION-SICKNESS PREVENTIVES UPON CERTAIN PERCEPTUAL-MOTOR COMPONENTS OF THE PILOT'S TASK. Proj. 21 1601 0004, Rep. 3, May 1953, 5pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

4393 To appraise the relative effects of two motion-sickness preventives (hyoscine and bendaryl-hyoscine) upon certain perceptual-motor components of pilot skill, 64 subjects received training on a compensatory pursuit task involving simulated aircraft instruments and controls. They then continued work for four hours under conditions designed to appraise the relative effects of the two drugs which differed in protective capacity. The effects were viewed in terms of the general course of performance and the terminal level obtained. Results are discussed with regard to aircrew effectiveness. T. G. R 6

4395 Demsey, M.E., Siskind, R.P., Hanley, T.D. & Steer, H.D. A FUNDAMENTAL FREQUENCY RECORDER FOR COMPLEX SOUNDS. Contract N60r1 104, Rep. SDC 104 2 34, Tech. Rep., Oct. 1953, 55pp. Purdue University, Lafayette, Ind.

The design and development of an electronic-photographic circuit for recording the fundamental frequency of simple or complex speech signals is described. The instrument employs the Purdue Pitch Meter with a revised equalizing section and a new circuit to time electronically the period of the individual cycles of the fundamental frequency. This period measurement is recorded at the end of each cycle as a dot on a cathode ray oscillograph screen, which is calibrated in an approximately logarithmic frequency scale. The 3 scales are 250, 500, and 1,000 cps full scale. Permanent fundamental frequency records are obtained through the use of either a single or a moving-frame 35 mm oscillograph recording camera. The analysis of these records is facilitated through the use of an opaque projector. Although frequency measurements may be taken at other time intervals, for the present, the time interval is 1/26 second. Measurements may be taken at the nearest quarter-tone or 1/24 of an octave. R 4

4394

Spilka, B. & Steer, M.D. THE EQUATING OF READING MATERIALS FOR VOCAL RATE-DURATION AND INTENSITY. Contract #6ori 104, Tech. Rep. SDC 104 2 35, Jan. 1954, 25pp. Purdue University, Lafayette, Ind.

An investigation was conducted to select reading passages considered to be equivalent with respect to the voice variables of percent phonation time, average syllable duration, mean vocal intensity, and vocal intensity variance. One hundred and twenty-eight young adult college males took part in this study. Eight reading passages were chosen for analysis and 16 subjects read each of the passages. Recordings of the passage readings were analyzed by means of the Purdue Speech Sound Timer and the Sound Apparatus Company's High Speed Power Level Recorder, Model MPL-2. The results of the analysis may be summarized as follows: a) All eight passages were found to be homogeneous with respect to their means and variances of mean vocal intensity; b) Seven of the reading passages (all except Passage H) were found to be equated in their means and variances of mean syllable duration; c) Six of the reading passages (all except F and H) were found to be equivalent with respect to their means and variances of percent phonation time; d) Seven of the reading passages (all except E) were found to be equivalent with respect to their means and variances of the vocal intensity variance.

R9

4396

Steer, M.D., Weiss, A.L., Green, D.S. & Hanley, T.D. UTILIZATION OF THE SONOGRAPH AS AN INSTRUMENT FOR PREDICTING RELATIVE INTELLIGIBILITY OF TALKERS IN MILITARY COMMUNICATION. Contract #6ori 104, SDC Tech. Rep. 104 2 33, Oct. 1953, 18pp. Purdue University, Lafayette, Ind

As was shown by this experiment the Sonograph is limited in its usefulness as a method of predicting the intelligibility of talkers because of the following factors: a) The limitations which are imposed upon this method by the differences in pronunciation of words on the part of military Ss. b) Shortcomings of the Sonograph itself in offering measurements of the overall intensity of speech and duration of individual speech sounds. c) The need for extensive training and experience on the part of personnel who will be required to interpret the sonagrams.

R 5

4398

Wismann, F.R., Vanderble, J.H. & Daniels, F., Jr. ENERGY COST OF WEARING ARMORED VESTS AND CARRYING PACK LOADS ON TREADMILL, LEVEL COURSE, AND MOUNTAIN SLOPES. Rep. 208, May 1953, 11pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

4398

The energy cost of wearing an eight-pound, laminated nylon, armored vest with zipper closed was measured while subjects were walking, with and without a 40-pound pack load, on 1) a treadmill, 2) a level course, and 3) climbing slopes of from 3 to 22 degrees. Metabolic rates, sweat loss, and final pulse rates of six subjects were compared for each condition.

T. I.

4399

Newman, R.W. MODEL AND SIZE DATA FOR THE DESIGN OF MEN'S CLOTHING. Proj. 64 02 001, Rep. 217, July 1953, 16pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

4399

This study presents average data on bodily dimensions of approximately 25,000 United States soldiers. The series is successively divided into subgroups on the basis of size (Chest Circumference), model (Drop or Chest Circumference minus Waist Circumference), and length (Stature). Mean values on size groups and models within size groups are presented in tabular and graphic form; length groups within the models and sizes are given in tabular form only. It is recommended that the data presented here be considered in any proposed major revision of the U.S. Army men's service uniform.

T. G.

4400

Daniels, F., Jr., Lyman, J. & Vanderble, J.H. A STUDY OF THE EXPERIMENTAL PACK T 53-8 WITH A REVIEW OF METHODS FOR STUDYING LOAD-CARRYING SYSTEMS. EPD Rep. 225, March 1954, 27pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

4400

The T53-8 load-carrying system (an experimental pack designed to balance the load fore and aft, to minimize motion of load, and to stabilize the load) was compared to other systems (Standard Combat Pack, United Kingdom Z-2, and the packboard) by methods aimed at evaluating the effect of the pack on the man at all times during a complex activity. The methods used included: 1) energy expenditure studies, 2) performance tests, and 3) dynamic physical measurements. Findings from the three types of studies were analyzed in terms of comparisons among the packs as well as the value of each test used. A discussion of the rationale for field and laboratory studies for load-carrying systems was presented. Recommendations were made regarding the most promising methods.

T. G. I. R 14

4401

Teichner, W.N. & Kobrick, J.L. EFFECTS OF PROLONGED EXPOSURE TO LOW TEMPERATURE ON VISUAL MOTOR PERFORMANCE, FLICKER FUSION, AND PAIN SENSITIVITY. EPD Rep. 230, June 1954, 13pp. USA Quartermaster Research & Development Center, Natick, Mass.

4401

To investigate the effects of prolonged exposure to low temperatures on visual-motor performance; flicker fusion and pain sensitivity, five subjects lived in a constant temperature chamber for 41 days (first 16 days temperature, 75°; next 12 days, 55°; last 13 days, 75°). Radiant heat pain and visual flicker fusion thresholds were obtained. Subjects practiced daily (15 trials) on a pursuit rotor. The threshold data and pursuit rotor data (mean time-on-target per trial) were analyzed for significant changes attributable to low ambient temperatures. Implications of the findings for the design of protective equipment and the training and use of soldiers are pointed out.

T. G. R 13

4403

USA Field Forces, Board 3. TROOP TEST OF COLD-DRY FOOTWEAR. Proj. 2542, Oct. 1953, 35pp. USA Field Forces Board 3, Fort Benning, Ga.

The comparative suitability of the rubber insulated combat boot, the cold-dry mukluk boot, and the felt Arctic boot for use under cold-dry field conditions was determined. The test results indicate that the approximate lower thermal limits of the mukluk, the insulated, and the felt boot for wear by inactive soldiers were -40°F, -35°F, and -30°F respectively; for physically active soldiers all boots were worn without ill effects at temperatures down to -56°F; the insulated and felt were equally suitable for wearing comfort; the mukluk was unsatisfactory because of lack of foot support; and the durability of all 3 was unsatisfactory. Recommendations for appropriate modifications are included. (HEIAS)

R9

4406
Brown, F.H., Jr. TEST OF EVACUATION BAG, CANADIAN. Proj. 1774, Sept. 1954, 25pp. USA Board
No. 2, Fort Knox, Ky.

The Canadian Evacuation Bag, which is intended for evacuation of sick and wounded patients in extreme cold areas, was tested to determine the durability, portability, ease of repair and cleaning, and suitability. It was determined to be no more suitable than the standard item (stock no. 6530-915-5700 (9-195-700)) if certain modifications are made in the latter. (NEIAS)

4407
Frammel, H.H., Blevins, W.V., Garren, H.W. & Craig, F.M. THE INFLUENCE OF DESIGN ON THE PHYSIOLOGICAL EFFECTS OF WEARING SEMIPERMEABLE PROTECTIVE CLOTHING. Res. Rep. 226, Nov. 1953, 21pp. USA Chemical Center, Chemical Corps Medical Labs., Md.

The research objectives were: a) to determine if the thermal exchange of a man wearing semipermeable protective clothing is modified by bringing the material in closer contact with the skin; b) to observe the effects of preconditioning with water on semipermeable suits, and c) to evaluate the physiological strain resulting from the addition of a protective apron and rubber gloves. For a, 2 Ss in loose vs. close fitting suits in 5 warm environmental conditions varying from 38°C 30% RH to 24°C 80% RH were examined for water transfer, heat storage, and strain index values. For b, wetted suits were tested at 38°C 22% RH. For c, twill fatigue clothes were evaluated for heat storage values with and without a partial impermeable covering. In both a and b water transmission from the surface of the body through the suit was not increased as much as predicted. (NEIAS)

R11

4409
Comstock, C.C. & Gerst, F.M. THE MEDIAN DETECTABLE CONCENTRATION OF DIBORANE, PENTABORANE AND DECABORANE BY ODOR FOR MAN. Res. Rep. 206, Aug. 1953, 5pp. USA Chemical Corps Medical Labs., Army Chemical Center, Md.

To determine the median detectable concentration of diborane (B_2H_6), pentaborane (B_5H_9), and decaborane ($B_{10}H_{14}$) by odor for man, threshold determinations were made by 10 to 15 Ss for each of the three boron hydrides. The Fair-Mells osmoscope was used. Concentrations of diborane vapor were determined by chemical analysis and those for penta- and decaborane were determined by a nominal method. Median detectable concentrations by odor were presented in both tabular and graphic form. After-effects from smelling the vapors were discussed.

I. G. R 4

4426
Edgerton, H.A., Feinberg, M.P. & Zaikind, S.S. PERSONNEL FACTORS IN POLAR OPERATIONS. Contract NMR 871(C), Proj. 295, May 1953, 106pp. Richardson, Bellman, Hervey and Company, Inc., New York, N.Y.

To supply systematic information on personnel requirements for polar operations a survey of existing and available literature was made as a first step. On the basis of a summary of the findings from the literature, an interview guide was prepared directed toward the clarification of problem areas in which published reports were incomplete or ambiguous. Individual and group interviews were held with 53 individuals having polar or extreme cold experience and personal letters sent to 19 other such persons. The findings are discussed under five headings: 1) selection, 2) problems of orientation and indoctrination, 3,4) effects of polar conditions on job performance and on morale, and 5) physical and physiological reactions to extreme cold. Both operational and research recommendations were made in some detail. R 192

4422
Stone, L.M., Jr. MAN LOAD CARRYING EQUIPMENT. INTERIM REPORT I. Proj. S 787, July 1954 10pp. USMC Development Center, Quantico, Va.

This project was aimed at developing improved man load carrying equipment for use by the Marine Corps. The present report reviews presently known data relevant to this aim - physiological, neurological, and logistical aspects of the load carrying problem. Specifically the questions thus answered are: what are the best means of carrying and distributing the load on the human body considering neurological and environmental factors; what is the weight of the average load presently carried by the individual enroute to an overseas destination, under march conditions in a combat area, and when actually committed to combat; and what are our logistical practices regarding the practical problem involved in the issue and resupply of clothing, individual equipment, rations, water, and ammunition required by the individual in combat. Conclusions and recommendations are detailed. (NEIAS)

R2

4424
Thompson, G.G. EFFECTS OF DISPLAY SIZE AND OF SUPPLEMENTAL RATE INFORMATION COMPENSATORY PURSUIT PERFORMANCE. SUPPLEMENTARY REPORT. Contract N9onr 93103, Doc. 86, Mar. 1952, 39pp. Stanley Aviation Corporation, Buffalo, N.Y.

This study was conducted to explore the relation between some design characteristics of instrument displays and the precision of control obtainable when using these displays. It involved 2 experiments. A compensatory pursuit task, requiring the subjects to move a control and thereby compensate for random disturbances applied to an instrument pointer, was used in both parts of the study. The purpose of the first experiment was to determine the influence of dial size on precision of control. The four dials used were 1 1/2, 2 3/4, 4 and 5 1/2 inches in diameter. Results of this first part of the study showed no significant difference among the four dial sizes in their effect on performance. In part 2, variations in the nature of the information furnished by four different displays were compared for their effect on precision of control. Of major interest here was the effect on performance of adding to a direct indication of the variable being controlled, an incremental indication proportional to the first time derivative of the former. Time integral error scores showed a statistically significant superiority in the performance of subjects using this latter type of display over their performance using as a display indication of the variable being controlled.

X'2

4427

Miller, J.G., Southillet, Lorraine & Eldridge, C. A BIBLIOGRAPHY FOR THE DEVELOPMENT OF STRESS-SENSITIVE TESTS. Contract DA 49 083 osa 611, PRS Tech. Res. Note 22, Oct. 1953, 125pp Psychological Research Associates, Washington, D.C.

The items in this bibliography have been selected and assembled with view to providing a survey of the background material useful in the preparation of stress-sensitive tests. It is made up of 2 sections: a) An extensive list of references cited by title only and b) Abstract of those references which were deemed most important and having the most direct bearing on the present research. In both sections the references are listed alphabetically according to author's name. The reference list is based on a thorough search of the pertinent literature. It includes references immediately and specifically concerned with the effects of stress and the measurement of these effects, as well as studies of anxiety and anxiety-measurement, effects of extreme or unusual environmental conditions, studies of combat fatigue and war neuroses, physiological stress reactions, and various other related investigations. In general, research on human, rather than animal, Ss has been emphasized unless the animal studies are of broad theoretical interest which would contribute to the rationale of stress-sensitive instruments. Although the coverage is wide and exhaustive, it was decided to omit certain books of a general nature, especially those which are of essentially of a textbook or handbook type. Standard works in statistics, test construction, etc., are likewise not included. The abstracts of experimental studies are presented in some detail in order to show the population sampled and the procedures used. Theoretical and review articles are summarized more briefly. An asterisk before a title in the bibliography means that the reference has been abstracted.

4429

Eckenrode, R.T. & Hedberg, R.D. CONTROLS AND DISPLAYS: II. OUT-OF-LEVEL CORRECTOR FOR MEDIUM ANTIAIRCRAFT FIRE CONTROL EQUIPMENT. Projs. TR1 1000 & TR1 1042, Human Engng. Rep. 3, Memo Rep. PR 543, Jan. 1943, 16pp. Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Penn.

Dial design recommendations have been made for a double drum, open window, fixed pointer, out-of-level corrector for 127/60 medium antiaircraft weapon. The design features treated include: scale and numeral design, pointer design, window size, and control-display relationships for reset. A rough estimate of expected reading accuracy is made and possible sources of reading errors are discussed.

R 21.

4430

Personnel Research Center. THE CONTROL TOWER OPERATOR--SELECTED REFERENCES. Contract AF 18(600) 470, Nov. 1953, 30pp. Personnel Research Center, Inc., Detroit, Mich.

This annotated bibliography has been prepared for the purpose of summarizing previous studies and articles which can be useful in planning further research in the selection, training, and use of control tower operators. The areas reviewed include psychological problems related to selection and evaluation of control tower operators. The areas of fatigue, vision, and hearing as related to traffic control are represented. Articles on techniques and special problems in traffic control are also covered.

R 103

4431

Williams, P.L. VISIBILITY STUDIES. Prog. Rep., ca. 1951, 16pp. Northrop Aircraft Inc., Hawthorne, Calif.

An evaluation of the optical properties of windshield angle of 35° in high performance aircraft was made in terms of the distances at which a pilot can see and recognize the presence of objects. The study was confined to "Day Fighter" and "All Weather Interceptor" type aircraft, targets of 50, 200, and 500 sq. ft. area, and conditions from twilight to full daytime. Analyses of these problems were made using data on light transmission and distortion of optical materials, target visibility, meteorological range, combat conditions, and the like. Conclusions and recommendations were as follows: windshield angle has a definite effect on pilot's ability to see a target. The probability of visually detecting 50 to 200 ft. targets under broadcast control vectoring in time to make an effective attack at high speeds would be marginal for many daylight conditions at 40,000 ft. even with a 35° windshield and would be very small during dark-daylight and twilight conditions. Recommendations are that further investigations be made in order that design limits be set and substantiated by actual flight tests. (HEIAS)

R 4

4432

Marsh-Thesis, Inc., Huntington, N.Y. VOICE INTELLIGIBILITY HANDBOOK. NAVEXOS P 1192, Aug. 1953, 129pp. USN Special Devices Center, Port Washington, N.Y.

4432

This handbook concerns the application of voice communication principles to the problem of training for improved voice intelligibility under combat conditions. It is organized into the following topics: basic information on voice communication in relation to intelligibility, training equipment, specific training procedures, and testing procedures for selection of the best qualified men for key talker posts. The appendix includes material for message drill and test word lists.

T. G. I.

4433

Shaffer, W.C. BIOGRAPHICAL INVENTORY FOR NAVAL AVIATORS. Contract Nonr 69405, Series 1953, Inst. Rep. 7, Nov. 1953, 22pp. Institute for Research in Human Relations, Philadelphia Penn.

A preliminary Biographical Inventory consisting of 576 items was assembled from a variety of sources. This inventory was administered to all men entering flight training at NAS Pensacola beginning with class 20-51. During the summer of 1952 an interim analysis was made against a pass-fail criterion. Failures included "Dropped at Own Request" as well as Flight Failures up to Stage D of training (10 months beyond entering date). The validity coefficient based on an independent sample for the interim form was .39. A final analysis involving 2 independent populations of approximately 1,000 each was conducted to establish the scoring keys and validity for 114 items selected by the interim analysis. These populations were drawn from the total group entering training between 14 September 1951 and 9 September 1952. The validity for the final key is .33. It is recommended that additional analysis be made of validity after the inventory has been administered to candidates for flight training rather than to cadets already selected and admitted to flight training.

4434

Courtney, D. & Greer, F.L. LEADERSHIP: A REVIEW AND SUMMARY. Contract Nonr 1229(00), Series 1954, Inst. Rep. 3, Feb. 1954, 23pp. Institute for Research in Human Relations, Philadelphia Penn.

The leadership findings of the Institute are reviewed and summarized and a bibliography of publications growing out of the project is presented. The results are described in terms of attitudinal relationships, behavioral relationships, and methodological findings. In addition, 2 studies are reported on the problem of why some individuals are better liked or more accepted than others in a structured group situation. (HEIAS)

4436

Crook, M.N., Gray, Florence E., Hanson, J.A., Weisz, A., et al. INFOMAX. INTERIM ENGINEERING REPORT. Contract AF 33(616) 362, Rep. 1176 IR 11, April 1954, 18pp. Hogan Laboratories, Inc., New York, N.Y. (Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.).

4436

This interim report set forth the progress made on a research study in development, design, and testing of a system (the Infomax communication system) for transmitting information over long radio circuits where both poor signal-to-noise ratios and bad multipath conditions prevail. An experimental comparison between synchronous and linear detection was completed with a further test of effect of letter size in noisy Infomax copy. A method for printing test copy on 16 mm film for use in the new scanner was devised and equipment for the system has been developed.
T. G. I.

4440

Felton, W.W., Fritz, E., & Grier, G.W., Jr. AIR-GROUND COMMUNICATIONS IN TERMINAL AIR TRAFFIC CONTROL. FINAL REPORT. Contract OCA 28538, Rep. F 2185 1, March 1953, 67pp. Laboratories for Research & Development, Franklin Institute, Philadelphia, Penn.

4440

This report contains the principal findings of a two-year study of communications measurements at Washington National Airport and Langley Air Force Base, the purpose of which was to describe and analyze the use of air-ground channels for voice communications in air traffic control. Channel density, types of information transmitted, actual information value (measured in bits), communication difficulties, and suggested modifications of the system are presented.
T. G. I. R 3

4437

Miller, J.W. & Ludvig, E. DYNAMIC VISUAL ACUITY WHEN THE REQUIRED PURSUIT MOVEMENT OF THE EYE IS IN A VERTICAL PLANE. Contract Nonr 58600, Rep. NM 001-075-01-02, Joint Proj. Rep. 2, May 1953, 9pp. USN School of Aviation Medicine, Pensacola Air Station, Fla. (Kresge Eye Institute, Detroit, Mich.).

The present investigation demonstrates the manner in which visual acuity deteriorates as the angular velocity of the test object, traveling in a vertical plane, is varied between 20°/sec and 140°/sec. It is shown that the empirical equation, $y = a + bx^2$, may be used to represent the experimental data. In this equation y is the critical detail resolvable, expressed in minutes of arc at the nodal point of the eye, x is the angular velocity of the test object in degrees per second and a and b are parameters characteristic of the dynamic acuity of the individual in the plane of motion tested. The values of the a and b coefficients of the 9 subjects tested were shown not to be significantly dependent upon whether the motion of the test object was in a vertical or a horizontal plane. However, a very high coefficient of correlation (.96) was found between the values of b determined by the use of vertical movement and the values of b determined by the use of horizontal movement. This high correlation indicates that individuals "velocity resistant" or "velocity sensitive" to horizontal movement remain velocity resistant or velocity sensitive when subjected to vertical movement of the test object.
R 8

4438

Goodyear Aircraft Corporation, Akron, Ohio. FLIGHT CONTROLS HUMAN DYNAMIC RESPONSE STUDY. FINAL REPORT. Contract NOAS 53 013 C, Rep. AE 61 6, Nov. 1953, 21pp. USN Bureau of Aeronautics, Washington, D.C.

4438

This report describes the construction and use of a movable cockpit capable of providing realistic simulation of aircraft movements in addition to the usual visual display. The basic techniques of the problem are described in an earlier report. A major portion of this report describes the design features of the apparatus. Some data on motion characteristics common to most pilots are given and tests of a simple, linear approximation of pilot dynamics are discussed.
G. I. R 3

4441.

Cookley, J.D. A HUMAN ENGINEERING REVIEW OF THE CONTROL MONITOR GROUP AM/FSA 4. Contract AF 30(602)215, Jan. 1954, 6pp. Dunlap and Associates, Inc., Stamford, Conn.

The results of the review contained in this report are divided into two parts. The first section raises questions regarding some of the general aspects of the equipment. Discussion of specific design features and recommendations for desirable changes are contained in the Appendices. The relative importance of the recommendations can be judged by the three-letter symbol appearing over each recommendation. This symbol takes into account the relative importance of the proposed change with regard to the over-all operation and a rough estimate of the cost to effect the change. The method utilized to obtain these values is described in the supplement attached to the report.

4443

Baldwin Company. REAL-VOICE AND REAL-EAR RESPONSE AM/AIC-10 INTERCOMMUNICATION SET. Contract AF 33(038)23313, Rep. AFAC 10, Final Eng. Rep. on Task 10, Dec. 1953, 51pp. Baldwin Company, Cincinnati, Ohio.

Subjective measurements were made on the real-ear response of the M-70/AIC and M-75/AIC headsets and the research models which preceded them. Several different crews of listeners were used in the measurements. Masking threshold data on these headsets were also obtained in typical simulated aircraft noise spectra. The real-voice response of each of the 3 microphone types used with the AM/AIC-10 Intercommunication Set was measured with a group of talkers. Both production units and research models were tested. Data were obtained in quiet and in different noise spectra. Transmitted noise spectra were also measured in some cases. It is expected that these data will be useful in the writing of specifications for procurement of these equipment items.

4444

USN Personnel and Training Branch. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. June 1956, 46pp. USN Personnel and Training Branch, ONR, Washington, D.C.

4444

This bibliography includes unclassified reports relating primarily to personnel and training. The reports are grouped under the following general headings: 1) isolation and measurement of basic psychological traits; 2) selection and classification problems; 3) billet analysis and billet classification research; 4) performance criteria; and 5) training and education research.

4451

Miller, R.B., Folley, J.D., Jr., Smith, P.R. & Swain, A.D. SURVEY OF HUMAN ENGINEERING NEEDS IN MAINTENANCE OF GROUND ELECTRONICS EQUIPMENT. Contract AF 30(602) 24, RADC TR 54 31, Feb. 1954, 302pp. American Institute for Research, Pittsburgh, Penn.

4451

The procedures, results, and human engineering research problems derived from a field study of the maintenance of ground electronics equipment at Air Defense sites are described. Verbal and written questionnaires were developed and administered to all available personnel at six sites, observation data were collected, and special techniques of equipment and activity analysis were used. The following problem areas were derived and discussed at length: 1) accessibility, 2) presentation of technical information, 3) test equipment, 4) work conditions, 5) environmental effects, 6) safety, 7) component size, 8) power problems, 9) color-coding of equipment, 10) warning indicators, 11) cable connectors, 12) panel controls and meters, 13) circuit-switching arrangement, etc. T.

4454

de Charms, R., Morrison, H.W., Reitmänn, W. & McClelland, D.C. BEHAVIORAL CORRELATES OF DIRECTLY AND INDIRECTLY MEASURED ACHIEVEMENT MOTIVATION. Contract N7onr 463, Oct. 1954, 13pp. Wesleyan University, Middletown, Conn.

Results from a number of different experiments have been collected to show that measuring achievement motivation directly by asking the S or indirectly by content analysis of his stories tends to produce 2 different scores which signify different things as far as the rest of the S's behavior is concerned. A consciously high desire for achievement tends to be associated with conformity, a high valuation on expert authority, and a low valuation on unsuccessful people. A high need for achievement as measured indirectly through projective material tends to be associated with internalized standards of excellence which lead to superior performance of various sorts in task situations.

R 10

445E

Bach, L.M.N., Sperry, C.J., Jr. & Long, R.I. ARTIFICIAL MOONLIGHT PROJECT. SEVENTH TECHNICAL REPORT. Contract DA 44 009 ENG 775, Proj. 8 19 06 001, Sept. 1953, 30pp. Tulane University, New Orleans, La.

4458

This report presents some data on the distribution of illumination from searchlight beam scatter as measured with a physical photometer. Iso-foot candle curves as determined over several distances on three surfaces (parallel to ground and facing sky, perpendicular to ground and facing direction in which searchlight was swung in azimuth, and surface perpendicular to ground facing away from searchlight) are presented. Weather data for those hours during which data were collected are included.

T. G.

4459

Bach, L.M.N., Sperry, C.J., Jr. & Long, R.I. ARTIFICIAL MOONLIGHT PROJECT. SECOND ANNUAL REPORT. Contract DA 44 009 ENG 775, Proj. 6 18 06 001, June 1953, 15pp. Tulane University, New Orleans, La.

4459

This annual report presents some data on distribution of illumination from searchlight beam scatter and some visual threshold data for the detection of targets under such illumination. Since the report is a continuation of previous reports, there is no discussion of general background. There is discussion of instrumentation problems and presentation of some field measurements obtained with visual photometers of illumination on five surfaces at distances of 3,000, 5,000, 8,000, and 14,000 yards from the searchlight. The visual thresholds were obtained on nine subjects at points 25, 50, and 75 yards in nighttime field trials. Problems encountered in gathering such data are discussed.

G.

4460 Rohrer, J.H., Baron, S.H., Hoffman, E.L., & Swander, D.V. THE STABILITY OF AUTOKINETIC JUDGMENTS. Contract Nonr 47501, Res. Rep., June 1954, 11p. Urban Life Research Institute, Tulane University, New Orleans, La.

The stability of judgmental norms, established as a result of interpersonal interaction was evaluated one year after they were established. The evaluation was made by testing the subjects individually. It was shown that the norms, so established, were stable. Data were presented which showed that social interaction resulted in a rapid modification of response tendencies established in a previous individual training session. The results obtained were interpreted within a reinforcement theory framework.

T. G. I.

4463 Blodgett, H.C., Wilbanks, W.A., & Jeffress, L.A. THE EFFECT OF LARGE INTERAURAL TIME DIFFERENCES UPON THE JUDGMENT OF SILENCE. Contract Nonr 52267, DRL A-83, Aug. 1954, 32pp. Defense Research Laboratory, University of Texas, Austin, Texas.

The maximal interaural time difference that could be added to one channel without loss of sidedness was determined for various noise bands. Through the presentation of stimuli by several methods it was found that time values very with frequency of the noise bands, being greater for lower bands. Marked inter-subject differences were found. For the lowest and most effective band used (106-212 ~) times ranged from 7.54 to 20.64 ms.

4464

Sandel, T.T., Teas, D.C., Feddersen, W.E. & Jeffress, L.A. THE LOCALIZATION OF AIRBORNE SOUND. Contract NCBRS 52267, DRL A Rep. 78, Aug. 1954, 22pp. University of Texas, Austin, Tex.

4-54

Three experiments on the localization of sound employing loudspeakers as the sources to be localized were conducted. The first experiment used a single speaker at a time; the second and third used pairs of speakers either in phase or in phase opposition. All three used the same device for indicating direction of signal source--an additional speaker carried by a movable arm and producing a clearly localizable, wideband noise. This source was adjusted in location by the subject until it seemed to be in the same direction as source to be localized. Five subjects were used throughout the experiments. Accuracy of localization and interaural time, intensity and loudness differences were analyzed and discussed. Advantages of the methodology employed were indicated.

T. G. I.

4465

Karpovich, P.V. & Hale, C.J. PHYSIOLOGY OF LOAD-CARRYING IV. PRESSURE EXERTED BY PACK STRAPS AS RELATED TO LOAD CARRIED AND CHEST DIMENSIONS. Contract DA44 109.QM 912, Projs. 64 12 001 & 64 12 002, EPB Rep. 213, June 1953, 26pp. USA Quartermaster-Climatic Research Lab., Environmental Protection Branch, Lawrence, Mass. (Physiology Dept., Springfield College, Springfield, Mass.).

4466

To measure objectively the pressure exerted on various parts of the shoulders and chest by pack straps, and to find out the relationship between strap pressure and chest size, the following measurements were made. A special pressure meter was devised to measure strap pressure and used to test 30 male Ss who carried high or low packs weighing from 20 to 70 lbs. while standing still on horizontal, downgrade, or upgrade planes, or walking on the same planes. A mathematical relation between strap pressure and pack weight was established and formulas derived for determining strap pressure in lbs. when pack weight was known. The relation between strap pressure and chest size was studied on 49 men representing a wide range in chest sizes. T. G. I.

4466

Hale, C.J., Coleman, F.R. & Karpovich, P.V. PHYSIOLOGY OF LOAD-CARRYING V. TRUNK INCLINATION IN CARRYING LOW AND HIGH PACKS OF VARIOUS WEIGHTS. Contract DA44 109, QM 912, Projs. 64 12 001 & 64 12 002, EPB Rep. 2161, July 1953, 11pp. USA Quartermaster-Climatic Research Lab., Environmental Protection Div., Lawrence, Mass. (Physiology Dept., Springfield College, Springfield, Mass.).

4466

The effect of low and high packs of various weights on trunk inclination was studied on eight Ss. The loads carried were 0, 20, 40, 60 and 80 lbs. Still pictures were taken while Ss were standing and while walking on horizontal, downgrade, and upgrade planes on a motor-driven treadmill. The speed of treadmill, for walking, was 2.8 mph. During walking, two body positions were photographed: when S's center of gravity was at lowest level and when at highest level. The pictures were analyzed to determine degrees of trunk inclination.

T. G. I.

4470

Slade, J.J., Jr., Fich, S., Molony, D.A., Manni, L.F., et al. THEORETICAL AND EXPERIMENTAL RESEARCH IN COMMUNICATION THEORY AND APPLICATION. Contract DA 36 039 SC 42703, Projs. 3 99-12 022 & 17 1329 0, Prog. Rep. 1, March 1954, 25pp. Bureau of Engineering Research, Rutgers University, New Brunswick, N.J.

4470

A progress report of work accomplished on a research program in communication theory and application was presented. Measurements of the characteristics of the random noise generator (described in earlier reports) were made. The study of voice was directed toward the development of electric circuitry capable of continuously determining the frequencies that characterized speech and of synthesizing these frequencies to reproduce speech. A theoretical analysis of several types of coding was made to determine the permissible signal to noise ratio in a system of moment detection having a prescribed bandwidth and speed of signalling.

T. G. I.

4473

University of Pennsylvania. UNIVERSAL DIGITAL OPERATIONAL FLIGHT TRAINERS. Contract NONR 55102, Rep. 54 45, June 1954, ca. 200pp. Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Penn.

4473

The first phase of research conducted to determine the feasibility of actuating Operational Flight Trainers using a universal digital computer is reported. Two primary developments have been previously reported: 1) development of a stability chart enabling predictions of solutions of flight equations using specified quadrature formulae and quadrature time interval, and 2) the design of a high-speed "sequential" digital computer. In this paper two new quadrature formulae are discussed, the circuits used in the digital OFT are described, changes incorporated into the sequential computer are delineated, flight instrumentation is discussed, and some tests are reported on the essential correctness of the stability chart approach.

T. G. I.

4474

University of Pennsylvania. DESIGN OF DIGITAL FLIGHT TRAINERS. Contract NONR 55102, Rep. 54 08, Prog. Rep. 2, July 1953, ca. 150pp. Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Penn.

4474

Progress was reported on research conducted to determine the feasibility of actuating Operational Flight Trainers with a universal digital computer. Major emphasis was placed, during the period reported, on three topics: 1) The logical structure of a serial machine using serial memory has been laid out in almost complete detail, 2) The equations of motion of the F9F airplane have been studied in detail to determine all its possible characteristic frequencies, and 3) a new quadrature method has been synthesized. The results of mathematical studies, the reprogramming of the flight equations, and the logical structure of the serial simulator were described.

T. G. I.

4478

Essigmann, M.W., Dolansky, L.O. & Wren, J. VISUAL-MESSAGE PRESENTATION, PART II. SPECIAL EQUIPMENT FOR SPEECH ANALYSIS PURPOSES. Contract AF 19(122)7, Final Rep., May 1945-Feb. 1954. 89pp. Northeastern University, Boston, Mass.

This part of the final report summarizes the design, construction, and test of special equipment developed for speech-analysis purposes. The applications of this equipment are given under Part I (issued separately) of this final report. Equipment covered includes a 12-channel speech spectrograph, an autocorrelator for speech sounds, zero-crossing density meters, 2 different interval filters, an intervalgraph, 2 different squarelaw devices, an electronic function multiplier, an electronic divider circuit, an automatic-amplitude-control circuit, a pitch-period indicator, a mechanical separator for speech sounds, complementary filters, tilting and delay networks, fraction-power filters, a network for harmonic suppression, various types of high-speed cameras, sound ropes, and sound recording and playback devices.

R-22

4479

Chang, S.H., Essigmann, M.W., Stubbs, H.L., Dolansky, L.O., et al. VISUAL MESSAGE PRESENTATION. PART I OF FINAL REPORT. Contract AF 19(122) 7, Item I, Feb. 1954, 153pp. Northeastern University, Boston, Mass.

4482

Clark, K.E., Gee, Helen H., Perry, D., Albittz, Diane, et al. MEASUREMENT OF INTEREST PATTERNS. ANNUAL REPORT. Projs. NSCRI 21203 & 212151 248, Task III, Nov. 1953, 87pp. Department of Psychology, University of Minnesota, Minneapolis, Minn.

4479

This part of the final report summarizes the results of theoretical and experimental studies performed during the period from May, 1949, to February, 1954, on the general problems of visual-message presentation and speech compression. Practical details concerned with special equipment for speech-analysis purposes are given in Part I (issued separately). Chapter I defines the general problem under study and provides pertinent background theory. The experimental methods employed and results obtained are given in Chapter II. The last chapter presents conclusions based upon the research and makes specific recommendations for future development of speech-compression systems based upon the phonoid-identification and formant-tracking schemes.

T. G. I. R 132

4482

The several chapters of this annual report describe the work on interest measurement as it has progressed along various lines: 1) description of general scope of project and present status of data collection; 2) summary of work completed on Navy and civilian working keys for the Navy Vocational Interest Inventory; 3) summary of several studies on relation of NWII scores to school achievement in the Navy; 4) a like summary related to on-the-job performance in civilian occupations; 5) comparison of some responses on NWII and the Strong Vocational Interest Blank; and 6) description of methods developed in the project to portray measured interests in profile form with mean profiles given for each of a number of Navy rates.

T. I.

4480
Chang, S.H., Essigmann, M.W., Pihl, G.E., Stubbs, H.L., et al. VISUAL MESSAGE PRESENTATION. Contract AF 19(122) 7, Quart. Prog. Rep. 16, Feb.-May 1953. 41pp. Northeastern University, Boston, Mass.

Included herein are reports of progress made on the various topics under active study during the period from January 15, 1953 to April 15, 1953. General consideration is given to discussion of specific items involved in the development of a speech-compression system based upon the identification of speech sounds as discrete units. Treated specifically in this connection are a) the automatic determination of the pitch epoch, b) phoneme segmentation, c) the application of discriminatory analysis to vowel identification, d) preliminary results in the identification of fricatives, and e) experiments performed by repeatedly playing back the waveform for a single period of a vowel sound. Also discussed are various topics related to the compression system. These include: a) linguistic studies involving the consideration of phoneme clusters, an international language for air, and some descriptive parameters of fricatives; and b) theoretical study of the joint distribution W_2 as applied to sine waves and Gaussian noise. Descriptions are given of progress made in the construction of certain apparatus for use in speech analysis; namely, a network for harmonic suppression, an anechoic chamber, a pitch-period indicator, a divider circuit, and a high-speed camera for recording the details of speech waveforms.

R-8

111 - 472

4489
Fenning, W.H., Jackson, P.L., & Kelley, R.J. REFERENCE SOURCES IN THE PHYSIOLOGY OF EXTREME ENVIRONMENTAL TEMPERATURES. Contract DA 20 018 ord 13146, Proj. TTI 696, Rep. 2167 2 P, May 1954. 59pp. Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

A short discussion and conclusions are presented concerning articles and reports on which the recommendations of physiological criteria for evaluating systems for heating, cooling, and ventilating combat tanks are based. The reports found to be most pertinent are listed, together with short abstracts of their content. 2 sets of recommendations are made. The first set, specific to the present project, suggests the following objectives in designing a system: a) Maximum operational efficiency of the crew should be the primary overall objective; b) No attempt should be made to control relative humidity; c) Air-ventilation rate should be as recommended by the Office of the Surgeon General: 250 cubic feet per minute per man; d) An attempt should be made to keep air velocities below 100 feet per minute; e) in the high extreme ambient range the compartment should be cooled to a minimum of 85°F with a maximum of 90°F; f) in the low extreme ambient range, the compartment should be heated to a minimum of 20°F with a maximum of 25°F. The second set of recommendations, pertaining to future physiological research, suggests the following projects to be conducted by qualified people: a) Experimentally determined ventilation requirements in the tank crew compartment; b) Determination of the effects of radiation between the human body and the vehicle walls; c) Determination of the extent of mutual aggravation of all the annoyances in tank operation, and the conduction of a more extensive literature search, with emphasis on foreign sources and discussions.

4492

Neel, R.G. NERVOUS STRESS IN THE INDUSTRIAL SITUATION. Contract No. ONR 232, presented at the American Psychological Association Meeting, New York, N.Y., Sept. 1954, 14pp. American Psychological Association, Washington, D.C.

4492

To point up some of the factors within the industrial situation which relate to the nervous tension and worries of the employee, data are presented here that represent a small part of a study of psychological factors related to morale and productivity in a heavy equipment manufacturing industry. A one-third sample of the hourly workers (N=5703) is used for analysis. The data were obtained by a questionnaire designed to get at nervous tension and worry. For a criterion measure, answers to a "jumpy-nervous" item were dichotomized and correlated with a number of questions concerned with attitudes toward foremen, work group, working conditions, productivity system, etc.

I.

Massachusetts Institute of Technology, FUNDAMENTAL INVESTIGATIONS IN METHODS OF OPERATIONS RESEARCH. Contract DA 19 020 ORD 2684, Proj. R82 0001, Interim Tech. Rep. 1, July 1953-March 1954, 28pp. Massachusetts Institute of Technology, Cambridge, Mass.

Progress over a 6-month period on a project investigating problems and techniques of Operations Research (OR) as applied to industrial problems is reported. Topics covered include economic lot sizes, inventory production schedule, water use in a hydroelectric system, machine scheduling to meet seasonal sales variation, OR in production management courses, information handling at Westinghouse's transformer division, MIT library operations, electric light bulb replacement schedule at MIT, inventory control of sheet foam rubber, hotel payroll control, and a preliminary discussion of optimum radiological cancer treatment. (MEIAS)

4495

Whittenburg, J.A. INDICATORS OF BEHAVIOR DECREMENT. A FURTHER EXPERIMENTAL INVESTIGATION OF PERCEPTUAL EFFICIENCY DURING SUSTAINED VIGILANCE. Proj. DA 19 007 MD 222 (OI 19 52), Tech. Rep. 17, ca. 1953, 40pp. Dept. of Psychology, University of Maryland, College Park, Md.

4495

In an investigation on the effects of sustained vigilance on perceptual efficiency, this study was made to provide information concerning the nature of behavior that is measured by the Mackworth Clock Test. Each of 13 Ss performed twice under two experimental conditions: 1) response was made only to occurrence of variable stimulus (double jump of pointer); and 2) response was made to both variable and standard (single jump) stimuli. Each S was tested approximately three hours on each condition. Three dependent variables were used: errors of omission or failure to detect stimulus, critical flicker frequency, and stress experience inventory. Error data were analyzed for individual differences and all scores were studied for relationships with each other.

T. G. R 14

111 - 473

4496

Katchmar, L.T. A REVIEW AND ANALYSIS OF THE CONCEPT OF STRESS AND RELATED VARIABLES. Contract DA 49 007 MD 222, Tech. Rep. 16, Feb. 1954, 49pp. Psychology Dept., University of Maryland, College Park, Md.

This study was designed to determine the effects of 2 types of stress and manifest anxiety on performance of a perceptual task. The 2 types of stress used were task induced stress and failure stress. The perceptual task was a repetitive color naming at high speed. Performance on this task, as measured by errors of omission, was analyzed for groups of subjects and individuals treated differentially with respect to the independent variables used. 27 college students scoring extremely high, and 27 scoring extremely low on a modified form of the Taylor Scale of Manifest Anxiety, were selected as subjects. 3 subjects from each group performed the color naming task under a combination of one of 3 task induced stress conditions and one of 3 failure stress conditions. Each subject was also given a Stress Experience Inventory immediately after performance on the task. Ratings of the inventories, by trained judges, were also analyzed for groups of subjects operating under the different experimental conditions. The results indicate that task induced stress conditions exhibit a positive relationship with performance as measured by errors of omission; whereas, failure stress conditions exhibit a curvilinear but generally increasing relationship with performance. Anxiety appears to increase susceptibility to the effects of stressful conditions.

R.30

4498

Davidson, W.Z. THE EFFECTS OF TWO TYPES OF STRESS AND ANXIETY ON PERFORMANCE OF A PERCEPTUAL TASK. Contract DA 49 007 MD 222, Tech. Rep. 19, Aug. 1953, 44pp. Psychology Dept., University of Maryland, College Park, Md.

This present report was prepared as a background literature review for the Technical Reports Nos. 17, 18, 19, 20, 21, 22 and 23. An attempt has been made to present some of the current conceptions of stress as it is related to motivation and various personality variables. In addition to presenting the recent experimental studies, stress for this review has been defined as an intervening variable, and conceived of as an internal process of the organism which is manifested as an equilibrium seeking response, occurring in the psychological context when the objective situation is cognitively evaluated as one involving a goal, the attainment of which is thwarted, or interpreted as being thwarted. In its maximal form stress is produced when the thwarting of the goal produces a threat to the individual. Motivation in such a definition is, of course, a basic assumption. In view of the discussion and studies presented above we can state that objectively defined stress situations produce impairment in performance on a wide variety of tasks. This impairment has been shown to be related, to some degree, to personality characteristics such as anxiety and rigidity. These personality variables have been found to act, as sensitizers in stress effects. Characteristic of most stress studies is the wide individual difference found. The study of personality variables is an approach to reducing these individual differences. With further work in this area it may be possible to make fairly accurate predictions for individual reactions to stress. More systematic studies with respect to types of stress are needed in this area.

R 120

4501

Revis, S.W., Elmudjian, et al. A STUDY OF COMBAT STRESS, KOREA, 1952. PRELIMINARY REPORT. Proj. SAS 6 FAST, Tech. Memo OMD T 41(FEC), Dec. 1952, 203pp. Operations Research Office, Johns Hopkins University, Baltimore, Md.

This report presents a preliminary examination of data gathered by a field team composed of physiologists, psychologists, and one psychiatrist. Physiological and psychological tests were conducted on a group of 23 soldiers at Camp Oniz, Japan; on 24 infantrymen in Korea who were in reserve behind the MRL; on 35 men from an infantry company which led a major assault; and on 13 men from another that had just returned from 5 days active combat. Preliminary findings, pending final treatment of the data, show these general conclusions: Analysis of blood and urine specimens show definite physiological changes occurring as a result of combat. Physiological disturbances resulting from the effects of psychological stress were found to be dehydration and an almost total absence of certain types of adult white blood cells. The adrenal gland, particularly the adrenal cortex, functions normally in the front-line infantryman not in active combat, but shows a high level of adrenal activity following severe combat stress.

4503

Conlay and Associates, Inc. HUMAN ENGINEERING EVALUATION OF THE FERRAND STAR TRACKER. Contract NMR 17719, Mon. Rep. 3, April 1957, 6pp. Conlay and Associates, Inc., Stamford, Conn.

4503

The Ferrand Star Tracker has been evaluated from the human engineering viewpoint in order to identify human operator sources of error in the navigation system. Techniques are suggested for minimizing these errors through design changes in the 1) TV tube display, 2) tracking control, and 3) console design.

4506

Fattor, M.A. & Standlee, L.S. ANALYSIS OF READING DIFFICULTY OF SELECTED NAVY MATERIALS. Contract NMR 90801, Tech. Bull. 54 3, March 1954, 53pp. Institute of Educational Research, Indiana University, Bloomington, Ind.

4506

In order to ascertain the reading difficulty of certain materials used for training in the Navy, a basic training text, a "house organ," some specialized training manuals, and an instructor's manual were analyzed according to the Flesch readability formula. The scores assigned to these materials are discussed with respect to the reading ability of marginally literate and average recruits. Rules for improvement of the readability of training texts are given and illustrated.
T. R 162

4507

Standlee, L.S., Fattor, M.A. & Able, D. FREQUENCY INDEX OF WORDS APPEARING IN FOUR NAVY PUBLICATIONS. Contract NMR 90801, Tech. Bull. 54 2, Jan. 1954, 158pp. Institute of Educational Research, Indiana University, Bloomington, Ind.

4507

A frequency count of words appearing in four Navy publications was performed. Frequency in each publication and mean frequency is tabulated for the 503 most common words in the 121,931-word sample. The relevance of this count to the presentation of instructional materials for a literacy training program is noted.
T.

4510

Fritz, E.L. & Grier, G.N., Jr. EMPIRICAL ENTROPY: A STUDY OF INFORMATION FLOW IN AIR TRAFFIC CONTROL. Contract DA 36-039-SC-56695, Rep. R-54, March 1954, 21pp. Control Systems Laboratory, University of Illinois.

4510

To study information transfer between pilots and tower controllers during landings at an Air Force training base, verbatim transcriptions of the radio messages over a period of several weeks (approximately 100 hours) were made. The messages were broken down into "information elements" and the dependent probabilities of these elements computed. The analysis required the development of new methods which are discussed. The findings on rate of information transfer and redundancy are discussed in relation to other studies on human information-handling capacities.
R 3

4511

Black, A.J. & Quastler, H. NOTES ON THE ESTIMATION OF INFORMATION MEASURES. Contract DA 36-039 SC 56695, Proj. R 1234, O/A Proj. 3 99 10 101, Rep. R 56, May 1954, 36pp. Control Systems Lab., University of Illinois, Urbana, Ill.

4511

This collection of notes on the estimation of information measures is a by-product of psychological assessments of human performance in information processing. Since these experiments involve such large numbers, exact computations were replaced with approximating shortcuts based on samples of moderate size.
T. G. R 1

4512
LBY, W.W. SUMMARY OF CLIMATIC EFFECTS ON RAILROAD OPERATION, MAINTENANCE, AND CONSTRUCTION. Section 2 on Climatic Criteria Defining Efficiency Limits for Certain Industrial Activities. Contract AF 19(605) 416, ca. 1954, 35pp. University of Illinois, Urbana, Ill.

This report presents a summary of the effects of climate on railroad operations. The following conclusions are drawn: a) Railroads, if properly maintained and operated, can function under any known conditions of the inhabited lands of the world. b) All climatic conditions are capable of producing nominal delays of a few minutes to several hours. These can develop into major tie-ups if proper maintenance and operation are not maintained. c) Very severe floods, hurricanes, and tornadoes can block a railroad for a month or more by destroying bridges, or, in the case of floods, washing out long stretches of track and subgrade. d) Tracks may be blocked for several days to a week by a combination of heavy snow, fall, high winds, and low temperatures. (Without sufficient equipment, especially rotary plows, lines may remain closed for over a month.) e) The conditions of items c and d occur infrequently. f) Modern designs of equipment and maintenance and operating methods are making railroads less and less susceptible to the effects of climate. g) Railroads, especially those with modern operation and dense traffic, are especially susceptible to loss of communications, be it from flood, fire, wind, or ice storms.

4513 May, W.V. THE EFFECT OF LOW TEMPERATURES ON RAILROAD OPERATIONS. CLIMATIC CRITERIA DEFINING EFFICIENCY LIMITS FOR CERTAIN INDUSTRIAL ACTIVITIES. Contract AF 19(604)16, 1954, 41pp. University of Illinois, Urbana, Ill.

This report presents the effects of low temperature on railroad operation insofar as these can be isolated from the combined effects of snow, wind and cold. The following conclusions were drawn: a) cold weather will not of itself halt or even slow down rail movements; b) cold effects on freight and locomotives, ice formations, broken rails, etc. will occur and cause delays and tie ups; c) the principal adverse effects of cold weather are reduced train tonnage, hard-rolling cars in yard operation and frozen switches; d) train tonnage are reduced proportionally from no reduction at 30 F. to 50% reduction at 40 F.; e) outdoor personnel can work only in emergencies below 40 F. Their efficiency decreases at about the same rate as locomotive tonnage ratings; f) once a sub-zero condition becomes stabilized there is little more difficulty with switches, rails, etc. until a thaw occurs. (MEIAS)

4515 Beach, C.K., Paolucci, D.J. & Milano, J.E. THE DEVELOPMENT OF A MULTI-PURPOSE ANALYSIS TECHNIQUE FOR NAVY RATINGS. Contract NMR 401(10), Tech. Bull. 53 1, Part 1, Oct. 1953, 163pp. Personnel Analysis Div., USN Bureau of Naval Personnel, Washington, D.C. (New York State School of Industrial and Labor Relations, Cornell University, Ithaca, N.Y.).

4515 The development of a multi-purpose analysis procedure for the Gunner's Mate Billet is described. Particular emphasis is placed on data collection for maintenance, casualty diagnosis and rectification procedure, and operational sequences of new weapons in the field of ordnance. The three-inch/50 Rapid Fire Twin Mount was selected as the vehicle for study. Based on the expressed needs of current and potential consumers within the Bureau of Naval Personnel, methods, instruments, and techniques were developed and applied in the field. Results include a detailed breakdown of weapon casualties in terms of frequency, casualty analysis, rectification procedure, time requirements, personnel proficiency, battle station assignments, etc.
T. I. R 10

4516 Kuhn, L.A. ELECTROCARDIOGRAPHIC STUDIES OF NORMAL MEN HOUSED AT DIFFERENT SHELTER TEMPERATURES AFTER VARIOUS GRADES OF WORK IN ARCTIC AND TEMPERATE CLIMATES. Projs. 6 64 12 028 & 6 61 12 004, Rep. 160, Jan. 1955, 32pp. USA Medical Research Lab., Fort Knox, Ky.

To investigate the effects of exercise in the cold on electrocardiograms, seven normal subjects were studied in an arctic climate. Electrographic records were made at rest both indoors and outdoors, following twelve minutes of standard exercise equivalent to march rate of 3.5 to 4.0 miles per hour, following twelve minutes of exercise at double the usual rate, and after modified "Hess's Tests." The same tests were performed in a temperate climate preceding and following the arctic tests. The subjects lived in shelter temperatures of either 30° or 70° Fahrenheit. The electrocardiograms were analyzed for effects of cold exposure and shelter temperature following various grades of work. The findings are related to previous studies and recommendations for further work are made.
T. R 5C

4517 Leco, R.D. A SURVEY OF THE THEORY OF SELECTIVE INFORMATION AND SOME OF ITS BEHAVIORAL APPLICATIONS. Contract CG 10 54 WDR 264(21) BASR, Proj. MR 042 115, Tech. Rep. 8, June 1954, 137pp. Bureau of Applied Social Research, Columbia University, New York, N.Y.

4517 This document presents a synopsis of the discrete theory of selective communication. The presentation is most deeply influenced by Shannon's work, although there has been some departure from it. The second part of the report is concerned entirely with applications of the theory to problems in psychology: the entropy in printed English, distribution of words in a language, the capacity of the human being and rates of information transfer, reaction time and information transfer, visual threshold and word frequencies, the information transmitted in absolute judgments, sequential dependencies and learning, concept formation, and other such categories. A short summary of Shannon's theory of continuous communication systems is appended.
T. I. R 102

4521 Royle, L.J., Mopoe, P. & Nayer, Sylvia R. A STUDY OF TWO TESTS FOR DISCRIMINATION OF PROFICIENT PHOTO-INTERPRETER STUDENTS. Contract AF 33(616) 455, Tech. Note 114, Aug. 1953, 37pp. Optical Research Lab., Boston University, Boston, Mass.

2 objective tests have been developed in an attempt to measure certain visual skills judged to be relevant to photo-interpretation. The reliability and validity of the tests are discussed, and some general remarks on the photo-interpretation career specialty are included. The results of the reliability study revealed satisfactory consistency and discrimination indices and it was noted that the tests' discriminative capacity might be further improved if they were administered under speed rather than power conditions. In the validity study, 2 questions were posed: a) Do scores on these tests differentiate proficient from nonproficient photo-interpreter students? and b) Is performance on these tests affected by training in photo-interpretation? In connection with the latter question, no evidence was found to indicate that the perceptual skills measured by the tests were increased as a result of training. The results of the study did indicate, however, that the tests were able to differentiate proficient from nonproficient photo-interpreter students, at least when such proficiency is independently measured by the ratings of school instructors. In the final section, some features affecting the career status of photo-interpretation, and how these relate to preference for training in photo-interpretation and the high turnover among trained photo-interpreters, are presented for consideration.
R 10

4522
Mayer, Sylvia P. THE EFFECT OF INDUCED EFFORT, TRAINING AND DRAWING ON VISUAL ROOM LEARNING. Contract AF 33(616) 432, Tech. Note 115, Sept. 1954, 49pp. Optical Research Lab., Boston University, Boston, Mass.

4522
A study was made of the effectiveness of several techniques for training in target identification. The techniques differed in kind of effort and amount of effort employed during the learning of targets: 1) "task-related" effort involved observation, tracing, and drawing of targets; and 2) "task-unrelated" effort was induced in various degrees by use of a hand dynamometer. Identification tests were given after two- and ten-minute intervals. Conditions for maximum retention were identified. The effect of effort was further analyzed with respect to structural complexity of target, nature of identification errors, and individual differences. The findings were discussed in relation to photo- and radar interpretation training.
T. G. I. R 11

4526
Neely, K.K. ACOUSTIC PROPERTIES OF HEADGEAR: II. HELMETS LTD. HEADGEAR ASSEMBLY. DRAC Proj. 100 43 72, DRAC Rep. 100 3, P.C.C. 077 82 30 04, April 1954, 18pp. Reference Research Medical Labs., Toronto, Ontario, Canada.

4528
To determine the acoustic insulation properties and the listener-intelligibility properties of crash and inner helmets manufactured by Helmets, Ltd. and General Textile Mills, Inc., two series of tests were run. In the first test, the open-ear threshold of hearing for nine test tones was determined for 15 Ss and compared with thresholds obtained while wearing the various items of headgear. In the second test, six Ss responded to intelligibility tests while wearing the headgear items with a noise level of 110 db. The data from these tests were analyzed for differences attributable to the headgear worn.
T. G. I. R 5

4531
Ministry of Supply: BIBLIOGRAPHY OF INFORMATION ON SERVOMECHANISMS AND RELATED SUBJECTS. ADDENDUM NO. 1. Nov. 1953, 117pp. Ministry of Supply, London, England.

An annotated bibliography of 464 references on servomechanisms and related topics is provided. The articles are organized in a topical outline. Part I--automatic control--is organized under the following major topic headings: a) General theory; b) Analysis and design of control systems and associated instruments; c) Components and sub-units of control systems; d) Applications; and e) Tests and performance. Part II--manual tracking--is organized under the following major topic headings: a) Psychological and physiological studies of the operator and his performance; b) Trainers; and c) Design of equipment. An author index is included. (HEIAS)
R 464

4532
Loveless, N.E. MANUAL TRACKING IN THE FOUR QUADRANTS OF A CIRCULAR SCALE - III - LEFT AND RIGHT QUADRANTS. Rep. FPRC 886, July 1954, 13pp. Flying Personnel Research Committee, London, England. (University of Durham, (King's College, Newcastle-on-Tyne) England).

In a compensatory tracking task, Ss were required to control the pointer on a circular scale. 2 targets and 2 display control connections, direct drive and reversed drive, were used. Each S was tested under all 4 experimental conditions. It was found that speed and accuracy are greater with direct than with reversed drive. Superior performance was found on the left-hand target with direct drive. The differences in performance under the 4 conditions tested are attributed to the combined effects of 2 direction-of-motion expectations which may summate or conflict. The dominant tendency is to expect a clockwise movement of the control to result in a clockwise movement of the pointer. There is also a tendency to expect a clockwise movement of the control to move the pointer upwards. It is recommended that direct drive be used for greatest speed and accuracy. (HEIAS)
R 5

4534
Zweigbaum, H. HUMAN ENGINEERING EXPERIMENT ON ELECTRON TUBE TEST SET TV 2/U. Proj. Nr 20518 & DA Proj. Nr 3 27 01 013, Tech. Memo. M 1642, April 1955, 6pp. USA Signal Corps Engineering Labs., Evans Signal Lab., Fort Monmouth, N.J.

Consideration of the man-machine relationship involved in the operation of Electron Tube Test Set TV-2/U led to the design of a statistical experiment to ascertain whether or not undue reliability was being placed on the precision of measurement obtained by a normal class of operators. The experiment was carried out with the cooperation and assistance of personnel of the Tobyhanna Signal Depot. Measurement data were obtained by 2 classes of operators, laboratory personnel whose readings were used as a standard of comparison, and depot personnel who had received both instructions in the use of the instrument and several weeks time for familiarization in its operation. Analysis of the components of variance indicated that major contributions to variation in results were those due to lack of reproducibility within a class of operators. Applying an F test to either confirm or deny the hypothesis of equal precision of classes resulted in an unqualified denial of the tenability of this hypothesis.
R 0

4535
Brogle, A.P. THE HUMAN BEING AS AN ELEMENT IN CONTINUOUS CONTROL SYSTEMS. Proj. Nr 1544 & DA Proj. Nr 3 29 04 100, Tech. Memo. M 1605, Sept. 1954, 21pp. USA Signal Corps Engineering Labs., Fort Monmouth, N.J.

The similarity in structure of a servo system and the man-machine system is of importance in all areas of human engineering and is fundamental to the study of the control aspects of the human being. Starting with a brief review of the characteristics of any servo-mechanism, a generalized model of the man-machine system is formulated. Considerable attention is devoted to a discussion, from an engineering viewpoint, of the basic functions which the human employs to perform as an integral part of the control system and to the possible forms of man's composite transfer function. From this analysis, a general approach to man-machine design is stated and the applications of the method to manual tracking systems and to flight control systems are illustrated.
R 18

4536

Clark, B. & Graybiel, A. DISORIENTATION: A CAUSE OF PILOT ERROR. BuMed & Surg. Res. Rep. NM 001 110 100.39, March 1955, 82pp. USN School of Aviation Medicine, Pensacola, Fla.

This report which is written primarily for flight surgeons summarizes and organizes a large number of studies bearing on disorientation (vertigo) in aircraft pilots. It is organized in terms of the perceptual processes which lead to proper orientation and disorientation in flight and attempts to show their relation to the pilot's task. Disorientation in flight is considered to be due to psychophysiological causes which should be regarded as the inevitable consequence of placing man in a task for which he is not fitted either by endowment or past training. An attempt is made to present explanations of pilots' experiences with disorientation in psychophysiological terms. Some suggestions are made to prevent disorientation and to deal with it when it does occur.

R 72

4537

Miller, J.W. & Ludwig, E. A SHORTENED PROCEDURE FOR THE TESTING OF DYNAMIC VISUAL ACUITY. Contract Monr-586(00), ONR Proj. Des. No. NR 142-023, Proj. NM 001 110 501.08. May 1955, 12pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

4537

To test the feasibility of shortening the procedure of testing dynamic visual acuity from a forty-five minute test to a twelve-minute test, the data on 200 subjects who were tested by the longer procedure were re-analyzed on the basis of a twelve-minute test. The correlation between results with the two methods as well as the reliability and predictability of each method was computed. The effect of shortening the test on learning curves was also examined. Conclusions about the worth of the short test are stated.

4538

Mann, C.W. CATALOG OF TRANSLATED MATERIAL IN SPACE PERCEPTION. Contract N7onr 434, T.O.I. Proj. Des. NR 143 455, Proj. NM 001 063.01.37 New No. NM 001 110 500.37, May 1955, 42pp. USN School of Aviation Medicine, Pensacola Air Station, Fla. (Tulane University, New Orleans, La.)

This report is a catalog of bibliographic materials in the area of proprioceptive, vestibular function and vision which have been translated from foreign languages. The catalog lists 427 items. The catalog is arranged in the author-alphabetical format adopted by the American Psychological Association.

R 427

4540

French, G.N., McPhaul, Mary V., & Melton, R.S. SOME EFFECTS OF PHYSICAL TRAINING ON BREATHING, OXYGEN CONSUMPTION, AND OXYGEN EXTRACTION DURING MODERATE EXERCISE. Res. Rep. No. NM 001 105 100.02, June 1955, 5pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

Respiratory studies were done on 10 naval aviation cadets during a standard exercise both before and after 3 months of the pre-flight physical training program. It was found that minute ventilation and oxygen consumption were diminished after training but that the per cent oxygen extraction was not altered. 10 enlisted subjects, judged to be relatively unfit physically compared to the cadets, were tested with the same task. Their ventilation was higher and oxygen extraction smaller than the cadets. The enlisted subjects varied more widely in their ventilatory response to exercise than the cadets. The enlisted group and the cadets, both before and after training, showed mean decreases in ventilation with shift to oxygen breathing during exercise. The enlisted group showed a larger ventilatory change in this respect than the cadets. The ventilatory response of the cadets to oxygen breathing was not altered greatly by the training. There was a significant inverse correlation between oxygen extraction and the amount of diminution in ventilation when breathing oxygen.

R 3

4542

Black, J.W. & Tolhurst, G.C. THE RECEPTION OF REPEATED SPEECH SIGNALS. Contract N6onr 22525, Proj. Des. NR 145 993, Proj. NM 001 104 500.48, April 1955, 13pp. USN School of Aviation Medicine, Pensacola, Fla. (Ohio State University, Columbus, Ohio).

Recorded monosyllables, comprised of consonant-vowel-consonant (CVC), in a variety of permutations, listened to simultaneously through a direct playback and a delay channel, were found to be successively relatively intelligible and unintelligible depending on different values of delay times. Words, when delayed with a single 0.06 second delay time, were improved in intelligibility only when the direct and delayed channels fed, dichotically, the 2 ears separately. Words were more intelligible when repeated one by one than when the same words were repeated in groups of 3 simulating a connected phrase utterance. These word groups when repeated were no more intelligible than single renditions of the separate words.

R 3

4544

Black, J.W. ALTERNATIVE SPEAKER LISTS FOR MULTIPLE-CHOICE INTELLIGIBILITY TESTS. Contract N6onr 22525, Proj. Des. NR 145 995, Proj. NM 001 104 500.51, May 1955, 15pp. USN School of Aviation Medicine, Pensacola, Fla. (Ohio State University, Columbus, Ohio).

Possible error responses on the answer forms of the multiple-choice intelligibility tests outnumber the correct responses 3 to 1. Each of these error responses in the printed answer sheets of Forms A, B, C, and D was read by at least 10 speakers to determine the usefulness of the words as test items. The speakers also read the standard lists of the tests. From the subsequent item analysis 12 alternative speaker lists were constructed for each form of the test. Mean intelligibility values for the lists are included. These permit the researcher to select and combine lists from the original and alternative lists within predetermined criteria of equality.

R 6

4547 Freeman, S., Petty, D.T., Last, J.H., & Faller, Inga L. TOTAL BODY WATER IN MAN: ADAPTATION OF MEASUREMENT OF TOTAL BODY WATER TO FIELD STUDIES. Contract DA 44 109 OH 729, Proj. 7 64 12 002, EPD Tech. Rep. EP 11, July 1955, 27pp. USA Quartermaster Research & Development Command, Environmental Protection Division, Natick, Mass. (Northwestern University, Evanston, Ill.).

A critical comparison was made between the heavy water (D_2O) and antipyrine (ANP) methods for measuring body water. In addition, comparisons were made between values obtained from intravenous and oral routes of administration for each method for the purpose of developing a field method of determining total body water (TBW). It was found that: a) The D_2O space was significantly larger than the ANP space. In 10 non-adipose V.A. Hospital patients, the ratio of D_2O to ANP was 1.06 ± 0.03 ; in 21 healthy U.S. Army soldiers, it was 1.08 ± 0.07 . b) The D_2O space was more reproducible on repeated determinations than was the ANP space. In cases of abnormal water distribution, the time for equilibration of D_2O was prolonged up to 6 to 24 hours, while ANP did not reach equilibrium even after 24 hours. c) Oral ingestion of D_2O can be substituted for intravenous injection, and urine samples can be substituted for blood in measurement of TBW. In 15 subjects the ratio of urinary D_2O space to serum D_2O space was 1.06 ± 0.02 . From these findings a simple field method for determining TBW is outlined in which subjects drink a known amount of D_2O and urine collected after 5 hours of water as has been suggested by other workers. It is concluded that the D_2O method of determining TBW is more reliable than is ANP in "normal" individuals, but that neither method is reliable in situations of deranged body water distribution. A simple field method has been found for determining TBW in which venepunctures are completely eliminated.

R 18

4545

Peters, R.W. CHANGES IN VOICE INTELLIGIBILITY, SOUND PRESSURE LEVEL OF RESPONSE, AND DURATION OF RESPONSE AS A FUNCTION OF THE SPEAKER'S BEING REPEATEDLY INFORMED THAT HE IS NOT BEING REPEATEDLY INFORMED THAT HE IS NOT BEING UNDERSTOOD BY HIS LISTENERS. Contract N60r 22525, Proj. Des. NR 145-993, Proj. NH 001 104 500-50, May 1955, 7pp. USN School of Aviation Medicine, Pensacola, Fla. (Ohio State University, Columbus, Ohio).

Criterion measures of voice intelligibility, relative sound pressure level of response, and duration of response were determined for 24 speakers who were repeatedly informed during their reading of testing materials that their voice transmissions were not being understood by their listeners. Voice intelligibility did not progressively improve even when significant increases in both sound pressure level and duration of vocal responses resulted from an increase in the number of times the speaker was informed that he was not being understood.

R 2

4550 Hembree, H.W. & Gaydos, H.F. ACOUSTIC TRANSMISSION PROPERTIES OF WINTER HEADGEAR. Proj. 7-95-20-0038, Tech. Rep. EP-19, Aug. 1955, 18pp. Quartermaster Research & Development Command, Environmental Protection Division, Human Resources Branch, Natick, Mass.

4550 The problem of hearing impairment as a result of winter headgear is discussed and investigated in terms of the acoustic transmission characteristics and sound attenuation of various (insulating) materials used in headgear. The experimental procedures utilized forty military subjects, pure-tone audiometric techniques, and a variety of insulating (thermal) materials such as pile and woven fabrics, Ensolite sound cells, etc. Results of the acoustic transmission losses of the various materials are presented and recommendations for further consideration are made.

T, G, R5.

4549 Baker, P.T., Daniels, F., Jr., Byron, R.F., & Munro, Ella H. RELATIONSHIP BETWEEN SKINFOLD THICKNESS AND BODY COOLING AT 59°F. Proj. 7 64 12 001, Tech. Rep. EP 14, July 1955, 21pp. USA Quartermaster Research & Development Command, Environmental Protection Division, Natick, Mass.

This study was designed to test the relationship between body fat and body temperatures when men are subjected to a cool environment. 31 men were exposed to an ambient temperature of 59°F. (15°C.) for 2 hours. They wore only shorts and were seated for the total period. Rectal and skin temperatures were recorded at 10-minute intervals. It was found that fat, as measured by skinfold callipers, bore a strong relationship to both rectal and skin temperatures. The greater the percent of fat in the body, the lower the skin temperatures. The correlations were closer between skin temperature and skinfold thickness in specific areas than between skin temperature and the calculated percent of fat in the body. The difference between one and 19 percent body fat made 5.9 degrees (F.) difference in the minimum mean weighted skin temperature. The correlation between minimum rectal temperature and percent of fat was high: the fattest men maintained near normal rectal temperatures, while the thinnest men had rectal temperatures 1.2°F lower. The examination of stature and fat-free weight correlations indicated that the primary relationship of fat to rectal temperature was modified by variations in body surface area.

R 17

4548

Woodcock, A.H., Fratt, R.L., & Fonseca, G.F. A COMPARISON OF EXPERIMENTAL PILE CLOTHING WITH THE STANDARD ARMY ARCTIC UNIFORM OF 1953. Proj. 7-64-06-001, EPD Tech. Rep. EP-13, Aug. 1955, 29pp. Quartermaster Research & Development Command, Environmental Protection Division, Natick, Mass.

Certain concepts of heat transfer and thermal stress were applied experimentally to the design of loose- and tight-pile clothing for Arctic wear, and the resultant suits were compared to the Standard Army Arctic Uniform of 1953. Relative advantages of the 3 suits were determined in the field and in the laboratory with 8 observer-subjects for the following conditions: rest, activity, and after-exercise chill. Detailed description of fabric construction and suit design in relation to scientific and theoretical requirements are discussed.

T, I, G, R3.

4551

Munro, Ella H. PREPARATION OF ANTHROPOMETRIC MONOGRAPHS. Rep. 184, Feb. 1952, 15pp. USA Office of Quartermaster General, Environmental Protection Branch, Washington, D.C.

The purpose of this paper is to provide simple sources of reference of anthropometric data for use by designers of clothing and other personal equipment. 7 analyses of Army populations were made in order to present the interrelationships between selected bodily dimensions and 2 independent dimensions, varying to the analysis. Each analysis has resulted in a monograph which is the graphic representation of the interrelationships. (MEIAS)

4552

Teichner, W.H. & Mehrkamp, R.F. VISUAL-MOTOR PERFORMANCE AS A FUNCTION OF SHORT-DURATION AMBIENT TEMPERATURE. Rep. 198, Jan. 1953, 8pp. USA Office of Quartermaster General, Environmental Protection Branch, Washington, D.C.

For 5 days subjects were exposed for 20 minutes to ambient temperatures of 55°, 70°, 85° or 100°F. and then given 15 trials on a task involving a high degree of visual-motor coordination. Performance was found to be poorer in temperatures both higher and lower than 70°F. The results suggest that the amount of decrement in performances to be expected in temperatures under 70°F may be greater than the amount to be expected in comparable temperatures above 70°F.

R 4

4553

Morsh, J.E., Wilder, Eleanor W. IDENTIFYING THE EFFECTIVE INSTRUCTOR: A REVIEW OF THE QUANTITATIVE STUDIES, 1900-1952. Proj. 7714, Task 77243, AFPTC TR 54 44, Oct. 1954, 151pp. USAF Training Aids Research Lab., Chanute AFB, Ill.

4553

A comprehensive and critical review of pertinent research in the selection and training of instructors is presented. The material is organized under two large topic headings: criteria of instructor effectiveness (ratings, objective observation, and student change), and the predictors--traits and qualities assumed to be related to instructor effectiveness (intelligence, education, scholarship, age and experience, knowledge of subject matter, personality, etc.). The findings are presented tabularly, and from the arrays of results, the reviewers have set down what appeared to them to be the most probable generalizations and discuss the implications for future research.

R 392

4555

Torrance, E.P. SOME CONSEQUENCES OF POWER DIFFERENCES ON DECISIONS IN B-26 CREWS. Proj. 7713, Task 57157, AFPTC TR 54 128, Dec. 1954, 29pp. USAF Crew Research Lab., Randolph AFB, Tex.

4555

To study some of the consequences of power differences on decision-making in permanent groups with well-defined power structures and to compare these effects with those obtained in similarly constituted temporary groups, B-26 combat crews were used. Each of 62 intact crews and 32 rearranged crews were administered four decision-making problems of varying nature and difficulty: horse-trading problem, dot test, conference-group projection sketch, and a survival problem. Both individual and group decisions were elicited. Analysis was in terms of the "influence" and "failure to influence" of each group member.

T. G. R 17

4556

Lichtenberg, P. & Deutsch, M. A DESCRIPTIVE REVIEW OF RESEARCH ON THE STAFF PROCESS OF DECISION-MAKING. Contract AF 18(600) 404, Proj. 505 036 0004, AFPTC TR 54 129, Dec. 1954, 50pp. USAF Crew Research Lab., Randolph AFB, Tex.

4556

This report presents a digest of research materials that might have pertinence to the central problems of the staff process of decision-making. It is organized under six topic headings: group vs. individual effort, size of group, leadership, coordination as a problem, motivation, and gaps in the literature. The digest emphasizes primarily the experimental social-psychological literature, although there are some items of a more general sociological and social anthropological nature.

R 165

4557

McPherson, J.H. PREDICTING THE ACCURACY OF ORAL REPORTING IN GROUP SITUATIONS. Contract AF 18(600) 5, Proj. 505 040 0004, AFPTC TR 54 130, Dec. 1954, 84pp. USAF Officer Education Research Lab., Maxwell AFB, Ala.

4557

This bulletin describes a study of the accuracy of reporting on assigned materials in a course at the Air University. A Reading Distortion Test and a Reactions to Group Situations Test were used to predict which men would be most likely to distort the content of assignments in making oral reports to groups. The tests were given to 100 men. Eight men predicted to be high in distortion and eight predicted to be low on the basis of these tests were then observed as they discussed specially prepared readings in class. Different patterns of behavior tending to bear out the predictions are discussed.

T. R 11

4558

Houston, R.C., Smith, J.F. & Flexman, R.E. PERFORMANCE OF STUDENT PILOTS FLYING THE T-6 AIRCRAFT IN PRIMARY PILOT TRAINING. Proj. 508 016 0002, AFPTC TR 54 109, Dec. 1954, 98pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

4558

This paper sets forth an objective method for recording performance in flight. Experienced instructor pilots entered on Performance Record Sheets the data furnished by 168 Air Force student pilots at five levels of Primary Pilot Training on 524 different flight checks. Results are presented as frequency distributions of performance values for each item on the Sheets. The implications of this method for the assessment of proficiency are noted.

T. G. I. R 5

4559

Fleishman, E.A. EVALUATIONS OF PSYCHOMOTOR TESTS FOR PILOT SELECTION: THE DIRECTION CONTROL AND COMPENSATORY BALANCE TESTS. Proj. 7701, AFPTC TR 54 131, Dec. 1954, 28pp. USAF Skill Components Research Lab., Lackland AFB, Tex.

4559

As part of a continuing effort to develop new apparatus tests that might measure more efficiently the psychomotor skills important to pilot success, two promising tests (Direction of Control, and Compensatory Balance) were administered to over 1200 unclassified pilot cadets along with the complete Aircrew Classification Battery. Reliabilities, distribution statistics, internal consistencies, validities (pass-fail criterion data for primary stage of flying training) and correlations with other Air Force classification tests were computed. The contribution to be expected from the tests if added to the Battery was studied. Complete test descriptions, wiring diagrams, instructions, and stanine tables are given.

T. G. I. R 7

4560

Mulsin, F.R. RESPONSES OF MAN TO A HOT ENVIRONMENT. Rep. 139, Dec. 1948, 61pp. USA Office of Quartermaster General, Environmental Protection Section, Washington, D.C.

This paper has been confined to the problem of heat stress, as it is likely to affect soldiers in the tropics. The evidence shows that, from this point of view alone, full clothing is often a disadvantage, and that the uniform should be reduced in amount, and opened to ventilation as far as possible. The design of clothing is complicated by questions of convention and by the need for protection from insects and thorns, which exist in some parts of the tropics. Progress in the study of these related matters bears directly on the clothing problem; for instance, the discovery of a highly effective and permanent insect repellent would do much to simplify and to lighten tropical dress and equipment. This paper suggests several questions which could be made objects of further research with probable benefit to the Army. Among them are the merits of alternative uniforms, the permeability of textiles to water vapor when dry and when wet, the effect of solar radiation on underlying tissues, and the nature of the peculiarities which distinguish heat tolerant individuals from others.

R 57

4561

Randall, P.E. APPLICATIONS OF ANTHROPOMETRY TO THE DETERMINATION OF SIZE IN CLOTHING. Rep. 133, June 1948, 108pp. Office of Quartermaster General, Environmental Protection Series, Climatic Research Lab.

4561

Applications of anthropometry to the determination of clothing size are presented. Body reference points and the techniques for anthropometric measurement of men and women are described and illustrated. Statistical methods for relating and applying these dimensions to clothing size and manufacture are discussed. In addition, data on typical anthropometric measures for large samples of men and women are included.

T.G.B6.

4562

Biser, E. HUMAN ENGINEERING. Signal Corps Proj. 122A, Dept. Army Proj. 3 99 05 021, Tech. Memo M 1477, Dec. 1952, 47pp. Signal Corps Engineering Lab., Department of the Army, Fort Monmouth, N.J.

Human engineering is concerned with analyzing the elements that serve as connecting links between the human and mechanical parts of the man-machine system. The task of the human engineer consists of keeping the operation of the machine within the optimal thresholds of the human sensory and motor capabilities and of eliciting proper operator-responses to facilitate a high level of performance. The design of instruments should be undertaken with a careful study and consideration of the limitations of the motor and sensory capacities of the operator. The design engineer should possess adequate knowledge of the human factors involved in the use and operation of instruments, such as reaction time, the effects of fatigue on the operator, the number of stimuli to which a sensory organ will give the desired response, etc. The instrument engineer should be concerned with such items as: how often the instrument is to be used, where it is to be placed, who is to use it, and how the information is to be utilized.

R 14

4565

Clarke, H.H. IMPROVEMENT OF OBJECTIVE STRENGTH TESTS OF MUSCLE GROUPS BY CABLE-TENSION METHODS. Res. Quart. Amer. Assoc. Phys. Educ. Res., 21(4), 399-419. (Physical Education Research Lab., Springfield College, Springfield, Mass.).

This is a report on the improvements of objective strength tests of muscle groups by cable-tension methods. Basically the old methods and their disadvantages are described along with the new methods and their advantages. The major changes in test procedure consist of alternate body positions, the selection of proper joint angles, the location of strap positions and the taking into account of the effect of gravity on the measurements. (HEIAS)

R 13

4566

Clarke, H.H. SINGLE BOUT ELBOW FLEXION AND SHOULDER FLEXION ERGOGRAPHY UNDER CONDITIONS OF EXHAUSTION TESTING. Arch. Phys. Med., April 1953, 240-246. (Springfield College, Springfield, Mass.).

In this research, procedures necessary to achieve precision in single-bout elbow flexion and shoulder flexion ergography under conditions of exhaustion testing were investigated. Objectivity coefficients between 0.75 and 0.85 were obtained for these tests. Inasmuch as the muscle-conditioning effect of repeated exhaustion bouts was found to be pronounced and was not compensated for in the study, these results were considered satisfactory. The essential feature in achieving precision in single-bout ergography was in determining the proper load to place on the ergograph carriage. These loads may be determined objectively for each individual as a proportion of the strength of the muscles directly involved in the movement. For the SS utilized in this research and with an 8-in. ergograph lever arm, the proportions were: 3/8 of elbow flexion strength for elbow flexion ergography; and 5/8 of shoulder flexion strength for shoulder flexion ergography. The greater proportion required for the shoulder flexion movement is attributed to the fact that the muscles are able to exert their greatest strength when the shoulder is fully extended; for elbow flexion, this position is between 100 and 140°, with a 20% decrease in strength at the extended position.

R 4

4567

Clarke, H.H. MUSCULAR STRENGTH-ENDURANCE OBSERVATIONS FROM SINGLE-BOAT ERGOGRAPHY. *J. Assoc. phys. mental Rehabilitation*, Jan.-Feb. 1953, 2(1), 4pp. (Physical Education Research Lab., Springfield College, Springfield, Mass.).

The Kelso-Hellbrandt ergograph was used to determine the endurance of the elbow flexor and shoulder flexor muscles. 64 Ss were used. The following conclusions were drawn: a) the amount of weight required to induce exhaustion in a relatively short time varies from individual to individual, depending on the strength of the muscles. The amount of weight for each S to lift may be determined objectively as a proportion of that strength; b) the work output of muscles in exhaustion performances is greater when in positions to apply greatest strength at the point of greatest stress; c) even with a limited number of exhaustion bouts, the training effect, as determined by the increased distance the ergograph load can be moved, is definite and positive. (HEIAS)

R 7

4569

Clarke, H.H. & Bailey, T.L. STRENGTH CURVES FOR FOURTEEN JOINT MOVEMENTS. *J. phys. mental Rehabilitation*, Apr.-May 1950, 4pp. (Physical Education Research Lab., Springfield College, Springfield, Mass.).

Research was conducted to assess the amount of muscle strength that is applied throughout the range of motion of certain joints. 14 movements of the joints were investigated. It was concluded that a muscle exerts its greatest power when it functions at its greatest tension, that the angle at which the muscle pulls is of importance, that the mechanical arrangement of the levers sometimes interfere with the full application of strength, even though the muscle may be at their greatest length, and that there probably is an optimal position in which each muscle group functions the best. (HEIAS)

R 3

4570

Clarke, H.H. PRECISION OF ELBOW FLEXION ERGOGRAPHY UNDER VARYING DEGREES OF MUSCULAR FATIGUE. *Arch. phys. Med.*, May 1952, 33, 279-288. (Springfield College, Springfield, Mass.).

Research was undertaken to determine the precision with which ergographic testing of the elbow flexion muscles can be accomplished. Ss were 31 physical ed. majors. The Kelso ergograph was used in muscular fatigue testing. The following results were obtained: a) High degree of precision was obtained under conditions of mild to moderate muscular fatigue; b) Any length lever arm may be used with consistent results; c) The effect of practice was slight when fatigue did not reach exhaustion states; d) Precision was maintained when weight loads were increased, provided 30 min. rest periods between trials were allowed and the fatigue induced fell short of exhaustion; e) Precision of ergographic testing was reduced when exhaustion states were reached. The objectivity coefficient of .78, however, is high enough to suggest that precision procedures might eventually be achieved. (HEIAS)

R 9

4572

Jenoff, Irma Z., Beck, L.H., & Child, I.L. THE RELATION OF SOMATOTYPE TO REACTION TIME, RESISTANCE TO PAIN, AND EXPRESSIVE MOVEMENT. *J. Pers.*, 1950, 18, 454-460. (Yale U.)

4572

This is an experimental study of the relation of somatotype (Sheldon) to reaction time, resistance to pain, and expressive movement. Measures were derived from 51 male college subjects on the following: simple auditory reaction time, visual discrimination reaction time, reaction time at shock threshold, reaction time to strong shock, radiant heat pain threshold, shock threshold, upper limit of shock, leg flexion threshold and ratings of expressive movement by one experimenter on a series of graphic rating scales. Correlations were computed between each of these measures and each of the three dimensions of physique. T.R.S.

4573

Beck, L.H., Kruger, L. & Calabresi, P. OBSERVATIONS ON OLFACTORY INTENSITY. I. TRAINING PROCEDURE, METHODS, AND DATA FOR TWO ALIPHATIC HOMOLOGOUS SERIES. *Ann. N.Y. Acad. Sci.*, March 1954, 58(2), 225-238. (Yale University, New Haven, Conn.).

4573

To investigate the problem of measuring odorous intensity, a standard odorant (heptanal) was selected and a set of diluted solutions of the standard prepared that yielded a scale of odorous intensity physically anchored in terms of the concentrations of the standard. The subjects' task was to find a concentration of the standard that was as strong as a comparison odor differing in quality. The training procedures, experimental methods and data for two aliphatic homologous series for four subjects are presented.

T. G. R 10

4574 Kennedy, S.J., Meigs, P., Telchner, W.H., Daniels, F., Jr., et al. PAPERS ON FIELD SLEEPING. ca. 1952, 71pp. Office of the Quartermaster General, Environmental Protection Div., Natick, Mass.

Historically, military field sleeping has been a simple problem. 5 papers are presented which show both the complexity and review the problems involved. The papers presented include: a) Military requirements for field sleeping gear; b) Problems of environmental description; c) Psychophysiological problems of field sleeping; d) Biophysical aspects of field sleeping; and e) Psychological problems of field sleeping. (HEIAS)

R 19

4575

Stockbridge, H.C.W. & Draper, J. THE VALIDATION OF AN APPARATUS FOR MEASURING THE STEADINESS OF AIM OF A RIFLE. CEPRE Rep: 14, 1954, 15pp. Clothing and Equipment Physiological Research Establishment, Directorate of Physiological and Biological Research, Ministry of Supply, Great Britain.

This validation is an attempt to estimate how much Spring's apparatus for measuring the steadiness of aim of a rifle affected marksmanship, as measured by grouping scores. The assumption made in the present experiment is that if similar scores are obtained with normal fire and with the apparatus then the tremor pattern preceding a normal shot is similar to the pattern using the apparatus. The calibration of the apparatus and the readings taken with it to check an aiming experiment are also discussed. 2 Ss were selected for their good shooting. They each fired 40 rounds grouping, and, on the following day, 40 rounds application. On each occasion the S fired with and without a mirror attached to his rifle, over and without the remainder of the apparatus, 4 conditions in all. X and Y axes were marked on the 2 targets used and the coordinates of each point of impact recorded. The range was 100 yards. The data was subjected to an Analysis of Variance. Under the conditions of the experiment the apparatus does not significantly affect the marksmanship of the Ss.

4576

Grandpierre, C. & Biget, C. THE PHYSIOLOGICAL BASIS OF PROTECTION AFFORDED BY CLOTHING. (LES BASES PHYSIOLOGIQUES DE LA PROTECTION VESTIMENTAIRE). Trans. 363, April 1956, 13pp. Royal Aircraft Establishment, Farnborough, Hants, England.

4576

During recent years, considerable progress has been made on the determination of the protective capacity of clothing by placing the problem in the field of physiological experimentation. Methods of measuring the thermal insulating capacity of clothing are described: 1) measurement expressed in "clos," 2) measurement expressed in "tolerance time," and 3) a mixed method.

4577

Institute for Associated Research. BIBLIOGRAPHY OF BOOKS AND ARTICLES REFERRING TO RESEARCH IN HUMAN BEHAVIOR FROM THE TRANSACTIONAL POINT OF VIEW. Rev. March 1954, 7pp. Institute for Associated Research, Hanover, N.H.

A briefly annotated bibliography of 55 books and articles referring to research in human behavior from the transactional point of view is provided. The references are divided into 2 general categories: a) primary references and b) other references arranged according to area of interest (art and architecture, education, mathematics, philosophy and general). The bibliography covers the period to March 1954. (HEIAS)

4578

Egan, J.P., Carterette, E.C. & Thwing, E.J. SOME FACTORS AFFECTING MULTI-CHANNEL LISTENING. J. Acoust. Soc. Amer., Sept. 1954, 26(5), 774-782. USAF Human Factors Operations Research Labs., Washington, D.C. (Psychology Dept., Indiana University, Bloomington, Ind.).

Certain factors were investigated that affect the intelligibility of a speech message which is presented to a listener simultaneously with an interfering speech message. In 2 of the 4 experiments reported, filters were introduced into one of the 2 channels that carried the messages. Thresholds of perceptibility were not reliably decreased by moderate amounts of filtering of the received message. However, articulation scores were considerably increased by the use of a high-pass filter (500 cps) in either of the 2 channels. The great advantage of presenting one message to one ear and the interfering message to the other ear (dichotic presentation) was measured by changes in the thresholds of perceptibility and by articulation tests. Functional relations between thresholds of perceptibility for the message to be received and the intensity of an interfering signal were determined for both monaural and dichotic listening. In separate tests, noise was also used as the interfering signal. Dichotic reception permits a reduction in intensity of the received signal of about 30 db as compared with monaural reception. Articulation-gain functions demonstrated a similar advantage for dichotic over monaural listening. When the message to be received and the interfering message are monaurally received at equal intensities, the articulation scores for the designated messages are about 50 percent. If the message to be received is somewhat less intense than the interfering one, the cue value of the intensity difference offsets the increased masking of the less intense by the more intense message.

R 13

4579

von Karman, T. (Chm.). PROCEEDINGS OF THE FOURTH AGARD GENERAL ASSEMBLY. The Netherlands AGARD Conference, 3-7 May 1954. AG 14/P-5, 160pp. Advisory Group for Aeronautical Research and Development, NATO, Paris, France.

4579

These are the Proceedings of the Fourth AGARD (Advisory Group for Aeronautical Research and Development) General Assembly, May 1954. Topics relevant to human engineering include: human factors in aircraft design, subjective experiences and reactions during test flying, low temperature operation of aircraft, use of personal equipment for survival, environmental extremes, etc. Several bibliographies on AGARD publications are also included.

G, I, R.

4581

Bartlett, T.E. TRANSPORTATION SYSTEMS RESEARCH: I. AN ALGORITHM FOR THE MINIMUM UNITS REQUIRED TO MAINTAIN A FIXED SCHEDULE. Contract Nonr-1100(05), Proj. NR C4V 016, Res. Memo. 4, May 1956, 20pp. ONR, School of Industrial Engineering and Management, Purdue University.

4581

As one of a series of studies on various aspects of transportation systems planning and control, this report develops a method for evaluating the minimum number of "transport units" required to maintain a fixed schedule. The analysis results in an algorithm which employs data usually found in schedules (arrival and departure times of the various runs at the various terminals during the typical time period). The minimum number of "transport units" required are developed in terms of convenient quantities related to minimal lay-over time, running time, and length of typical time period. The focus of the study is rail transportation.

I.

4582

Newman, R.W. & White, R.H. REFERENCE ANTHROPOMETRY OF ARMY MEN. EPS Rep. 180, Sept. 1951, 172pp. Environmental Protection Section, Quartermaster Climatic Research Lab., Lawrence, Mass.

The data presented in this report were derived from an anthropometric survey of approximately 85,000 U. S. Army white males, conducted by the Quartermaster Corps in 1946. A total of 65 dimensions was obtained on each man in this series; 43 of these are considered in varying detail in this report. Of the remainder, the majority are dimensions of the head and face which form a group applicable to special problems. The very large number (2030) of interrelationships between dimensions which are possible in a consideration of the 65 dimensions obtained during the survey has necessitated the exclusion of all but the most obvious relationships in this report. The data derived from the total sample of approximately 85,000 white males proved too unwieldy and time consuming to handle in the mechanical processes of sorting and analyzing. For this reason the analyses presented here are based on a smaller sample. It has been found that a geographically weighted subsample of approximately 25,000 white males did not differ significantly from the larger sample.

4583

Rogers, M.S. AN APPLICATION OF INFORMATION THEORY TO THE PROBLEM OF THE RELATIONSHIP BETWEEN MEANINGFULNESS OF MATERIAL AND PERFORMANCE IN A LEARNING SITUATION. Ph.D. Thesis, RB 52-4, April 1952, 100pp. Princeton University.

4583

To develop a quantitative description of the relation of meaningfulness of material to rate of learning, an information theory of learning was outlined and an equation for learning in the paired associates situation derived. A suggestion, based on the theory, was made that differences in learning which has been attributed to meaningfulness might be related to differences in certain informational characteristics of the learning situation which are related to different kinds of materials. Three paired associates learning tasks were developed and analyzed in terms of information theory, Gestalt theory and transfer theory of meaning. T. G. 1. R 19

4588

Kendler, T.S., Kendler, H.H. & Cook, J.O. IMPLICATIONS OF LEARNING THEORY FOR THE DESIGN OF AUDIO-VISUAL AIDS. Prof. 504 28 002, Rep. 348300, HRL Memo. 12, Nov. 1951, 34pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C. (Psychological Research Center, New York University, New York, N.Y.).

4588

This paper describes various principles of learning (in terms of the stimulus-response reinforcement theory of Hull) and relates them to audio-visual training. Several specific hypotheses dealing with such variables as participation by the learner, identification of audience with actors, and temporal lag between picture and sound track are derived from these principles, and experiments designed to test them are outlined in detail.

R 25

4585

Beck, L.H. OSMICS: OLFACTION. Medical Physics, 1950, 11, 658-664. (Yearbook Publishers, Inc., Chicago, Ill.).

This paper is a general analysis of osmics (olfaction). Continued in the paper is an analysis of the perfume chemist's job, early theories concerning stimulation of olfactory receptors, a modern theory of olfaction, a discussion of several tests of the notions: that the molecule is the unit of smell, the notion of the direct radiation mechanism, the notion of adsorption, the joint infra-red-mono-molecular-film hypothesis. Classification systems and their shortcomings are also discussed as are methods which would permit direct physical measurements on odorants at suprathreshold levels without the uncertainties of extrapolation. (HEIAS)

R 13

4586

USN Electronics Laboratory. SUGGESTIONS FOR DESIGNERS OF ELECTRONIC EQUIPMENT. Aug. 1955, 41pp. USN Electronics Laboratory, San Diego, Calif.

This handbook deals with the design of electrical equipment. A list of the main topics contained in it are as follows: a) common faults found in electronic equipment manufactured for the Bureau of Ships; b) technical suggestions for designers; c) human engineering suggestions for designers; d) 12 points for proper parts application. Some of the secondary topics are concerned with maintenance, panel layout, console design, visual displays, common mistakes in design philosophy concerning the human operator, safety and operating conditions, etc. (HEIAS)

4587

Beck, L. & Shepherd, H.R. DESIGNING AN AEROSOL DEODORANT. Soap & Sanitary Chemicals, Sept. 1949. (Yale Univ. & Connecticut Chemical Research Corp.)

4587

This paper discusses the various considerations involved in developing an aerosol deodorant for household use. Psychophysiological aspects of the problem are considered together with other theoretical, practical, and production considerations. The variables to be considered in laboratory evaluation of a deodorant are listed and the Bostwick Odorometer, employed in such tests, is described.

I. G.

4589

Stockbridge, H.C.W. & Draper, J. AN ESTIMATION OF THE VARIATION OF THE POINT OF AIM USING THE RIFLE NO. 4, MK. 1. CEPRE Rep. 10, Jan. 1954, 16pp. Ministry of Supply, Clothing & Equipment Physiological Research Establishment, London, England.

The purpose of this study was to estimate the variation of the point of aim, both in elevation and traverse, using the Rifle No. 4 Mk. 1, while considering changes in the aperture of the backsight, the design of the target and the range at which firing was done. 8 Ss sighted the rifle attached to a theodolite on 2 types of target at 2 ranges with the issue sights. The theodolite readings which gave a measure of the point of aim and its variation were analyzed statistically. (NEIAS)
A-8

4593

Joos, G. THE RESOLUTION IN TELEVISION. Tech. Note 15, Feb. 1948, 6pp. Boston Univ., Optical Research Lab.

4593

This report presents mathematical data on the resolution and deterioration of contrast in television due to the mosaic structure and the electron beam dimensions.
T.C.

4590

National Research Council, Panel on Psychology and Physiology. A SURVEY REPORT ON HUMAN FACTORS IN UNDERSEA WARFARE. Contract N7 ori-291, Task III, 1949, 541pp. plus supplement. Committee on Undersea Warfare, National Research Council, Washington, D.C.

4594

Stark, S. OPTICAL COMPUTATION MANUAL. Tech. Note 22, June 1948, 77pp. Boston Univ., Optical Research Lab.

4590

This volume presents a general summary of the status of knowledge (1949) with reference to the role of the human factor in undersea warfare. The topics covered are: (1) general visual problems (basic principles, night vision, design and use of optical instruments, printed materials, maps, charts, radar, display of complex information), (2) design and arrangement of operating equipment, (3) auditory problems (signals, sonar), (4) communication (voice, visual), (5) habitability (physiological and psychological factors), (6) emotional stability and adjustment (psychological stress, morale and leadership), (7) selection and training, and (8) personnel resources for research. A name and subject index are included.
T. G. I. R 1165

4594

A manual presenting the mathematical procedures and methods used in lens design. Topics discussed include paraxial ray tracing, tracing of finite rays, Coddington ray traces for locating astigmatic images, chromatic aberration, etc.
G.I.R.

4595

Macdonald, D.E., Ross, G., Aschenbrenner, G., et. al. CRITERIA FOR DETECTION AND RECOGNITION OF PHOTOGRAPHIC DETAIL. Part I. RESOLUTION, SCALE, AND CONTRAST CONDITIONS FOR ISOLATED DETAIL. Contract AF #33-038-ac-14075, E.O. No. 680-84-SA10, Tech. Note 69, Sept. 1950, 26pp. USAF, Boston Univ., Optical Research Lab.

4591

Asher, J.W., Hanley, T.D. & Steer, M.D. A FIELD STUDY OF VOICE COMMUNICATION PROBLEMS AS RELATED TO TRAINING DEVICES, PROCEDURE AND EQUIPMENT. Contract N6ORI 104, SDC Proj. 20 F 8, SDC TR 104 2-41, April 1955, 43pp. USN Special Devices Center, Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

4595

The present study is concerned with the relation between resolution, scale, and contrast for interpreting aerial photographs. A laboratory set-up provided simulated aerial photographs. For scoring resolution, the films were viewed through binocular microscopes. The 50%, 80%, 95%, and 100% probability of seeing with different resolution and contrast values on the negative are presented.
T. G. R 29

4591

In order to evaluate the communication problems in the Navy, personnel concerned with communication systems were sampled by means of interview and questionnaire techniques. In addition, a sampling of operational voice communications aboard three Navy vessels was obtained. The results are presented in terms of the problems of voice communication found to be most prevalent among the personnel who were interviewed. Recommendations are offered concerning the solution of these problems.
T, R 5

4596

Macdonald, D.E. CRITERIA FOR DETECTION AND RECOGNITION OF PHOTOGRAPHIC DETAIL. Part II. SYSTEM PERFORMANCE. Contract AF #33-038-AC-14075, E.O. 680-84-SA10, Tech. Note 72, Oct. 1950, pp. 31-48. USAF, Boston Univ., Optical Research Lab.

4596

This paper is a theoretical (mathematical) presentation of the characteristics of aerial photographs which will lead to improved interpretability. Stimulus and human operator characteristics are discussed and it is suggested that information unit in a visual process be taken as a gradient rather than a level of exposure.
G.T.R.

4592

Matheny, Beatrice J. TWO SIMULATORS FOR TRAINING PILOTS AND CONTROLLERS IN AIR TRAFFIC CONTROL PROCEDURES. Contract N6ori 71 (16), SPECDEVCEV Proj. 20 L 1, Tech. Rep. 71 16 15, June 1955, 22pp. USN Special Devices Center, Port Washington, N.Y. (University of Illinois, Urbana, Ill.).

In this study 2 simulators for training pilots and controllers in air traffic control procedures were developed and given a preliminary training evaluation. Both methods, one involving very little equipment and the other somewhat more complex, were found to be useful in training both pilots and controllers. It is recommended that a method for training pilots in traffic control procedures be introduced into the Navy pilot training syllabus. The simplest method, using paper and pencil, seems adequate for teaching low frequency and omnirange procedures. The more complex method, using Link trainer crabs, permits training on radar approach procedures as well as low frequency and omni-systems and, therefore, is a more versatile training device.

4597
Brooks, R., & Anderson, R.C. RADC-RADC EVALUATION OF TACAN (NETE REPORT). RADC-TR-56-50, June 1955, 78pp. RADC, Griffiss AFB, Rome, N.Y.

4597
This report summarizes engineering tests and evaluation of the short-range, tactical, omnibearing, distance-measuring system (TACAN) which provides a pilot with visual bearing indication in degrees and distance in nautical miles within line-of-sight of a ground beacon. Equipment designation for ground beacon is AN/TRN-5(AW/URN-3); for the airborne equipment, AN/ARN-21. The test covered three months and was identified as HETT (North-East TACAN Test). Measurements were made of system azimuth accuracy, range, pattern coverage, reliability, altitude capability, traffic capacity, and channel interference. Test methods, data accumulated, and flight tests are defined and summarized. Recommendations for correction of system deficiencies are included.
T: 1.

4599
Macdonald, D.E. SOME CONSIDERATIONS OF RESOLUTION, SHARPNESS, AND PICTURE QUALITY IN TECHNICAL PHOTOGRAPHY. Contract AP 33 (038)-16615, Tech. Note 89, Sept. 1952, 12 pp. Boston Univ., Optical Research Lab.

4599
The present study investigated the ability of the average observer to detect the presence of basic object forms from laboratory-produced aerial photographs using different contrast and different resolution levels, for different sizes. Results are presented relating symbol size to focal setting for achieving peak probability of detection and focal setting for maximum contrast.
G.T.R.II.

4603
Lightfoot, C. EVALUATION OF THRESHOLD TRACING AUDIOMETRY AS A METHOD FOR STUDYING EFFECTS OF STRONG ACOUSTIC STIMULATION. Proj. 21 1203 C001, Rep. 8, April 1955, 18pp. USAF School of Aviation Medicine, Randolph Field, Tex. (Northwestern University, Evanston, Ill.).

An audiometric procedure is described which involves the subject's tracing of his threshold by oscillating an attenuator and thus causing a test tone to fluctuate continually between audibility and inaudibility. This procedure was followed by a number of normal-hearing persons both before and after 3 minutes of strong (105 db re 0.0002 microbar) acoustic stimulation. Data were thus provided to facilitate evaluation of the procedure as a possible means of measuring "fatigability," which was assumed to be a correlate of susceptibility to stimulation deafness. 4 combinations of fatiguing sound (white noise or 2-kc. tone) and test tone (3000 or 4000 cps) were each used twice for each subject. In general, traced thresholds compared well with conventionally obtained measures with respect to test-retest reliability. Because of the high test-retest consistency associated with it, and its tendency to differentiate individuals markedly, the noise/4000 cps combination appeared to be the best for fatigability measurement. The threshold tracing procedure revealed not only threshold shift and rate of recovery but also 2 extra-threshold dimensions--namely, directional consistency of recovery and smoothness of tracing.
R 5

4604
Bancroft, R.W., Carter, E.T. & Luft, U.C. EVALUATION OF THE HYPOXIA WARNING DEVICE. Rep. 55 60, May 1955, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The results of these studies indicate that the hypoxia warning device based on the principle of oximetry has promising possibilities. However, the fact that the device requires constant attention and adjustment up to the moment of each hypoxic exposure in the laboratory and altitude chamber also indicates that, in its present form, it can not be considered a reliable instrument for signaling the onset of hypoxia under operational flying conditions. The most important limiting factor as far as the reliability of the device is concerned is the physiological problem of maintaining a constant blood flow through the ear pinna on which the oximeter photocell unit is attached. The constriction and dilation of blood vessels in the ear are unpredictable variables, not only in a single individual, but even more so in different individuals, and these vascular changes are difficult to control consistently. For this reason, further study and modification of the photoelectric ear unit is necessary in order to insure the detection of hypoxia and a decreased arterial oxygen saturation under a variety of flying conditions to which a pilot is subjected.
R 4

4605
Sells, S.B., Barry, J.R., Trites, D.K. & Chinn, H.I. A TEST OF THE EFFECTS OF PREGNENOLONE METHYL ETHER ON SUBJECTIVE FEELINGS OF B-29 CREWS AFTER A TWELVE-HOUR MISSION. Rep. 55 11, May 1955, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Pregnenolone methyl ether has been reported in the literature as having favorable effects, with psychiatric patients, on subjective reactions of fatigue, irritability, anxiety, and fear. Student B-29 crews were administered this drug or a placebo, in a balanced design, immediately after completing an all-night, overwater mission, to determine whether similar effects might be produced in normal bomber crew personnel. A battery of psychological tests was administered twice to both groups, by crew, with an interval of from 63 to 94 minutes between pre-drug and post-drug test periods. No significant differences were found between drug and placebo groups, although the changes observed support the validity of the tests.
R 10

4606
Loving, D.L. AERODYNAMIC MEASUREMENTS MADE DURING NAVY INVESTIGATION OF HUMAN TOLERANCE TO WIND BLASTS. Res. Memo L7025, Nov. 1948, 10pp. National Advisory Committee for Aeronautics, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).
This report presents the aerodynamic measurements made during a Navy investigation conducted in the Langley 8-foot high-speed tunnel to determine the actual human tolerance to wind blasts. Those tests were made at the request of the Naval Medical Research Institute, Bethesda, Md., to obtain direct evidence of the forces involved when the human head is suddenly thrust into a rapidly moving air stream, as is the case in ball-bats from aircraft at high speeds, and also to determine the maximum speed considered safe for the unprotected face to be exposed to wind blasts.
R 3

4607
 Bylund, R.M. A GUIDE FOR USE IN PERFORMANCE TESTING
 IN AIR FORCE TECHNICAL SCHOOLS. Prof. 7729, Task
 77142, AFMIL IN 25 1, Jan. 1956, 75pp. DEP. ARMY
 Systems Research Lab., Lowry AFB, Colo.

4608

This performance testing guide is intended to sup-
 plement the information on performance testing currently
 contained in Air Training Command Regulation 50-2, "Gen-
 eral Training," and AFMIL Manual 50-900-9, "Improvement of
 Training Procedures for Air Training Command Schools."
 Following the introduction which defines performance
 testing and the need for such testing, various chapters
 deal with 1) characteristics of performance tests, 2)
 development and administration, and 3) utilization of
 test results. A checklist for use in developing a
 performance test and a primer for measuring test re-
 liability are appended.
 T. G. L.

4609

Goodrich, J.W. ESCAPE FROM HIGH PERFORMANCE
 AIRCRAFT. Tech. Note 54-7, Jan. 1956, 8pp.
 Directorate of Research, WAC, Wright-Patterson
 AFB, Ohio.

4609

An objective analysis of the problem of escape from
 high performance aircraft is presented in terms of human
 tolerance to acceleration correlated with pertinent com-
 ponents and physical factors. The maximum linear accel-
 eration experienced during escape is computed for the con-
 ventional ejection seat system as a function of alti-
 tude, speed, altitude, and thrust vector. Many of
 conditions are computed as a function of altitude for a
 given initial altitude speed. Correlation of these
 physical conditions with human tolerance to accelera-
 tion reveals the critical human limitations associated
 with conventional ejection seats for successful escape
 from high performance aircraft. Suggestions are included
 for lines of research on escape systems.
 G. R. 4

4610

Dyson, G.W. & Chilling, C.K. MILITARY APPLICATION OF
 RESEARCH IN PSYCHOLOGICAL SCIENCE. DEP. ARMY, Proc.,
 Sept. 1955, 1023-1030.

4610

The necessity for an accelerated program of
 research in the field of psychological sciences in
 relation to requirements for national defense is the
 premise of this paper. The scope of military appli-
 cations of research in this area is defined and dis-
 cussed under the following topics: human relations,
 morale, selection, training, psycho-physiology (re-
 lation of special senses to the military problem),
 human engineering, and operational analysis and
 research. Examples of military applications are given.
 L.

4617

Dupree, L. THE JUNGLE SURVIVAL FIELD TEST.
 ADTIC Publ. 7-101, Rep. AC-387-54 RSI, June
 1956, 75pp. Arctic, Desert, Tropic Informa-
 tion Center, Research Studies Institute, Air
 University, Maxwell AFB, Ala.

4617

To evaluate the Air Force survival system (man,
 procedures and technique, equipment) in a simulated
 emergency situation in the rain forest of Borneo, ex-
 perimented Air Force crew members were selected at random
 to participate in the test (with observer-participant the
 crew size was seven). The modified Griffide A-1 sur-
 vival kit, a back parachute, and supplementary items nor-
 mally carried in pockets were provided each man for a
 trek (estimated duration of 14 days) through the jungle.
 A pre- and post-trek questionnaire were given to the
 participants, an objective field diary was kept of the
 observers, and photographic coverage was made. Data
 from these sources were analyzed in terms of the ade-
 quacy of each system component.
 I. R 19

4618
 Lloyd, V.V. A COMPARISON OF CRITICAL FUSION FREQUENCIES FOR DIFFERENT AREAS IN THE FOVEA AND
 PERIPHERY. AMERICAN JOURNAL OF PSYCHOLOGY, 1957, 61, 346-357. DEP. ARMY, New York, N.Y.).

4621
 Hall, R.L. PREDICTING BOMBER CREW PERFORMANCE FROM THE AIRCRAFT COMMANDER'S ROLE. Proj.
 7713, Task 7723, AFMIL IN 56 78, Feb. 1956, 16pp. WAC, Personnel Training Research
 Center, Crew Research Lab., Randolph AFB, Tex.

To examine predictive relationships between the aircraft commander's interpersonal role
 during training and the effectiveness of his crew's later performance, three dimensions
 were selected for study: nurturance, intimacy and militancy. Measures for these three
 dimensions were available from a previous study. Performance criteria include one rating
 of performance during training by flight instructors and four measures of combat perfor-
 mance: ratings by superiors, peer ratings, administrative overhead costs, and altitude
 scales. The various measurements were made in 28 B-36 crews during their last training
 phase and after six to eight months of combat experience. The data were studied by cor-
 relational methods to determine how adequately predictions of crew effectiveness were made
 from dimensions of commander role behavior.
 T. R 13

An apparatus and procedure have been described for determining the critical fusion fre-
 quency as a function of intensity for the human eye. Areas with diameters of 1', 2', and 3'
 visual angle in the fovea and at 1', 2', 6', and 14' visual angle centered 20' below the
 fovea have been investigated. The data for the foveal areas seem to indicate the function-
 ing of a single receptor, i.e., cones. Those for the periphery fall into 2 parts which are
 probably due to rod and cone function, respectively. According to intensity level, both sets
 of data show that the critical fusion frequency increases with area of stimulation over a
 wide range of intensities. A comparison of results for the corresponding foveal and peripheral
 areas reveals that at low intensities the periphery is more sensitive to flicker than the
 fovea, while for intermediate and moderately high brightness levels, the situation with com-
 parable areas (1' and 2') is reversed. The superiority of the periphery at low intensities
 is attributed to the greater sensitivity of the rods at these levels. At the very highest
 intensities, the 1' and 2' foveal and peripheral areas show similar maximal critical fusion
 frequencies.
 R 21

4612

Minter, R.S. VISUAL CUES: LEARNING AS A FUNCTION OF TIME AND INTENSITY OF EXPOSURE. *J. exp. Psychol.* Nov. 1942, 21(5), 421-429. (Brown University, Providence, R.I.).

4613

This study concerns the speed with which an S learns to estimate visual numerosity accurately as it depends on the numerosity and duration of the stimulus at low intensities. An experienced S was required to estimate the number of dots in various arrays presented tachistoscopically, each array being presented until the estimate was correct. The results related the number of presentations to collection and the reaction times for different numbers of dots to duration and intensity of exposure.

T. C. R 4

4630

Miles, W. HOW TO SEE IN THE DARK. *General Electric Science Paper Program*. Sept. 8, 1943, 477. (General Electric Co., Schenectady, N.Y.).

4630

A simplified presentation of rules for seeing in the dark. (Radio address).

4624

Eisendorfer, C. A COMPARISON OF TWO METHODS FOR THE DETERMINATION OF VISUAL RECOGNITION THRESHOLDS. *Psychol. Newsletter*, Nov.-Dec. 1954, 6(2), 35-47.

An experiment was performed to compare 2 methods for the determination of visual recognition thresholds, and to retest the Postman, Bruner, and McGinnies hypotheses concerning the role of personal values in perception. 24 subjects were presented with word stimuli tachistoscopically and at varying brightness levels to obtain visual thresholds. Systematic correlations between the 2 methods of presentation were not found; nor did either method show a value-based patterning of thresholds.

R 32

4625

Haus, G.T. & Payne, R.S. THE EFFECTS OF DEXTROAMPHETAMINE AND BENZYL-HEXAMINE UPON JUDGMENT. *Rep.* 55 104, Nov. 1955, 11pp. *USAF School of Aviation Medicine, Randolph AFB, Tex.*

At regular intervals during the learning of a unique perceptual-motor task, subjects were told the proficiency score which they had attained during the period just completed and then asked to estimate the proficiency score they expected to attain during the next period of practice. The magnitude and direction of estimation error were determined by computing the absolute and algebraic differences between the proficiency estimated and the proficiency that was then actually attained. When these measures of estimation error were analyzed, it was found that neither dextroamphetamine sulfate (5 mg.) nor diphenhydramine hydrochloride (50 mg.) + scopolamine (0.65 mg.) had significantly affected the judiciousness of these estimations.

R 5

4626

Macdonald, N.E. WORK DESIGN AND TRAINING FOR FUTURE INDUSTRIAL SKILLS. Report from "Paper presented to the Institution in London, 9th February 1956". *APD 25.0.56*, Feb. 1956, 211-250. *Medical Research Council, Applied Psychology Research Unit, London, England.*

This paper on two psychological approaches to industrial problems—work design and training—was presented to the Institution of Production Engineers Conference, London, 1956. Part I deals with work design for inspection and decision taking; Part II considers some matters related to the training of electrical maintenance workers. While acknowledging the values in a common sense approach to work design, the discussion points out that such an approach breaks down with complex problems and with entirely new forms of work; here specially devised measures of human achievement are needed. Some typical performance data on such inspection tasks as continuous monitoring for misalignments, consecutive inspection for misalignments or defects and monitoring automatic machines for emergencies are presented and design problems discussed. Work design for decision making for the controller of automatic system, is discussed and many research problems defined. Finally, the increased problems of electrical maintenance in present and future machine systems with consequent training and supply of personnel are set forth. (MEIAS)

R 4i

4629

Miles, W. NIGHT VISION - FLYING DEMANDS LIGHT SENSITIVITY AND DARK ACUITY. *Yale Sci. Mag.*, Oct. 1943, 18:1, 4pp.

4631

Miles, W.R. RED GOGGLES FOR PRODUCING DARK ADAPTATION. *Ed. Proc.*, June 1943, 2, 109-115. (Yale Univ.)

4629

A brief summary of some basic data on dark adaptation and its relation to form perception. Topics discussed include action of the eye, eye defects, night vision, laboratory tests and test conditions, illustrative results, night acuity and acuity criteria. I.G.

4631

Stimulus thresholds at 7° on the nasal side of the retina were obtained for six trained subjects following 27-30 minutes of wearing red (Corning No. 5113) goggles as well as after complete darkness. In addition, curves were determined when 4-5 minute exposure to the red light was interspersed 7 or 8 times during the determination of the dark adaptation curve. The efficiency (rapidity of acquired sensitivity) of the various experimental conditions is compared. C.R.

4632

Leavitt, R.J. & Schlosberg, H. THE REDUCTION OF THRESHOLD OF MUTE SIGNALS. *Univ. Psychol.*, Oct. 1944, 34 (5), 404-407. (Brown University, Providence, R.I.).

4633

To assess the comparative retention of verbal and motor habits, 48 college students were given equivalent amounts of training on a nonsense syllable task and on a pursuit rotor. Retention was tested by a relearning method after four different intervals. Differences between the savings scores on the tasks were discussed with respect to units of the task, retroactive inhibition, and reinforcement.

T. G. R 21

4635

McFarland, R.A. FATIGUE IN AIRCRAFT PILOTS. *New Engl. J. of Med.*, 1941, 225, 345-355. (Harvard University, Boston, Mass.).

Some of the more important contributing factors to pilot fatigue are analyzed. It is shown that a pilot whose muscular activity in flight is limited could hardly exhaust the energy reserves sufficiently to explain fatigue and exhaustion often observed in airmen. The essential variables in acute or chronic pilot fatigue are ascribed to psychological factors such as emotional stress. Most of the discussion concerns contributing factors in pilot fatigue, especially lack of exercise, the reduced tension of O_2 during high altitude flights, the poor selection of food and the excessive use of alcohol and tobacco. Also, certain physical variations in the cockpit are discussed, such as noise, vibration, poor illumination, etc. Finally, the results obtained in a study of transoceanic airmen are analyzed to show the effects of long flights at moderately high altitudes. (HE145)

R 34

4637

McConnell, R.J.W. DIRECTION OF MOVEMENT OF MACHINE CONTROLS. III. A TWO PHASED TASK IN A DISCONTINUOUS OPERATION. Aug. 1947, Sp. *Ministry of Supply, Psychology Lab., Cambridge, England.*

An experimental study was made of some aspects of the relationship between display and control movements. A discontinuous task was devised in which the direction of movement of the display was either upward or downward, while the direction of movement of the control could be varied—up-down, right-left, forward-backward. This task was performed by the S, working at about maximum speed, with his right hand, while performing simultaneously a fairly difficult, but dissimilar task with his left hand. The mean number of errors made with different combinations of control and display movement were analyzed in order to determine rank order of accuracy of the conditions. The results were compared to a previous study where only the one-handed task was performed. The findings from the analysis and comparison indicate that the order of accuracy is a stable phenomenon and that far fewer errors were made when the control and display system was connected in the "expected" way—an upward to forward movement of the control producing an upward movement in the display. A side-to-side, backward, or downward movement of the control producing an upward movement in the display increased the number of errors. The effect of practice was not investigated. (HE145)

R 4

4638

Gillinsky, Albert S. THE EFFECT OF AT-TITUDE UPON THE PERCEPTION OF SIZE. *Amer. J. of Psychol.*, June 1955, 68, 173-192. (Columbia Univ.)

4639

This study investigated the effect of two kinds of instructions upon the perceived size of a biplanarily observed plane triangle at six distances (10' to 150 feet from the subject). Perceived size judgments are reported when the subject was required to match the distant triangle to a variable triangle at 100 feet under "objective" instructions (to make the two triangles the same linear size), and under "retinal" instructions (to match the apparent visual images). T.G.R.24.

4639

Lit, A., & Hyman, A. THE MAGNITUDE OF THE PULFRICH STEREOPHENOMENON AS A FUNCTION OF DISTANCE OF OBSERVATION. *Amer. J. Optom. & Arch. Amer. Acad. Optom. Monogr.* 122, Nov. 1951, 17pp. (Columbia Univ.)

4639

The author studied the effect on the Pulfrich phenomenon of varying (1) the distance of the subject from the test object (from 30 to 150 centimeters), and (2) the ratio of the retinal brightnesses from 0.10 to 1.50 (log I right/log I left). The obtained data demonstrate the relationship between the degrees of the stereo-phenomenon and retinal brightness differences and distance of observation. T.G.R.2.

4640

Long, G.E. THE EFFECT OF DURATION OF ONSET AND CESSATION OF LIGHT FLASHES ON THE INTENSITY-TIME RELATION IN THE PULFRICH STEREO. *Univ. Psychol.*, Nov. 1943, 31(11), 743-747. (Columbia University, New York, N.Y.).

4640

To investigate how the variation in the wave form of the light flash, as manifested by the rate of onset and cessation of the stimulus, influences the threshold in the periphery, two experiments are reported. The first studies the intensity-duration function for peripheral threshold stimulation over a range of durations from 0.02 to 0.24 seconds. The flashes were rapid in onset and cessation (nearly rectangular in wave form). The second determines the total energy required for threshold excitation for flashes of various wave forms (different onset and cessation times), the maximum duration always being below the critical duration obtained in the first experiment.

G. R 23

4641

Locke, M. SEEING. 20pp. *General Electric Co., Lighting Research Lab., Yale Park, Cleveland, Ohio.*

4641

This is a popularized summary of the different functions of the eye, together with the levels of illumination recommended by the General Electric Company for different tasks. G.T.R.22.

4643

Wodzis, Helen E. THE INFLUENCE OF SUCCESS AND FAILURE ON THE RESUMPTION OF AN INTERRUPTED TASK. *J. exp. Psychol.*, April 1941, 28(4), 304-325. (Yale University, New Haven, Conn.).

4643

To study the influence of verbally produced success and failure on the resumption of an interrupted task, 180 college students were required to complete a problem-solving task after performing an interrupted task and were then given an opportunity to resume the first task. Frequency of resumption of the first task was discussed as it depended on success or failure on the first or second task and on the interval between interruption and opportunity to resume.

T. R 11

4645 Frazer, D.C. A STUDY OF FATIGUE IN AIRCREW. II. COMPARISON OF THE EFFECTS OF DAY AND NIGHT FLYING. FMAT 915, June 1955, 6pp. Flying Personnel Research Committee, Royal Air Force Institute of Avialling Medicine, London, England.

This paper, a systematic study of fatigue in aircrew, reports the result of an investigation comprising 19 15-hour sorties, 11 by day and 8 by night. One member of each crew was tested by the writer to obtain a measure of variability of judgment (s-function). The same individuals were tested when fresh to obtain a control score. The results show: a) that there is a significant difference (p<0.01) between the control and experimental scores for the day-flying group, and a more significant difference (p<0.001) between the control and experimental scores for the night-flying group; b) the increase in s-function for the night-flying group is significantly greater (p<0.01) than for the day-flying group; c) The variances of the experimental scores in both cases are significantly higher than those of control scores.

4647 Ratovich, P. & Graham, C.H. ASPECTS OF HUMAN ENGINEERING CONCERNING THE AIRCRAFT PERISCOPE. Dec. 1951, 42(6), 367-375. (Ohio State University, Columbus, Ohio & Columbia University, New York, N.Y.).

4647 To investigate the effect on foveal brightness discrimination of changes in the size of both the test and the adapting-fields, a foveal, circular, illuminated adapting-field was presented to one eye of the subject to which was added a concentric, circular test-field, smaller than, or equal in size to the adapting-field. The diameter of the field was varied from 0.17 to 1.34 degrees of visual angle. The test-field was presented for a duration of 0.52 seconds and over a wide range of illuminations. Data from two subjects were analyzed for constant sizes of both fields, for constant test-field size with increasing adapting-field size, and for a constant adapting-field size with increasing test-field size.

T. G. I. R 16

4651 Kethercut, R.E. THE HUMAN ENGINEERING OF AIRCRAFT INSTRUMENTS AND CONTROLS. 7pp. Minneapolis-Honeywell Regulator Company.

4651 This paper defines human engineering by discussing its application to the particular field of aircraft instruments and controls. Following a discussion of the general problem in relation to aircraft of today, instrument panel design is used to illustrate something of the methodology followed in solving human engineering problems. Finally, the effect of human engineering on future aircraft instrumentation is discussed and illustrated.

I

4652 Gellford, J.P., Kettner, S.W. & Christensen, P.E. STUDIES OF ATTITUDES OF HIGH-LEVEL PERSONNEL. THE RELATION OF CERTAIN THINKING FACTORS TO TRAINING CRITERIA IN THE U.S. COAST GUARD ACADEMY. Contract N000120, Rep. 13, May 1955, 17pp. University of Southern California, Los Angeles, Calif.

4652 The purpose of this investigation was three-fold: 1) to attempt to verify thinking factors found in previous studies, 2) to gain further information about new tests, and 3) to relate certain experimental tests to training criteria furnished by the United States Coast Guard Academy. Scores on 20 experimental tests, nine Academy tests, and 11 criteria (ten grades earned in courses and an aptitude measure based on ratings of cadets while on cruise) were studied by factor analytic methods. Factors extracted were identified and discussed in relation to criterion scores. The adequacy of the present Academy tests for prediction purposes was discussed.

T. R 15

4653 Gellford, J.P., Berger, S.W. & Christensen, P.E. STUDIES OF ATTITUDES OF HIGH-LEVEL PERSONNEL. A FACTOR-ANALYTIC STUDY OF PLANNING. II. ADMINISTRATION OF TESTS AND ANALYSIS OF RESULTS. Contract N000120, Proj. 150 Oct. Rep. 12, May 1955, 23pp. University of Southern California, Los Angeles, Calif.

4653 To isolate and define the primary abilities involved in planning performance, a battery of tests covering six hypotheses and a number of reference factors was administered to 354 entering United States Air Force aircrew trainees. One test representing an actual planning activity of a certain type was included in the battery. The scores were intercorrelated and 17 factors were extracted. Each factor that could be identified was described and interpreted. Some of the factors had been previously reported and four factors unique to planning tests were found.

T. R 21

4661 Campbell, C.J., McEachern, L.J. & Marg, E. FLIGHT BY PERISCOPE. RMO 696 67, WADC TR 55 142, March 1955, 12pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

4661 As a possible solution to the problem of providing external vision in some high performance aircraft, a binocular aircraft periscope was constructed and flight tested. The periscope and its installation in the nose of a B-17 aircraft were described. Twenty USAF pilots carried out routine flight operations including aerial performance, flight pattern, final approach and touchdown. Subjective responses of the pilot and objective observations of performance were analyzed in terms of the efficiency of flying performance while using the periscope.

T. I. R 1

4663

MacDonald, D.E. (Director). **QUALITY ASPECTS OF THE AERIAL PHOTOGRAPHIC SYSTEM.** Contracts W33 038 ac 14075 & AF33 038 15615. E.O. 680 & SAIO. Tech. Note 55, June 1952, 24pp. Optical Research Lab., Boston University, Boston, Mass.

An investigation has been made of the relationship between resolution, scale and contrast criteria and the performance of a generalized aerial photographic system. The results imply that: a) the judgment of the relative performance of an aerial photographic system on the basis of high-contrast resolution scores in the laboratory is not infallible, and b) the best operational focus can not be determined in the laboratory from a maximum resolution setting on a high-contrast target. A performance rating is suggested that considers the total number of symbols in the object space that the system will record.

4664

Tonicliffe, W.W. & Ross, G.O. **INVESTIGATION OF TELEVISION PHOTOGRAPHY.** Tech. Note 12, Jan. 1948, 24pp. Boston University, Optical Research Lab., Boston, Mass.

This report deals with the subject of television photography, with particular interest in the application of photography of the kinescope of a television receiver located at a ground station and receiving an image being transmitted from an aircraft. This is one aspect of the larger problem of television aerial reconnaissance. Preliminary tests were conducted using a modified Smeets 5-7 aerial reconnaissance strip camera to photograph the kinescope of the Black television receiver during actual plane to ground television transmission. These, and subsequent laboratory tests are described. The laboratory tests include such factors as exposure, contrast, resolution, field and sweep motion, Smees banding, variable frame rates, electrical fluctuations, and sweep compression. The general conclusion which may be drawn from the tests and analyses described here is that ordinary-strip photography of a field scanned television receiver kinescope does not satisfactorily solve the problem of continuous strip print production. The major difficulties are the lack of resolution due to blurring and the striation effects. The slit scan system has inherently higher resolving power, is not subject to loss of resolution due to multiple exposure to successive frame, and is not subject to the striations discussed in this report. It is recommended that additional studies be made of this system. (RMAS)

4665

Lipkin, M., Bailey, Guido & Hardy, J.D. **THE EFFECT OF ULTRAVIOLET IRRADIATION UPON THE CUTANEOUS PAIN THRESHOLD.** Rep. NADC RA 514, Oct. 1954, 17pp. Aviation Medical Acceleration Lab., USN Air Development Center, Johnsville, Penn.

In order to further investigate relationships which may exist between the onset of cutaneous pain and tissue damage, measurements were made of pain threshold, degree of hyperalgesia, and onset and intensity of erythema during the development of burns caused by ultraviolet irradiation. It was found that the onset of erythema was associated with a fall in pain threshold. The maximum fall of pain threshold, the duration of this lowering, and the intensity of hyperalgesia and erythema increased with the ultraviolet radiation (intensity x time). It is shown that these experimental data are consistent with the hypothesis that, as a result of the ultraviolet irradiation, there is inhibition of some tissue repair processes, thereby causing a pain threshold lowering from roughly 45°C to 35°C. In this state, even a slight (1-2°C) elevation of skin temperature in a burn area evokes pain, and may be sufficient to cause thermal inactivation of cellular proteins at a rate great enough to result in tissue damage.

R 16

4666

Burnoff, M. & Myppard, C.W. **DESIGN OF DIGITAL FLIGHT TRAINERS.** Contract NED 551(C2), Res. Div. Rep. 54 09, Sept. 1953, 19pp. Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Penn.

4666

This report describes the development and design of a digital flight trainer. Three phases in the development of the trainer are reported: 1) mathematical techniques for fast but accurate solution of flight equations, 2) the logical structure of a special-purpose digital machine capable of ultrahigh-speed computation, and 3) reliable circuits not only for the digital computer but for conversion to and from analog form, multiplexing, and cockpit transformation. The method of "stability charts," a technique developed for assuring solutions to the several differential equations and related information on flight conditions, such as control forces and range, is discussed in considerable detail. A "parallel" simulator, which is about three times faster than the serial machine, is also described. T. G. R 6

4667

Cochran, L.B. **A STUDY OF THE HALF-PRESSURE ANTI-BLACKOUT SUIT.** Res. Rep. NM 001 059.15.03, July 1954, 4pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

A) evaluation of the half-pressure anti-blackout suit designed to provide evenly distributed pressure over the total body area from the waist downward. Evaluation was conducted on the human centrifuge and revealed significantly greater protection of vision by the half-pressure anti-blackout suit than that afforded by service anti-blackout suits. Certain significant unexplainable pulse rate response and irregularity of cardiac rhythm induced by pressurization makes it inadvisable to determine the absolute protection afforded by this suit.

R 6

4670

Richards, D.L. **THE INTERDEPENDENCE OF SOUND IMAGES WITHIN LOGATONS USED IN ARTICULATION MEASUREMENTS: STATISTICAL THEORY.** Res. Rep. 13640, 1953, 13pp. Phys. Office Engineering Dept., Research Station, Dollis Hill, London, England.

4670

Whereas the results of many articulation measurements are adequately expressed by logaton or sound articulation percentages, studies of a more detailed character require numerical expression to be put to the error incidence of the separate sounds of the logatons and to the degree of interdependence of these errors. A theory has been developed which enables the extent of interdependence to be expressed in useful numerical terms. Suitable tests of significance are also given. The process has been applied to one set of results as an example.

T. R 4

4673
O'Mara, J.E., Carls, C.M. & Tully, W.E. ANALYSIS OF THE ENVIRONMENTAL CONDITIONS AFFECTING ACCIDENTS AT SEA. R.O. Misc. 15444, 1954, 30pp. US Naval Air Station, Washington, D.C.

4673
A relationship between the frequency of accidents at sea (damage of \$1500 or more to vessel or cargo) and meteorological and associated oceanographic factors is presented. Accident data used are those for United States vessels during the years 1947-1951. These accidents are primarily in the North Atlantic and North Pacific areas. The area distribution of accidents as related to annual, seasonal, and diurnal factors, and the probability of ship accidents per million ton-miles of cargo along trade routes are presented.
C. I. 28

4674
Hopkins, R.G. THE EVALUATION OF OPTICAL IMAGES. Contract DA 36-039 sc 15544, Aug. 1953, 75pp. Institute of Optics, University of Rochester, Rochester, N.Y.

5 more or less independent studies on the problem of image evaluation are reported. These experiments are: a) new evaluation equipment using a knife edge scan; b) problem of evaluating a white light image; c) evaluation of asymmetrical images; d) energy concentrations predicted from lens data; e) calculation of edge transition curves. (MAG)

4675
Hortman, A.B., Randall, W.C., Peliss, C.M. & Adams, J.D. FACTORS INFLUENCING THE SIGNIFICANCE OF LOCAL SWEATING RESPONSES. THE 12TH OF A SERIES OF REPORTS ON CUTANEOUS HEAT LOSSES. Contract AF 18(600)C, Tech. Rep. 6480, Part 12, Jan. 1954, 20pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (St. Louis University, St. Louis, Mo.)

The desiccating capsule and sweat print techniques of measuring local sweating responses were used separately and together in the study of cycling in sweat gland activity and together in the measurement of the mean rate of secretion per individual gland. Whether recorded by either technique or by both methods simultaneously, cycling in the activity of sweat glands is usually similar but not necessarily identical in extent and timing on adjacent skin areas (same dermatome). Two different regions (dermatomes) (e.g. the medial and lateral aspects of the thigh) may exhibit cycles which are in or out of phase. The longer cycles appear simultaneously in the measurements with both methods, but the shorter cycles are more obvious in the sweat prints. Capsular data for the sweating rates of main body regions were examined and the effects of the regional sweating rates were studied.
R.Y.

4676
Aeroplane 2 Armament Experimental Establishment. COCKPIT APPRAISAL AND NIGHT FLYING ILLUMINATION ASSESSMENT. Second part of Rep. AAE 840/1, Jan. 1954, 6pp. Aeroplane 2 Armament Experimental Establishment, Ministry of Supply, London, England.

4677
An appraisal of the pilot's cockpit and night flying illumination of the aircraft Marathon XA 260, a production of T.Mk. 11, was made. Since a cockpit appraisal of the mock-up T.Mk. 11, VX 229, had already been made, only those items changed in this production version or not previously appraised have been commented upon. The following aspects of the cockpit were discussed: entry and seating, controls, emergency exits, and lighting.
I.

4678
Crumley, L.M., Atkinson, V. & Fletcher, Dorothy C. PART II. VALIDATION OF AN INSPECTION TEST FOR WINDSHIELD DISTORTION. THE DEVELOPMENT OF INSPECTION METHODS AND CRITERIA FOR OPTICAL DISTORTION IN COCKPIT ENCLOSURES. Rep. TED NAV 45405, Pt. 2, June 1954, 21pp. UN-AMSL-NAVAL MEDICAL ESTABLISHMENT, Naval Material Center, Philadelphia, Penn.

In a previous study, an inspection test of aircraft windshield distortion was constructed so that it would agree in ordering windshields with a criterion of pilot judgments of the suitability of the windshields for use in aircraft on the basis of visual quality. The present cross-validation, with a selected set of windshields, indicates that the inspection test reliably predicts this criterion. Individual judges, using the inspection test, agree in relative scoring of windshields but disagree in overall level of scoring.
K.Y.

4679
Cain, S.M. THE EFFECTS OF EXERCISE AND HEAT ON BREATH-HOLDING TIME. Res. Rep. 262, April 1954, 13pp. USA Chemical Corps Medical Lab., Army Chemical Center, Md.

An experiment was conducted to determine the time for which breathing may be voluntarily suspended at various levels of exercise and under various environmental conditions. Conclusions were: a) The average breath holding time (BHT) obtained with 4 is is probably applicable to a larger population group of young white males. b) Under laboratory conditions, men performing moderately severe and very severe exercise will not be able to hold their breaths continuously long enough to do the lightweight service gas mask on the basis of a 14 sec. masking time. c) In a steady state of exercise, the rate of oxygen consumption determines the duration of breath holding and serves as a measure of the effects of exercise on BHT. d) Environment does not affect BHT enough to alter conclusion b) however, there is an indication that an (optimal) environmental condition may produce a large increase in BHT at rest. It is recommended that on the basis of these results, further studies be carried out for the purpose of validating these observations on a greater number of individuals and of applying them to field experimentation.
R.21

4680

Thompson, J.H. AIRCRAFT SEPARATION VISUAL INDICATOR. AADC Tech. Rep. 53-7, Nov. 1953, 3pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

An historical account of the evolution of an aircraft separation indicator is contained in this report. The device was developed as an aid to establishing and maintaining desired distances of separation between aircraft for the purpose of conducting radar resolution test flights. Constructional data is furnished to facilitate the duplication of the device by organizations having a need for such an aid.

4683

Vonderhe, J.M. PHYSIOLOGY OF LOAD-CARRYING III. SOME EXPERIMENTAL LOAD DISTRIBUTIONS STUDIED ON THE TREADMILL. Projs. 64 12 001 & 64 12 003, EPB Rep. 212, June 1953, 10pp. USA Quartermaster Clinic Research Lab., Environmental Protection Branch, Lawrence, Mass.

4683

The energy cost of carrying loads of 15 and 45 pounds, in five different distributions, was studied on a horizontal, motor-driven treadmill maintained at 3.5 mph. Eight sets of varied physical characteristics performed the tasks. The hypothesis that extra energy is required for accelerating and decelerating loads that are attached to body parts which undergo rapid changes in velocity during walking was examined in light of the findings. The feasibility of loads balanced fore and aft on the upper thorax is examined along with differences in efficiency for sets placed in "fat" and "lean" groups.

T. 1. R. 2.

4684 Taylor, C.L. & Huettner, K. THE EVAPORATIVE EFFECT ON HUMAN PERSPIRATION. Contract AF 33 (616)32, WADC Tech. Rep. 53 345, Sept. 1953, 28pp. University of California, Los Angeles, Calif.

Evidence for an "evaporative effect" upon human perspiration has been obtained from a series of experimental data. Plots of skin water losses against average skin temperature, using results from human experiments under conditions of altered temperature, humidity, air movement and air pressure reveal that significant residual evaporation is associated with these environmental influences. Since the direction and magnitude of these effects are such as to increase or decrease evaporation from the skin, the phenomenon has been designated as the "evaporative effect." Explanation for the "evaporative effect" has been sought in skin water transfer not involving sweat gland participation. This brings attention to the processes of diffusion (insensible) losses, skin water storage shifts, and to the much less completely understood processes of penetration, re-penetration and osmotic regulation of the human skin.

R 34

4685

Bommarito, C.L. & Harvey, W.J. AN APPARATUS FOR MEASURING THE WORK DONE IN SLED PULLING. Proj. 64 12 001, Rep. 222, Sept. 1953, 13pp. USA Environmental Protection Research Div., Q4 Research & Engineering Center, Natick, Mass.

4685

A direct-writing ergometer, used principally for field use in measuring the amount of work done in pulling trailed loads, is described. Work loads of men operating under extremes of cold in the field have been measured where it is difficult or impossible to standardize conditions. Principal components for the instrument are a calibrated spring to measure force and a trailed bicycle wheel to measure distances. A stylus attached to the spring marks the forces on a wax-surfaced paper which is fed through the instrument in proportion to the distance traveled by the wheel. Methods of calculating power and efficiency are given.

G. 1.

4686

Mart, A.B. PRINCIPLES OF CANOPY DESIGN FOR MILITARY AIRCRAFT. WADC TR 53 92, April 1953, 9pp. USAF Aircraft Lab., Wright-Patterson AFB, Ohio.

4686

A comprehensive review of all aspects of canopy design for military aircraft is presented. Data on canopy design from many sources are correlated with past service experience, and conclusions are drawn relative to desirable and undesirable features of various canopy designs. Basic design considerations: air-availability and prospective transparent materials, structural aspects, ejection-seat design, and testing and testing requirements are included. A complete bibliography is incorporated as a source of more detailed information on various phases of the subject.

T. G. 1. R 42

4688 Loucks, R.B. INTERPRETATION OF AZIMUTH INDICATORS BY NOVICES. I. AIRCRAFT DIRECTION INDICATORS WITH FIXED RUBBER LINES AND AZIMUTH CARDS THAT TURN. Contract WJ3 018 ad 15130, AF Tech. Rep. 5957, Oct. 1949, 24pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio.

A series of experiments were carried out to compare rotating pointer and rotating card (stereoscopic pointer) azimuth indicators in terms of the ease of interpretation by novices. Several instruments of each type were evaluated in an azimuth ground trainer which provided error and response time records. The rotating scale instruments, in general, produced more turns in the wrong direction which were not corrected; an effect attributed to the incomplete exposure of the scale on this type of instrument. On the other hand, a simple moving pointer indicator was responded to with more starts in the scale instrument. These initial errors on the moving pointer instrument were attributed to the relation between rubber pedal motion and the resulting direction of turn which appeared to be unnatural to the novices.

R 1

4689

Jones, R.E., Milton, J.L. & Fitts, P.H. AN INVESTIGATION OF ERRORS MADE BY PILOTS IN JUDGING THE ATTITUDE OF AN AIRCRAFT WITHOUT THE AID OF VISION. Memo Rep. TSEAA 8/PHF/paw, Serial TSEAA 694 13, May 1947, 22pp. USAF Air Materiel Command, Wright Field, Dayton, Ohio.

4689

An experimental study was made of errors by twenty AAF pilots in judging the attitude of an aircraft without the aid of vision. Judgments were made at ten-second intervals during eight repetitions of a standard three-minute flight procedure in a C-45 aircraft, consisting of six thirty-second maneuvers with climbing banks, diving banks, and straight and level flight components. Data on accuracy of judgments are presented and discussed.

T, F, R2.

4691

Welford, A.T., Brown, Ruth A. & Cobb, J.E. TWO EXPERIMENTS ON FATIGUE AS AFFECTING SKILLED PERFORMANCE IN CIVILIAN AIR CROW. Brit. J. Psychol., June 1950, 42(4), 195-211. (Psychological Lab., University of Cambridge, Cambridge, England).

Experiments carried out on civilian air crew with a view to studying the effects on complex skilled performance of fatigue resulting from flying gave the following results: a) Electrical problems--Ss tested on return from a trip took longer to solve the problems than did those tested after a stand-down of at least 8 days. "Easy" trips affected performance more than "hard" trips; b) Plotting task--Ss tested on return from a hard trip showed a performance which was no less accurate but slower than that of Ss tested after stand-down; c) Performance when tested a second time--the impairment of performance shown in Ss tested after a trip appeared also when they were retested after a stand-down of at least 8 days. Conversely, Ss tested after stand-down showed no impairment of performance when retested after a trip. (MEIAS)

R 3

4692

Warden, C.J., Brown, H.C. & Ross, S. A STUDY OF INDIVIDUAL DIFFERENCES IN MOTION ACUITY AT SCOTOPIC LEVELS OF ILLUMINATION. J. exp. Psychol., 1945, 35, 57-70. Proj. GEN cam-284. (Columbia University)

4692

To study individual differences in motion acuity at scotopic levels of illumination, threshold values were secured for 28 male subjects under two levels of illumination ($\log 3.4$ ml and $\log 4.0$ ml) at six retinal positions ranging from 7 degrees to 55 degrees from the line of sight. Motion acuity functions are plotted for each level of illumination and individual differences in motion acuity at the various retinal positions are analyzed and the implications are discussed.

4693

Warden, C.J. & Brown, H.C. A PRELIMINARY INVESTIGATION OF FORM AND MOTION ACUITY AT LOW LEVELS OF ILLUMINATION. J. exp. Psychol., 1944, 34, 437-449. (Columbia Univ.)

4693

To investigate form and motion acuity at low levels of illumination, tests of form acuity were made with four subjects at various retinal positions, ranging from 5 degrees to about 50 degrees of peripheral angle. Motion acuity was tested at 5, 7, 10, 25, 35, 45, and 55 degrees. A full set of determinations for both form and motion acuity was made at 3 levels of illumination: $\log 1.0$, $\log 3.4$, and $\log 4.0$ ml. In tables and figures, the width of the gap of the stimulus, in terms of degrees of visual angle (for form acuity) and rate of movement of the stimulus, in degrees of visual angle per second (for motion acuity) are given for the various peripheral angles tested.

4697
Rouse, R.O. COLOR AND THE INTENSITY-RING RELATION. J. Opt. Soc. Amer., Sept. 1957, 47(9), 626-630. (Williams College, Williamstown, Mass.).

Measurements of the intensity necessary for monocular differential thresholds for red, green and blue test lights were made at exposures of the test light ranging from 0.002 to 1.000 second. Central fixation was used, the colored test light appearing as a small dot brighter than the surrounding white-lighted field. The adaptation brightness was just above the cone threshold. Adaptation was controlled over 40 degrees of the visual field, including the very center. 3 selected subjects, with normal color vision and acuity, contributed approximately one thousand threshold determinations. The method of limits was used. It was found that there was no differences among the critical durations for the 3 colors.

R 11

4695

Schlosberg, H. STEREOSCOPIC DEPTH FROM SINGLE PICTURES. Amer. J. Psychol., Oct. 1941, 54(4), 601-605. (Brown University, Providence, R.I.).

The phenomenon of monocular plastic depth is due to the release of certain monocular factors from overpowering cues, largely binocular, that show the picture to be flat. These 'flatness' cues must be eliminated, and not merely held constant. Holding a factor constant is not always the best method of controlling it. This is true for depth perception, and probably for a number of other psychological processes. As a matter of fact the caution holds true pretty generally throughout all experimental fields. If an engineer were trying to plot speed against horsepower he would scarcely hold certain factors constant--for example, the car brakes firmly applied! Similarly, when convergence or binocular differences are held constant one finds out more about them than he does about the factors he is deliberately varying.

R 11

4696

Pollock, W.T. THE VISIBILITY OF A TARGET AS A FUNCTION OF ITS SPEED OF MOVEMENT. J. exp. Psychol., June 1953, 45(6), 449-455. (Johns Hopkins University, Baltimore, Md.).

Monocular luminance thresholds of a 1° circular spot of white light were measured with the spot moving at angular speeds of 50-2000° per sec. The extent of target travel was 20° of visual angle with the midpoint of the target excursion centered on the fovea. The direction of target movement was either vertical or horizontal. The results show that threshold luminance increases systematically with increases in target speed. The function is best characterized as linear with a slope near unity when threshold luminance and speed are plotted logarithmically. However, there is some indication that the function relating target speed and visibility is not continuous. The data show that vertical target movement yields consistently lower luminance thresholds than does horizontal movement.

R 8

4698

Boetherage, B.M., Jeffress, L.A. & Blodgett, H.C. A NOTE ON THE AUDIBILITY OF INTENSE ULTRASONIC SOUND. J. acoust. soc. Amer., July 1954, 26(4), p582. (Defense Research Lab. & Psychology Dept., The University of Texas, Austin, Tex.).

Investigation of a tone heard in the water in a beam of a transducer transmitting at 50kc yielded the conclusion that the tone was heard as a result of direct stimulation of the basal end of the cochlea and that the sensation is not due to the creation of any vibration in the head in the sonic range of frequencies. Observations which bear out these conclusions are the phenomenon of changing apparent localization of the tone in the head, and that the pitch of the sound heard under ultrasonic stimulation is the highest pitch a given subject is capable of hearing. Thus it appears that ultrasound is audible by bone conduction. (MEIAS) R 5

4699

Locks, R.E. AN AZIMUTH TRAINER FOR EVALUATING THE INTERPRETABILITY OF DIRECTIONAL INDICATING FLIGHT INSTRUMENTS. Contract W33 038 AC 15230, TSEA 694 16, Oct. 1947, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Washington, Seattle, Wash.).

4699

This paper describes a ground trainer that can be turned in azimuth in order to simulate conditions of contact flight as well as conditions of blind flight. Such a trainer furnishes a means for evaluating reliably the relative interpretability of flight direction indicators. I.

4701

Locks, R.E. THE INTERPRETATION OF AZIMUTH INDICATORS BY NOVICES: II. AIRCRAFT INDICATORS WITH FULL-SCALE AZIMUTH CAPS THAT TURN. Contract W33 038 AC 15230, E.O. 694-19, AF Tech. Rep. 5965, March 1950, 13pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio.

A moving dial azimuth indicator with a 360-degree scale of clockwise figures was found to be very superior to the conventional stationary dial instrument, and to a moving dial indicator with counterclockwise figures. Both 'instrument' and 'contact' flight conditions were used in the evaluation. 3 proposals are presented for modifying the design of moving dial indicators so as to minimize the blurring of the scale which is reported to occur under night flying conditions. It is concluded that the change which is most essential to solve the numerous problems of interpretability in azimuth indicators is to reverse the action of the rudder pedals. Extreme as this proposal may appear to be, it would seem very important to ascertain the actual degree of habit interference induced by reversed pedals because the gains that might ensue from this change might well justify the alteration. R 6

4702

Smith, M.R. & Dudek, F.J. REPORT ON PRELIMINARY STUDY OF HAND GRIPS USED WHEN FIRING THE PISTOL. Res. Note 1, June 1952, 11pp. USA Human Research Unit No. 2, Ft. Ord, Calif.

4702

To compare the one-handed grip and the two-handed grip when used to fire the .45 calibre pistol, two groups of 84 men were selected randomly from a company of basic trainees. One group used the one-handed grip for firing ten rounds of slow-fire and 15 rounds of quick-fire, the other group used the two-handed grip. Variables such as target and range position differences were controlled systematically. Records were obtained of the number of hits scored by each man. The scores for the two groups were compared. T. G.

4704

Gullford, J.P., Kettner, M.W., & Christensen, P.R. A FACTOR-ANALYTIC INVESTIGATION OF THE FACTOR CALLED GENERAL REASONING. No. 14, Aug. 1955, 16pp. (University of Southern California).

4704

To investigate the nature of the factor called general reasoning, three alternate hypotheses as to the definition of this factor were formulated as: (1) defining problems, (2) handling complicated procedures, and (3) trial-and-error manipulation. A battery of 23 tests covering these hypotheses and five reference factors was administered to an entering class of 176 U.S. Coast Guard Academy cadets and a factor analysis was done using Thurstone's complete centroid method. The factors (axes were rotated orthogonally) were identified and the most plausible definition for general reasoning discussed. T. R 19

4705
Egan, J.P. INDEPENDENCE OF THE MASKING AUDIOGRAM FROM THE PERSTIMULATORY FATIGUE OF AN AUDITORY STIMULUS. J. acoust. soc. Amer., July 1955, 27(4), 737-740. (Hearing and Communication Lab., Psychology Dept., Indiana University, Bloomington, Ind.). (AFRC TR 54 87).

The loudness of a steady auditory stimulus declines during the first few minutes of the application of that stimulus. This decrease in loudness is so great that it is important to know whether or not the masked threshold also changes during the initial period of stimulation. In the present investigation the degree of perstimulatory fatigue and the amount of masking were both determined for the same stimulus. It is shown that the masked threshold is essentially independent of the duration of the masking stimulus. R 7

4706

Twining, E.J. SPREAD OF PERSTIMULATORY FATIGUE OF A PURE TONE TO NEIGHBORING FREQUENCIES. *J. acoust. soc. Amer.*, July 1955, 27(4), 741-748. (Hearing and Communication Lab., Psychology Lab., Indiana University, Bloomington, Ind.). (AFCAP TR 54-78).

When a fatiguing tone is presented to one ear of an observer, and, after a period of time a comparison tone of the same frequency is also presented to the other ear, the intensity of an equally loud comparison tone is considerably less than the intensity of the fatiguing tone. This phenomenon has been referred to as perstimulatory fatigue. The present investigation was designed to determine the extent to which the perstimulatory fatigue induced by a pure tone spreads to neighboring frequencies. Perstimulatory fatigue was measured by means of a series of simultaneous dichotic loudness balances made prior to, during, and subsequent to stimulation by a fatiguing tone of 1000 cps at a SPL of 80 db. Test tones were the same in sound pressure as the fatiguing stimulus. When measuring fatigue at a frequency other than that of the fatiguing tone, the fatiguing stimulus was turned off for a 15-second interval. During this interval, a loudness balance was made at the frequency of the test tone. The findings demonstrate that maximum fatigue is produced at the frequency of the fatiguing stimulus. Fatigue falls off rapidly on both sides of this frequency at a negatively accelerated rate until at 100 cps and at 2500 cps little or no effect is evident. The gradients of perstimulatory fatigue are nearly symmetrical when plotted on a log-frequency scale.

R 13

4707

Katz, S., & Schwartz, I. NEW OBSERVATION OF THE PULFRICH EFFECT. *J. opt. soc. Amer.*, July 1955, 45(7), 523-524. (USN Medical Research Lab., New London, Conn.).

The Pulfrich effect has been characterized as a perception of depth produced by image disparity when the stimulus to one eye is less bright than that to the other. A method has been devised which permits ostensible binocular vision but gives a monocular stimulation to each eye in succession, so that no portion of the pathway of the oscillating stimulus is visible to both eyes at the same time. Under this condition, the perception of depth is still reported, thus damaging the latency hypothesis based on binocular vision as an explanation of the phenomenon.

R 10

4708

Morris, A., McGuire, F.L., & Van Cott, H.P. ACCURACY OF THE MACBETH ILLUMINOMETER AS A FUNCTION OF OPERATOR VARIABILITY, CALIBRATION, AND SENSITIVITY. *J. opt. soc. Amer.*, July 1955, 45(7), 525-530. (Medical Research Lab., USN Submarine Base, New London, Conn.).

The accuracy of the Macbeth illuminometer was studied by measuring a known source. The mean of a number of measurements from a number of operators gives a precise estimate of brightness. The most adequate measures are obtained when "calibration" acceptance of the working lamp is carefully determined and maintained with precision. To establish the relation between the sensitivity of the eye and brightness measurements, the difference thresholds for lighter and darker were determined. The close similarity of the curves for the threshold data and for the brightness measurements demonstrates that "match" judgments are essentially discriminations of "lighter" and "darker."

R 5

4709

Bilodeau, Ina McD. SELF-PACED REST WITH VARIATION IN WORK LOADING AND DURATION OF PRACTICE. *J. exp. Psychol.*, 1955, 50 (4), 245-248. AFPRC-IN-55-35, AFPRC, Lackland AFB, San Antonio, Tex.

4709

To investigate the effects of present work loading and duration of work on the duration of self-paced rest, 400 basic trainee airmen (ten groups) turned a crank against one of two work loadings (Load Zero and Load Four which required three times the horsepower of Load Zero at any rate of turning). The subjects worked for 10, 30, 60, 120 or 240 seconds, rested until they felt ready to do their best, then cranked against Load Zero for 120 seconds. The length of the rest period was measured in seconds, performance was number of revolutions per ten seconds. Self-paced rest was analyzed as a function of length of present practice and discussed as an index of inhibition (I_R).

G. R 4

4710

Smith, S.W., Morris, A., & Dirmick, F.L. EFFECTS OF EXPOSURE TO VARIOUS RED LIGHTS UPON SUBSEQUENT DARK ADAPTATION MEASURED BY THE METHOD OF CONSTANT STIMULI. *J. opt. soc. Amer.*, July 1955, 45(7), 502-506. (Medical Research Lab., USN Submarine Base, New London, Conn.).

In order to answer a practical question as to the most effective red light to be used in military situations requiring dark adaptation, an experiment was undertaken to compare the effects of 4 "red" filters at constant brightness levels. It was obvious that with traditional methods of measuring dark adaptation, these effects could not be measured with sufficient accuracy to make comparisons. An application of the method of constant stimuli was developed which gave adequate accuracy of measurement. The results show differences in the effects of adapting to light having dominant wavelengths of 601, 626, 640, 675, 690 mμ and neutral. The maximum sensitivity differences occurred early in dark adaptation (before two minutes). Dark adaptation preceded most rapidly following adaptation to 626 mμ. The maximum difference between neutral and 676 mμ was 0.5 logμL and differences between the various "red" conditions ranged from zero to 0.22 logμL. This application of the constant stimuli method gives results which may be more sensitive than the calibrations of standard instruments.

4711
Steinberg, Hannah. SELECTIVE EFFECTS OF AN ANAESTHETIC DRUG ON COGNITIVE BEHAVIOR. Quart. J. Exp. Psychol., Nov. 1954, 6(Part 4), 170-179. (Pharmacology Dept., University College London, England).

The prediction has been tested that under the influence of an anaesthetic drug, nitrous oxide, cognitive performances undergo differential impairment, the extent of which is positively correlated with the "complexity" of the task. 10 kinds of performance were investigated, ranging from speed of finger tapping to reasoning by analogy. The relative complexity of each task was determined, in accordance with conventional criteria, from its respective qualitative category or "level"--relational, associative, and motor--and within each category from qualitative analysis of the component processes involved in its execution. A simple group difference design was used, involving 2 groups of 50 subjects each, matched for age and sex. Significant deterioration as a consequence of drug administration occurred in the performance of all tasks. On the whole, the more complex a task the more did it tend to be impaired. Motor performances were, however, impaired to a greater extent than had been predicted. The possible significance of these findings is discussed.

R 33

4712
Fitts, P.M. VISUAL ENGINEERING: THE DESIGN OF EQUIPMENT AND TASKS FOR EFFICIENT USE OF HUMAN VISUAL CAPACITY. Engng. Exp. Station News, Oct. 1953, XXV(4), 9-13. (Aviation Psychology Lab., Ohio State University, Columbus, Ohio).

The specialty of visual engineering within the human engineering field was defined. Five goals (or dividends) attained by visual engineering were discussed with examples from industry as follows: 1) improved worker efficiency, 2) fewer accidents, 3) reduced training costs, 4) improved manpower utilization, and 5) user acceptance. Cf. 4714.

R 12.

4713
Fry, G.A. EFFECT OF BRIGHTNESS DISTRIBUTION IN THE ENTIRE FIELD OF VIEW UPON THE PERFORMANCE OF A TASK. Engng. Exp. Station News, Oct. 1953, XXV(4), 22-28. (Institute for Research in Vision, Ohio State University, Columbus, Ohio).

The focus of this paper is upon tasks that are primarily dependent upon central vision, such as reading a micrometer. The current concept that maximum performance can be achieved when the surround is uniformly bright and has the same value as the average brightness in the central portion is examined for its validity. The problem is appraised by considering the mobile and immobile eyes and fixed and changing environments. Deleterious effects on visual performance that accrue from raising or lowering surround brightness or from introducing nonuniformities into the surround are specified.

G.-I. R 19

4714
Nitten, L.G. ENGINEERING DESIGN AND VISION. Engng. Exp. Station News, Oct. 1953, XXV(4), 13-15. (Ohio State University, Columbus, Ohio).

This paper points out some aspects of man's visual apparatus which are important when designing a system using the eyes as one component. No specific quantitative data on the performance characteristics of the eye are included; the discussion is confined to the general characteristics and principles of operation of the human visual apparatus and some problems in selection. Cf. 4712.

4715
Shlaer, S., Smith, E.I. & Chase, A.M. VISUAL ACUITY AND ILLUMINATION IN DIFFERENT SPECTRAL REGIONS. J. Gen. Physiol., 1942, 25, 553-569. (Columbia Univ., Lab. of Biophysics.)

4715
To measure the relation between visual acuity and illumination in lights of different restricted spectral regions, data were obtained for two observers using a broken circle and a grating as test objects. Acuity measurements were made with a red filter (dominant wavelength is 670 millimicrons) and a blue one (dominant wavelength of 490 millimicrons) and the resulting curves describing the functional relationships were compared with those for white light from earlier work of one of the authors.

4716
Warden, C.J. & Ross, S. A COMPARISON OF THE NAVY ADAPTOMETER TEST AND THE COLUMBIA MOTION ACUITY TEST. J. Exp. Psychol., 1945, 35, 147-152. Proj. EOM cwr-264, Office of Scientific Research & Development and Columbia Univ.

4716
To make a comparison of the scores secured on the Navy Red'ux Plaque Adaptometer (test of scotopic form acuity) with threshold values obtained on the Columbia University Motion Test (test of scotopic motion acuity), 100 subjects were tested on both pieces of apparatus. The results were analyzed by correlational techniques relating the two scotopic tests to each other and to a photopic test (Snellen Index).

4717
Prince, J.H. OPTIC NERVE AND EYESIGHT TESTING. I. OPTIC NERVE INVESTIGATIONS. 2. VISUAL ACUITY EXPERIMENTS. Engng. Exp. Station News, Oct. 1953, XXV(4), 52-54. (Ophthalmology Dept., Ohio State University, Columbus, Ohio).

Two experimental programs in the field of vision are described briefly. The first concerns investigations of the sheathing cells in the optic nerve in vertebrate mammals. The second program deals with the development of better testing charts for visual acuity.

1.

4718
Ratoosh, P. SOME ASPECTS OF BRIGHTNESS DISCRIMINATION. Engng. Exp. Station News, Oct. 1953, XXV(4), 48-52. (Psychology Dept., Ohio State University, Columbus, Ohio).

Brightness discrimination is defined; the methods used to determine the difference thresholds or detection of a change in brightness and some typical results are discussed. Some practical suggestions for the illumination engineer are offered. Finally, the relation of brightness discrimination to visual acuity and some neurophysiological considerations are discussed.

G. I.

4719
Renshaw, S. OBJECT PERCEIVED-SIZE AS A FUNCTION OF DISTANCE. Engng. Exp. Station News, Oct. 1953, XXV(4), 44-48. (Psychology Dept., Ohio State University, Columbus, Ohio).

Results of a series of studies on size-constancy were summarized in this paper. In all the studies visual conditions were kept as nearly normal as possible. In one series, the target was viewed in an outdoor situation at various distances and phenomenal size matches were made by adjusting a pair of drill rods to make a square which exactly contained the target. Other tests were run using stereo instruments. The data were analyzed in terms of perceived size as a function of distance.

T. G.

4720
Rosebrook, Wilde M. SCHOOL ACTIVITIES AND VISION. Engng. Exp. Station News, Oct. 1953, XXV(4), 15-17. (Bureau of Special and Adult Education, Ohio State University, Columbus, Ohio).

A brief summary of a longitudinal study testing the hypothesis that children with visual problems are not able to make progress through the elementary school in keeping with their first six grades in a given school. Records of visual tests, of group intelligence tests, and of group achievement tests were obtained for 74 children; of these, 22 had specific visual problems (high esophoria, high exophoria, tropias, and poor vision). Comparisons of performance of the 22 visually handicapped with the 52 normal were made.

4721
Sherman, H.L. THE VISUAL DEMONSTRATION CENTER. Engng. Exp. Station News, Oct. 1953, XXV(4), 17-22. (School of Fine and Applied Arts, Ohio State University, Columbus, Ohio).

The Visual Demonstration Center (Ohio State University) described here has 27 demonstration units dealing with the origin and nature of perception. Many are duplicates of those developed at Hanover, N.H., by Adelbert Ames, Jr. and his associates. The use of the facilities at the center by a wide range of university disciplines is discussed.

1.

4733

Gersuch, J.W. PSYCHOLOGICAL PRINCIPLES IN THE DESIGN AND OPERATION OF SYNTHETIC TRAINERS WITH PARTICULAR REFERENCE TO ANTI-AIRCRAFT GUNNERY. Contract OMSr 700, Proj. N 105, Memo 19, Feb. 1945. 10pp. National Defense Research Committee, Applied Psychology Panel, Washington, D.C.

On the basis of detailed observations of synthetic anti-aircraft gunnery training devices and their experimental study, several psychological principles are suggested for future design, operation and use. General conclusions concerning the present (1945) devices are as follows: a) Considerable attention has been directed to make synthetic training devices physically similar to the real situations, but psychological relationships have frequently been overlooked. b) Practice without guidance is of questionable value since incorrect habits may be established unless the men are corrected. Scoring, in general, is inadequate for guidance purposes, and coaching is too often given scant attention. c) Properly designed and properly used, synthetic training devices offer an effective and economical method of preparing men for operational weapons. (MEIAS)

4725

Prentice, W.C.W. A STUDY OF THE PERFORMANCE OF NIGHT LOOKOUTS ABOARD SHIP. Contract OMSr 1136, Proj. N 115, Rep. 2, OSRD Rep. 4087, Oct. 1944, 20pp. US National Defense Research Council, OSRD, Washington, D.C. (Princeton University, Princeton, N.J.)

This report presents the findings of a preliminary study made aboard a light cruiser of the USN while she was serving as a convoy-escort. A method of testing and measuring the performance of night lookouts on watch was devised and is reported in detail. It consisted, briefly, in holding lookout "drills" during which each man reported the most distant ship he could see in the formation. Subsequently each report was reduced to a common unit to make it comparable with the others. Analysis of these scores indicated: a) lookouts are moderately consistent from night to night; b) the poorest lookout requires a target to be about 15 times as large in area as that noticed by the best lookout under the same lighting conditions; c) Radiom Plaque Adaptometer scores show no relation to lookout performance as measured in this study. Maximum range for the average lookout under several different conditions were given.

4732

Foxboro Company. INERTIA, FRICTION, AND DIAMETER IN HANDWHEEL TRACKING. Contract OMSr 453, Rep. 4, OSRD Rep. 3474 to Div. 7, Services 74, Sept. 1943, 14pp. US National Defense Research Council, Washington, D.C. (Foxboro Company, Foxboro, Mass.)

Handwheel operated tracking have shown that inertia and friction of the handwheel and tracking mechanism and the size of the handwheel have a pronounced effect on the accuracy and the character of the tracking error. Inertia, either in the form of a heavy handwheel or as flywheel effect inherent in or added to the moving system, reduced tracking error materially. 2 handwheel sizes, 4 1/2" and 9" diameter, were tested. The difference between the 2 sizes did not make large differences in accuracy or smoothness of tracking, except with friction. Small amounts of friction are unavoidable in mechanical systems, and these tests indicate that the detrimental effect of these small amounts of friction was not serious, especially if there is a reasonably high inertia in the system.

4733

The Foxboro Company. RELATIVE ACCURACY OF HANDWHEEL TRACKING WITH ONE AND BOTH HANDS. Contract OMSr 453, Rep. 5, OSRD Rep. 3455 to Div. 7, Services 75, Nov. 1943, 10pp. The Foxboro Company, Foxboro, Mass.

Studies of accuracy of direct tracking with a two-handed crank as compared with a single-handed handwheel showed moderate but significant superiority in the accuracy of the two-handed operation. This superiority was found both with free turning and with frictional load. The double crank handwheel control has certain practical advantages in direct handwheel tracking particularly where the load is appreciable and where the steadying effect from both hands on the wheel is useful. A double crank has the disadvantage that it must be mounted almost directly in front of the operator, for adequate vision and ease of operation. In these tests the double crank handwheel had an advantage of 22% in tracking accuracy over the average of the single handwheels without frictional load. Study was based on a group of unidirectional courses to be followed by direct handwheel tracking using a pointer-matching presentation.

4734

Forbes, T.W., Garner, W.R. & Howard, J.G. FLYING BY AUDITORY REFERENCE ("FLYBAR"). (Relevant to Service Control NK 108). Contract OMSr 658, MHR 107, OSRD Rep. 5123, June 1945, 69pp. National Defense Research Committee, Office of Scientific Research & Development, Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

The purpose of the project "Flybar" was to devise a series of auditory signals by means of which the ears could take over some of the duties of reading flight instruments. Several experiments were performed to explore the range of useful signals. These were followed by the design and testing of auditory signal combinations. Finally, tests of flybar indications were made on the Link trainer. (MEIAS)

4739
Beverly, R.F. A MEASURE OF RADAR SCOPE INTERPRETATION ABILITY TEST #1. Proj. 506 006 0002, Res. Note AN-229, Dec. 1952, 13pp. NSAF Human Resources Research Center, Lockheed AFB, Tex.

4739
This report is concerned with the development and description of a test of navigational radar scope interpretation ability. The interpretation task was defined as an activity requiring a complex of abilities and knowledge that may be measured by performance of tasks requiring map-scope correlation. A photograph-flight chart test was constructed requiring such performance. The test was given to four classes of rated pilots and the scores were analyzed for reliability. Some evidence for validity of the test is also presented. The problem of validation is discussed in some detail.
T. I. R. 1

4740
Cohner, R. AN IMPROVED STUDENT RESPONSE AND MONITORING SYSTEM FOR GROUP TRAINING. FO COMCOM, NEDAL34 1 (20-377), Rep. 341, Nov. 1952, 8pp. NSAF Electronics Lab., San Diego, Calif.

4740
This report describes a redesign of the AF/UGB-11 student response group trainer in which response, monitoring, and scoring are incorporated in a simply constructed and operated system employing an array of response lights. The system provides an item-by-item score as well as a cumulative score for drill-type material which can be reduced to a fixed number of choice-categories with up to ten choices per category. This device provides a diagnostic display of student responses and automatic indication of right-wrong to the student.
I.

4741
Clanton, B.R. THE PHYSIOLOGICAL EFFECTS OF PERMEABLE IMPREGNATED CLOTHING ON TROOPS PERFORMING ROUTINE DUTIES IN TROPICAL CONDITIONS. Rep. 167, Feb. 1953, 27pp. Army Chemical Center, Md. Lab., Md.

4741
More than 400 soldiers wore regular cotton fatigue uniforms with long or short underwear which had been impregnated with CC-2 (chemical) suspension by 3 different processes (M1, M2, and M3) in order to determine the physiological and behavioral effects on routine tasks. Systemic effects, and skin irritation are related to method of impregnation, type and fit of underwear, ambient temperature and humidity, and condition of the subjects' skin before the experiment.
T.M.

4742
Atkinson, W.H., Crumley, L.M. & Willis, Marion P. A STUDY OF THE REQUIREMENTS FOR LETTERS, NUMBERS, AND MARKINGS TO BE USED ON TRANSLUMINATED AIRCRAFT CONTROL PANELS. PART 5. THE COMPARATIVE LEGIBILITY OF THREE FONTS FOR NUMERALS. Rep. TED NAM EL 609, Part 5, June 1952, 33pp. USN Aeronautical Medical Equipment Lab., NAMC, Philadelphia, Penn.

4742
To evaluate the legibility of new forms for numerals to be used on red transilluminated cockpit consoles (see 4759), they were compared with the Air Force Navy Drawing 10,400 and the font developed by Berger. Tests were conducted under conditions of red transillumination (from 0.10 to 3.30 ft.-L) and daylight illumination (from 11 to 34 ft.-c). Letters were exposed approximately 200 msec. for transillumination and five msec. for daylight illumination. Error scores for individual digits were analyzed for significant differences in form. Recommendations were included.
T. R. 8

4743
Brookhill, J.V. PROGRESS IN THE THEORY OF OPTIMUM SEQUENTIAL TESTING FOR RELIABILITY. Rep. AL 1721, May 1953, 8pp. North American Aviation, Inc., Downey, Calif.

4743
The problem dealt with here is a balance between (1) the cost of testing a product for reliability and (2) the risks, because of limiting the testing, of either accepting an insufficiently reliable product or rejecting a sufficiently reliable one. With a suitably defined pay-off function, the optimum parameters are obtained for a sequential test. The validity and reliability of this treatment are discussed. Modifications are also discussed for (1) the optimal sequential test when the pay-off function includes some uncertainty as to what is meant by sufficiently reliable, (2) the sequential test between two rival products, and (3) multidecision sequential test.
T. R. 4

4744
University of Illinois, Urbana, Ill. HOW PICTURES AND GRAPHS ARE LEARNED FROM PRINT. Contract AF 18(600) 335, GTO 07, 52 24, Res. Memo. 11, July 1, 53, 32pp. NSAF Human Resources Research Institute, Maxwell AFB, Ala. (Division of Communications, University of Illinois, Urbana, Ill.).

4744
This is a review of the literature from 1926 to 1952 on graphic and pictorial aids to learning. It contains a summary of published empirical findings on the legibility and effectiveness of graphs and pictures as aids to learning from print.
R. 57

4745
University of Oklahoma Research Institute, Norman, Okla. DISASTERS AT SEA. Tech. Memo. GED T 204, Aug. 1952, 20pp. Operations Research Office, Johns Hopkins University, Baltimore, Md.

4745
This is one of a series of disaster studies made to determine the existence or development of emergency behavior patterns. Records of outstanding sea disasters were studied and descriptions of relevant individual and group behavior were extracted. Conclusions about the factors that determine whether or not panic will occur (leadership, training, morale) and how control of crew and passengers can be maintained are stated.
R. 37

4746
Sieker, H.O. DEVICES FOR PROTECTION AGAINST NEGATIVE ACCELERATION. PART 2. CENTRIFUGE STUDIES. WADC Tech. Rep. 52-87, Part 1, June 1952, 15pp. WADC, Aero Med. Lab., Air Res. and Devel. Command, Wright-Patterson AFB, Ohio.

4746
The physiological effects of varying degrees of negative acceleration (1-5g) were studied on flight personnel and laboratory subjects under three conditions: 1) unprotected, 2) protected by counter-pressure via a partial-pressure suit and helmet, and 3) protected by an experimental prone-position "bed". Results related the physiological changes to acceleration rate and degree of protection.

4747

Department of Defense. A SURVEY OF CURRENT ARMED FORCES RESEARCH ON PSYCHOLOGICAL SCREENING. HQ 202/2, Dec. 1952, 15pp. US Department of Defense, Committee on Human Resources, Washington, D.C.

Research on psychiatric screening of inductees for the armed forces is reviewed. This review is primarily concerned with the Armed Forces Qualification Test (AFQT). Topics covered include: a) The development of the AFQT; b) Validation of the AFQT against combat performance; c) Reports on the AFQT under operational conditions; d) The detection of malingerers; e) Administrative inductees (inductees with scores below the authorized minimum on the AFQT); f) Nonverbal tests of intelligence; g) Utilization of personnel available for restricted assignment.

R 25

4748

Sieker, E.O., Martin, E.E., Ganser, O.H., & Henry, J.P. A COMPARATIVE STUDY OF TWO EXPERIMENTAL PSYCHOMETRIC ANTI-G SUITS AND THE STANDARD CHAP 6-41 ANTI-G SUIT. WADC Tech. Rep. 52-317, Feb. 1953, 13pp. WADC, Aero Med. Lab., Air Res. and Devel. Command, Wright-Patterson AFB, Ohio.

4749

Two new types of pneumatic anti-g suits (which apply pressure to a greater portion of the lower body than the standard G-suits) have been examined and compared with the G-41. The tests entailed accelerations up to 6.5g on the human centrifuge, and were done on 5-11 men wearing each suit consecutively to ascertain the following physiological variables: visual symptoms and subjective observation, arterial and venous blood pressure, and the relation of these pressures to heart-to-head distances. Comparisons are noted and recommendations for subsequent study are made.

I, J, C, 215

4752

Beland, R.S. EVALUATION OF PRECISION APPROACH RADAR. EDOE ZEP 16, Tech. Note WOT 52 67, Dec. 1952, 60pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

4752

To evaluate the Precision Approach Radar (PAR), a ground-controlled piece of equipment representing an attempt to improve the older type, a comparative analysis was made of display characteristics of the two instruments. Operational characteristics were determined by making a number of approaches, recording sufficient information to study the reliability of the approach system. Recommendations are made based on the analysis of this information.

G. 1.

4753

USN Air Technical Training Command. GENERAL AVIATION TECHNICAL TRAINING CONFERENCE REPORT. 14-17 APRIL 1953. NE/4/05/A 19, 39pp. USN Air Technical Training Center, Memphis Air Station, Tenn.

4753

This report of the General Aviation Technical Training Conference of 14-17 April 1953 is concerned with problems of training of naval aviation maintenance personnel, evaluation of the adequacy and suitability of specific training courses, and associated problems. Discussions and recommendations are included.

4754

Jogan, L., Millian, L.W. & Harris, M. A STUDY OF THE EFFECT OF CATASTROPHE ON SOCIAL DISORGANIZATION. Tech. Memo. CHO T 194, Dec. 1950, 135pp. Operations Research Office, Johns Hopkins University, Baltimore, Md. (University of Oklahoma Research Institute, Norman, Okla.).

4754

This is the first in a series of studies in which, in the absence of actual combat experience, the reactions of troops to atomic attack are extrapolated from the observed behavior of civilian groups in disasters. The bases for this study are the April 1947 Texas City explosion, four towns hit by tornadoes, and a holocaust fire. Attention is given to 1) the reactions of the participants, 2) the functioning of already existing disaster control organizations, and 3) the problems of individual and group rehabilitation. Conclusions are given regarding the pattern of social reorganization, the effect of previous organization and training, and the best methods of controlling panic.

I. R 11

4755

US Panel on Personnel Committee on Human Resources. SYMPOSIUM ON TECHNICAL PROBLEMS IN THE EFFICIENT CLASSIFICATION AND ALLOCATION OF MILITARY PERSONNEL. DPT 202 /1, Oct. 1952, 63pp. US Panel on Personnel Committee on Human Resources, Dept. of Defense, Washington, D.C.

4755

The papers presented in this symposium deal with technical problems in the classification and allocation of personnel. Completed research as well as research under way are reviewed and discussed. Included are reviews of: 1) the results of the Armed Services personnel procurement and induction procedures, 2) physical standards, 3) the Army's research in establishing minimum psychological requirements for jobs and the technical problems involved, and 4) application of intra-service classification procedures of classification and allocation. A summary of the symposium is included.

T. G. I. R 6

4756

Smith, H.P.E. MAN AND THE AIRCRAFT WORKSPACE. Aug. 1954, 9pp. RAF Institute of Aviation Medicine, Farnborough, Hants, England.

4756

This paper outlines some of the human factors that have a detrimental effect on aircraft workspace. The method of cockpit layout is discussed, followed by a consideration of the means for preventing necessary flight data. This entails recommendations for design and placement of visual displays with only brief relation of auditory displays. Implementing the decision involves link movements to operate controls, thus design and placement of controls are outlined with accompanying recommendations.

I

4757

Browne, R.C. FIGURE AND GROUND IN A TWO-DIMENSIONAL DISPLAY. FPRC 791, July 1952, 8pp. Flying Personnel Research Committee, London, England.

4757

To assess two aircraft attitude indicators differing in respect to 1) relation of figure and ground and their relative movement, 2) damping of oscillations after a given movement, and 3) their relative complication, the speed and accuracy of response to the displays installed in a standard instrument flying trainer were compared for groups of naive and experienced (pilots) Ss. Instruction time needed before the test could be started and preferences were also measured. The data are also analyzed for transfer effects and individual differences. Practical implications for design of displays are discussed.

T. I. R 6

4750
Brown, F.R., Lowery, E.A., & Willis, M.P. A STUDY OF THE REQUIREMENTS FOR LETTERS, NUMBERS AND MARKINGS TO BE USED ON TRANS-ILLUMINATED AIRCRAFT CONTROL PANELS. PART III. THE EFFECT OF STROKE-WIDTH AND FORM UPON THE LEGIBILITY OF NUMERALS. Rep. TED XAN EL-608, Part 3, May 1951, 38pp. Naval Air Materiel Center, Naval Air Experimental Station, Philadelphia, Penn.

4753
To determine design factors influencing legibility of numerals (presented) under conditions simulating those encountered in reading trans-illuminated cockpit consoles, twenty subjects read numerals (5/32 inch high) presented tachistoscopically. The variables were: numeral design (Serif and sans serif), stroke width to height ratios (1:6, 1:7, 1:8, 1:9, 1:10, 1:12), exposure time (1/8, 1/20 seconds), illumination (40 and 60 footcandles, flood-lighting; 0.25 to 3.50 millilamberts, red trans-illumination). Error data is analyzed for significant differences between the two designs for each digit and its variations. A new series of digits was designed for improved legibility.
T. I. R 2 19

4750
USN Air Training Command. REPORT OF GENERAL AVIATION TRAINING CONFERENCE AT NAS, PENSACOLA, FLORIDA, 17-19 FEBRUARY 1953. SAC/ATC, March 1953, 60pp. USN Air Training Command, Pensacola Air Station, Fla.

4750
This report of the General Aviation Training Syllabus Conference of 17-19 February 1953 is concerned with current problems of training naval flight personnel, training equipment availability and utilization, and consideration of problems connected with specific training programs. Discussion and recommendations are included.

4762
Zuckerman, J.V. TESTING WITH A PRE-RELEASE FILMSTRIP AS A MEANS OF PREDICTING FACTUAL LEARNING FROM A TRAINING FILM. TECHNICAL MEMORANDUM REPORT. HSPR Memo Rep. 14, Nov. 1951, 6pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C.

4762
An attempt was made to use experimental methods to assess the extent to which a filmstrip made from a story-based art work can serve as a predictive device to secure data on how much people would learn from a completed factual figure. Such a filmstrip was made for preliminary testing of an Air Force training film. The filmstrip or the finished film were administered to groups of student pilots. Both groups were tested before and after administration with an identical factual test. Test results were analyzed after scores, absolute gain and relative gain in learning.
T.

4763
Baillinger, E.R. & Dempsey, C.A. THE EFFECTS OF PROLONGED ACCELERATION ON THE HUMAN BODY IN THE PRONE AND SUPINE POSITIONS. WADC Tech. Rep. 52 250, July 1952, 18pp. USAF Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.

2 acceleration problems of equal interest were studied simultaneously on the Wright Air Development Center human centrifuge at the Aero Medical Laboratory. Data were obtained in regard to both the evaluation of the prone bed at various accelerations and the concomitant determination of the physiological tolerance to prolonged periods of acceleration in semi-prone and supine positions. The duration of runs depended upon the acceleration, ranging from 15 minutes at 3 g, 8 minutes at 4 g, etc. to 2 minutes at 10 g. There was no appreciable difference in tolerance in the semi-prone or supine positions with accelerations up to 10 g. However, the necessity for a well constructed bed and head-supporting helmet, primarily for the comfort of the subject, was repeatedly demonstrated. In properly designed prone and supine beds, 23 unprotected subjects were able to tolerate accelerations up to 10 g for 2 minutes with only a small amount of discomfort. The security classification of the title of this report is Unclassified.
R 4

4764
ASTIA Reference Center. HUMAN ENGINEERING. A SELECTED BIBLIOGRAPHY AND A GUIDE TO THE LITERATURE. Rep ARC 4260, Aug. 1953, 15pp. ASTIA Reference Center, Library of Congress, Washington, D.C.

Part I. This bibliography is a revision of Human Engineering: A Report Bibliography (TIP US1462), by the Navy Research Section. The earlier document contained a detailed subject index which has been omitted here in favor of broad subject groupings. In general the references in Part I have a direct military application, whereas the bibliographies in Part I are broader in scope and may have only an indirect military application. Although reports issued prior to 1949 have been included, the emphasis has been on very recent publications. Part II. The references under each section are arranged alphabetically by the issuing agency known.
R 345

4765
Stable, M.H., Abbott, P.S. & McLelland, M.A. THE DEVELOPMENT AND ANALYSIS OF A SECOND TEST OF RADAR SCOPE INTERPRETATION ABILITY, PSI TEST #2. Proj. 506-006 0002, Res. Note 52 10, Dec. 1952, 9pp. USAF Human Resources Research Center, Lackland AFB, Tex.

4765
A test of radar scope interpretation was constructed using 0-15 scope photographs and a standard flight chart. The subject's task was to identify two specified returns on each of 16 photographs in a two-hour period. The test was administered to 161 aircraft observer students, most of whom were also rated pilots. Test results were subjected to an item analysis, estimates of test reliability and of test validity. This latter item was not fully reported in this note.
T. I. R 3

4764

Von Cott, H.P., & Altman, J.W. PROCEDURES FOR INCLUDING HUMAN ENGINEERING FACTORS IN THE DEVELOPMENT OF WEAPON SYSTEMS. Contract AF 33(616)-2986, Task 71833, Proj. 5-(A-7182), Tech. Rep. 56-408, Oct. 1954, 118pp. WADC, Wright-Patterson AFB, Ohio. (American Institute for Research).

4766

This report is intended to suggest procedures for the human engineering of developmental weapon systems. A brief discussion of man-machine systems and the role of human engineering in their design is followed by a design schedule. This schedule suggests at what points and in what ways human engineering should be accomplished. Following the design schedule, procedures that may be used to assess and solve human engineering problems are suggested. Finally, human capabilities and limitations are discussed from the point of view of the man as a system component. Sources of human engineering data are included.
I. R 32

4767

Pride, A.M. & Hyland, J.J. DEVELOPMENT OF EMERGENCY LANDING TECHNIQUES. Proj. PTR AC-235, May 1953, 130p. USN Air Test Center, Patuxent River, Md.

The circumstances surrounding actual flame out landings were investigated for 4 types of currently operational jet fighters: the F9F-2, F9F-5, F9F-2, and F9F-3. An average of 9.1 hours with 12 actual dead stick landings were flown per aircraft during the project test flying. It was established that all 4 types can be landed with relative ease with engines flamed out. A power setting with speed brakes extended was determined for each type which very closely duplicates the engine-off condition, so that pilots may practice simulated dead stick landings with relative safety. A simple procedure for each type is recommended. Air starting techniques were investigated for the 4 types and the airspeed for the best gliding range with engines shut down was established. Simple plots of possible range extension are presented. The details of engine-off behavior of each airplane type and its affected systems are discussed.

4768

Robinson, M. (Group Supervisor). DESIGN OF DIGITAL FLIGHT TRAINERS. Contract NMR 551(02), Study 24 F 3, Res. Div. Rep. 53 21, Proj. Rep. 1, Feb. 1953, 12pp. Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, Penn.

4768

This paper discusses certain features of a digital computer that was designed to solve equations of motion in a flight trainer. It describes some of the circuitry and some of the mathematical aspects of the design that fulfill the requirements of computational speed and analog-to-digital conversion in the device.
I. G. I. R 54

4769

Pride, A.M. INSTALLATION AND TEST OF AUTOMATIC LIGHT INTENSITY CONTROL SYSTEM FOR APPROACH AND RUNWAY LIGHTS. Proj. PTR AE 2201, ET311 292, Bull. 30, Rep. 1, Dec. 1952, 12pp. USN Air Test Center, Naval Air Station, Md.

4769

An automatic brightness control system developed by the National Bureau of Standards was evaluated in connection with runway approach lights at the Naval Air Station, Patuxent River. The system, responsive to horizontal visibility, has functioned satisfactorily and provides good control at proper brilliance. Recommendation is made to examine the improvement to be obtained by the addition of vertical transmissivity information to the system through the use of a cellometer.
I. R 4

4770

Hunter, W.S., Mead, L.C. & Geidard, F. (Chm.). SYMPOSIUM ON PSYCHOLOGY OF LEARNING BASIC TO MILITARY TRAINING PROBLEMS, 7-8 May 1953. HR HTD 201/1, 195pp. Panel on Training and Training Devices, Committee on Human Resources, US Research & Development Board, Washington, D.C. (Brown University, Providence, R.I.).

4770

This is a transcription of paper presented at a symposium on the psychology of learning basic to military training problems. The papers cover these general areas: theories and models for learning, motor and perceptual learning, motivation, problem-solving, and learning in groups. Included are some discussions on specific training devices and on special aspects of military training.
G. I. R 193

4772

Chapman, D.M., Jr. (Chm.). SYMPOSIUM ON RESEARCH IN GROUP BEHAVIOR. HR HTD 202/1, 4-5 Feb. 1952, 104pp. NS Panel on Human Relations and Morale of the Committee on Human Resources, Dept. of Defense, Washington, D.C.

4772

This document contains a compilation of papers presented at the symposium on Research in Group Behavior. The topics discussed indicate the range of problems that affect the Armed Forces, some of the types of research methods under study, and the kinds of efforts being made to solve group behavior problems.
I. G. I. R 16

4774

Blythe, C.A., Scribner, L.J., Helm, V.B., McGhee, C.H., et al. A REPORT ON HUMAN FACTORS IN B-47 OPERATION. Proj. R 318 001, Rep. 1, Nov. 1952, 204pp. USAF Research and Development Command, Headquarters, Washington, D.C.

This report on human factors in B-47 operation covers the following topics: personal equipment, seats, emergency escape and landings, work space, instruments and panels, illumination problems, food and water, environmental control systems, team problems, and fatigue. (HEIAS)

4775
Fenton, R.W. (Dir.). REVIEW AND PLANNING CONFERENCE ON THE RESEARCH PROGRAM OF THE PROFICIENCY ANALYSIS SECTION 14-15 JANUARY 1952. Rep. 52 2, Oct. 1952, 96pp.
USAF Technical Training Research Lab., Lackland AFB, Tex.

4775
This is a transcription of a conference on the research program of the Technical Training Research Laboratory, proficiency analysis section. Included are papers on the validation of items on tests of job proficiency and on the general problems of evaluating measurements of performance on a learned task.
1.

4776
Kryter, K.O. (Dir.). SIMULATOR CONFERENCE, SUMMARY OF MINUTES. (SAC-5521) 22-24 JULY 1952. Memo. Rep. 25, Sept. 1952, 25pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C.

4776
This is a summary of a conference on flight simulators. Included are reviews of training activities making use of B-36, B-47, and B-50 simulators at various Air Force bases. Also included are specific recommendations for the improvement of simulator training programs.

4777
Butler, F.C., Jr. & Williams, R.J. PROCEDURE FOR PRODUCING RADAR SCOPE MOTION PICTURE AIMING POINT DETERMINATION TESTS. Proj. 506 006 0002, Res. Note AFR 52 8, Dec. 1952, 8pp. USAF Human Resources Research Center, Lackland AFB, Tex.

4777
This report presents detailed instructions for the construction of a test for use in training a subject to locate the aiming point on a radar scope. The test consists of a motion picture of a radar scope during a bombing run; the subject is required to determine the aiming point in relation to cross hairs added to the film by a process of animation. Included are a sample set of instructions and an answer sheet.
1. R 3

4778
Hattson, J.B. & Hollis, J.B. REPORT ON PRELIMINARY OBSERVATIONS OF HUMAN ENGINEERING PROBLEMS UNDER ARCTIC CONDITIONS. Proj. 731 1000, Rep. 1, May 1953, 31pp. USA Research and Development Div., Ordnance Corps, Washington, D.C.

This report presents the findings of preliminary observations of human engineering problems under arctic conditions. Information was gathered at Big Delta, Alaska, Devils Lake, North Dakota, and Fort Churchill, Canada, to determine current problems and future areas for investigation. Implications of these findings are discussed and, where appropriate, recommendations are made for further study and evaluation.
R 35

4780
Brown, R.H. VELOCITY DISCRIMINATION AND THE INTENSITY-TIME RELATION. J. OPT. SOC. AMER., March 1955, 45(3), 189-192. (USN Research Lab., Washington, D.C.).

The visual discrimination of velocity is considered in terms of the observer's response to its direction at different speeds. The hypothesis is advanced that the direct perception of motion in a middle range of speeds involves a single sensory event dependent on the intensity-time relation. To test this hypothesis, 4 subjects discriminated velocity at different speeds for each of 8 durations of exposure. The minimal luminance required for correct judgments of direction was measured by the method of limits. The data indicate that velocity discrimination occurs at intermediate speeds when the energy of the stimulating flash is constant (I₀t=C). The reciprocity relation does not hold for exposures longer than a critical duration of 0.1 sec. The luminance of the flash tends to be the sole limiting factor on velocity discriminations at longer durations of exposure (I₀k). Implications of these results are discussed with reference to other experiments.
R 16

4782
Brown, R.H. & Conklin, J.E. THE LOWER THRESHOLD OF VISIBLE MOVEMENT AS A FUNCTION OF EXPOSURE-TIME. Amer. J. Psychol., March 1954, 62, 104-110. (USN Research Lab., Washington, D.C.).

An attempt was made to determine the influence of exposure-time upon the lower threshold. Conditions were obtained that exclude inferences of movement based upon visual comparisons of position. The essential features of the method used are: a) provision for initial fixation of a moving spot, b) presentation of a small-spot of light in the dark, and c) determination of the lowest rate at which the direction of the movement can be discriminated. The results of this study indicate that the threshold of visible movement decreases (becomes better, more acute) as the exposure-time is increased; that the decrease, large at first as the short exposure-times are lengthened by equal steps, becomes progressively less as the exposure-times become longer; and that autokinetic phenomena did not under the condition of this study affect either the observations or the reports of our Ss.
R 7

4781
Conklin, J.E., Baldwin, A. & Brown, R.H. APPARATUS FOR MEASURING THE THRESHOLD FOR VISUAL DISCRIMINATION OF DIRECTION OF MOVEMENT. Amer. J. Psychol., April 1953, 66(2), 289-319. (Naval Research Lab., Washington, D.C.).

The apparatus described here was designed to measure the threshold for visual discrimination of the direction of movement as a function of exposure-time. Although the apparatus was specifically constructed for the movement of a spot of light in complete darkness, it can be readily adapted to a situation where faint illumination is required. The equipment incorporates 4 desirable features: a) the presentation is noiseless; b) the movement within a given trial is made at a constant rate; c) the rate of movement may be accurately varied; and d) it has an automatic timing device for controlling the exposure.

4783
 Peckin, J.C. THE RELATIONSHIP OF THE COLOR AND BRIGHTNESS OF BACKGROUND TO THE PERCEPTION OF COLORED TEST OBJECTS. Contract AF 30 (602)-109, Final Rep., RADC-TR-55-90, March 1955, 13pp. University of Rochester.

4783
 To explore the relationship between color and brightness of background and of test object, the just perceptible brightness of a test illumination of a given spectral composition when viewed against a series of colored backgrounds was determined. The subject viewed test flashes presented for 1/5 second at ten-second intervals and decided whether or not it was seen; three successive positive responses was the criterion. Colors for both backgrounds and test flashes ranged from 700 to 400 millimicrons and included white background brightnesses ranged from a just perceptible level to a maximum. Threshold data were analyzed to show the pattern of change over the entire array of conditions. Recommendations governing use of colored presentations against a luminous background are given.

4784
 Headquarters, Air Proving Ground Command. FINAL REPORT ON OPERATIONAL SUITABILITY TEST OF THE POINTER-DRUM ALTIMETER. Proj. APG/SAT/593-A, Dec. 1955, 6pp. Headquarters, Air Proving Ground Command, Eglin AFB, Fla.

4784
 To determine the operational suitability of the Pointer-Drum Altimeter for use in United States Air Force aircraft, evaluations were made by 29 pilots after flying jet aircraft in which the altimeter had been installed. Both day and night flights were made with regulation instrument flight checks. Some evaluations were made during normal visual flight rule flying with special emphasis on rapid ascents and descents. Questionnaires (completed by all pilots) yielded pilot opinions concerning suitability of data presentation during all phases of instrument and night flight, ability to interpret readings accurately during rapid ascents and descents, preferences for new or conventional instrument, and design aspects of the altimeter. Recommendations are included.

4785
 Knowles, W.B. & Newlin E.P. CODING BY GROUPS AS A MODE OF STIMULUS PRESENTATION. Proj. NR 592 030, NRL Prob. Y02 03, Rep. 4604, Sept. 1955, 11pp. USN Research Lab., Washington, D.C.

Using a 5x5 matrix of lights and a similar panel of pushbuttons, 5 subjects were required to respond to sequences of 60 signals presented in sub-sequences of 2, 3, or 4 signals with intervals of 0.37, 0.52, 0.68 or 1.02 sec. between signals. Performance on each of these 12 experimental conditions was compared with a signal-by-signal control condition in terms of speed and accuracy measures. It was found that under limited conditions coding by groups can result in better performance than the item-by-item mode of operation, and that the amount of information rather than the rate at which it is presented seems more critical in determining the temporal organization of the responses to grouped signals.

4789
 Eldredge, D.H. & Hirsh, Shirley K. THE EFFECTS OF BLAST PHENOMENA ON MAN: A CRITICAL REVIEW. Contract Nonr 1151(01), Proj. NR 140 069, Rep. 3, June 1955, 24pp. National Research Council, Committee on Hearing and Bio-Acoustics, Washington, D.C.

The effects of blast phenomena on man are critically reviewed and summarized. Topics covered include: a) The physical stimuli; b) Measurement of the physical stimuli; c) The response of human tissues to transient forces; d) Reported effects of blast phenomena. A selected bibliography of 186 references is included in addition to the references cited in the review. (HEI-3)

4791
 Neely, K.K. ACOUSTIC PROPERTIES OF HEADGEAR: I. RCAF HEADGEAR ITEMS. Proj. 100 43 72, Rep. 100 2, July 1953, 28pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

4791
 To determine the adequacy of various items of Royal Canadian Air Force headgear in the maintenance of efficient voice communications and in the protection of the ear from noise, two series of tests were conducted: acoustic insulation tests and listener-intelligibility tests. Four helmet modifications and two oxygen masks were tested singly and in various combinations.

4792
 Young, H.L. DESIGNS FOR HORIZONTAL PARALLAX AND STAR SHELL SPREAD DIALS OF THE TRAIN RECEIVER REGULATOR MARK 28 MODIFICATION 0. NRL Prob. R13 060 (Bureau Request) 214, Interim Rep., Oct. 1948, 6pp. USN Research Lab., Washington, D.C.

Design recommendations are made for the horizontal parallax and star shell spread dials of the Train Receiver Regulator Mark 28 Modification 0. A list of formulae is given for determining the spacing of star shell spread dial graduations and a table is included to specify the relative directions of turret, dial and knob rotation for forward and aft turrets in terms of starboard and port star shell spread orders. Illustrations of the recommended designs are enclosed. It is recommended that horizontal parallax and star shell spread be indicated on separate dials. This recommendation is based on the fact that the 2 dials have discrete functions and are different operationally. The parallax dial is used only as a checking dial to inform the operator that the instrument is working accurately. The operator reads a specified amount against a fixed index mark located at the top of the dial when a known gun train order is received. On the other hand, the star shell spread dial is an operating dial. The star shell spread orders are received verbally as so many degrees port or starboard and are inserted into the dial with a knob so that the given order is seen against the fixed index at the top of the dial.

4793

Cookley, J.T., Fucigna, J.T. & Dunlap, J.V. HUMAN ENGINEERING REVIEW OF THE AERIAL RECONNAISSANCE CAMERA KA-5. Contract DA 36 039 SC C4647, Proj. 3 99 01-222, Task 2004A, Sept. 1955, 24pp. USA Signal Corps Engineering Lab., Fort Monmouth, N.J. (Dunlap and Associates, Inc., Stamford, Conn.).

Recommendations, with regard to size, shape, location, angle and material, are made for 2 handles on the aerial reconnaissance camera, KA-5. For the left handle, a contoured grip, located in the lower-left front corner of the camera, and adjustable through a range of 45°, is recommended as an optimum design and location. Three alternative locations are also discussed should it be impossible to meet the optimum specifications. A contoured grip is also recommended for the right handle. In addition, the angle of the right handle is modified to equalize further the distribution of weight over the right hand.

4794

Coardren, L.J. THE USE OF RADIOACTIVE SELF-LUMINOUS MARKERS AS SOURCES OF ILLUMINATION. Proj. NR 672 010, NRL Prob. NO2 01, July 1955, 21pp. Photometry Branch, Naval Research Lab., Washington, D.C.

The results of various studies show that radioactive self-luminous deck and personnel markers can be used as simple, inexpensive, and reliable sources of illumination to assist some military operations under dark conditions. Strontium-90 is the most suitable of the present radioactive isotopes for exciting the phosphors in the markers. Experiments were made using single markers and groups of markers in a variety of colors, luminances, and distances. Green markers are the most efficient illuminators since the spectral energy distribution of the light from green markers has its maximum at about the same wavelength as the maximum of the sensitivity curve of the dark-adapted eye. The distribution of luminance of a white wall, illuminated by various groups of markers, was measured to show the extent of useful illumination. Various tests revealed many uses that are possible.

R 11

4795

Chambers, A.W. HUMAN ENGINEERING RECOMMENDATIONS FOR A SYNTHESIZED HELICOPTER SIMULATOR. Contract AF 33(616) 2080, Supplemental Agreement 87(55-823), June 1955, 78pp. American Institute for Research, Pittsburgh, Penn.

4795

This report presents human engineering recommendations for a synthesized helicopter simulator to be used for advanced training of pilots. A task analysis of the pilot's job was made to determine the essential discriminations, decisions, and responses required of a pilot to fly a helicopter. Human engineering recommendations are concerned with the equipment required to provide training on the tasks; the physical and functional properties of this equipment, and the use of the equipment for training.

T. I. R 20

4796

Marks, M.R. & Uhlaner, J.E. EVALUATION OF NEW ARMED FORCES VISION TESTER PLATES. Projs. DA 29560000 & PRB B 6 133 33, PRB Tech. Res. Rep. 1092, Task 133, June 1955, 37pp. USA Personnel Research and Procedures Div., The Adjutant General's Office, Washington, D.C.

Previous research and operational considerations indicated that a vision test, which could be given in an optical instrument at moonlight (mesopic) levels of illumination, warranted development as a predictor of ability to see in night operations. The Armed Forces Vision Tester was modified to permit testing at mesopic levels. Potential vision tests were screened for appropriate psychometric characteristics. In checking test procedure, 10 mins. of dark adaptation preceding the presentation of test targets was found to be sufficient for reliable mesopic testing. A night field detection course was developed on which examinee-observers were required to spot aggressors in various positions at varying distances. Scores of infantrymen on the selected mesopic tests were compared with measures of their performance on the night detection course. The most effective predictor of night visual performance was found to be the Mesopic Line Resolution Test.

R 12

4797

Adams, Marjorie, M. & Wiley, L.N. INDEX TO AIR FORCE PERSONNEL AND TRAINING RESEARCH CENTER 1954 TECHNICAL DOCUMENTARY REPORTS. AFPTC TR 54 132, Dec. 1954, 49pp. USAF Personnel & Training Research Center, Lackland AFB, Tex.

4797

This is an index of all the unclassified reports on research that were released in 1954 by the Air Force Personnel and Training Research Center. It includes abstracts of these 131 documents as well as lists of authors, subjects, and depository libraries. Among the topics treated in the documents are transfer of training, flight simulators, gunnery training, distribution and amount of practice, and training in trouble-shooting.

R 131

4798

Thistlethwaite, D., Moltz, H., Kamenetzky, J. & de Haan, H. EFFECTS OF BASIC TRAINING ON THE ATTITUDES OF AIRMEN. Contract AF 33(638) 25726, Proj. 7705, Task 15, AFPTC TR 55 3, June 1955, 44pp. USA Personnel Research Lab., Lackland AFB, Tex. (University of Illinois, Urbana, Ill.).

4798

This paper evaluates the effects of an eight-week basic military training course on certain attitudes of 900 airmen. The attitudes, measured with questionnaires, pertain to combat, authoritarian leadership, loyalty toward the flight, instructor's competence, motivation to serve, and personal adjustment. Changes in these attitudes are related to characteristics of the instructors and predispositions of the trainees.

T. I. R 7

4799

Stono, G.R. THE TRAINING FUNCTION OF EXAMINATIONS: RETEST PERFORMANCE AS A FUNCTION OF THE AMOUNT AND KIND OF CRITIQUE INFORMATION. Proj. 7711, Task 57001, AFPTC TR 55 8, June 1955, 22pp. USAF Aircraft Observer Research Lab., Mather AFB, Calif.

4799

This study undertook to determine how different amounts and kinds of feedback (knowledge of results) affect the elimination of wrong answers on a multiple-choice examination. The 55, 240 Air Force cadets divided into five groups, all took the same examination at two different times. Each group was given different amounts of information as to correct and incorrect answers after the original test. Errors on the retest relative to errors on the original test are compared for the five groups.

T. G. R 5

4800

Gragg, D.B., Kieselbach, D.J., Murphy, M.F., Peckham, R.E., et al. THE 14-WEEK EXPLORATORY STUDY OF MARGINAL-AIRMAN BASIC TRAINING: COMPARISON OF PROFICIENCY OF 8-WEEK AND 14-WEEK TRAINING GROUPS. Proj. 7700, Task 77003, AFPTTC TN 55 10, June 1955, 26pp. USAF Personnel Research Lab., Lackland AFB, Tex.

4500

The basic training period was extended from eight to 14 weeks for a group of 140 marginal (low-aptitude) airmen. This group's proficiency scores for various military tasks and academic skills at the end of 14 weeks were compared with those obtained by a matched control group at the end of eight weeks. The effectiveness of the prolonged training period was evaluated and recommendations for further research were made. T. R 10

4801

Cohen, J.D. & McKelvey, R.K. THE BEHAVIOR OF INDIVIDUALS AND PERSONNEL SYSTEMS IN THE SURVEILLANCE FUNCTIONS OF AN AIR DEFENSE DIRECTION CENTER: III. DISTRIBUTION OF RESPONSES WITH RESPECT TO JOB FUNCTIONS. Proj. 7712, AFPTTC TN 55 11, June 1955, 15pp. USAF Crew Research Lab., Randolph AFB, Tex.

4801

As part of a research program directed toward the development of a method of systematically recording and analyzing the behavior of operators in the surveillance function of an Air Defense Direction Center, observations were collected on activities of 24 Aircraft Control and Warning operators under standard system operations. The data were summarized in terms of distributions of types of responses at three positions (scope operator, plotter, and teller/recorder) and categorized in relation to effectiveness in accomplishing mission. Analysis revealed the characteristic way each of the positions was performed. The results have implications for job specification as well as assessment procedures. T. G. I. R 3

4802

Jones, E.R. & DuBois, P.H. THE USE OF EXPERT JUDGMENTS IN THE DEVELOPMENT OF FLIGHT SIMULATOR TRAINING COURSES. Proj. 504 030 0010, AFPTTC TN 55 14, July 1955, 20pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C.

4802

This article describes and evaluates a rating method for the selection of flight procedures to be emphasized in B-50 simulator training courses. Three groups of experienced flight personnel (aircraft commanders, pilots, and flight engineers) chose out of 30 training areas the 20 areas in which their crews needed the most and the least additional training. The data presented include mean ratings for the training areas, agreement within and between groups of judges, and agreement between the judgments of flight personnel and flight instructors as to the relative importance of the areas. T.

4803

Rowland, G.E., Cornog, D.Y., & Courtney, D. EXTERIOR LIGHTING FOR NAVAL AIRCRAFT. Contract N156a-32795, Rep. 9, Proj. F, Aug. 1956, 150pp. Courtney and Company, Philadelphia, Penn.

4803

This is a second interim report of research on development of an optimum exterior lighting system for Naval Aircraft. The data in this report include an analysis of aircraft movements during operations involving exterior lighting, relationships of perceptual problems of crucial personnel to aircraft movement, and the limiting factors of the working environment. These data were gathered by a research team (1) observing operations, (2) actually participating in operations wherever possible, and (3) interrogating--interviews with senior personnel, unstructured interviews with personnel on the job, and written interviews. Appendices contain data collection devices, coding manual and examples from interviews and the raw data summary. T. I.

4804

McMahon, C.A., & Ford, T.R. SURVIVING THE FIRST FIVE YEARS OF RETIREMENT. J. Geront., April 1955, 10, 212-215. AFPTTC TN 55-22, Aug. 1955. AFPTTC, Maxwell AFB, Alabama.

4804

In order to evaluate the belief that retirement has a negative effect on life expectancy, it was hypothesized that examination of the longevity records of two populations of Army and Air Force officers should reveal a higher mortality rate in the first 5-year retirement period than in two subsequent 5-year periods. Results are discussed with regard to the hypothesis and the particular population utilized in the study. T.R2.

4805 Zwislowski, J. SEMIPLASTIC EARPLUGS. J. acous. soc. Amer., May 1955, 27(3), 460-465. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (PWR 165)

Description of the development of an earplug with soft elastic walls and a viscous core malleable at body temperature. The problems of suitable material, shape, and size are considered as well as the shape and size adaptability. People have found these earplugs sufficiently comfortable to sleep with, and they ensure a sound attenuation equal to or better than any known earplug. One size fitted 90 percent of the ears of the 25 people tested sufficiently well. R 6

4806 Ward, W.D. TONAL MONAURAL DIPLACUSIS. J. acous. soc. Amer., March 1955, 27(2), 365-372. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

2 similar cases of tonal monaural diplacusis are described. When low-intensity sinusoids within a certain range are presented, several distinct tones are heard in addition to the tone presented. The effects are focused at 3610 cps for one subject and at 3155 cps for the other. Pitch-matching and probe-tone techniques show that the additional tones correspond to combination tones expected in a normal ear stimulated by 2 tones, one of which is fixed at one of the above frequencies. Hence some basic instability of the auditory mechanism at these frequencies is indicated for these observers. It is suggested that the defect lies in the "peaking" process of the cochlea, so that an adequate explanation of the phenomena may be of some importance to auditory theory. R 10

4807

Tupes, E.C., Bowles, J.W. & Torr, D.V. PREDICTING MOTIVATION FOR FLYING TRAINING AMONG SENIOR AFROTC CADETS. Proj. 503 002 7701, AFPTTC TN 55 18, July 1955, 8pp. USAF Personnel Research Lab., Lackland AFB, Tex.

4807

Concerned with the general problem of motivation for flying, this report presents an investigation of the relationship between certain test and proficiency variables (physical proficiency, intelligence, personality, attitudes, pilot aptitude, etc.) and a motivation-for-flying training criterion obtained by comparing a group of AFROTC cadets in flight training with AFROTC cadets who did not apply although they believed they could qualify for flight training. Data on approximately 700 cases yields results which are discussed in terms of the relationships found to exist between acceptance versus rejection of flying training and the various test and proficiency variables. T. R 1

4809 Coakley, J.D., Fucigna, J.T. & Barrack, J.E. A FUNCTIONAL APPLICATION OF ANTHROPOMETRIC DATA TO THE DESIGN OF THE WORKSPACE OF PPI SCOPE OPERATORS. Contract AF 33(038) 18'03, WADC Tech. Rep. 53 3, Jan. 1953, 16pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Dunlap and Associates, Inc., Darien, Conn.).

The dimensions and layout of PPI consoles now in production are based on the needs of operators having average body dimensions. The use of averages results in equipment unsuitable both for operators who are larger than average and for those smaller than average. 2 needs assumed to be basic to the operations of a PPI scope operator are the need to see the GCI plotting board and the need to feel comfortable while operating the scope for long periods of time. With these needs as a basic consideration, conceptual dimensions should be chosen to accommodate approximately the middle 95-5% of the military population. These principles are applied to the design of a PPI console and the operator's chair, and to the placement of the PPI scopes in a GCI station.

4811 Bayroff, A.G., Gorsuch, J.H., Mueller, R.A.H., Murphy, D.L., et al. THE OPERATION AND USE OF THE BUREAU OF ORDNANCE GUNNERY TRAINER MARK 3 MOD 2. PART I: OBSERVATIONS ON THE USE AND OPERATION OF THE TRAINER. PART II: EXPERIMENTAL STUDY OF TARGET FLIGHTS SUITABLE AT THE INDOCTRINATION LEVEL. Contract OEMSR 700, Proj. N-105, OSRD Rep. 6229, Memo. 33, Oct. 1945, 34pp. University of Pennsylvania, Philadelphia, Penn.

4811 This is an experimental study undertaken to investigate the characteristics of target films suitable for indoctrination on the Bureau of Ordnance Gunnery Trainer Mark 3. The effect upon difficulty of practice, range setting, and screen employed (lower or upper) was tested with 36 Ss. In addition to the conclusions concerning the level of difficulty of indoctrination target patterns, observations on the operation of the trainer are reported.

T. R few

4812 Morsh, J.E., Burgess, G.G. & Smith, P.N. STUDENT ACHIEVEMENT AS A MEASURE OF INSTRUCTOR EFFECTIVENESS. AFPTC TN 55 12, June 1955, 20pp. USAF Personnel Research Lab., Lackland AFB, Tex.

4812 To evaluate student achievement as a measure of instructor effectiveness, gains in proficiency made by Air Force students in a hydraulics course were compared for 121 instructors teaching the course. Student gains were measured by gains on a posttest beyond those predicted by a pretest. This criterion was correlated with several others, among them ratings by students and by supervisors of the instructors.

T. R 18

4813

Johnson, C.D., Burke, L.K., Loeffler, June C. & Brucker, A.J. PREDICTION OF THE COMBAT PROFICIENCY OF INFANTRYMEN. Proj. 79560000 & FEB Proj. B 8 251 20, PAB Tech. Res. Rep. 1095, July 1955, 16pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

4813

Research completed and research plans pertinent to the development of aptitude areas for classifying personnel into the Combat Arms are reviewed. A self-description blank, a personal inventory of combat-related traits, and several tests of learning and perceptual abilities were tried out on two combat regiments in Korea. Among the results of this series was a new and promising self-description blank predicting combat performance. Reanalysis of available data indicated that an interest questionnaire developed in a fighter factor study is equally promising. These items are being further investigated for development of the desired aptitude areas.

T. G. I. R 4

4816

Gordon, Mary Agnes. INFLUENCE OF BACKGROUND FACTORS UPON THE PREDICTION OF SUCCESS IN AIR FORCE TRAINING SCHOOLS: A REVIEW OF THE LITERATURE. Proj. 7703, Task 77072, AFPTC TN 55 4, June 1955, 14pp. USAF Personnel Research Lab., Lackland AFB, Tex.

4816

This is a review of studies of the effect upon prediction of success in training of such background factors as: prior learning; community characteristics; socio-economic status of family; specific background; and background factors in racial differences. The implications of these findings is discussed in relation to prediction of success in Air Force technical schools, with particular reference to mechanical skills.

R 27

4818 Poulton, F.C. & Stevens, S.S. ON THE HALVING AND DOUBLING OF THE LOUDNESS OF WHITE NOISE. J. acoust. Soc. Amer., March 1955, 27(2), 329-331. (PMR 159) University, Cambridge, Mass.).

The decibel changes required to halve and to double the apparent loudness of a white noise were determined at 9 sound pressure levels by 36 subjects. The subjects adjusted the level of the noise by means of an "improved control" -- a "tone potentiometer" whose angular turn is roughly proportional to the loudness produced. An attempt was also made to measure and control some of the biasing factors that affect loudness estimations. Results: the median decibel changes required to produce a 2:1 loudness ratio ranged from 6 to 10 db, approximately.

R 6

4819
Stevens, S.S., Rogers, H.S., & Herrstein, R.J. THE APPARENT REDUCTION OF LOUDEST A REPEAT EXPERIMENT. *Acoustics, 1953, March, 1953, 27(2), 326-328.* (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (PDR 164)

The experiment of Laird, Taylor, and Wille (1952) showed that the reduction in the intensity of a sound required to produce half-loudness is of the order of 10 db. Since this result is out of line with most other studies in this field, an attempt was made to repeat the experiment with a similar piece of apparatus (acknowledged). The first attempt to copy the procedure of Laird, Taylor, and Wille gave results more like those usually obtained, namely, a required reduction for half-loudness of the order of 10 db. A second experiment, involving the use of comparison tones placed at such as 40 db below the standard, gave results more like those of Laird, Taylor, and Wille. The method they used appears to be overly sensitive to the range and order of presentation of the comparison stimuli.

4820
Miller, R.B., Kelley, J.D., Jr., & Smith, P.R. THE VALIDITY OF MAINTENANCE JOB SKILLS FROM THE PRACTICE OF AN ELECTRONIC EQUIPMENT. PART II. K-1 TROUBLE-SHOOTING SKILLS. Contract AF 33(616) 7001, 7-1-53, 307 OGS 0021, Feb. 1953. *Wright Air Development Center, Dayton, Ohio.*

4821
A procedure developed earlier for the anticipation of maintenance job requirements for an electronic equipment was applied to the K-1 Tracking Navigational Set, an equipment already in field use. The procedure consists mainly of making a detailed analysis, in terms of behavior, of the demands imposed upon the maintenance personnel by the equipment. In the application to K-1, two separate job analyses were made, one from available manufacturer's records kept during the prototype stage of equipment development and one from data available on production models in field installations. A comparison was then made of the two analyses for degree of similarity. Training implications were discussed.

4822
Henderson, D.R. A REVIEW OF MULTIPLE CHANNEL LISTENING EXPERIENCE. *RAF 55/533, CDS 257, April 1955, 9pp.* Royal Naval Research Committee, NRC, London, England. (Applied Psychology Research Unit, NRC, Cambridge, England).

4823
Siegel, A.L., Jensen, J.J., & Dancy, E.R. AN INVESTIGATION AND TEST OF THE TROUBLE-SHOOTING ABILITY OF AVIATION ELECTRICIANS. Contract NRC 1348(00), Series 1953, Inst. Rep. 1, Jan. 1953, 80pp. *Investigation for Research in Human Relations, Philadelphia, Penn.*

4824
A battery of four separate performance tests (AE Trouble-Shooting Performance Examination) was developed. Each test measures the aviation electrician's ability in one of the four critical skills judged necessary for adequate trouble-shooting. The tests were administered to a first sample of aviation electricians and the scores analyzed for evidence of test reliability and test validity. Four written tests, each related by content to an individual "E" school phase, were first developed on the basis of internal consistency and then validated against the AE Trouble-Shooting Performance Examination. A short form of the written test was also developed. Some additional relationships were studied.

4825
This paper contains a review of results of previous experiments on multiple-channel listening, and some practical conclusions which may be drawn from them. The discussion covers listening to two messages at once, listening to a message against irrelevant background, monitoring of several channels, memory of one channel while listening to another, and miscellaneous experiments. In each type of situation two chief problems are discussed: the amount of information a listener can handle, and the physical means by which it is delivered.

4826
Richards, G.W. YELLOW GLASSES FAIL TO IMPROVE SEEING AT NIGHT-DRIVING LUMINANCES. *Highway Res. Abstracts, July 1953, 23(7), 32-36.* (American Optical Company.).

Acuity and contrast were measured for 73 persons (ages 16 to 72) at 11, 1.0 and 0.1 ft.-L. (3025 K.) with and without Noviol C glasses, and without the yellow glasses at an intensity equal to the overall transmission of the yellow glasses. The latter permits evaluation of any effect due to yellowness separate from decreased illumination. Yellowness had little effect at the higher luminances and some loss of seeing found at the lower levels is associated with the Purkinje shift. A small but statistically significant loss of vision occurs from yellow glasses. The loss appears to increase with age. No observers showed any consistent gain in seeing with yellow glasses for both acuity and contrast for all luminances tested, although random small gains were common. Since there is barely sufficient luminance for average night driving, the loss from yellow glasses is potentially dangerous and the data recommend that yellow glasses not be worn during night driving on public roads.

4824

Shapard, R.J. THE EVALUATION OF A NULL-POINT DISCONTINUOUS ELECTROCALORIMETER. *IPMC* 588, Aug. 1955, 177p. Flying Personnel Research Committee, Royal Air Force Institute of Aviation Medicine, London, England.

Description is given of a null-balance electrical pursuit meter based on a Wheatstone bridge circuit. Evaluation in a group of normal subjects shows that it is capable of yielding repeatable measurements of an "initial response time" and a "total response time" for coordinated manual tasks of the type encountered in flying an aircraft. Possible applications include addition and subtraction problems, code substitution tests, and measurements of inhibition and contrast discrimination. "Initial response time" would, in flying, for example, be the time required to read the left-hand dial, memorize the reading and initiate appropriate coordination movements of the wrist. "Total response time" would be the time required to complete a fairly simple coordination task; for example, "initial response time" plus period occupied by muscular movement plus time required for making a final judgment of accuracy. With suitable adjustment the apparatus is capable of testing other psychological functions and of visual contrast discrimination. It is recommended that the apparatus should be tested under conditions of psychological stress.

R 17

4825

Smith, A.D. GUIDE FOR THE DESIGN AND EVALUATION OF THE INSTRUCTOR'S STATION IN TRAINING EQUIPMENT. Contract AF 33(616) 2380, Proj. 7157, MOD TR 54 564, Dec. 1954, 272pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (American Institute for Research, Pittsburgh, Penn.).

4825

This report is based on an application of systems analysis to the instructor's station in the training situation. It describes in detail methods for evaluating the effectiveness of the instructor's station, for determining what specific equipment is needed at the instructor's station and how this equipment should be designed and arranged, and for deciding which inputs and outputs to the trainee station the instructor should control and how he should control them. Included also in the report are examples of inadequate human engineering in the design of instructors' stations and sample questionnaires for obtaining information on the function of training equipment from instructors and observers.

1. R 25

4825

Warr, D.M. A CRITICAL REVIEW OF THE LITERATURE ON "ABSOLUTE PITCH". *Psychol. Bull.*, May 1947, 44(3), 249-264. (Indiana University, Bloomington, Ind.).

4829

The author presents a critical review of the literature pertaining to the concept of absolute pitch. The experiments are presented and discussed in terms of the definition of absolute pitch, the various theories of absolute pitch, and the results of specific investigations of absolute pitch. Practice effects and the role of past experience are two of the variables discussed in detail.

4826

Nachwias, J. FIGURAL AFTER-EFFECTS IN KINESTHETIC SPACE. *Amer. J. Psychol.*, 1953, 66, 609-612. (Swarthmore College, Swarthmore, Penn.).

2 experiments were performed to demonstrate that kinesthetic after-effects can be induced by a method closely analogous to that employed in visual experiments. The method is based on the subjective comparison of the stationary position relative to the body of the 2 hands; 20 Ss were studied. The S was blind-folded, then one of his hands was placed for 60 sec. on a bar 4 in. above or below the test-bar; the other hand remained at his side. For the test, both hands were placed simultaneously on the same horizontal bar, and S was asked to report whether his hands now appeared to be at exactly the same height, and if not, which felt higher. If kinesthetic after-effects behave like their visual analogs, the satiated hand should appear displaced away from the previously satiated locus; 16 of the 20 Ss reported such an effect. In a 2nd experiment, an attempt was made to discover whether the magnitude of the displacement passes through a maximum. Both hands were satiated simultaneously, with each hand kept at a different height. In the test-period, the 2 hands were placed on the same test-bar; 72 Ss were tested. There was no evidence of a maximum for an equal number of Ss reported quite opposite effects. Some tentative explanations for this effect are offered.

(HEIAS)

R 8

4828

Newhall, S.M. COMPARABILITY OF THE METHOD OF SINGLE STIMULI AND THE METHOD OF PAIRED COMPARISONS. *Amer. J. Psychol.*, March 1954, 67, 96-103. (Eastman Kodak Company, Rochester, N.Y.).

A group of 12 Os made preferential judgments of three separate series of color prints both by the method of single stimuli and the method of paired comparisons. In all 3 series the original uncorrected product moment correlations of the results by the two methods exceeded 0.95. Even when the 2 different methods were used by 2 different groups of 12 Os, the r 's ranged from 0.77 to 0.99. A different group of 12 Os made preferential judgments of 3 separate series of projected color transparencies, using the same two methods. In all 3 series, the r 's were 0.50 or more; and when the two methods were used by different group of Os the r 's ranged from 0.78 to 0.93. The r 's between the methods proved to be as high when only 1/5 as much data was taken by the method of single stimuli, viz. a simple trial, as when the same amount of data was taken by both methods. The method of single stimuli appears to be the more efficient method. (HEIAS)

R 6

4824

Shepherd, R.J. THE EVALUATION OF A MULTI-POINT DISCONTINUOUS ELECTRICAL PURSUIT METER. *IPMC 388*, Aug. 1955, 171p. Flying Personnel Research Committee, Royal Air Force Institute of Aviation Medicine, London, England.

Description is given of a multi-balance electrical pursuit meter based on a Wheatstone bridge circuit. Evaluation in a group of normal subjects shows that it is capable of yielding repeatable measurements of an "initial response time" and a "total response time" for coordinated manual tasks of the type encountered in flying an aircraft. Possible applications include addition and subtraction problems, code substitution tests, and measurements of inhibition and contrast discrimination. "Initial response time" would, in flying, for example, be the time required to read the left-hand dial, memorize the reading and initiate appropriate coordination movements of the wrist. "Total response time" would be the time required to complete a fairly simple coordination task; for example, "initial response time" plus period occupied by muscular movement plus time required for making a final judgment of accuracy. With suitable adjustment the apparatus is capable of testing other psychological functions and of visual contrast discrimination. It is recommended that the apparatus should be tested under conditions of psychological stress.

R 17

4825

Smith, A.D. GUIDE FOR THE DESIGN AND EVALUATION OF THE INSTRUCTOR'S STATION IN TRAINING EQUIPMENT. Contract AF 33(616) 2080, Proj. 7157, WDC TR 54 544, Oct. 1954, 22pp. Naval Research Medical Lab., Wright-Patterson AFB, Ohio. (American Institute for Research, Pittsburgh, Penn.).

4825

This report is based on an application of systems analysis to the instructor's station in the training situation. It describes in detail methods for evaluating the effectiveness of the instructor's station, for determining what specific equipment is needed at the instructor's station and how this equipment should be designed and arranged, and for deciding which inputs and outputs to the trainee station the instructor should control and how he should control them. Included also in the report are examples of inadequate human engineering in the design of instructors' stations and sample questionnaires for obtaining information on the function of training equipment from instructors and observers.

1. R 25

4826

Nachmias, J. FIGURAL AFTER-EFFECTS IN KINESTHETIC SPACE. *Amer. J. Psychol.*, 1953, 66, 609-612. (Swarthmore College, Swarthmore, Penn.).

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R 6

4829

Wye, D.M. A CRITICAL REVIEW OF THE LITERATURE ON "ABSOLUTE PITCH". *Psychol. Bull.*, May 1947, 44(3), 249-266. (Indiana University, Bloomington, Ind.).

4829

The author presents a critical review of the literature pertinent to the concept of absolute pitch. The experiments are presented and discussed in terms of the definition of absolute pitch, the various theories of absolute pitch, and the results of specific investigations of absolute pitch. Practice effects and the role of past experience are two of the variables discussed in detail.

4838
Noble, C.E. AN ATTEMPT TO MANIPULATE INCENTIVE-MOTIVATION IN A CONTINUOUS TRACKING TASK. Proj. 509-020 0009, AFFTC TR 54 43, Oct. 1954, 6pp. USAF Skill Components Research Lab., Lackland AFB, Tex.

4839
To investigate the effect of verbal incentive-related information upon the learning of a motor skill, 400 Ss were required to perform a modified Two-Hand Coordination Test. Three groups of these Ss were told their scores at three periods during practice of the task and instructed that a 25 percent improvement was necessary to achieve a passing score. A fourth group received no information. The results are presented and discussed in terms of the differences in performance among the various groups as indicative of the relative effect of motivation in the acquisition of a tracking skill of this sort.

4839
Noble, C.E. AMOUNT SET AND THE LENGTH-DIFFICULTY FUNCTION FOR A SELF-PACED PERCEPTUAL-MOTOR SKILL. Proj. 7707, Task 7133, AFFTC TR 54 19, May 1954, 5pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex. (Reprinted from: J. exp. Psychol., Dec. 1953, 46(6), 435-439).

4839
To investigate the effects of a wide range of amount sets on initial performance and to determine a provisional length-difficulty function for certain psychomotor skills, 160 basic airmen were tested on a self-paced psychomotor apparatus (the Complex Coordination Test). The basic task was to match patterns of green lamps (of known absolute-difficulty) to red ones by manipulating a stick and rudder. Results are discussed in terms of difficulty of task as a function of length of task and the relation between amount set and task length.
T. G. R 11

4841
Singer, J.L. PERSONAL AND ENVIRONMENTAL DETERMINANTS OF PERCEPTION IN A SIZE CONSTANCY EXPERIMENT. J. exp. psychol., June 1952, 43(6), 420-427. (University of Pennsylvania, Philadelphia, Penn.)

Employing a simple size constancy procedure, 4 experiments were conducted to observe the interaction of personal and environmental determinants of perceptual response. The Ss made size judgments of distant squares under conditions which included changes in the distance and in meaningfulness of stimulus content, 2 types of experimental instructions, and following emotional disturbance. Experiment I presented evidence to support the hypothesis that meaningful stimulus content (a schematic "happy face") led to a significant enhancement in perceived size of a standard square compared with squares containing a nonsense figure, a circle, or blank surface. Experiment II provided results suggesting that this effect of meaningful stimulus content was operative when analytic rather than synthetic or objective perceptual attitudes are demanded of Ss. The Ss also differed markedly in susceptibility to the influence of meaningful content and in mode of compliance with instructions. Experiment III, Ss chosen as extreme thinking introverts and extroverts differed significantly in perceptual response, extroverts showing values closer to constancy. In Experiment IV, the effect of frustration was shown to be more striking when analytic rather than objective perceptual attitudes were called for.
R 17

4843
Solomon, P. & Werner, H. STUDIES ON CONTOUR: III. NEGATIVE AFTER-IMAGES. Amer. J. Psychol., 1952, 55, 67-74. (Clark University, Worcester, Mass.)

An investigation of the role of contour in the formation of negative after-images was conducted. A reversible pattern, the sector-disk, was used as the stimulus. Before testing, each S was trained in the deliberate shift of the figure-ground relationship and practiced fixation. The test procedure was to have S fixate the center mark and to organize in such a way that one (white or black) sector was perceived as rotating upon the ground and to maintain that view for 2 min. At the end S had to project the circular negative after-image upon a gray indicator-disk by fixating its center; the gray color of the ring was then varied until the inner disk and the outer ring were reported to be equal in brightness. The results were presented in terms of degrees of whiteness of the after-image as measured on the indicator-ring. For all 10 Ss the after-image was always brighter for black sector on white than for the reverse condition; the difference in group means was significant. Thus, the experiment demonstrated that the degree of brightness of a negative after-image is to a considerable extent dependent on the brightness of the area articulated as figure. It is felt that the differences are explainable in terms of the relative efficacy of figural contour.
R 5

4842
Smith, V.M. APPARENT SIZE IN STEROSCOPIC MOVIES. (Princeton University, Princeton, N.J.)

The reduction of apparent size induced by viewing movies with stereoscopic vision (through polaroid glasses) is discussed in this note. Information was obtained from students in a course in introductory psychology by means of a questionnaire asking whether they observed any size changes, if so, what they were, and finally a check-list of physical experiences they might have had during or following the movie, such as watering of the eyes, double vision, strain in and around the eyes, dizziness, etc. The majority of students did observe this intended depth-effect and also noted the size change, 3 symptoms checked with a disproportionate high frequency were experience of strain in and around eyes, difficulty keeping picture in focus, and recurring double images. The author's explanation for the size effect and the symptoms involves the factors of anomalous convergence and accommodation by which conflict in visual perception is produced. The viewing distance calls for adjustment of the accommodation convergence mechanism which is related to a much larger viewing distance.
R 4

4842
Smith, V.M. APPARENT SIZE IN STEROSCOPIC MOVIES. Amer. J. Psychol., 1953, 56, 488-491.

4844

Conzelmann, C.P., Hawkins, J.M., Johnson, O.C., Ryer, R., et. al. NUTRITION SURVEYS AT FIVE ARMY CAMPS IN VARIOUS AREAS OF THE UNITED STATES. Proj. 6-60-11-GC0, Rep. 187, Aug. 1956, 64pp. Medical Nutrition Laboratory, Fitzsimons Army Hospital, Denver, Colo.

4844

To determine the quantity and nutrient content of the foods consumed by the soldier in Army camps, under temperate climatic conditions, in the continental United States, five surveys were performed over a period of four years (1952-1956) in ten companies in five Army camps. The data were collected and analyzed both by chemical and "long" inventory methods and include determination of calorie and carbohydrate, food consumed in Army mess, food eaten between meals, total quantity of edible food, food losses and energy requirements of the soldier, based upon food consumption from all sources and the energy equivalent of the gain or loss of body weight during the survey period. A comparison of data obtained by the two methods is made. Recommendations are included. T. R 32

4847

Ross, S. DEPENDENCE OF SCOTOPIC PERCEPTION OF FORM UPON DISTANCE. *Smith. J. Psychol.*, Jan. 1946, LX, 137-143. (Camp Lejeune, N.C.).

4849

To increase the range of applicability of the standard (1945) Navy radius plaque adaptometer, six Ss were tested over a distance range from four to ten ft. The results are plotted as average percent seen as a function of distance. The practicability of using this method in field-testing procedures is discussed. T. G. R 6

4845

Wilcott, R.C. A SEARCH FOR SUBTHRESHOLD CONDITIONING AT FOUR DIFFERENT AUDITORY FREQUENCIES. *J. exp. Psychol.*, Oct. 1953; 46(4), 271-277. (Human Factors Div., USN Electronics Lab.).

An attempt was made to condition a change in skin resistance (GSR) of ten Ss using 4 separate frequencies with each at an intensity below the absolute threshold. The frequencies chosen were a 200, 2000, and 13,000 cps, and a thermal noise. The UCS was an electrical shock. The absolute threshold was specified as a range between a) the lowest intensity level that S could consistently hear, and b) the highest intensity level that S did not report hearing during five successive trials. The latter level was used as the intensity of the CS. Before each attempt at subthreshold conditioning, each S's GSR was conditioned to a sound 20-db above the subthreshold level. A control study was run which indicated that for intensity levels within 20 db above the subthreshold level the intensity of the CS is not consistently related to the magnitude of the CR. The results indicate that no subthreshold CR's were elicited for any S with any of the four frequencies used.

R 23

4846

Verner, H. & Wapner, S. EXPERIMENTS ON SENSORY-TONIC FIELD THEORY OF PERCEPTION: IV. EFFECT OF INITIAL POSITION OF A ROD ON APPARENT VERTICALITY. *J. exp. Psychol.*, Jan. 1952, 43(1), 68-74. (Clark University, Worcester, Mass.).

The influence of the position of a rod at the beginning of a trial (starting position) on the final position in which it is perceived as vertical has been systematically investigated. The main finding is that the apparent vertical is always closest to the position in which the rod was set initially for that trial. These results are viewed here as figural adaptation effects. Taking the results of this study together with those gained from previous investigations on the effect of postural tilts and extraneous stimulation on the perception of verticality, such adaptation is interpreted within the framework of a general theory which emphasizes body-object relationships. The dynamics underlying these adaptation effects are assumed to be equilibration tendencies within a field that encompasses body and object.

R 11

4847

Wilcott, R.C. & Gales, R.S. COMPARISON OF THE MASKED THRESHOLDS OF A SIMULATED MOVING AND STATIONARY AUDITORY SIGNAL. *J. exp. Psychol.*, 1954, 47(6), 451-456. (University of Southern California, Los Angeles, Calif. & USN Electronics Lab.).

The masked thresholds of a simulated moving signal produced by a linear stepwise change in interaural time delay, and with movement at two different locations in the phenomenal field, were compared with the thresholds obtained with a stationary signal. A noise band extending from 75 to 850 cps was used as the signal and was presented against an uncorrelated background noise, and masked thresholds were made under the following conditions: a) with a signal moving at a perceptually slow and fast rate; b) with a perceptually fast-moving signal making four excursions across the phenomenal field during each presentation period; c) with the signal movement controlled by 0; and d) during an extended listening period in which 0 was given no cue as to when the signal was to be presented. The results of the threshold comparisons with these different conditions indicate that the masked threshold of a moving signal is a function only of its localization at any given instant in time, and that a moving signal does not elicit a lower masked threshold than does a stationary signal.

R 2

4848

Ross, S. & Versace, J. THE CRITICAL FREQUENCY FOR TASTE. *Amer. J. Psychol.*, 1953, 66, 496-497. (University of Maryland, College Park, Md.).

A replication of an early study on fusion-frequencies for periodic electrical excitation of taste (F. Allen and H. Weinberg, The gustatory sensory reflex, *Quart. J. Exper. Physiol.*, 15, 1925, 385-420) is reported in this note. A laboratory signal generator was used to drive a double-diode clipper followed by a clamper. The output thus consisted of positive square-waves variable from 0 to 3.6 v. The electrodes were of low galvanic action dental wire spaced about 1/4 in. apart. 5 Ss were studied. None of them spontaneously reported discrete sensations of taste for frequencies varying from 20 to 2000 cps and none was able to report the appearance of such sensations, even though set by instructions to attend to them. Little or no sensation was elicited at 1 v. and below. Varying complex sensations of cold, sour, and bitter were produced at higher voltages; with excitations exceeding 3 v., pronounced tactual-kinesthetic vibratory sensations were evoked. Fusion occurred between 500 and 1700 cps, and seemed to be related to pressure of electrodes against the tongue and area stimulated. These findings do not confirm the earlier study's data. (HEIAS)

R 4

4850

Ross, S. & Fletcher, J.L. RESPONSE TIME AS AN INDICATOR OF COLOR DEFICIENCY. *J. appl. Psychol.*, 1953, 37(3), 211-213. (University of Maryland, College Park, Md.).

Response time measures to 15 selected plates of the AG pseudo-isochromatic test for color perception were secured for 136 college students (28 females; 108 males). Of this group, 110 were classified as normal, 26 as defective, on the basis of their error scores. Each subject was given 2 successive tests: criterion and test trials. Mean plate response times between the normal (0.56 sec.) and the defective (1.93 sec.) groups were found to differ significantly. Practice effects were noted within the normal group. It was concluded that response time measures could be used in the separation of color normal from color defective individuals.

R 7

4851

Ross, S., Hussman, T.A. & Andrews, T.G. EFFECTS OF FATIGUE AND ANXIETY ON CERTAIN PSYCHOMOTOR AND VISUAL FUNCTIONS. *J. appl. Psychol.*, 1954, 38(2), 119-125. (University of Maryland, College Park, Md.).

The primary purpose of the experiment was to determine whether or not performance on each of the 5 dependent variables changed significantly as a result of intensive muscular exercise (fatigue) or the fear of bodily injury (anxiety) or the interaction of these conditions in the collegiate competitive boxing situation. 24 boxers were measured under the following 4 conditions: at rest; after heavy exercise; before fighting; and after fighting. The tests were administered 3 times to each subject under each of the experimental conditions. Hand steadiness scores decreased significantly with fatigue, but not with the anxiety conditions. Fatigue and anxiety significantly increased body sway scores. Body sway time scores were found to be unreliable, although the fatigue conditions significantly increased these scores. Tapping was found to be unreliable, possibly due to a learning factor. Significant changes were found, however, in the test scores as a result of both fatigue and anxiety. Critical flicker frequency thresholds were shown to decrease significantly as a result of anxiety. No relationship was found between the dependent variables used and the number of head blows received by the Ss during a boxing bout. Measures of steadiness more than the other variable tested satisfy the criteria for indicators of behavior decrement.

R 18

4852

Schutz, H.G., & Pilgrim, P.J. THE SWEETNESS OF VARIOUS COMPOUNDS AND ITS MEASUREMENT. Proj. 7-24-15-007, Subtask 07-30, Interim Rep. 1, Oct. 1956; 8pp. Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.

4855

Hecht, S., Ross, S., & Mueller, C.G. THE VISIBILITY OF LINES AND SQUARES AT HIGH BRIGHTNESS. *J. opt. soc. Amer.*, 1947, 37, 500-507. (Laboratory of Biophysics, Columbia University, New York City)

4852

To develop a simple psychophysical method for measuring the relative intensities of rapid substances and to determine the relative sweetness of various compounds at different subjective intensities, the single stimulus method with a nine-category rating scale of subjective intensity (from no intensity to extreme intensity) was used. Sixteen compounds of five logarithmically spaced concentrations were rated for sweetness by ten subjects. Mean intensity ratings based on 20 judgments for each concentration were obtained, and a least squares curve fitted by method of orthogonal polynomials. The relation between concentration and subjective intensity for the various compounds is presented graphically. These results are compared to findings from similar studies that used more complex methods. T. G. R 9

4855

To determine the visibility of lines and squares at high brightness, field experiments were conducted in which the visibility of targets was studied at the limits of their resolution as viewed in silhouette against the open sky. One test object was a long wire, the other was a square. Measurements are given of the frequency with which the presence of a target was correctly recognized in relation to the visual angle it subtended as well as the influence of sunglasses on this visibility.

4853

Ross, S., Ray, W. & Valle, L.D. POINTER LOCATION AND ACCURACY OF DIAL READING. *J. appl. Psychol.*, 1953, 37(2), 131-135. (University of Maryland, College Park, Md.).

The purpose of this experiment was the determination of the relationship between accuracy of dial reading and the sector and specific location of the dial pointer. The 3 dials used were a semicircular upright dial, a semicircular inverted dial, and a circular dial. 10 subjects made a total of 4,100 judgments at 5 exposure times on the 3 dials. Tests of significance for error scores were made and permitted the following conclusions: a) differences in dial shape were not an important source of error; b) differences in sector location of the dial pointer were not an important source of error; c) significant differences in error score were found for readings made at 9, 12, 3 and 6 o'clock positions corresponding to pointer settings at 0, 5, 10 and 20 when compared with intermediate points; d) no significant differences in error scores were found when upper and lower dial halves were compared. These findings suggest that critical regions of a scale should be assigned to the 9, 12, 3 or 6 o'clock positions of a circular dial, and that factors other than errors may be considered in the choice of a dial from among the 3 types studied here.

R 12

4854

Lybrand, W.A., Andrews, T.G. & Ross, S. SYSTEMATIC FATIGUE AND PERCEPTUAL ORGANIZATION. *Amer. J. Psychol.*, 1954, 67, 704-707. (University of Maryland, College Park, Md.).

To investigate the hypothesis that perceptual organization is affected adversely by systematic fatigue, 48 Ss in groups of 12 were studied. Performance on three perceptual tasks (Kohs Block Designs, Perception of Hidden Figures, and the Müller-Lyer Illusion) was measured under the presence and absence of 2 independent variables, sleep deprivation (one night's sleep loss) and physical exercise (5-mile march with 40 lb pack at rate of 120 steps per minute). Mean performance scores (adjustments were made for individual differences in basic abilities) were computed and analyzed for all combinations of conditions and tasks and their interactions. The results show that performance on the Kohs Block Designs (time-scores) was more efficient after exercise but less after sleep deprivation; on the Hidden Figures task performance was not affected by exercise but was less efficient after sleep deprivation; while performance on the Müller-Lyer Illusion was unaffected by either. It is suggested that the findings do indicate perceptual organization is a behavioral category sensitive to variations in conditions assumed to induce systematic fatigue and should be further investigated. (HEIAS)

R 6

4856

Warner, H., Kopner, S., & Chandler, K.A. EXPERIMENTS ON SENSORY-TONIC FIELD THEORY OF PERCEPTION: II. EFFECT OF SUPPORTED AND UNSUPPORTED TILT OF THE BODY ON THE VISUAL PERCEPTION OF VERTICALITY. *J. exp. Psychol.*, 1951, 42, 346-350. (Clark University, Worcester, Mass.).

The present study was designed to investigate the effect of postural changes upon the visual perception of verticality. Apparent verticality was studied while S's body was tilted at specified angles. Observations were made under 2 main conditions: a) supported--S was supported by the sides and back of a chair; and b) unsupported--S had to maintain the angle of tilt by his own muscular efforts while sitting on a stool. 40 Ss, 20 men and 20 women, were tested. The task for S consisted in the adjustment of a luminescent rod to a position of apparent verticality. The main results are: a) the apparent vertical was shifted to the side opposite the direction of body tilt; b) with increase of body tilt from 15° to 33° there was a significantly greater shift of the apparent vertical; and c) under identical angles of body tilt, the apparent vertical was displaced to a greater degree when the body was unsupported than when the body was supported. These results are in accordance with specific hypotheses derived from the sensory-tonic field theory of perception.

R 5

4857

Doty, L., Hanley, T.D. & Steer, H.D. A STUDY OF TYPE AND FREQUENCY OF COMMUNICATION MESSAGES ABOARD NAVAL VESSELS. Contract N60RI 104, Proj. 20 F 8, SDC TR 104.2 42, April 1955, 34pp. USN Special Devices Cent Port Washington, N.Y. (Purdue University, Lafayette, Ind.).

4857

In order to determine the efficiency of voice communications systems aboard Naval vessels, recordings were made of messages transmitted during actual Naval operations. The messages were analyzed in terms of the frequency of occurrence of various types of messages and the relative contribution of information of each message. The results are discussed in terms of the implications for increasing the effectiveness of voice communications and voice communications training.

4859

Miller, R.B. PSYCHOLOGICAL CONSIDERATIONS IN THE DESIGN OF TRAINING EQUIPMENT. Contract AF 33(616) 2080, Proj. 7197, WADC TR 54 563, Dec. 1954, 138pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (American Institute for Research, Pittsburgh, Penn.).

4859

This report presents concepts in learning and transfer of training, as well as considerations and recommendations for the design and use of training simulators, demonstration charts, mock-ups, and synthetic training devices. The following topics are discussed: concepts in learning and transfer of training; problems of physical simulation; stage of learning and degree of physical simulation; knowledge of results and scoring; recording procedures; proficiency measurement; design of the instructor's station; the trainer as demonstrator or principles; steps in designing a training device.

F, R.

4860

Dunlap and Associates, Inc. VISUAL STAR TRACKING THROUGH A PERISCOPE. Contract NORD 17719, Memo Rep. 9, July 1957, 11pp. Dunlap and Associates, Inc., Stamford, Conn.

4860

The problem examined in this memorandum is the determination of those values of physical parameters in a periscope system in vibratory motion which will permit and facilitate the detection, acquisition, and tracking of a star by a human observer. The various sections deal with 1) the basic ability of the human observer to detect a point source of light against a background, 2) the facilitation of this ability by addition of magnification, 3) the relation degradation of performance when relative vibratory motion is introduced between observer and star, 4) special problems such as field of view, optical quality, etc., and 5) periscope parameter values for facilitating performance.

G.I.

4861

Scher, S.H. PILOT'S LOSS OF ORIENTATION IN INVERTED SPINS. Tech. Note 3531, Oct. 1955, 10pp National Advisory Committee for Aeronautics. (Langley Aeronautical Lab., Langley AFB, Va.).

The rising problem of pilot orientation during spins, especially during unintentional inverted spins, is discussed. The free-spinning-tunnel results and reported airplane experiences concerning inverted spins and recoveries are reviewed. Information is provided regarding the nature of inverted spins, optimum control technique for recovery, and some of the factors which apparently contribute to the pilot's loss of orientation. A spin-simulator rig which was recently constructed at the Langley Laboratory for use in an attempt to understand better the problems confronting the pilot of a spinning airplane is described.

R 3

Teichner, W.H. & Zigler, H.J. A METHOD OF STUDYING THE TACTUAL-KINESTHETIC SENSITIVITY OF THE HAND. Environmental Protection Div. Rep. 224, Nov. 1953, 11pp. USA Quartermaster Research and Development Center, Natick, Mass.

A method for determining the tactual-kinesesthetic sensitivity of the hand was developed and evaluated. The apparatus consisted of 11 brass discs which the subjects discriminated by hand in terms of difference in size. Both frequency of the judgment, larger-smaller, and latency of the judgment were obtained with the method of paired-comparisons. Since the differences between discs were all suprathreshold, the former measure did not yield a sufficient number of errors to be useful for the construction of a psychophysical scale. The latency measure, however, yielded meaningful results showing that the method being investigated might be useful for making inferences regarding the effects of temperature and handwear on the complex tactual-kinesesthetic sensitivity of the hand.

R 4

4863

Navy Electronic Laboratory. SELECTIVE SPECTRUM LIGHTING FOR CIC AREAS. PD 06401, NE 121303 3 (NEL 382c), Rep. 337, Nov. 1952, 7pp. USN Electronics Lab., San Diego, Calif.

Two SSL systems have been examined and found practicable for CIC operations. Without disturbing CRT visibility, ambient light level in a CIC or similar area may be maintained with SSL at approximately 2 foot-candles--enough to permit reading, writing, moving about, and respiring equipment more efficiently. There is no appreciable loss in the detectability of threshold targets on the CRT at this level of illumination. Contrast ratios of the CRT presentation under SSL are greater than those obtained under actual lighting practices of present CIC's. The sodium-yellow system may be installed immediately in CIC's with only superficial changes in equipment.

4870

Moble, C.E. AN ESTIMATION OF THE ABSOLUTE DIFFICULTIES OF COMPONENT TASKS IN THE COMPLEX COORDINATION TEST (CH701E). Proj. 509 020 0093, Res. Note P & M: 52 8: Sept. 1952, 15pp. Air Training Command, USAF Human Resources Research Center, Lackland AFB, Tex.

The object of the present Research Note was an evaluation of the absolute difficulties of representative task components in Complex Coordination performance. By statistically counterbalancing the effects of order and by attenuating the effects of sequence of presentation on difficulty (reaction latency per match), a set of 39 all-or-none-elevator-rudder patterns of known difficulty was developed. The values estimated for this pattern set constitute a first approximation to a scale of absolute difficulty. In agreement with a previous experiment, relative pattern difficulties were positively skewed and multimodal. Coefficients of test-retest ($r=0.92$) and inter-group reliability ($r=0.99$) using median latencies were similar: $r=0.92$, and $r=0.97$, respectively. A directional comparison of the relative difficulties in the 2 studies indicated that the effects of sequence are highly significant ($p<0.001$). Estimated absolute difficulty, based on means of medians for 0th and 18th degree derived lists had a test-retest reliability after 10 minutes of 0.92 ($M=156$). An analysis of the range of absolute difficulty represented in these experiments indicated that the estimated scale values are significantly different among themselves ($p<0.001$). These studies have suggested that a more refined scale of absolute difficulty might be obtained by distributed presentation of the pattern set.

R 5

4872

Perryman, D.R. & Girardot, M.F. ADVANCED TASTE TEST METHOD. Food Engng., July 1952, 58-61. (Quartermaster Food & Container Institute, Chicago, Ill.).

A technique offering progress in evaluating consumer preference of foods and called the "hedonic-scale method" is described and discussed. The method uses a variant of the rating scale, introducing the hedonic value concept, which refers to the psychological range of "unpleasant" (dislike) at the lower end to "pleasant" (like) at the upper end. The problem of quality control is completely divorced from this technique. Information concerning the questionnaire form, administration, selection of test people, checking the data, and interpreting the scores is presented. Certain purposes for which the hedonic scale method is considered appropriate are listed along with cautions as to its use. (HEIAS)

R 4

4873

Perryman, D.R., Josephson, D.V., Renaley, R.J. & Revold, H.L. NEW FLAVOR EVALUATION METHOD. Food Engng., Aug. 1951, 83-86 & 167.

A new method for evaluating the quality of dried milk, bidding fair to predict the consumer's reaction more accurately than conventional taste panels, was developed at Quartermaster Food & Container Institute for the Armed Forces, Chicago. An index of quality called "Flavor Number" (FN) is set up and defined as "percent of reconstituted milk in a mixture of that material with a fresh whole milk standard such that the difference in taste between it and the standard lies just above the threshold". A duo-trio test with a total of 20 judgments from 5 to 10 trained Ss is used to determine the threshold. An initial test of this method was made showing correlations of $+0.96$ between 2 FN determinations, of $+0.99$ between FN's and consumer preference ratings by 40 untrained Ss, and of $+0.82$ between FN's and ratings of a trained 17-member panel. The potential application of this method to flavor problems of other foods is discussed. (HEIAS)

R 4

4867

Wood, K.R. & Perryman, D.R. PRELIMINARY ANALYSIS OF FIVE ARMY FOOD PREFERENCE SURVEYS. Food Technol., 1953, 2(6), 248-253. (Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.).

Soldiers' relative preferences for more than 300 Army recipes were established through 5 surveys conducted by the QM Corps during a 2-year period. Preliminary analyses are reported showing levels of preference for various food classes and reproducibility of results.

R 8

4869

Niven, J.L., Johnson, W., Rand, G.W. & Pettit, W.A. EVALUATION OF A MODIFIED VERHOEFF STEREOPTER. Proj. W4 001 057-09-01, Aug. 1952, 10pp. USA School of Aviation Medicine, Pensacola Air Station, Fla.

The Verhoeff Test of Depth Perception was administered on each of 2 occasions to 100 patients and volunteers at the Eye Clinic of the U.S. Naval School of Aviation Medicine. On each occasion 2 forms of the test were used: the standard instrument held in the hand of the tester, and a modified apparatus mounted in a rigid framework. Test-retest reliability of the standard form was 0.75 and of the modified form 0.86. Neither form showed a marked superiority over the other.

R 2

4871

Moble, C.E. A PRELIMINARY ANALYSIS OF THE RELATIVE DIFFICULTIES OF COMPONENT TASKS IN THE COMPLEX COORDINATION TEST (CH701E). Proj. 509 020 0093, Res. Note P&M: 52 8, April 1952, 11pp. USAF Human Resources Research Center, Lackland AFB, Tex.

4871

In an investigation of the relative difficulties of the component tasks in the Complex Coordination Test, 78 Ss were presented with a series of 39 task patterns which they had to perform twice (with a ten-minute rest interval). The results were presented and discussed in terms of the relative difficulty of the 39-item pattern, comparison between initial and final performance and so forth.

4874

Peryam, D.R. & Shapiro, Ruth. PERCEPTION, PREFERENCE, JUDGEMENT-CLUES TO FOOD QUALITY. Indus. Quality Control, 1955, 11, 1-5. (Quartermaster Food & Container Institute, Chicago, Ill.).

3 objectives guided the development of this paper. First, to gain acceptance of the idea that effective flavor quality control requires use of human observers; second, to show how the human response can give reliable information about flavor variables through use of the proper test methods; third, to make these points more convincing by demonstrating the use of adequate methods in flavor control. It is our belief that, through intelligent selection and application of such techniques, food processors will be able to reap the benefits of using statistical methods to control flavor quality and consumer acceptance of their products

R 4

4876

Pilgrim, P.J., & Wood, K.R. COMPARATIVE SENSITIVITY OF RATING SCALE AND PAIRED COMPARISON METHODS FOR MEASURING CONSUMER PREFERENCE. Food Technology, 1955, 9, 385-387. (Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.).

4876

To compare the relative sensitivity of scale rating and paired preference methods in determining differences in food preferences, twelve pairs of foods were tested with half the subjects using one method and the other half the other method. Subjects were untrained. In the rating scale method, food samples were presented successively or with one intervening sample at the same test session to approximate the limiting conditions of the paired comparison method. The preference data were analyzed for differences in sensitivity.

T. R 12

4877

Broadbent, D.E. SUCCESSIVE RESPONSES TO SIMULTANEOUS STIMULI. FRNC 934, RNP 55/837, OES 260, April 1955, 22pp. Operational Efficiency Sub-Committee, RNPFC, London, England. (Applied Psychology Research Unit, MRC, Cambridge, England).

4877

In an investigation of successive response to simultaneous stimuli, a total of 92 subjects were presented with a list of digits to be reproduced immediately after exposure under the following experimental conditions: (1) simultaneous presentation to eye and ear; (2) the effects of varying the sensory cues available for differentiating two channels of incoming information; (3) the degree to which preliminary set is essential for successive reaction to simultaneous stimuli; and (4) simultaneous stimulation in an immediate memory experimental design. The results are discussed in terms of the implications of these variables for message communication and comprehension.

4878

Prentice, W.C.H. NEW OBSERVATIONS OF 'BINOCULAR YELLOW'. J. exp. Psychol., June 1948, 38 (3), 284-288. (Johns Hopkins University, Baltimore, Md.).

6 Ss were tested under Hecht's conditions for the appearance of binocular yellow. Filters with "tighter" transmission curves for "red" and "green" were used. Also the effects of the brightness of the fixated area and the duration of the observation were varied. The improved selectivity of the filters did not prevent the appearance of "binocular yellow". Although all Ss reported that the brighter lights gave a "better" yellow, there was no mistaking the presence of yellow even with the lowest illumination used. Although long observations (30 sec. and up) produced reports that the fixation point "gets yellower", very short exposures (1 or 2 sec.) also gave rise to the perception of a clearly recognizable yellow. Further, there was no appreciable evidence that the perceived "binocular yellow" is a poor match in saturation for a fair spectral yellow. (HEIAS)

R 3

4879 Prentice, W.C.H. & Beardslee, D.C. VISUAL 'NORMALIZATION' NEAR THE VERTICAL AND HORIZONTAL. J. exp. Psychol., June 1950, 40(3), 355-364. (Swarthmore College, Swarthmore, Penn.)

Having questioned the generality of Kohler and Wallach's explanation of Gibson's tilted line phenomena, we performed a series of experiments to test whether the straightening or normalizing of slightly tilted lines near the vertical and horizontal might occur independently of conditions favorable to the figural after-effect. We have been able to show that lines tilted 10 degrees away from the vertical or horizontal show a normalization of about 2 degrees under our conditions. We have shown that this effect is independent of the simultaneous or previous presence of contours that might produce the typical figural after-effect. We have shown that this phenomenon is separate from the disorientation phenomena of Wertheimer and Asch and Witkin inasmuch as it is localized in the visual field and develops only after fairly long periods of fixation. We have shown that it cannot be accounted for in terms of inhomogeneities of the primary visual projection areas, either anatomical or physiological, since the effect appears in full or nearly full strength when the head is tilted to parallel the lines which then fall on the vertical meridian of the retina. A brief theoretical discussion has suggested the necessity for extending the theory of figural after-effects to account for these findings.

R 4

4881

Walk, R.D. EFFECT OF DISCRIMINATION REVERSAL ON HUMAN DISCRIMINATION LEARNING. J. exp. Psychol., 1952, 44, 410-419.

4881

In a test of the continuity hypothesis of discrimination learning, 90 college students served as Ss. The experimental groups were given partial training on a concept-formation task and were then required to form either a reversed or an identical discrimination on a second task. The control groups were given no preliminary training. The data presented include learning curves for the reversed, nonreversed, and control groups during the preliminary and final learning tasks.

T. G. I. R 18

4890

Weitz, J. A FURTHER STUDY OF THE RELATION BETWEEN SKIN TEMPERATURE AND CUTANEOUS SENSITIVITY. *J. exp. Psychol.*, May 1942, 30(5), 426-431. (Psychological Lab., Sophie Newcomb College, New Orleans, La.).

Using 6 Ss, the pain threshold (for electric-shock) was measured at different skin temperatures. The changing of skin temperatures was accomplished by means of a radiant heater. It was found that with increasing skin temperature, pain thresholds drop to a minimum, at which point, with further heating, they rise. This function uniting pain and temperature is similar to the function linking temperature and pressure and temperature and vibration. A chemical theory is suggested to explain these results. (HEIAS)

R4

4892

Noble, C.E. THE MEANING-FAMILIARITY RELATIONSHIP. Res. Bull. 53 15, June 1953, 10pp. USAF Personnel & Motor Skills Lab., Lackland AFB, Tex. (Reprinted from: *Psychol. Rev.*, March 1953, 60(2), 89-98).

4892

In an investigation of the relation between meaning and familiarity in verbal stimuli, 200 airmen rated 96 dissyllabic words for frequency of use. An index of familiarity was computed for each stimulus word; familiarity was then plotted as a function of meaning, derived from a previous experiment, for each word. Implications of the author's conclusion for research in verbal and motor learning are discussed. T. G. R 19

4897

Quartermaster Food and Container Institute. FOOD ACCEPTANCE TESTING METHODOLOGY - A SYMPOSIUM, 8-9 OCTOBER 1953. Committee on Foods, Advisory Board on Quartermaster Research and Development, National Academy of Sciences, National Research Council, Washington, D.C.

4897

This report presents the proceedings of a symposium on food acceptance testing methodology. One section is devoted to panel techniques (variables affecting difference tests, dilution method for stability testing, descriptive analysis of flavor, practical applications to food evaluation problems, ranking versus scoring in palatability tests, selection and training of panels) and a second section deals with consumer preference techniques (military importance of acceptance problems, food preferences and menu planning, field testing of Armed Forces rations, effect of bias on difference-preference test, effect of continued testing on preference ratings, and some new psychophysical methods). T. G.

4893

Phillip, B.R. EFFECT OF LENGTH OF SERIES UPON GENERALIZATION AND CENTRAL TENDENCY IN THE DISCRIMINATION OF A SERIES OF STIMULI. *Canad. J. Psychol.*, 1952, 6(4), 173-178. (University of Western Ontario, Ontario, Canada).

The effects of generalization and central tendency were studied in a graded series (6, 7, 9, and 11 stimuli respectively). The task in each series consisted of making an absolute judgment of the predominating color on 11 cards, on each of which were 36 dots of blue and green, randomly distributed. The maximum number of blue dots on any card was 23 so that the number of green dots was 13 on that card; the next card had 22 and 14, and so on. As each card was exposed, S had to determine the relative amount of a previously designated color and locate on a scale (from 1 to 11 for the 11-card series) the point which, in his opinion, represented the relative amount of the designated color. Generalization gradients were determined for 4 Ss. In general, the judgments of the shorter series tended to be distributed closer to the correct position than those of the longer series. There was some tendency to skewness in all series. Regardless of length, the generalization gradients were roughly of the same form. When the median responses for each scale position were computed, measures of the subjective values of the stimuli were obtained. In the shorter series the median values tended to be compressed towards one focus (2.5 value on the objective scale), while the longer series seemed to have 2 foci (around 4 and 8). (HEIAS)

R 4

4895

Pilgrim, F.J., Schutz, H.G. & Peryam, D.R. INFLUENCE OF MONOSODIUM GLUTAMATE ON TASTE PERCEPTION. *Food Research*, 1955, 20(4), 310-314. (Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.).

3 types of experiments were designed to test the hypothesis that monosodium glutamate (MSG) affects flavor perception by altering gustatory acuity. Absolute and differential thresholds were measured with and without a prior mouth rinse with MSG. The effect of the presence of MSG in solutions of the basic tastes on subjective intensity was determined. MSG raised the absolute thresholds for sweet and sour; it did not significantly alter the differential thresholds for salt and bitter. It increased the subjective intensities of salt and bitter, but had no effect on sour and sweet tastes. No consistent pattern of the effect of MSG emerged. The results do not support the hypothesis that MSG acts as a general intensifier of flavor and suggest no other hypothesis, except the general one that MSG is simply another seasoning that may contribute a flavor of its own to a complex food flavor.

R 10

4896

Rethingshafer, Dorothy. MEASUREMENT OF A MOTOR SET. *J. exp. Psychol.*, Jan. 1943, 32(1), 75-81. (University of North Carolina, Chapel Hill, N.C.).

Intervening rates, slower or faster than the natural tapping rate, were forced on subjects who were then asked to return to a rate natural to them. 4 conditions were investigated:

a) Effect on the natural tapping rate when subjects were asked to tap at one-half their natural rate. b) Effect on the natural tapping rate when the intervening rate is the same for all subjects, being one-half the average of the preceding group. c) Effect on the natural tapping rate when the intervening rate is the same for all subjects, but in this case only one tap per second. d) Effect when all the subjects were forced to go faster than their own rate. The results were as follows: The natural rate, though a highly reliable performance, was in all cases changed in the direction of the forced rhythm. The differences between the means of the original natural rate and the return rate were significant except in Condition d). In no condition do the subjects as a group reproduce the forced rhythm, which shows the consistent effect of the natural rhythm. When the return rate is predicted from the original natural rate, the slope of the regression line varies according to the intervening rate. Significant critical ratios of differences are found between the slopes, using only Condition a) as a standard for comparison. Effect of the forced rhythms shows marked individual differences.

R 4

4899

Paterson, D.G. & Tinker, M.A. INFLUENCE OF SIZE OF TYPE ON EYE MOVEMENTS. *J. appl. Psychol.*, 1942, 26, 227-230. (University of Minnesota, Minneapolis, Minn.).

4899

To study eye-movements in reading as affected by size of type, two groups of 20 subjects each read ten paragraphs from the Chapman-Cook Speed of Reading Test, Form A, set in ten-point type, and Form B, set in either six-point or fourteen-point type. Photographic records of eye-movements were compared for the three type sizes and interpreted with respect to causes for varying reading speeds.

T. R 2

4902

Paterson, D.G. & Tinker, M.A. EYE MOVEMENTS IN READING OPTIMAL AND NON-OPTIMAL TYPOGRAPHY. *J. exp. Psychol.*, Feb. 1944, 34(1), 83-83. (University of Minnesota, Minneapolis, Minn.).

4902

To compare eye-movement patterns employed in reading optimal and nonoptimal materials, 20 Ss read ten paragraphs of Chapman-Cook Reading Test, Form A in ten-point type, two-point leading, 19 pica line width, black print on white eggshell paper (optimal arrangement), and Form B in six-point set solid, 34 pica line width, white print with black background on enamel paper. Photographic records were scored for number of fixations, number of words per minute, duration of pauses, perception time and number of regressions. These data were analyzed for differences due to the two patterns.

T. R 6

4905

Coakley, J.D., Abbott, W.C. & Bishop, E.W. HUMAN ENGINEERING REVIEW OF REQUIREMENTS FOR THE RADIO SET AN/GRC-53 () ANTENNA AND MAST PART II: THE MAST ASSEMBLY. Contract DA 36 039 SC 64647, DA Proj. 3 99 01 022 & SC Proj. 2004A, Sept. 1957, 21pp. *Dynalco and Associates, Inc.*, Stamford, Conn.

4905

This study reviews the requirements for an antenna mast to be used with Radio Set AN/GRC-53 from a human engineering viewpoint and makes recommendations for design that will facilitate operator use of the mast. The study specifically reduces the time and manpower required to assemble the radio set in field operations.

T.

4906

Pfaffmann, C., Young, P.T., Dethier, V.G., Richter, C.P., & Stellar, E. THE PREPARATION OF SOLUTIONS FOR RESEARCH IN CHEMO-RECEPTION AND FOOD ACCEPTANCE. *J. comp. physiol. Psychol.*, 1954, 47, 93-96. Proj. NR 140721 and NR 140909, *ONR*, Brown University and Johns Hopkins University.

4906

This paper discusses the need for uniformity and precision in the preparation and specifications of solutions in research in chemoreception and food acceptance. The advantages of the use of molar units are discussed. Three methods for specifying solutions by percentage concentration are discussed and illustrated to show their respective advantages and disadvantages. Specific recommendations are included.

R 2

4908
Wagner, S., Werner, H., Bruell, J.H. & Goldstein, A.G. EXPERIMENTS ON SENSOR-TONIC FIELD THEORY OF PERCEPTION: VII. EFFECT OF ASYMMETRICAL EXTENT AND STARTING POSITIONS OF FIGURES ON THE VISUAL APPARENT MEDIAN PLANE. *J. exp. Psychol.*, Oct. 1953, 46(4), 300-307. (Clark University, Worcester, Mass.).

3 experiments were carried out concerned with the shifts of the position of the apparent median plane, defined as the straight-ahead. It was found that a test figure extending asymmetrically to the left of fixation produces a shift of the apparent median plane relative to the left compared with a test figure extending asymmetrically to the right of fixation. The effect of asymmetrical figure extent has been found to be significant irrespective of the degree of flux emanating from the figure surface. Furthermore, there was evidence for starting position effects, analogous to those previously found in studies on verticality, i.e., other things being equal, the position of the straight-ahead (apparent median plane) is relatively closest to the position in which a line is placed in the visual field; if a line is initially placed to the left of the objective median plane, the straight-ahead is shifted more toward the left, more toward the center, more toward the right.

R 6

4909
Wagner, S., Werner, H., & Morant, R.B. EXPERIMENTS ON SENSOR-TONIC FIELD THEORY OF PERCEPTION: III. EFFECT OF BODY ROTATION ON THE VISUAL PERCEPTION OF VERTICALITY. *J. exp. Psychol.*, Nov. 1951, 42(5), 351-357. (Clark University, Worcester, Mass.).

The present study was designed to investigate the effect of labyrinthian stimulation induced by rotation of the body around its vertical axis (concentric) on the visual perception of verticality. 28 Ss, 14 men and 14 women, were used. The task for S consisted in the adjustment of a luminous rod to apparent verticality under 5 test conditions: control--absence of rotation; clockwise and counterclockwise acceleration; deceleration from constant clockwise and counterclockwise rotation. It was found that visual perception of verticality is significantly affected by accelerative and decelerative rotation around S's vertical axis. The apparent vertical under clockwise acceleration is tilted in a counterclockwise direction, and under counterclockwise acceleration is tilted in a clockwise direction. Deceleration from rotation in one direction affects the apparent vertical like acceleration in the opposite direction. These results are interpreted within the framework of the sensory-tonic field theory of perception.

R 14

4910

Wapner, S., Werner, H. & Chandler, K.A. EXPERIMENTS ON SENSORY-TONIC FIELD THEORY OF PERCEPTION: I. EFFECT OF EXTRANEUS STIMULATION ON THE VISUAL PERCEPTION OF VERTICALITY. *J. exp. Psychol.*, Nov. 1951, 42(5), 341-345. (Clark University, Worcester, Mass.).

The present study was designed to investigate the effect of 2 kinds of stimulation from diverse sources--electrical stimulation to the neck muscle, and auditory stimulation--on the visual perception of verticality. 40 Ss, 20 men and 20 women, were used. The task for S consisted in the adjustment of a luminescent rod to a position of apparent verticality. It was found that asymmetrical stimulation affected the position of the apparent vertical significantly. Under stimulation to one side of the body the position of apparent vertical was shifted relatively to the side opposite the stimulation. Electrical stimulation to the neck muscle and auditory stimulation affected perception of the vertical in an equivalent manner. R 2

4911

Wapner, S., & Werner, H. EXPERIMENTS ON SENSORY-TONIC FIELD THEORY OF PERCEPTION: V. EFFECT OF BODY STATUS ON THE KINESTHETIC PERCEPTION OF VERTICALITY. *J. exp. Psychol.*, Aug. 1952, 44(2), 126-131. (Clark University, Worcester, Mass.).

The present experiment was carried out to study the effect of head tilt, body tilt, and concentric body rotation on the kinesthetic perception of verticality. The S, while blindfolded, had the task of adjusting a rod pivoted at the lower end, to the vertical by moving the fingers of both hands along the rod. The results are essentially identical with those previously reported for visual perception of the vertical. That is, the position of the rod that appeared vertical was objectively tilted to the left when: a) the head was tilted right; b) the body was tilted right; c) the body was accelerated around the vertical axis in the clockwise direction; d) the body was decelerated from constant counterclockwise rotation. For the opposite test conditions the respective displacements were in a direction opposite to those mentioned above. The significance of this study consists in the demonstration that the effects of extraneous stimulation and body tilt previously described for visual perception of verticality can be generalized to include kinesthetic perception of verticality. The results, thus, broaden the interpretations given within the sensory-tonic field theory of perception. R 6

4913

Small, A.M., Jr. & Thurlow, W.R. LOUDNESS-RELATIONS IN TWO-COMPONENT TONES. *J. acoust. Soc. Amer.*, May 1954, 26(3), 381-388. (University of Wisconsin, Madison, Wisc.).

A two-component tone was presented under a number of frequency and intensity conditions. The loudness of each component and the total loudness of the combination were traced as the intensity of the higher frequency and were brought from masked threshold to well above masked threshold. Loudnesses were determined by equating the tone or tones under consideration to a comparison tone. When the higher frequency of the pair was at or below 1000 cps, it showed a loudness loss, relative to its loudness when presented alone, at medium intensities above its masked threshold; but as its intensity was increased, it tended to regain its normal loudness. When the higher frequency of a pair was above 1000 cps, it exhibited a greater than normal loudness at medium intensities above its masked threshold which again approached normal with increased intensity. The lower frequency of a pair seemed to be little affected by increases in the intensity of the higher frequency within the limits of intensity used. Total loudness tended to be the algebraic sum of the components' loudnesses. The results indicate that the effect of a tone upon the loudness of another is not so simple a phenomenon as a tone's effect upon the threshold of another. R 14

4914

Seward, J.P. AN EXPERIMENTAL COMPARISON OF CODE-LEARNING METHODS. *J. exp. Psychol.*, Aug. 1943, 32(2), 115-129. (Connecticut College, New London, Conn.).

4914

This is a report of a series of experiments comparing methods of conducting the initial stages of learning to receive blinker Morse Code. The three methods tested were 1) studying printed lists of dot-dash equivalents prior to testing, 2) a prompting method of presenting blinker signals with immediate knowledge of results, and 3) a method combining dot-dash study with prompting. Results were analyzed in terms of mean number of correct responses, by means of analysis of variance, and comparison at different stages of practice. T. G. R 12

4917

Young, Marguerite L. PSYCHOLOGICAL STUDIES OF TRACKING BEHAVIOR. PART III. THE CHARACTERISTICS OF QUICK MANUAL CORRECTIVE MOVEMENTS MADE IN RESPONSE TO STEP-FUNCTION VELOCITY INPUTS. NRL Rep. 3850, Aug. 1951, 6pp. *USN Research Lab.*, Washington, D.C.

An investigation has been conducted of the characteristics of quick manual corrective responses made to a visual target moving at a preset constant velocity. Visual errors of 2, 4, 8, and 16 degrees per second to the right and left were presented to 10 subjects in a predetermined irregular order. These errors were corrected through the movement of a joystick. The amplitude, rate, and acceleration (or force) of the response movements increased systematically as the velocity of the target increased. This resulted in all response motions being made in approximately the same amount of time regardless of the distance moved. The major difference between the findings of the present study and of previous investigations of responses to target displacements was the decrease in reaction time with increases in presented stimulus velocity. This result is believed due to the particular motivational and perceptual aspects of the present experimental situation. Although the response situation in the present study appears to be more complex than that in which step-function position errors are studied, due to the continued movement of the target during the reaction and response time, the response movements appear to be executed in a similar manner in both cases. That is, the response is released as a unit at the end of the reaction time and once started runs its course to completion unmodified by visual information arising during the course of the movement.

4915

Werner, N., Wagner, S. & Bruell, J.P. EXPERIMENTS ON SENSORY-TONIC FIELD THEORY OF PERCEPTION: VI. EFFECT OF POSITION OF HEAD, EYES, AND OF OBJECT ON POSITION OF THE APPARENT MEDIAN PLANE. *J. exp. Psychol.*, Oct. 1953, 46(4), 293-295. (Clark University, Worcester, Mass.).

2 experiments were carried out to investigate a) the effect of asymmetrically placed fixated objects and b) the effect of head torsion and of eye turning, on the position of the apparent median plane. The methodology of relating to a place in space that appeared straight ahead (apparent median plane) was used in both experiments. It was found that the position of the apparent median plane shifted in the direction of the fixated object, i.e., in the direction of eye turning; in contrast, with eyes closed, the position of the apparent median plane shifted opposite the direction of horizontal eye turning, and opposite the direction of head torsion. These effects are interpreted to be analogous to those found previously for the perception of verticality; the study therefore provides evidence for the generality of the constructs used within the framework of sensory-tonic field theory.
R 12

4919

Wilcock, W.E. LEARNING THE TWO-BAND COORDINATION TEST. *J. appl. Psychol.*, Feb. 1942, 27(1), 41-47.

4919

This experimental study is concerned with improvement of performance during 100 trials on the two-band pursuit rotor. The ten Ss tested were those scoring highest and lowest on a preliminary series of six trials. Each S was then given ten one-minute trials daily for a period of ten days. Recommendations were made concerning the optimum number of trials to be used when employing the test as a predictor of aptitude for this type of coordination.
T. G. R 4

4920

Teichner, W.H. RECENT STUDIES OF SINGLE REACTION TIME. *Psychol. Bull.*, March 1954, 51(2), 128-149. (USAF Aero-Medical Lab., Wright-Patterson AFB, Chic.).

4920

To assess the present scientific status of reaction time study, experimental literature of the last 20 years was reviewed. The examination was restricted to simple reaction time (RT), and deals with the effect on the RT of stimulus and receptor conditions, central and motor factors, and certain special conditions such as the effects of ambient temperature and loss of sleep.
R 162

4921

Teichner, W.H. & Wehrkamp, R.F. VISUAL-MOTOR PERFORMANCE AS A FUNCTION OF SHORT-DURATION AMBIENT TEMPERATURE. *J. exp. Psychol.*, 1954, 47, 447-450. (Quartermaster Research and Development Center.).

Time-on-target measures on the pursuit rotor were obtained from 4 subject groups which practiced for short periods on 5 successive days under ambient temperatures of 55°, 70°, 85°, and 100°F., respectively. Performance was found to be poorer at temperatures above and below 70°F. This result confirms and extends previous studies of the effects of ambient temperature. In addition, the data suggest the possibility that the temperature function falls off more rapidly with temperatures lower than the maximum than it does for those that are higher.
R 4

4926

Tinker, M.A. & Paterson, D.G. EYE MOVEMENTS IN READING A MODERN TYPE FACE AND OLD ENGLISH. *Amer. J. Psychol.*, Jan. 1941, 54(1), 113-114. (University of Minnesota, Minneapolis, Minn.).

4926

To study eye movements in reading a modern and old type face, 20 Ss read ten paragraphs from the Chapman-Cook Speed of Reading Test. Form A, set in Cloister Black (Old English) and Form B in Scotch Roman (modern), and their eye movements were photographed. Data on fixation frequency, words per fixation, pause duration, perception time and regression frequency were analyzed for differences due to style of type. The differences were interpreted with respect to difficulties in speed of reading.
T. R

4927

Tinker, M.A. EFFECT OF VISUAL ADAPTATION UPON INTENSITY OF LIGHT PREFERRED FOR READING. *Amer. J. Psychol.*, Oct. 1941, 54, 559-563. (University of Minnesota, Minneapolis, Minn.).

4927

To measure the degree to which the illumination intensity chosen for comfortable reading is determined by the illumination level to which the eye is adapted, 144 subjects adapted to 8 footcandles of light at one sitting and to 52 footcandles at another sitting. After adaptation, a paired comparison technique was used to obtain preferences for intensities considered best for ease and comfort in reading 11 pt. type. Frequencies with which various intensities were chosen are given, and the relation to previous adaptation level is discussed together with the implications for the choice of intensity level needed for efficient visual work.

4928

Tinker, M.A. & Paterson, D.G. READER PREFERENCES AND TYPOGRAPHY. *J. appl. Psychol.*, Feb. 1942, 27(1), 39-40. (University of Minnesota, Minneapolis, Minn.).

4928

To study reader preferences for typography, printed samples were arranged either in order of apparent legibility (ease and speed of reading) or in rank order from most to least pleasing (not defined). Typographical arrangements included form of type, styles of type face, color combinations, size of type, line length, paper surface. Mean-ranks are compared for the two types of preferences and compared with speed of reading scores obtained from previous experiments.
T. R 1

4932

Tinker, M.A. & Paterson, D.G. READABILITY OF MIXED TYPE FORMS. *J. appl. Psychol.*, Dec. 1946, 30(6), 631-637. (University of Minnesota, Minneapolis, Minn.).

4932

To determine the readability of mixed type forms (as used by newspapers), two equivalent test forms were printed in seven-point newspaper type, 12 pica line width, one point leading on newspaper stock. Form B was also printed in two different melody arrangements. Subjects (94) read Form A followed by one of the three variations of Form B. Speed of reading scores were compared for differences in form. Factors retarding rate of reading were discussed. Subject preferences for the test materials were given.
T. I. R 4

4734

Tinker, M.A. EFFECT OF SLANTED TEXT UPON THE READABILITY OF PRINT. *J. gen. Psychol.*, May 1954, 48(5), 287-291. (University of Minnesota, Minneapolis, Minn.).

4734

To investigate the effect of slanted text (parts of line at varying distances from the eyes) upon speed of reading and visibility of word forms, equivalent forms of reading material (ten-point Excelsior type on eggshell paper) were read under conditions of flat copy, 45 degrees and 60 degrees of slant by 180 Ss. Visibility measurements were made of words with Luckiesh-Moss Visibility Meter under the same conditions. Speed of reading scores and visibility measurements were studied for differences due to slanted text. The results were related to task of reading large books which have marked curvature of lines near inner margin.

T. R. 1

4938 Tinker, M.A. FIXATION PAUSE DURATION IN READING. *J. educ. Res.*, 1951, 44, 470-479. (University of Minnesota, Rochester, Minn.).

The purpose of the present investigation is to study the role of fixation pause duration in reading by coordinating the findings obtained in a series of experiments carried out in the writer's laboratory. Minimum pause duration for successive fixation of dots and for successive fixation and identification of single letters averaged 172 and 157 ms. respectively. These durations are more than necessary for cleared-up vision but less than employed in reading connected material. The proportion of reading time devoted to pause duration averages 92.7% to eye movements, 7.3%. These percentages vary somewhat with the comprehension requirements of the material but in no case do the pauses take less than 90% of the reading time. Mean pause duration in reading varies from about 220 to 324 ms. The greater the requirements of comprehension the longer the pause duration. In most reading situations variability in pause duration is relatively small and relatively constant. In certain special reading situations as for test items, however, variability can be relatively great. Reliability of pause duration as an eye-movement measure is relatively high. Variation in typographical arrangements may produce longer pause duration, shorter duration, or no change. Pause duration bears no significant relation to fixation frequency or regression frequency. Pause duration by itself is not a valid measure of reading proficiency. When combined with fixation frequency, however, the resulting perception time is a fairly valid measure of reading proficiency.

R 17

4939

Weitz, J. VIBRATORY SENSITIVITY AS A FUNCTION OF SKIN TEMPERATURE. *J. exp. Psychol.*, Jan. 1941, 28(1), 21-36. (Psychological Lab., University of Virginia, Charlottesville, Va.).

With increasing skin temperature, vibratory thresholds decrease to a minimum, at which point, with further heating, these thresholds rise. The function uniting temperature and vibratory sensitivity is similar to that linking temperature and pressure sensitivity, with the minimal thresholds falling at approximately the same point. The similarity of the effect of temperature changes on pressure and vibratory stimulation was assumed to be further evidence of the intimacy of the identity of the mechanisms mediating these 2 sensory experiences. With decreasing skin temperature vibratory thresholds show a continuous rise. The effects of warming and cooling the skin are shown to be not due to changes in skin conductivity; it is further shown that these changes are not a result of gross vascular action. There is no dependence of the temperature function on stimulus frequency. A chemical theory is thought necessary to explain the results.

R 16

4942

Stephens, J.M. THE INFLUENCE OF SYMBOLIC PUNISHMENT AND REWARD UPON STRONG AND UPON WEAK ASSOCIATIONS. *J. gen. Psychol.*, 1941, 25, 177-185. (Johns Hopkins University, Baltimore, Md.).

4942

In a study designed to test the hypothesis that punishment modifies strong but not weak associations and reward, weak but not strong associations, 80 high school students were required to answer 84 multiple-choice questions and to indicate degree of certainty for each answer. Persistence of choice on a re-test was analyzed in relation to initial degree of certainty and kind of feedback ("right," "wrong," or no information) given to each item.

4943

Stephens, J.M. & Baer, J.A. FACTORS INFLUENCING THE EFFICACY OF PUNISHMENT AND REWARD: THE OPPORTUNITY FOR IMMEDIATE REVIEW, AND SPECIAL INSTRUCTIONS REGARDING THE EXPECTED ROLE OF PUNISHMENT. *J. gen. Psychol.*, 1944, 65, 53-66. (Johns Hopkins University, Baltimore, Md.).

4943

In a test of the hypothesis that the differential effects of reward and punishment on weak and strong associations depend on opportunity to rehearse the correct association, 119 high school students answered 60 multiple-choice questions, indicating degree of certainty for each answer. On a subsequent identical test immediate knowledge of results was provided for each question; varying intervals of time elapsed before the presentation of the next question. Persistence of choices on a third test was analyzed with respect to initial degree of certainty, effect applied ("right," "wrong," or no information), opportunity for review, and special instructions on the avoiding of wrong answers.

T. G. R 5

4945

Werner, H. & Wapner, S. THE INNSBRUCK STUDIES ON DISTORTED VISUAL FIELDS IN RELATION TO AN ORGANISMIC THEORY OF PERCEPTION. *Psychol. Rev.* 1955, 62(2), 130-138. (Clark University, Worcester, Mass.).

Kohler of the Innsbruck Laboratory published results concerned with stages of perceptual adaptation to distorting prisms. The methodology of these experiments is discussed. The authors contend that Kohler's findings can be more adequately accounted for by an organismic than by a sensorial theory of perception. Some aspects of the sensory-tonic field theory of perception are discussed and an attempt is made to show that the essential findings of Kohler are consistent with this theory. The Innsbruck studies advance the understanding of perception by a) demonstrating the involvement of organismic states (oculo-muscular states) in so-called visual adaptation; b) giving evidence in support of the role of sensory-tonic states in regard to a great variety of spatial properties; and c) demonstrating that color is also affected by organismic states. (HEIAS)

R 23

4946

Roff, M.F. PERSONNEL SELECTION AND CLASSIFICATION PROCEDURES: SPATIAL TESTS A FACTORIAL ANALYSIS. FINAL REPORT. Proj. 21 29 002, Jan. 1951, 47pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Institute of Child Welfare, University of Minnesota, Minneapolis, Minn.).

4946

The factor analysis of a 60-variable aptitude test battery (primarily concentrated in the space thinking area) given to a large population of candidates for aircrew training is reported. The number of basic abilities required by the battery are described and interpreted. The relationship of these factors to earlier research findings and to each other are discussed.

T.

4947

Roff, M. THE PILOT CANDIDATE SELECTION RESEARCH PROGRAM V. A FACTORIAL STUDY OF THE MOTOR APITUDES AREA. Contract AF 41(126) 160, Proj. 21 29 008, Rep. 5, March 1953, 25pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Institute of Child Welfare, University of Minnesota, Minneapolis, Minn.).

4947

The factor analysis of a 69-variable aptitude test battery given to 2,000 Naval Aviation Cadets prior to pilot training is reported. Following a set of five subanalyses of groups of tests selected from the total battery, a total analysis with 63 variables is made. Fourteen factors were extracted and interpreted. Comparisons are made with results from previous Air Force populations. The major contribution is the splitting of the psychomotor area into several factors previously undiscovered.

T. R 5

4949

Krus, D.H., Werner, H. & Wapner, S. STUDIES IN VICARIOUSNESS: MOTOR ACTIVITY AND PERCEIVED MOVEMENT. *Amer. J. Psychol.*, Oct. 1953, 66(4), 603-608. (Clark University, Worcester, Mass.).

The hypothesis underlying the present experiment is that of the vicarious relationship obtaining between perception of motion and muscular involvement. If S is confronted with drawings representing objects which suggest motion, it is hypothesized that there will be an increase relation between the frequency of movement responses and the degree of motor involvement. An experimental group of Ss performed a motor task before viewing pictures, and a control group viewed the pictures without performing a motor task. It was found that the introduction of motor involvement has the effect of significantly decreasing perceptual movement as measured by verbal responses to pictorial material. (HEIAS)

R 11

4950

Goldman, A.E. STUDIES IN VICARIOUSNESS: DEGREE OF MOTOR ACTIVITY AND THE AUTOKINETIC PHENOMENON. *Amer. J. Psychol.*, Oct. 1953, 66(4), 613-617. (Clark University, Worcester, Mass.).

2 hypotheses pertaining to the relation of motion and motion-perception were formulated: a) Under conditions of inhibition of motor expression perceptual activity is expected to increase; b) Conversely, if motor expression is increased, perceptual activity is expected to decrease. Reaction-time and duration of the autokinetic phenomenon were chosen as measures to test the 2 hypotheses. The assumptions were that reaction-time measures readiness to perceive motion and that greater perceptual activity is reflected in longer duration. The results of this study indicate that the greater the degree of motor involvement: a) the longer the time of appearance of autokinesis; b) the shorter the duration of its first uninterrupted phase; and c) the less complex is its pattern of movement. These results support the postulate of vicarious channelization, according to which an inverse relation is expected between the amount of perceptual movement and motor activity.

4951
Prentice, M.C.H., Krinsky, Josephine & Barker, S. THE ROLES OF PATTERN AND APPARENT DISTANCE IN DETERMINING THE COLOR OF AREAS SEEN THROUGH TRANSPARENCIES. *J. Exp. Psychol.*, Sept. 1951, 42(3), 201-206. (Swarthmore College, Swarthmore, Penn.).

Using careful quantitative methods by which Os judged the apparent yellowness of a figure seen either through or surrounded by a blue of the complementary hue, we have been unable to find any influence of the separation of planes of assimilation. Earlier authors had reported a distinct enhancement of the contrast-effect under conditions of transparency and of "strong figures." It is suggested that their results were due to inadequate control of illumination or sampling error.

R 5

4953
Pastore, M. SOME REMARKS ON THE AMES OSCILLATORY EFFECT. *Psychol. Rev.*, July 1952, 59(4), 315-325. (Queens College, Flushing, N.Y.).

This report presents an analysis and theoretical discussion of 1 of the effects described by Ames in his monograph on the rotating trapezoidal window. The effect discussed is the perception of an oscillatory motion when the trapezoidal window is actually rotating. Ames' explanation implied that the perceived motion is unique to the trapezoidal window. The writer, however, found that the effect could be obtained with a wide range of forms, such as the circle, ellipse, lop-sided ellipse, triangle, rectangle, diamond, etc. The writer has proposed an alternative explanation to Ames' emericistic one. (HEIAS)

R4

4954

Kaden, S.E., Wepner, S. & Verner, H. STUDIES IN PHYSIOGNOMIC PERCEPTION: II. EFFECT OF DIRECTIONAL DYNAMICS OF PICTURED OBJECTS AND OF WORDS ON THE POSITION OF THE APPARENT HORIZON. *J. Psychol.*, 1955, 39, 61-70. (Clark University, Worcester, Mass.).

The present study, consisting of 2 experiments, is a continuation of previous work designed to demonstrate that visual directional dynamics exists as a behaviorally measurable event. The first of these experiments showed that a figure with directional dynamics upwards or downwards has the effect of shifting the physical location of the apparent horizon (eye line) opposite the direction of the dynamics. The second experiment used visually presented verbal symbols connoting upwardness or downwardness, e.g., "rising" vs. "falling." Analogous to the findings with meaningful pictorial material used in the first experiment, the physical position of the apparent horizon shifted opposite the direction of the dynamics conveyed by the words. Thus, in addition to demonstrating that visual dynamics in the upward-downward direction can be measured behaviorally, the study shows that certain semantic aspects of words can be conceived and dealt with experimentally in a theoretical framework developed for problems of perception.

R 10

4956

Stult, D.B. & Wilson, J.T. THE EFFECT OF AN INCREASINGLY WELL DEFINED CRITERION ON THE PREDICTION OF SUCCESS AT NAVAL TRAINING SCHOOL (TACTICAL RADAR). *J. Appl. Psychol.*, Dec. 1946, 30(6), 614-623. (Bureau of Naval Personnel & Headquarters, Washington, D.C.).

4956

This was a study of the validity of the selection technique and criteria of success employed at Naval Training School (Tactical Radar). Various selection tests were correlated with criteria of scholastic success such as the Officer Classification Test and the CIC Aptitude Test. The results were presented and discussed in terms of the magnitude of correlations obtained between aptitude tests and criteria of success. The validity of predictive indices was discussed in detail.

4957

Ogle, K.N. ON STEREOSCOPIC DEPTH PERCEPTION. *J. exp. Psychol.*, Oct. 1954, 48(4), 225-233. (George Washington University, Washington, D.C.).

4957

The relationship between retinal image disparity and stereoscopic depth perception was reinvestigated under the controlled conditions possible with modern instrumentation. The subject was presented a binocular view of a fixation point and central portions of both the reference and test objects (thin steel rods). By an arrangement of baffles, one eye saw the upper portion while the other saw the lower portion of the test line. When there was a vertical gap, both eyes could see the center portion. The task was to adjust the test line as the gap width was changed so that it was in the same plane as the reference line. A falling sphere was substituted for the test rod in some of the experiments.

G. I. R 5

4958

Canfield, A.A., Comrey, A.L. & Wilson, R.C. THE INFLUENCE OF INCREASED POSITIVE g ON REACHING MOVEMENTS. *J. appl. Psychol.*, June 1953, 37(3), 230-235. (Wayne University, Detroit, Mich.).

From the results of this research, certain conclusions about the effect of increased positive radial acceleration on reaching movements may be advanced. Both the speed and accuracy of reaching movements at increased g levels are seriously impaired, the degree of impairment being roughly equivalent to the amount of force imposed. The kinesthetic cues governing the thrust of the arm under normal circumstances are inadequate to maintain similar accuracy or speed under radial accelerative conditions. Due to the increased weight of the arm and the inadequacy of the normal kinesthetic cues, two types of errors are found, one being the negative inertia error and the other the error of downward tendency. The most favorable location of controls for the pilot of high-speed aircraft, both from the standpoint of speed and accuracy, is to the side of the pilot's preferred hand and below its normal resting point. Emergency controls that might have to be manipulated under conditions of increased positive radial acceleration should be no smaller than two inches in diameter if a pushing motion is required.

R 7

4959

Covner, B.J. A PSYCHOLOGIST VIEWS ELECTRONIC EQUIPMENT COMPLEXITY. *Elec. Engng.*, Oct. 1953, 4pp. (Dunlap & Associates, Inc., Stamford, Conn.).

4959

This paper presents a discussion of the impact of electronic equipment complexity upon human behavior and the parallel development of engineering psychology or human engineering. Some of the areas treated are: effects of automation on job specifications, job complexity and human performance, engineering decisions and job performance, analyses of man-machine systems and human engineering, and other psychological aspects of equipment complexity.

Y. R 4

4961

Osler, Sonia F. INTELLECTUAL PERFORMANCE AS A FUNCTION OF TWO TYPES OF PSYCHOLOGICAL STRESS. *J. exp. Psychol.*, Feb. 1954, 47, 115-121. (Johns Hopkins University, Baltimore, Md.).

4961

To investigate the effects of two types of psychological stress (failure and fear) upon performance, five groups of high school students (305 in number) performed an arithmetic test consisting of problems in long division. Following an initial test without stress, the five groups repeated the test (alternate form) under conditions designed to create stress of (1) failure, (2) failure and fear, (3) success and fear, (4) success, and (5) control. All subjects completed fifty items from Taylor's anxiety inventory. Test scores were studied by analysis of covariance for differential effects of stress conditions. The relation of anxiety level to performance was analyzed by correlational procedures.

T. R 19

4962

Rockway, M.R. & Duncan, C.P. PRE-RECALL WARMING-UP IN VERBAL RETENTION. *J. exp. Psychol.*, April 1952, 43(4), 305-312. (Northwestern University, Evanston, Ill.).

4962

In a test of the hypothesis that retention loss after warm-up activity depends on the amount of warm-up activity and on its similarity to the learned task, 160 college students learned a list of 15 dissyllabic paired adjectives for ten trials. Retention was tested 24 hours later. The experimental groups were tested after response to lists of paired colors of different lengths presented at different rates; a control group was given no warm-up activity. Mean number of correct responses on the retention trial was analyzed in relation to the experimental variables.

T. G. R 10

4963

Rockway, M.R. BILATERAL REMINISCENCE IN PURSUIT-ROTOR LEARNING AS A FUNCTION OF AMOUNT OF FIRST-HAND PRACTICE AND LENGTH OF REST. *J. exp. Psychol.*, 1953, 46 (5), 337-344. (Northwestern University, Evanston, Ill.).

4963

In a study of bilateral reminiscence in pursuit rotor learning, 300 female college students, divided into 12 experimental groups, practiced the performance for a specified interval with the preferred hand, and then shifted, after a specified rest interval, to practice with the other hand. Reminiscence, defined as gain in the second performance with rest, was analyzed as a function of amount of initial practice and length of interpolated rest period. The findings were discussed in terms of their implications for the locus of performance decrement.

T. G. R 22

4965

Silver, R.J. EFFECT OF AMOUNT AND DISTRIBUTION OF WARMING-UP ACTIVITY ON RETENTION IN MOTOR LEARNING. Ph.D. Dissertation, 1952, 8pp. New York University, New York, N.Y. (Reprinted from: *J. exp. Psychol.*, Aug. 1952, 44(3), 88-95).

4965

In an experiment concerned with the effects of amount and distribution of "warm-up" activity on the retention of a perceptual-motor skill, 480 college students were required to perform an "inverted alphabet" task. Each of 20 experimental groups received different amounts of initial practice and different amounts of "warm-up" activity, distributed or massed, prior to resumption of practice. Retention scores were analyzed in relation to the indicated variables.

T. G. R 11

4969

Tinker, M.A. CRITERIA FOR DETERMINING THE READABILITY OF TYPE FACES. *J. educ. Psychol.*, Oct. 1944, 385-396. (University of Minnesota, Minneapolis, Minn.).

4969

To compare visibility, perceptibility at a distance, and speed of reading of materials printed in ten type faces, 36 subjects were tested. The ten type faces were all printed in ten-point type; 30 five-letter words were cut from the text for each type face and mounted on a four-by-six inch card. Visibility measurements were made with the Luckiesh-Moss Visibility Meter, perceptibility at a distance by means of an optical bench, and speed of reading by means of standardized reading tests. Conclusions are drawn as to the most valid method to use as a measure of readability.

T. R 9

4971

Tinker, M.A. ILLUMINATION INTENSITIES PREFERRED FOR READING WITH DIRECT LIGHTING. *Amer. J. Optom. & Arch. of Amer. Acad. of Optom.*, June 1944, 21, 213-19.

4971

To determine illumination intensities preferred for reading under direct lighting that is strictly local, each of 30 readers, after preliminary adaptation to 3 footcandles, chose the intensity he preferred for comfortable reading of text in medium sized typed (9 point) in light from a reading desk lamp which could provide between 3 to 160 footcandles. The intensities chosen for 5 successive five minute periods of reading are given and interpreted.

4973

Tinker, M.A. ILLUMINATION STANDARDS FOR EFFECTIVE AND EASY SEEING. *Psychol. Bull.*, Sept. 1947, 44(5), 435-450. (University of Minnesota, Minneapolis, Minn.).

4973

This paper (1947) presented a critical examination of the specifications for illumination as set forth in publications of the Illuminating Engineering Society on practices in home lighting, office lighting, school lighting, etc. The data from which these specifications are derived was also examined. Topics covered included spectral quality of light, quality of lighting, intensity of illumination, specific lighting codes (school, office, industrial, home), visual factors, and illumination for adequate seeing.

R 31

4977

Tinker, M.A. CUMULATIVE EFFECT OF MARGINAL CONDITIONS UPON RATE OF PERCEPTION IN READING. *J. appl. Psychol.*, Oct. 1948, 32, 537-540.

4977

To study the effect of a combination of marginal conditions upon speed of perception, equivalent test forms were prepared. Form I, printed in ten-point roman, set with two-point leading in 20 pica line width, was the standard in comparison with Form II, typographically the same as I or set in eight-point italic, one point leading in 12 pica line width. Subjects (166) read Form I with illumination at 25 ft.-c then read Form II with either 25 or three ft.-c of illumination. Speed of reading data was analyzed for combined effects of marginal intensity, type form, and type size.

T. R 2

4978

Tinker, M.A. & Paterson, D.G. SPEED OF READING NINE POINT TYPE IN RELATION TO LINE WIDTH AND LEADING. *J. appl. Psychol.*, Feb. 1949, 33, 81-82.

4978

To study reading speed of nine point type in relation to line width and leading, standard materials (18 pica line widths with two point leading) served as comparison with equivalent material varied in line width (from 8 to 43) and leading (solid, 1, 2, or 4 point). Subjects (2000) read the standard and one variable form. Speed of reading scores were the data. A summary form of the data was presented as a guide to those wishing to specify optimal limits of variation in line width and leading for nine point type.

T. R 2

4979

Tinker, M.A. & Paterson, D.G. EYE-MOVEMENTS IN READING BLACK PRINT ON WHITE BACKGROUND AND RED PRINT ON DARK GREEN BACKGROUND. *Amer. J. Psychol.*, Jan. 1944, 57(1), 93-94. (University of Minnesota, Minneapolis, Minn.).

4979

To study eye-movements in reading as affected by color, 20 Ss read equivalent forms of material printed in black on white and red on green. Eye-movement photographs were analyzed for relative efficiency of the color combinations.

4981

Tinker, M.A. ILLUMINATION INTENSITIES FOR READING NEWSPAPER TYPE. *J. educ. Psychol.*, April 1943, 247-50.

4981

To determine the critical level of light intensity for reading newspaper type, text was read under 1, 4, 7, 10, 20, 50, + 100 footcandles by 405 university students. The critical level for solid set 7 point newspaper type was found and a margin of safety suggested.

4982

Tinker, M.A. EFFECT OF VIBRATION UPON SPEED OF PERCEPTION WHILE READING SIX POINT PRINT. *J. educ. Res.*, 1953, 46, 450-64.

4982

To investigate the effect of vibration upon speed of perception in reading six point type with and without italics, a control group (59 subjects) and three experimental groups (60 subjects each) were employed. Form I of Tinker's Speed of Reading Test was printed in ten point type with optimum typographical arrangement; Form II was printed in three arrangements: identical with Form I, in six point Bonna type, and six point Galis type. Control group read Form I and II in ten point type, with noise; experimental groups read Form I and one of the six point forms with noise and vibration (1/16 inch, five cycles per second). Number of items completed in a five-minute period was recorded and analyzed for differences due to vibration, type size and type face. T. R 5

4983

Tinker, M.A. LIGHT INTENSITIES PREFERRED FOR READING. *Am. J. Optom. & Arch. Soc. Acad. Optom.*, 1954, 31, 55-66. (University of Minnesota, Minneapolis, Minn.).

4983

To study factors involved in preferences for illumination intensities for reading, a series of four experiments was performed (from 30 to 144 Ss); 1 and 2) Ss were initially adapted to low intensity (three or four ft.-c) and then allowed to explore an extensive range of intensities while reading under direct lighting before making a selection; 3) (direct lighting) visual adaptation was kept constant at either 20 or 50 ft.-c during selection; 4) (general illumination) adaptation was kept constant at 8 or 52 ft.-c. The data were analyzed with reference to the role of adaptation and type of lighting. T. R 8

4985

Tresselt, M.E. THE EFFECTS OF BACKGROUND CONTRAST UPON THE TIME-ERROR IN VISUAL EXTENTS AND CERTAIN CHARACTERISTICS RELATED TO THE JUDGEMENTS. *J. gen. Psychol.*, 1955, 52, 75-82.

4985

This study was designed to assess the effects of brightness contrast of the background upon the phenomenon of time-error (with visual stimuli) and also to investigate the individual variability usually exhibited in studies of time-error. Utilizing a Weinland tachistoscope, 24 subjects were presented with four sets of cards composed of black lines of varied length (3.8, 4.0, and 4.2 cm) against backgrounds of four different shades of gray. Direction and magnitudes of time-error as a function of brightness contrast were computed for each subject and significance of differences among subjects was assessed. Correlations between scores on the Guilford-Martin personality inventory and time-error scores provide a basis for discussion of the role of personality factors in making judgments of this sort. T. R 15

4986

Tresselt, M.E. & Mayzner, M.S., Jr. A FURTHER EXPERIMENT IN THE RECOGNITION OF EGO-INVOLVED MATERIALS. *J. Psychol.*, 1954, 37, 135-139. (Dept. of Psychology, Washington Square College, New York, N.Y.).

4986

In a study of the role of overlearning in the recognition of ego-involved materials, 300 subjects were tested for recognition of strong and weak ego-involved materials over periods of 48 hours, 1, 3, 5, and 10 weeks. Recognition was evaluated under conditions of overlearning and non-overlearning. The results are presented and discussed in terms of the relative importance of overlearning and ego-involvement in forgetting and the relative amount of recognition of strong and weak ego-involved materials.

4987

Tresselt, M.E. & Leeds, D.S. THE EINSTELLUNG EFFECT IN IMMEDIATE AND DELAYED PROBLEM-SOLVING. *J. gen. Psychol.*, 1953, 42, 87-95. (New York University, New York, N.Y. & University of Illinois, Urbana, Ill.).

4987

Two problems in mental set (Einstellung) and problem solving were investigated: the relationship between the Einstellung problems given and the Einstellung effect, and the retention of the effect after one, two, and seven days. In the first experiment, seven groups of subjects (ten in each group) were given 2, 4, 6, 8, 10, 12, or 14 Einstellung problems respectively which could be solved by a given formula and two critical problems which could be solved with the formula or by a simple subtraction or addition. In the second experiment, three groups were given practice problems on one day and the critical problems one, two, or seven days later. T. G. R 11

4988

Tresselt, M.E. THE HOW-TO-STUDY COURSE. *J. Psychol.*, 1952, 34, 31-35. (Department of Psychology, New York University, New York, N.Y.).

4988

This was a report of a survey of courses on how to study offered at several colleges. The briefly summarized results included data on qualifications of the instructor, size and personnel of the class, content of the course, method of presentation, and evaluation of the effectiveness of the course. R 2

4989

Uhlaner, J.E., Gordon, D.A., Woods, I.A., & Zeidner, J. THE RELATIONSHIP BETWEEN SCOTOPIC VISUAL ACUITY AND ACUITY AT PHOTOPIC AND MESOPIC LEVELS. *J. appl. Psychol.*, June 1953, 37, 223-9.

4989

To assess the possibility of constructing a practical test of night visual acuity, the relationship between scotopic and mesopic visual acuity was investigated. Nineteen subjects, who showed a wide range of scotopic acuity scores on Army Night Vision Tester, were given mesopic and photopic acuity tests on wall charts and on the Ortho-rater. The correlations among scores on the various tests are presented and the practicability of developing a mesopic test of night vision ability is discussed.

4990

Underwood, B.J. STUDIES OF DISTRIBUTED PRACTICE: II. LEARNING AND RETENTION OF PAIRED-ADJECTIVE LISTS WITH TWO LEVELS OF INTRA-LIST SIMILARITY. *J. exp. Psychol.*, Sept. 1951, 42(3), 153-161. (Northwestern University, Evanston, Ill.).

4990

In an investigation of the interaction between distribution of practice and intralist similarity in the learning and retention of serial verbal material, 108 Ss each learned a list of paired adjectives of high or low similarity. Each list was learned under one of three conditions of distribution of practice; retention was tested after one of three intervals. Rate of learning, trials to criterion, errors per trial, errors in recall, and trials to relearn were analyzed with respect to the experimental variables. T. G. R 12

4991

Underwood, B.J. & Goad, D. STUDIES OF DISTRIBUTED PRACTICE: I. THE INFLUENCE OF INTRA-LIST SIMILARITY IN SERIAL LEARNING. *J. exp. Psychol.*, Aug. 1951, 42(2), 125-133. (Northwestern University, Evanston, Ill.).

4991

In a study of the interaction of distribution of practice and intralist similarity in serial verbal learning, 24 Ss each learned a high- or a low-similarity list of adjectives with one of three intertrial intervals. Data include trials to criterion, errors per trial, and errors as a function of degree of remoteness obtained under each of the six experimental conditions. The results are discussed with respect to theories of stimulus generalization and differential forgetting. T. G. R 13

4992
O'Brien, F.E. MOTIVATION OF RESEARCH AND DEVELOPMENT ENGINEERS. A RESEARCH REPORT. 1956, 40pp. University of Chicago, Chicago, Ill.

4992
The problem of motivating the engineer is examined first in terms of the human relations problem basic to any system of motivation of human beings. More specific problems relating to government needs for engineers, work-place adjustment, and factors arising from the complexity of modern society and the resultant attitudes toward the engineering profession are discussed. Prestige and status aspects of the profession are analyzed in both an industry and the community. Finally, the role of leadership is discussed as it affects the morale of individuals.
R 13

4993
Underwood, B.J. LEARNING. *Annual Rev. Psychol.*, 1953, 4, 31-58. (Northwestern University, Evanston, Ill.).

4993
This is a review of part of the literature on basic learning processes that appeared in psychological publications from 1951 to 1952. The area is organized into the following topics: motivation and reinforcement, generalization, reactive inhibition, extinction, rote learning, transfer, selective retention, and thinking.
R 103

4994
Underwood, B.J. ASSOCIATIVE INHIBITION IN THE LEARNING OF SUCCESSIVE PAIRED-ASSOCIATE LISTS. *J. exp. Psychol.*, April 1944, 34(2), 127-135. (Northwestern University, Evanston, Ill.).

4994
In a study of the course of associative inhibition in the learning of successive lists, 24 college students learned 0, 2, 4, or 6 lists of paired associates prior to learning a final list. Results include percent inhibition in consecutive trials on consecutive lists and trials to successive criteria on the final list for the four experimental groups.
T. G. R 6

4995
Underwood, B.J. AN ORIENTATION FOR RESEARCH ON THINKING. *Psychol. Rev.*, May 1952, 59(3), 209-220. (Northwestern University, Evanston, Ill.).

4995
A point of view concerning thinking is developed for the sole purpose of giving direction to research on certain variables which appear to influence efficiency in thinking. The one essential assumption presented is that for new relationships to be acquired, the pertinent responses to stimuli must be contiguous. Predictions concerning the influence of certain manipulable variables (perceptual vs. symbolic presentation of stimuli, number of stimuli, similarity among stimuli, biases) on thinking are made. Some problems are discussed which are not considered in the present orientation.
R 30

4996
Underwood, B.J. STUDIES OF DISTRIBUTED PRACTICE: III. THE INFLUENCE OF STAGE OF PRACTICE IN SERIAL LEARNING. *J. exp. Psychol.*, Nov. 1951, 42(5), 291-295. (Northwestern University, Evanston, Ill.).

4996
In an investigation of the effects of distribution of practice on rate of learning as they depend on stage of practice, 48 college students learned successively four lists of adjectives under conditions of massed or distributed practice. Results include errors per trial and trials to criterion for each list under each condition of practice.
T. G. R 7

4997
Underwood, B.J. & Viterna, R.O. STUDIES OF DISTRIBUTED PRACTICE: IV. THE EFFECT OF SIMILARITY AND RATE OF PRESENTATION IN VERBAL DISCRIMINATION LEARNING. *J. exp. Psychol.*, Nov. 1951, 42(5), 296-299. (Northwestern University, Evanston, Ill.).

4997
In an investigation of the effect of distributed practice on paired-associate learning when rate of presentation and intra-pair similarity are varied, 90 Ss were required to learn three lists of dissyllabic adjectives of high or medium similarity. Two rates of presentation and three inter-trial intervals were employed. The results include mean number of trials to criterion under each of the 12 experimental conditions.
T. R 10

4998
Underwood, B.J. THE EFFECT OF SUCCESSIVE INTERPOLATIONS ON RETROACTIVE AND PROACTIVE INHIBITION. *Psychol. Monographs*, 1945, 59(3, Whole 273), 1-33. (Northwestern University, Evanston, Ill.).

4998
Three experiments dealing with retroactive and proactive inhibition in the retention of paired associates are reported. The experimental variables were: 1) number of interpolated or previously learned lists and 2) number of trials on which a single interpolated list was presented. The data consist of recall and relearning scores and number of overt intrusions from interpolated or prior lists, for each experiment.
T. G. R 21

4999
Welford, A.T. AN APPARATUS FOR USE IN STUDYING SERIAL PERFORMANCE. *Amer. J. Psychol.*, Jan. 1952, 65(1), 91-97. (Nuffield Research Unit, Psychological Lab., Cambridge, England).

4999
This is a description of a piece of equipment, suitable for the study of serial responses, in which 12 telegraph keys and 12 corresponding light bulbs are connected by flexible leads to a control apparatus. Uses for the equipment, as in studies of serial learning or of spatial relationships of display and control, are discussed. Wiring diagrams are presented.
I. R 3

5000
Vertheimer, H. & Ward, V.O. THE INFLUENCE OF SKIN TEMPERATURE UPON THE PAIN THRESHOLD AS EVOKED BY THERMAL RADIATION--A CONFIRMATION. *Science*, May 1952, 115, 499-500.
This report derives from an investigation of the temporal variation of various sensory thresholds in which skin temperature was measured as a control for pain threshold. On 45 consecutive days pain thresholds were measured on each of 3 Ss. Radiant intensity (275 mc/sec/cm²) was applied to forearm on blackened circular area 1.8 cm in diameter. Threshold measure was the time in sec before S reported burning pain. Skin temperature was measured just before application of stimulus. Correlation coefficients between threshold and temperature were -.70, -.61, and -.72 for the 3 Ss. The data were plotted and fitted by a least square straight line. Extrapolation yielded a value of 44.1°C as the critical temperature at which pain occurred. Comparisons are made with findings from other studies which confirm this figure. (HEIAS)
R 1

5001
Wertheimer, M. THE VARIABILITY OF AUDI-
TORY AND VISUAL ABSOLUTE THRESHOLDS IN
TIME. *J. gen. Psychol.*, 1955, 52, 111-47.

5001:

This article presents a review of the literature and the results of experimentation on the phenomenon of variability of auditory and visual absolute thresholds in time. The survey of previous research is presented as follows: variability of visual threshold, variability of auditory threshold, correlations among thresholds in various modalities, and the effects of certain variables (e.g., experience, exercise, etc.) upon the thresholds. The results of experiments designed to evaluate the following aspects of the problem are presented in detail: 1) threshold changes from day to day, 2) threshold changes within a day, and 3) threshold changes within an hour. An extensive discussion is presented concerning the phenomenon of threshold fluctuation in the particular modalities and the interrelations between both modalities. T. G. R 54

5002
Wertheimer, M. A SINGLE-TRIAL TECHNIQUE FOR MEASURING THE THRESHOLD OF PAIN BY THERMAL RADIATION. *Amer. J. Psychol.*, 1952, 65, 297-298.
A technique for measuring the threshold of pain by thermal radiation is described. It involves holding the heat-stimulus constant and measuring threshold in terms of the length of time before S reports pain. Thus a single trial yields a quantitative determination, there is no danger in prolonged hyperaesthesia, and by a simple conversion formula, the measurements can be translated into the usual units. (HEIAS)
R 2

5003
Wertheimer, M. CAN A TRAINED SUBJECT JUDGE HIS AUDITORY SENSITIVITY? *Quart. J. exp. Psychol.* Feb. 1954, 6(1), 21-22.

Auditory thresholds were measured daily on 3 Ss over an extended period of time, and the Ss postdicted whether the level and variability of the day's measured thresholds were higher or lower than on the preceding day, without their having knowledge of their performance. It was found that their judgments agreed with the obtained psychophysical data better than would have been expected on the basis of chance alone. These results raise the question of the possibility that a S's understanding of, or hypothesis concerning, the experimental outcome may influence his behavior.
R 1

5004
Windle, C. VARIATIONS IN SENDING MORSE CODE. *J. exp. Psychol.*, July 1955, 50(1), 75-80. (USA Human Research Unit #3, Ft. Benning, Ga.).

5004

In an investigation of individual variations in sending Morse Code, two types of variations are considered: 1) "heterotaxic variations"—deviations among dots in different contextual occurrences; and 2) "homotaxic variations"—deviations among dots in repeated contextual occurrences. Eight inexperienced subjects were compared with five expert telegraphers in sending cipher material. The results are presented and discussed in terms of the relationship between sending ability and type of variation and in terms of a structural analysis of the signal components for each subject.
T. R 16

5005
Wyatt, Ruth F. IMPROVABILITY OF PITCH DISCRIMINATION. *Psychol. Monogr.*, 1945, 18(2), 1-58. (Northwestern University, Evanston, Ill.).

5005

In a study of the improvability of pitch discrimination, the author presents a review of the research pertinent to this problem and an experiment designed to discover whether training at one frequency level would improve pitch discrimination at that level and, should this be the case, to discover whether transfer to other frequency levels would occur. Sixteen Ss were given a series of pitch discrimination tests followed by 12 50-min. periods of intensive training. The effects of training and transfer effects were measured by the revised Seashore Pitch Discrimination Test, the Wyatt Pitch Discrimination Test, and an oscillator. The results are treated in terms of a comparison between pre- and post-training scores and the amount of transfer to other frequency levels. T. G. I. R 47

5006
Adams, R.E. FUNCTIONAL FIXEDNESS AS RELATED TO PROBLEM SOLVING: A REPETITION OF THREE EXPERIMENTS. *J. exp. Psychol.*, Oct. 1952, 44(4), 288-291. (Stanford University, Stanford, Calif.).

5006

To repeat demonstrations of the hypothesis that problem solving may in some instances be delayed through the "functional fixedness" of solution objects using more subjects and better controlled conditions than previous experiments, three experiments were conducted with 57 subjects (29 experimental group, 28 control group). Both groups were given the "box", "gimlet", and "paperclip" problems in that order. Experimental subjects were given each problem after having first used the solution objects in a function dissimilar to that demanded for solution. Control subjects were given the problem without pre-utilization. Number of solutions and time-to-solution were analyzed for differences between the two conditions.
T. R 3

5008
Bakan, P. PRELIMINARY TESTS OF VIGILANCE FOR VERBAL MATERIALS. Contract AF 33(038) 25726, Proj. 507 011 0001, Res. Note 52 7, July 1952, 7pp. USAF Human Resources Research Center, Lackland AFB, Tex.

5008

To determine whether a testing situation using verbal materials is practical in a study of vigilance, a series of digits were recorded on a tape at the rate of one per second for 90 minutes. In the series, sequences of odd numbers were restricted and sequences of exactly three odd numbers occurred every 36 times; six of such sequences occurred in each 15-minute period. The subject's task was to listen to the tape and write down each three-odd-number sequence heard. Eight subjects performed for 90 minutes on four different days. Error scores were analyzed for effect of period and of days. Suggestions for further study are made.
T. G. R 1

5009
Barch, A.M. WARM-UP IN MASSED AND DISTRIBUTED PURSUIT ROTOR PERFORMANCE. *J. exp. Psychol.*, 1954, 47(3), 357-361. (Department of Psychology, State University of Iowa, Iowa City, Iowa).

5009

In an investigation of progressive changes in warm-up decrement, 52 college students were required to perform an Epicyclic Pursuit Rotor Task under massed or distributed practice for 60 trials. Amount of warm-up, measured by two methods, is analyzed in relation to successive practice sessions for each group.
T. G. R 6

5011
Botwinick, J., & Shock, N.W. AGE DIFFERENCES IN PERFORMANCE DECREMENT WITH CONTINUOUS WORK. *J. Geront.*, Jan. 1952, 7, 41-6.

5011
To investigate age differences in the relationship of speed of response to continuous repetition of the performed task, 100 subjects divided into two age groups (20 to 29 and 60 to 69 years) were presented with 6 tasks (e.g. writing words, addition of digits, digit substitutions, etc.). Results are discussed in terms of performance decrement as associated with age, individual factors (e.g. blocking, intelligence, etc.), and task factors. (e.g. rest, practice, etc.).
T.G.R.25.

5013
Nye, J.A. Jr. OBSERVATIONS ON MAN-MACHINE RELATIONSHIPS IN THE AIR FORCE. Research paper submitted to The School of Business in partial fulfillment of the requirements for the MBA degree, Aug. 1958, 36pp.
The University of Chicago.

5013
This paper discusses the desirability and feasibility of replacing Air Force military support people with machines in much the same way as flight crews are replaced with machines. Examples are given of kinds of problems which could be handled by automation. Development of the theoretical basis for automation, and experience of business and industry with it are discussed. Special problems and hidden costs which may be encountered by a military branch in installing such a system are pointed out.
I. R 23

5014
Brown, D.R. STIMULUS-SIMILARITY AND THE ANCHORING OF SUBJECTIVE SCALES. *Amer. J. Psychol.*, April 1953; 66, 199-214.

The effects of anchoring on subjective scales of judgment were investigated. 3 variables were selected: a) similarity of the anchor to the stimulus-series; b) judging the anchor; and c) weight of the anchor. The first variable was tested by 2 types of anchors: a tray dissimilar to a series of weights and a weight identical to the series of weights. The second variable was dealt with by having O either judge or not judge the anchor and the third variable was represented by having 3 physical values of anchors. 72 Os were randomly split into 12 groups of 6 each. Every group was run on one of 12 experimental conditions in which all possible combinations of the 3 variables were included. The Os judged a series of 120 weights by the Method of Single Stimuli using a 5-category scale running from 'very light' to 'very heavy'. It was hypothesized that the degree of shift in the subjective scale of the judgment would be a function of the 3 experimental variables and would go from greatest shift to least shift in this order: weight-anchors furthest from the series judged, weight-anchors furthest from the series not judged, tray-anchors furthest from the series judged, and no effect with tray-anchors not judged. An analysis of variance was run on the 3X2X2 table resulting from the data and all predictions were confirmed with statistical significance. Graphic evidence was presented to demonstrate that the order of effect was as predicted and also to illustrate the operation of the size-weight illusion of the tray. Furthermore, the dimension of similarity was used to illustrate the need for response-derived definitions of psychologically real stimuli.
R 7

5015
Buss, A.H. RIGIDITY AS A FUNCTION OF ABSOLUTE AND RELATIONAL SHIFTS IN THE LEARNING OF SUCCESSIVE DISCRIMINATIONS. *J. exp. Psychol.*, March 1953, 45(3), 153-156. (Carter Memorial Hospital, Indianapolis, Ind.).

5015
In a test of the relative ease of absolute and relational discrimination reversals, 55 college students learned to make differential responses to wooden blocks on the basis of height. The Ss then learned a reversed discrimination in which either the negative stimulus remained the same and the positive was changed or in which both positive and negative stimuli were changed. The results, mean number of responses to positive and negative stimuli on the reversal task, are discussed in terms of reinforcement-inhibition and relational theories of discrimination learning.
T. R 11

5016
Buss, A.H. SOME DETERMINANTS OF RIGIDITY IN DISCRIMINATION-REVERSAL LEARNING. *J. exp. Psychol.*, Sept. 1952, 44(3), 222-227. (State University of Iowa, Iowa City, Iowa).

5016
In a study of rigidity in the reversal of a discrimination based on the height of stimulus blocks, 80 college students made differential responses to a set of stimuli, certain responses being reinforced. Rigidity, defined as inability to reverse the discrimination, was tested after training on the original discrimination under four schedules of reinforcement. Statistical analyses of the data (response frequencies) are presented.
T. R 11

5017
Buss, A.H. RIGIDITY AS A FUNCTION OF REVERSAL AND NON-REVERSAL SHIFTS IN THE LEARNING OF SUCCESSIVE DISCRIMINATIONS. *J. exp. Psychol.*, Feb. 1953, 45(2), 75-81. (Carter Memorial Hospital, Indianapolis, Ind.).

5017
In a study of the effect of training on one discrimination on the learning of a subsequent discrimination, 40 college students were required to respond differentially to wooden blocks on the basis of form, color, or size. For one experimental group the second discrimination was the opposite of the first ("reversal shift"); for the other group, the second discrimination was based on a different stimulus dimension ("nonreversal shift"). Both groups were trained on a third discrimination with nonreversal shift. Correct responses achieved by the groups on each task are discussed in terms of a reinforcement-inhibition theory of learning.
T. R 13

5018
Aborn, M. & Rubenstein, H. INFORMATION THEORY AND IMMEDIATE RECALL. *J. exp. Psychol.*, Oct. 1952, 44 (4), 260-266. (Michigan State College, East Lansing, Mich.).

5018
The influence of degree of organization of material upon recall was investigated. Information theory concepts furnished the rules for organization of the test passages. Thirty-three male and female undergraduates were familiarized with an inventory of nonsense syllables, then learned the rules of organization. Each set progressively limited the syllables which could appear. Subjects then attempted to learn passages of syllables chosen in conformity with the organizational rules. Testing for recall followed immediately. The number of correct responses for each passage is presented in the results and compared to results predicted from information theory.
T.G.R 3

5019

Adams, J.A., Reynolds, B. EFFECT OF SHIFT IN DISTRIBUTION OF PRACTICE CONDITIONS FOLLOWING INTERPOLATED REST. AFTRC TR 54 27, July 1954, 5pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex. (Reprinted from J. exp. Psychol., Jan. 1954, 47(1), 32-36.).

5019

In a test for the formation of conditioned inhibition, five groups of basic airmen practiced for 40 15-sec. trials on the Rotary Pursuit Test. Four groups practiced for 5, 10, 15 or 20 massed trials (five-sec. intertrial intervals) prior to shifting to distributed practice, after a 10-min. rest period, for the remainder of the trials. A control group received distributed training for 20 trials before and after the rest period. Gains over the rest period and final level of performance (time on target) are compared among the groups. The theoretical significance of the results is discussed.

T. G. R 11

5021

Adams, J.A. MULTIPLE VERSUS SINGLE PROBLEM TRAINING IN HUMAN PROBLEM SOLVING. J. exp. Psychol., 1954, 48(1), 15-18. (USAF Skill Components Research Lab., Lackland AFB, Tex.).

5021

Two methods for training subjects to solve a simple discrimination problem (for inducing a learning set) are compared. Two groups of 68 and 59 basic airmen were trained on 24 repeated presentations of the same problem and for 24 different problems with the same general solution respectively. Eight trials were given on each problem. Performances of the groups in terms of percent correct responses per problem are compared on the 24 training problems and on three subsequent test problems.

U. R 1

5022

Adams, J.A. THE INFLUENCE OF THE TIME INTERVAL AFTER INTERPOLATED ACTIVITY ON PSYCHOMOTOR PERFORMANCE. Contract AF 33(036) 13214, Proj. 509 020 0006, Res. Bull. 52 11, March 1952, 7pp. USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.

5022

This study deals with the effects on retroactive inhibition of length of the temporal interval between interpolated learning and relearning. Four groups of 12 Ss were given 25 trials on the Revised Complex Coordination Test with standard controls (original learning), 25 trials with reversed controls (interpolated learning), and 10 trials on the original task (relearning). Rest intervals before relearning were 2, 10, 30, or 240 min. Two control groups did not perform the interpolated task and a third group performed the standard task for 60 trials. Level of performance on the final 10 trials is compared for the various groups.

T. G. R 15

5023

Adams, J.A. PSYCHOMOTOR RESPONSE ACQUISITION AND TRANSFER AS A FUNCTION OF CONTROL-INDICATOR RELATIONSHIPS. J. exp. Psychol., 1954, 48(1), 10-15.

5023

In a study of control-indicator relationships in a psychomotor task, 142 basic airmen performed the Pedal Control Test. Angular orientation of the display boxes, and hence direction of indicator movement relative to direction of control movement, was varied among four experimental groups. The groups then performed the task with an identical control-indicator relation. Number of mistakes as a function of trials is analyzed as a measure of speed of acquisition and amount of transfer for each group.

T. G. R 8

5031 Barmack, J.E. & Seltz, C.P. THE EFFECT OF 10 MGS. OF BENZEDRINE SULFATE ON THE SPAN OF ATTENTION FOR LETTERS. J. gen. Psychol., 1940, 21, 195-196. (New York City College, N.Y.).

The effects of 10 mgs. of benzedrine sulfate on the span of attention for letters were compared with those of a blank pill on 32 Ss. Under the conditions of the experiment, 10 mgs. of benzedrine sulfate did not affect the attention span for letters. A substantial practice effect on the letter span was noted between the first and second sessions.

R 1

5032 Barnes, G.H. A FOUR-CHANNEL NOISE SOURCE. Contract AF 33(038) 10420, Proj. 7182, WADC Tech. Rep. 55 134, April 1955, 12pp. USAF Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio.

A low-frequency 4-channel noise source has been constructed for use in human response studies. This device is useful in determining frequency response characteristics for jet pilots. The amplitude on each channel is variable from zero to 1/4 volt rms, and the bandwidth is variable from 0.08 cps to 0.64 cps in 4 discrete steps.

R 4

5033

Bass, D.E., et al. THE EFFECTS OF CONTINUOUS WEAR OF THE COLDBAR UNIFORM. Proj. Ref. 7-64-12-004, Tech. Rep. EP-18, Oct. 1955, 57pp. Headquarters Quartermaster Research and Development Command, Environmental Protection Div., Natick, Mass.

5033

This study was designed to evaluate the effects of continuous wear of the coldbar uniform. A total of 44 subjects were required to wear one of the following uniforms for a period of 25 consecutive days: (1) Standard Cold-bar Uniform; (2) Coldbar, T57-7 (flat stock); (3) Coldbar, T52-9 (perforated); (4) Coldbar, T53-24 (double layer, perforated "olimatat"). Weather conditions, skin reactions, physiological response to a moderate heat load, durability of the uniform material, and the psychological responses of the subjects were recorded. A comparison of these factors provides a basis for a discussion of the relative effectiveness of each of the uniforms.

T. I.

5034

Bartley, S.H. BRIGHTNESS COMPARISONS WHEN ONE EYE IS STIMULATED INTERMITTENTLY AND THE OTHER EYE STEADILY. *J. Psychol.*, 1952, 34, 165-167.

A study was undertaken to determine whether brightness enhancement occurs when one eye is stimulated intermittently and the other eye steadily. The level of the illumination for the steady target was set at 0.11 ft-c and the level of the intermittent target was adjusted until the 2 targets matched in brightness. Readings were taken with and without a septum dividing the fields of view of the 2 eyes; the septum reached from the eyes to the target plane, so that each eye was confronted with only its own target. 2 Ss were used. The results show that for 1 S, intermittent stimulation with no septum was 85% as effective as steady stimulation; for the second S, 58%. With the septum, the 2 forms of stimulation were equally effective for both Ss. Under neither condition was actual brightness enhancement obtained. (Enhancement is defined as the effectiveness of intermittent stimulation which surpasses that of steady stimulation.) (HEIAS)
R 4

5035

Bartley, S.H. CONDITIONS INTENDED TO MANIPULATE ACCOMMODATION AS FACTORS IN PERFORMANCE WITH A VISUAL ACUITY TARGET. *J. Psychol.*, 1953, 36, 409-415.

5035

To determine the effect of the effort of accommodation on responses to targets in which visual acuity is a crucial factor, the distance at which a hairline target appeared, the distance of the circular field or surround, and the illumination of the surround were varied independently. Assuming that deteriorated performance is a function of accommodation difficulties, the effectiveness of performance for 3 observers is presented in terms of percentage of correct responses for orientation of the hairline made under each condition tested.

5036

Bartley, S.H. THE PERCEPTION OF SIZE OR DISTANCE BASED ON TACTILE AND KINESTHETIC DATA. *J. Psychol.*, 1953, 36, 401-408. (Michigan State College, East Lansing, Mich.).

In the several experiments performed in the attempt to find whether vision (through its imagery) operated in tactile and kinesthetic experience, it was found that size and space judgments derived from tactile and kinesthetic information were rather gross. Part of this impression stems from the difficulty in obtaining proper indicators for manifesting size and space perceptions. The more appropriate methods eradicate this. The results indicate that visual imagery plays a very significant and indispensable role, at least if size and space judgments are to be reasonably stable and reliable. This role of visual imagery is evidenced by the lawful change in apparent size with change of distance of exploration from the eye. The results point to the idea that although the blind make extensive use of tactile and kinesthetic information, it must be a sort not describable as the perception of space, but rather the perception of the body moving in the proper way in relation to contact, etc. This is not what we should call true space perception, even though the Ss get around in a spatial world.

5038

Bartley, S.H. INTERMITTENT PHOTIC STIMULATION AT MARGINAL INTENSITY LEVELS. *J. Psychol.*, 1951, 32, 217-223.

An investigation of brightness enhancement produced by intermittent photic stimulation at marginal intensity levels was conducted. In one experiment, frequency was varied, in another, the target area was varied. The targets were 2-in. squares and 11x7 in. rectangles, with the intermittent target on the left. 2 large rectangles were used when frequency was varied (6 steps from 3.6 to 20 pulses per sec.), intensity of the intermittent target was varied at each step to match the brightness of the steady target. It was found that at 20 pulses per sec., all of the 4 Ss judged the effectiveness of the intermittent target to be slightly above the steady one; as the pulse rate was reduced, effectiveness began to rise. For 1 S, the rise began near the critical rate (10 per sec); for another at 13 per sec.; for the other 2 at 7 per sec. When the area was varied, the procedure was the same as before, but the difference in amount of enhancement due to size was not statistically reliable. (HEIAS)
R 10

5039

Bartley, S.H. BRIGHTNESS ENHANCEMENT IN RELATION TO TARGET INTENSITY. *J. Psychol.*, 1951, 32, 57-62.

A comparison was made of the brightnesses of intermittent and steady targets where the target was a disk within a ring, each independently variable in intensity. The intensity of the disk was held constant at each of 15 levels varying from 0.11 to 730.0 ft-c. The ring was made the intermittent field, with a frequency of approximately 10 cps. A series of settings of intensity for the disk from the highest to the lowest were made and the level of brightness of the ring was matched to each setting. 3 Ss were used, one highly trained, one slightly experienced, and one completely naive. The data, presented in graphic form, indicate that a) at high intensity levels the intermittent stimulation was more effective than the continuous, b) throughout a small intermediate range the 2 were substantially equivalent, and c) at low levels of intensity the intermittent stimulation was less effective. The same pattern of results was obtained by all 3 Ss although the cross-over point for the trained S was at 35 ft-c and about 50 ft-c for the untrained Ss. (HEIAS)
R 11

5040

Bartley, S.H. & Seibel, Jean. A FURTHER STUDY OF ENTOPIC STRAY LIGHT. *J. Psychol.*, 1954, 38, 313-319. (Psychology Dept., Michigan State College, East Lansing, Mich.).

Using the flicker method, an attempt was made to determine the intensity of stray light produced at various distances from the retinal images of targets of various intensities and areas. To provide material for comparing off readings for target and surrounding field, off curves for various target areas and intensities were obtained. Offs for the field 6° from the target matched those obtained throughout a certain low intensity range for one area of target. From this, the actual intensity of stray light on the retina was deduced. Measurements of relative level of stray light to target area and intensity compared well with those previously obtained by Bartley and Fry when they studied the effect of stray light on raising the threshold of a test-object. Field off varied in accord with distance from target, edge for 8° or more.

R 13

5041

Bartley, S.H. & Wilkinson, F.R. SOME FACTORS IN THE PRODUCTION OF GAMMA MOVEMENTS. *J. Psychol.*, 1953, 36, 201-206.

The apparent movement observed when all or a portion of the visual field is suddenly raised or lowered in intensity is called here border movement or gamma movement. An examination of some of the possible conditions for the movement was undertaken with variation of 2 factors: target subtense (or its corresponding area) and target intensity. The targets were viewed at 2 distances such that they formed a series of relative areas; from 1 to 512° visual angle; a revolving disk with an open sector produced the pulses at a rate of 1 every 1200 msec. With flashes that, in one case, had an over-all duration of 48 msec. (16 msec. for rise to maximum and 16 msec. for decline), 144 msec. and 128 msec. The procedure consisted in going from intensities that did not produce movement to those at which movement just became apparent. 2 Ss were used. The data are presented graphically showing the relation between target size and intensity for threshold of border movement. As visual angle is increased, the intensity level for threshold border motion rises. Explanations are offered for this finding. (HEIAS)

R 7

5042

Bartley, S.H. & Wilkinson, F. BRIGHTNESS ENHANCEMENT WHEN ENTOPIC STRAY LIGHT IS HELD CONSTANT. *J. Psychol.*, 1952, 33, 301-305.

The fact that intermittent light results in a higher level of brightness than continuous light of the same intensity, under some conditions, is called brightness enhancement. The present investigation was conducted to demonstrate what happens when entoptic stray light is held constant, or, in other words, when the amount of interpulse light is varied. 2 rectangular targets (each divided into 2 equal parts) were used to compare a steady with an intermittent stimulation; both parts of the steady stimulus were equally illuminated but the areas of the other gradually illuminated and darkened alternately (thus scattered light remains constant). In a second part of the study only the top halves of each target were used, one steady and one intermittent. When the stray light was held constant, 2 Ss results were as follows. One required the steady field to be about 160% as intense as the intermittent; the other required only 153%. When the stray light was allowed to vary with the intermittent stimulus (Part II), the steady field had to be 207% as intense for 1 S and 200% for the other. These results indicate that lesser brightness enhancement occurs when the otherwise fluctuating stray light is made uniform. (HEIAS)

R 10

5043

Bartley, S.H. & Wilkinson, F.R. CERTAIN FACTORS IN PRODUCING COMPLEXITY OF RESPONSE TO A SINGLE PULSE OF LIGHT. *J. Psychol.*, 1953, 35, 299-306.

The present article reports an attempt to study a 2-flash response to a single pulse of light by manipulation of pulse intensity and duration and by varying the area of the image on the retina. Pulse duration was set at each of 10 different values (from 3 to 142 msec.) and the intensity was then varied upward so that the second flash just became apparent, and further increased to the point where the second flash disappeared. 6 different retinal stimulus areas (from 2 to 19°) were used; 2 Ss made observations. The data are presented graphically and show that the goodness (distinctness and general impressiveness) of the second flash diminished with the reduction in size of the retinal image. The curves for the largest retinal area are lowest in the intensity range, and that an orderly sequence is followed in the shift upward in the intensity range as retinal area decreases. This holds for pulse duration up to about 70 msec. where the one-flash to 2-flash transition curves for the smaller retinal areas reverse, and rise as pulse duration is further increased. Explanations are offered in terms of neural events. (HEIAS)

R 8

5044

Boldt, R.P., & Ellis, D.S. VOLUNTARY REST PAUSE BEHAVIOR IN A BLOCK-TURNING TASK AS A FUNCTION OF WRIST-CUFF WEIGHT. *J. exp. Psychol.*, 1954, 47, 84-90.

5044

To determine if behavior exhibited in reaching a voluntary rest pause is sensitive to task effortfulness, 80 subjects, 20 at each of four conditions of cuff weight, (0, 0.5, 1, and 3 pounds) performed a block-turning task. Instructions were given to take rests (60 seconds) whenever desired during a ten-minute work period. Knowledge of results was given every thirty seconds in the form of number of blocks turned. The number of responses made and the rate of responding in reaching a voluntary rest were studied by analysis of variance techniques for differences due to weights. The implications for studies of effect of effortfulness on performance are discussed. T. G. R 10

5045

Graybiel, A., Kerr, W.A. & Bartley, S.H. STIMULUS THRESHOLDS OF THE SEMI-CIRCULAR CANALS AS A FUNCTION OF ANGULAR ACCELERATION. *Amer. J. Psychol.*, Jan. 1948, LXI, 21-36. (USN School of Aviation Medicine, Naval Air Station, Fla.).

5045

By use of the human centrifuge records of responses both to constant angular acceleration and to changes in acceleration were obtained using the oculo-gyral illusion as an indicator. Five subjects were tested individually for perception of apparent movement of a collimated star (no movement, left or right movement) under constant acceleration (ten revolutions per minute), acceleration, and deceleration. The responses were to mean conditions over periods of 20 seconds rather than to conditions of the moment. Relationships between direction and amount of change in angular acceleration as expressed in the three responses were analyzed. A threshold for change in acceleration was determined. T. G. R 15

5046

Miller, J.W. & Bartley, S.M. A STUDY OF OBJECT SHAPE AS INFLUENCED BY INSTRUMENTAL MAGNIFICATION. *J. gen. Psychol.*, 1954, 50, 141-146.

The question involved in the investigation reported here is whether a tilted plane figure (2 dimensional, though a figure occupying 3 dimensions with reference to the S) will undergo some change when viewed with optical magnification. A series of plane targets (1 circle and 5 ellipses) varying in minor-major axis ratio from 1 to 0.5 in 5 equal steps was presented to 4 Ss in each of 4 positions (30, 67.5, 45, and 22.5°). All targets were 5 in. on the horizontal axis and were viewed at a distance of 5 ft. Visual clues as to target shape or position were reduced to preclude effective knowledge of them. All targets were viewed first by the unaided eye, and a second time through a 2-power binocular mounted in a fixed position. Nomenclature was used such that the object could be named, its perceived tilt could be designated, and its perceived shape could be indicated by examining the drawing made by the S of the perceived target. Phenomenal regression (tendency not to perceive a shape of the retinal image but to deviate toward the shape of the real object) was examined with and without the use of binoculars. It was found that phenomenal regression did not occur in the latter case to any great extent, or in other words, when the binoculars were used, the seen object was a thinner ellipse than with the unaided eye. With the tilted plane figure (those occupying 3 dimensions in space with reference to the S) the third dimension was found to be reduced when viewed through instrumental magnifiers. (MEIAS)

R 6

5047

Schman, R.D. & Scott, M.L. COLOR AND AFFECT: A REVIEW AND SEMANTIC EVALUATIONS. *J. gen. Psychol.*, 1952, 46, 185-223. (Department of Psychology, University of New Mexico, Albuquerque, N.M.).

5047

This paper reviews a number of surveys and experiments dealing with the relation between color and human behavior covering approximately the period 1920 to 1952. The studies are evaluated in terms of their semantic meaningfulness and in terms of their significance for normal life situations. The summary covers tests of color preferences, the association of color and emotional pattern, chemical studies and behavior correlates of color.

R 53

5051

Ogle, K.N. STEROPSIS AND VERTICAL DISPARITY. *A.M.A. Arch. Ophthalmol.*, 1955, 53, 495-504. (Mayo Foundation)

5051

To study the effect of vertical disparities on stereoscopic depth perception under controlled conditions, a light source was used as the test object. Stereoscopic acuity was determined by the constant stimulus method with two subjects as vertical disparity between the images in the two eyes was increased. The effect was studied for different retinal locations. The results are presented in graphical form and are discussed with reference to possible physiological bases for the phenomena.

5048
Ogle, K.N. BASIS OF STEREOSCOPIC VISION. *A.M.A. Arch. Ophthalmol.*, Aug. 1954, 52, 197-211. (Mayo Foundation & Mayo Clinic, Rochester, Minn.).

What are described which suggest that there are 2 aspects of stereoscopic depth perception: a) a true quantitative, or obligatory, sense of depth that necessitates the simultaneous stimulation of horizontally associated disparate retinal elements, and b) a vaguer qualitative, or facultative, percept of depth, also arising from disparate images. This provides the individual with an experience only of "farther" or "nearer" than the point of fixation; this perception appears to be empirical in nature. The obligatory, or true, stereopsis, because of the limitation imposed through the necessity of stimuli falling on horizontally associated disparate retinal points, implies a physiologic and neuroanatomic basis. The facultative depth perception would be classed with the empirical factors of spatial localization. The experiments show that the facultative depth is enhanced by momentary stimuli, but depressed with continuously visible disparate stimuli. Eye movements would enhance this aspect of depth perception.

R 17

111 - 532

5052
Ogle, K.N. PRECISION AND VALIDITY OF STEREOSCOPIC DEPTH PERCEPTION FROM DOUBLE IMAGES. *J. Opto. Soc. Amer.*, Oct. 1953, 43(10), 906-913. (Mayo Foundation and Mayo Clinic, Rochester, Minn.).

This study reports data on the question as to how precise is stereoscopic depth localization with double images and what is the relationship between that subjective depth and objective depth. Instrumentation was used which permitted a test object to be adjusted relative to a reference object, when both of these were observed in increasing disparity between the images of the 2 eyes and in increasing peripheral angle. The data show that the precision of the stereoscopic depth seems to decrease exponentially with disparity, becoming very small near the limiting values of disparity for stereopsis. When the test object is adjusted for half the depth of the reference object, and adjusted to be as far in front of the fixation point as the depth of the reference is behind, the data show a remarkable validity for a wide range of disparity, until the limiting disparities are approached. Then the stereoscopic depth levels off to a constant value. These results are discussed in relation to the visual processes and spatial localization.

R 18

5053

Ogle, K.W. ON THE LIMITS OF STEREOSCOPIC VISION. *J. exp. Psychol.*, Oct. 1952, 45(4), 253-255. (Section of Biophysics and Biophysical Research, Mayo Foundation, University of Minnesota, Minneapolis, Minn. & Mayo Clinic, Minneapolis, Minn.).

The fact that stereoscopic perception of depth is possible from disparate images which are seen double has been known since the middle of the last century. No systematic investigation of the limiting disparities within which such stereopsis exists, however, has been reported. In this paper an apparatus is described which permits such limiting disparities to be found without its introducing at the same time any of the usual empirical factors to spatial localization. Data on 2 Ss show that there are 2 ranges of depth with double images, the one in which there is a strong patent experience of stereoscopic depth, the second one in which there is a qualitative sense that both double images are seen farther or nearer than the fixation point, depending on the direction of the disparity. Measurements are made by the method of adjustment for the limiting disparities corresponding to these ranges. For a patent stereopsis these disparities range from about 10 minutes of arc at the maculas to 79 minutes of arc at a peripheral angle of 6 arc degrees. The qualitative sense of depth of the 2 double images ceased at disparities of about 15 minutes of arc at the maculas to nearly 2 arc degrees at a peripheral angle of 5 arc degrees. The extent of these regions has never been appreciated before. The existence of these limiting disparities is taken as evidence of neuro-anatomical limitations to be accounted for on the basis of the multiplication and overlapping of neural fibers in the terminal region of the occipital cortex or some other area of the brain. These limiting disparities and the corresponding region in space outside of which no stereoscopic vision exists must be taken into account in any general theory of space perception based on binocular vision.

R 13

5054

Ogle, K.W. OPTICS AND VISUAL PHYSIOLOGY. *A.M.A. Arch. Ophthalmol.*, 1952, 47, 301-320. (Mayo Foundation, Rochester, Minn.).

A review of the literature appearing, with a few exceptions, during the years of 1950 and 1951 in the field of optics and visual physiology is presented. Major topic headings are as follows: refraction, night myopia, aniseikonia, visual acuity, perception of light, adaptation, brightness discrimination, flicker, color perception, ocular movements, fusion, accommodative convergence, space sense, stereopsis, visual space, Pulfrich stereophenomenon, visual factors in aviation, dominance, and illumination-visual comfort. (HEIAS)

A 155

5056

Sells, S.B. & Ellis, R.W. OBSERVATIONAL PROCEDURES USED IN RESEARCH. *Rev. educ. Res.*, Dec. 1951, 21, 432-449.

The research literature appearing during the period 1948 through 1950 is reviewed here as it pertains to observational procedures used in research. The emphasis is on the usefulness of various research techniques as observational techniques. Thus considered, the review embraces various methods of direct observation including instrumental aids; methods utilizing ratings, interviews, case histories and biographies; questionnaires and surveys; as well as indirect techniques of analyzing writings, artistic productions, and other behavioral products. (HEIAS)

R 110

5057

Stroud, J.B. THE ROLE OF PRACTICE IN LEARNING. "Forty-First Yearbook of the National Society for the Study of Education, Part II." 1942, 353-376. The Public School Publishing Company, Bloomington, Ill. (State University of Iowa, Iowa City, Iowa).

5057

This paper discusses the conditions under which practice is effective as they relate to problems of learning in school. The following topics are reviewed: individual differences, characteristics of the material to be learned, mode of presentation, incidental learning, drill, transfer of training, motivation, knowledge of results, symbolic practice, distribution of practice, and amount of practice. Experimental results reported in the literature are cited under each topic.

R 44

5059

Thune, L.E. & Underwood, B.J. RETROACTIVE INHIBITION AS A FUNCTION OF DEGREE OF INTERPOLATED LEARNING. *J. exp. Psychol.*, March 1943, 32(3), 185-200. (State University of Iowa, Iowa City, Iowa).

5058

Thistlethwaite, D., Moltz, H., Kamenetzky, J. & de Haan, H. EFFECTS OF BASIC TRAINING ON LEARNING BY AIRMEN OF DIFFERENT INTELLECTUAL ABILITY. Contract AF 33(038) 25726, Proj. 503 001 0009, AFPTIC TR 54 14, May 1954, 9pp. USAF Personnel Research Lab., Lackland AFB, Tex. (University of Illinois, Urbana, Ill.).

5058

This study was concerned with the relation between intellectual ability and achievement in basic training. Pretest and posttest scores obtained by 933 basic airmen on information tests in 11 content areas were analyzed with respect to intelligence as measured by the Technician Specialty Aptitude Index. Posttest scores for the entire group were compared with those obtained by a control group that had received no pretest.

T. G. R 2

5059

In a study of retroactive inhibition as it related to degree of interpolated learning, 24 college undergraduates learned 10 paired adjectives for five trials. A second list was presented for 0, 2, 5, 10, or 20 trials. Retroaction is measured in number of trials to relearn the original list.

T. G. R 12

5060 Westheimer, G. & Conover, D.W. SMOOTH EYE MOVEMENTS IN THE ABSENCE OF A MOVING VISUAL STIMULUS. *J. exp. Psychol.*, April 1954, 47(4), 283-284. (Ohio State University, Columbus, Ohio).

It was demonstrated that eye movements fitting in all respects the conventional description of smooth or pursuit movements can occur in the absence of a moving visual stimulus in a situation where there is no reason to expect a lower reflex arc to be in operation. It has generally been believed that such movements require for their initiation, the presence of a moving visual stimulus. The evidence presented here suggests that, at least in the case of the present 2 Ss, the pathways subserving smooth movements can be activated without a moving visual stimulus.

R 6

5061 Westheimer, G. THE EFFECT OF SPECTACLE LENSES AND ACCOMMODATION ON THE DEPTH OF FOCUS OF THE EYE. *Amer. J. Optom. & Arch. Acad. Optom.*, 1953, 32(10), 513-519. (Ohio State University, Columbus, Ohio).

On the basis of first-order imagery, a general formula is derived expressing the depth of focus of the eye in terms of the ametropia, accommodation, eye-spectacle lens separation, the diameter of the pupil and the diameter of the retinal blur circles. The values of the latter are related to visual acuity by the use of experimental data of Reese and Fry. In this manner it is found possible to draw graphs relating the depth of focus for a given acuity to the ametropia, accommodation, and pupil size. When expressed in diopters, the depth of focus is independent of object distance. Examples are given of the application of the graphs in multifocal lens calculations.

R 1

5067 Brown, J.S. & Slater-Hammel, A.T. DISCRETE MOVEMENTS IN THE HORIZONTAL PLANE AS A FUNCTION OF THEIR LENGTH AND DIRECTION. *J. exp. Psychol.*, 1949, 23, 84-95.

An investigation was made of the speed and accuracy with which individuals could execute simple discrete movements of the hand and arm. The movements were confined to a horizontal line running parallel to the frontal plane of the body. Each movement was initiated at the sound of a buzzer and consisted in moving the limb as quickly and accurately as possible from one visually-perceived, fixed, reference line to another; 2 directions (left-to-right and reverse) and 3 lengths (2.5, 10, and 40 cm.) were investigated. Detailed graphic records were obtained of each movement for 12 Ss. Qualitative characteristics of the movements include a primary phase, consisting of a rapid initial acceleration and a period of high velocity which does not usually terminate at the target, and a secondary corrective movement to remove the error. Time taken to initiate a discrete movement following the auditory signal is about 0.25 sec. and is independent of distance or direction. Increases in length of movement are accompanied by significant increases in duration of primary movements, speed of movement, and variability of both time and speed. Secondary movements are only slightly affected by increases in length of movement; their duration remains approximately constant for movements within the range of 10 to 40 cm. (HEIAS)

R 6

5062

White, B.W. VISUAL AND AUDITORY CLOSURE. *J. exp. Psychol.*, 1954, 48(4), 234-240. (George Washington University, Washington, D.C.).

This study was concerned with discovering whether the closure factors isolated by Thurstone are specific to vision or whether they can generalize to the auditory modality. One auditory test was found which correlated with 2 visual tests of the second closure factor as highly as the 2 visual tests correlated with each other. This finding suggests that the second closure factor may be a central trait of considerable importance in a wide variety of behavior. Supporting evidence was found in other studies reporting significant relationships between this closure factor and tests of reasoning and temperament. A redefinition of this trait of ability was made in order to free it from its specifically perceptual connotations. Under this broadened definition, several other psychological phenomena--simultaneous contrast constancy, and retroactive inhibition--were suggested as additional situations in which this trait might be manifested. Correlation of individual differences in reaction to these situations with performance on a test such as Concealed Figures would throw further light on the generality of this trait, and offer valuable data both for personality research and perceptual theory.

R 14

5063

Armington, J.C. A NOTE CONCERNING THE VEG SCALE OF APPARENT WEIGHT. *Amer. J. Psychol.*, April 1953, 66(2), 304-306. (Walter Reed Army Medical Center, Washington, D.C.).

5063

This note deals with an examination of the derivation of the formula for the veg scale of apparent weight. An apparent mathematical error is noted, the difficulty pointed out and a possible solution suggested.

T. R 4

5065

Baxter, B. A STUDY OF REACTION TIME USING FACTORIAL DESIGN. *J. exp. Psychol.*, 1942, 31, 430-437. (Ohio State University, Columbus, Ohio).

An investigation of factors affecting RT was conducted with the primary purpose of evaluating the method of factorial design whereby not only the factors investigated but also the interaction of the factors can be evaluated. 3 factors were tested: the hand used for response, sensory modality (auditory and visual), and difficulty of discrimination (simple RT, discrimination between 2, and between 3 stimuli). These factors were arranged in a 3X2X2 factorial design, in which each of 6 Ss was presented with 6 of the combinations of these levels in a random order. The results were summarized as follows: a) there was no evidence that RT for the right and left hands were different; b) there were significant differences in the RTs to situations requiring different levels of difficulty of discrimination, the more difficult requiring greater time; c) reactions to visual stimuli require more time than those to auditory stimuli; d) there is a significant interaction between sensory modality and difficulty of discrimination; e) RT varies significantly between individuals; and f) consistent results concerning the main factors were obtained with the use of only 3 Ss arranged in factorial design. Comparing the confounded design of the above experiment with one using simple randomized blocks where each S was measured in all 12 situations instead of only 6, the writer believes the latter to be the more desirable.

(HEIAS)

R 4

5068

Crowden, A.J.P. ENVIRONMENTAL CONDITIONS IN H.M.S. "WREN" IN THE PERSIAN GULF DURING AUGUST 1951 IN RELATION TO THE HEALTH WELL-BEING AND SALT REQUIREMENTS OF R.N. PERSONNEL. R.N.P. 54/806, C.E.S. 410, ca. 1951, 89pp. Royal Naval Personnel Research Committee, Medical Research Council, London, England.

Environmental conditions in an air cooled frigate of the Persian Gulf Division during August are described, and discussed. A modified Fantus Test for urinary chlorides has been used to study the salt balance of 35 men living in the same vessel under these conditions. Enteric coated salt tablets have been given in varying dosage to Ss, and an attempt has been made to assess the requirements of ratings living and working in different conditions. Problems of health and efficiency of R.N. personnel serving in the Persian Gulf are discussed. Recommendations are made for the conditions of issue and dosage of salt tablets for the prevention of sodium chloride deficiency.

R 19

5069

Jenkins, W.L. & Stone, L.J. RECENT RESEARCH IN CUTANEOUS SENSITIVITY: II. TOUCH AND THE NEURAL BASIS OF THE SKIN SENSE. *Psychol. Bull.*, 1941, 28, 69-91.

A review of recent (1930 - 1940) experimental investigations in the field of cutaneous sensitivity with specific concern for studies on touch and for the evidence concerning the nature of peripheral cutaneous nerve function is presented. Under the topic of touch only those studies that deal with the sensitivity of the skin to simple mechanical stimulation are considered. Sub-topics are distribution of sensitivity, adaptation, discrimination of intensity, discrimination of extent, localization, 2-point limen, and perceptual phenomena. The second large topic, neural basis of the skin senses, is concerned with evidence bearing on the customary assumption that there are 4 cutaneous modalities (touch, pain, warm, and cold) each having separate receptors and nerve pathways. Sub-topics are nerve regeneration studies, differential blocking, histological evidence, and electrophysiological studies. (MEIAS)

R 109

5070

Jones, R.S. INTEGRATION OF INSTRUCTION WITH SELF-SCORING MEASURING PROCEDURES. *Abstr. Doctoral Dissertations*, 1954, (65), 157-165. (Ohio State University, Columbus, Ohio).

5070

In an evaluation of the efficacy of a self-scoring punchboard that provides immediate knowledge of results in a multiple-choice test, about 300 students in a psychology course were given regular tests with this device during the academic term. Scores obtained by these students on a final examination are compared with those obtained by a similar group that had not used the punchboard. Suggestions are made for the use of this device in military training.

5072

North, A.J. & Harrington, J., Jr. LEARNING RESPONSE COMPOUNDS HAVING TWO CRITICAL COMPONENTS. *J. exp. Psychol.*, 1954, 47(3), 173-178. (Southern Methodist University, Dallas, Tex.).

5072

To test the hypothesis that a response component which is varied more frequently in training is learned more accurately, 30 college students were required to point to the appropriate jewel light on a "reaction panel" in response to a given verbal stimulus. Distance or direction of the response movement was varied independently among three experimental groups during training trials. Responses on an identical set of test trials, where both distance and direction were varied, are compared for the groups.

T. I. R 4

5073

North, A.J. & Jenkins, L.B. READING SPEED AND COMPREHENSION AS A FUNCTION OF TYPOGRAPHY. *J. appl. Psychol.*, Aug. 1951, 32(4), 225-228. (Southern Methodist University, Dallas, Tex.).

5073

To study the effect of typography on reading, Ss (180) read a moderately difficult article prepared in three styles of typography: standard, spaced unit (words grouped in thought units), and square span (words grouped to utilize both horizontal and vertical span), and answered objective questions concerning the contents. Each group was subdivided into small groups, one of which received preliminary practice of four or eight min. with the new styles. Scores (reading speed, comprehension, and accuracy) are analyzed in terms of effect of style and practice. Further research is suggested.

T. I. R 6

5074

North, A.J. & Leedy, H.B. DISCRIMINATION OF STIMULI HAVING TWO CRITICAL COMPONENTS WHEN ONE COMPONENT VARIES MORE FREQUENTLY THAN THE OTHER. *J. exp. Psychol.*, June 1952, 43(6), 400-407. (Southern Methodist University, Dallas, Tex. & University of Michigan, Ann Arbor, Mich.).

5074

This is a study of the discrimination of stimuli having two critical components when one component varies more frequently than the other. Fifty-one subjects were presented with nine stimuli possessing two critical components. Each of these components was varied systematically with the other held constant throughout a series of learning trials. Three phases of learning were distinguished: (1) familiarization, (2) original, and (3) test learning. The results are discussed in terms of the relative discrimination of stimulus components which are varied frequently as compared to components varied infrequently.

5075 Odland, L.T. & Sloan, Louise I. SUGGESTED SYSTEMS FOR THE UNIFORM ILLUMINATION OF VISUAL ACUITY TEST CHARTS. *Milit. Med.*, Jan. 1955, 116(1), 37-42. (Johns Hopkins University, Baltimore, Md.).

A lighting unit equipped with 2 fluorescent light sources is described, suitable for use with the 22.4 by 23.6 in. acuity charts recommended by the Armed Forces-NRC Vision Committee. This unit fulfills the recommendations of the committee as to level and uniformity of illumination more closely than does its recommended system of overhead lighting. It has, moreover, other practical advantages as regards portability, cost, and maintenance of the desired level under ordinary conditions of use. An alternative system, consisting of either a single incandescent or 2 fluorescent sources mounted on a floor-stand is also described, and shown to meet the requirements as to level and uniformity of illumination, when placed at the proper location in relation to the test chart.

R 7

5076
Cweas, W.A., Jr. AGE AND MENTAL ABILITIES:
A LONGITUDINAL STUDY. Genet. Psychol.
Monogr., 1953, 48, 3-54. (Iowa State Coll.)

5075

This investigation has as its primary problem the determination of the effects of a 30-year age increment upon mental functions as measured by the Army Alpha, Form 6. It also concerns itself with the effects of the increment upon individual and trait differences, and the relation of personal-social variables to the observed shifts in mental functions. One hundred twenty-seven males were retested on the Army Alpha after a period of 31 years, and utilizing a personal information inventory, the results were treated in terms of temporal shifts in subtest and total Alpha scores, effects of age upon individual and trait differences, and the specific abilities reflected in the sub-tests. T.G.R.27.

5082

Seitz, C.P. & Barnack, J.E. THE EFFECTS OF 10 MCS. OF BENZEDRINE SULFATE AND LOW OXYGEN TENSION ON THE SPAN OF ATTENTION FOR LETTERS, AND OTHER FACTORS. J. Psychol., 1940, 10, 241-247. (University of Alabama, University, Ala. & College of the City of New York, N.Y.).

5082

The attention span for letters of 18 male subjects was measured under three conditions: 1) normal air and a blank pill, 2) simulated altitude of 16,000 feet and a blank pill, and 3) simulated altitude of 16,000 feet plus ten milligrams of benzedrine sulphate. Each session was approximately one hour. The visual angle of the exposed material was seven degrees. Subjective rating sheets concerning feelings, attention, and the like were filled out at the end of each session. Differences in objective attention span and subjective ratings among the three conditions were analyzed. T. R 5

5083

Quartermaster Food & Container Institute for the Armed Forces. PREFERENCE RATINGS FOR OPERATIONAL RATIONS ITEMS. Proj. 7 84 15 007, Termination Rep., Sept. 1956, 13pp. Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

5083

To obtain relative preference ratings for individual components of operational rations (Army), 97 such components served in small portions were rated on the hedonic scale by 2160 enlisted Army personnel. Where appropriate, based on intended use, more than one form of the item was rated (some meat items rated both hot and cold). Lattice designs were used to assign items in different combinations to each group of subjects. Mean hedonic ratings (9-Like Extremely; 1-Dislike Extremely) were analyzed for reliability of ratings and final preference ratings adjusted accordingly. Some significant relationships are discussed in terms of previous laboratory ratings. Suggested uses for the data are offered. T. R 5

5084
Slater-Hammel, A.T. BLACKOUT INTERVAL DURING EYE BLINKS. Res. Quart., Oct. 1953, 24(3), 362-367. (Indiana University, Bloomington, Ind.).

Direct measures of the blackout period during a blink were obtained from 25 adult Ss. in an experimental situation involving visibility, the blackout threshold for all Ss was found to be approximately .06 secs., with individual thresholds ranging from .04 to .09 secs. Some implications relative to the effect of the blink blackout upon various activities were noted. R 4

5085
Slater-Hammel, A.T. REACTION TIME AND SPEED OF MOVEMENT. Percept. Mot. Skills Res. Exch., 1952, 4(3-4), 109-113. (Indiana University, Bloomington, Ind.).

Measurements of reaction time and speed of arm movement over an arc of 120 degrees were obtained from 25 physical education majors. It was found that the mean reaction time was .22 secs. and the mean movement duration .238 secs. A correlational analysis of the relationships between reaction time and movement duration revealed values which were well within the limits of the sampling error of a true zero correlation. Some suggestions as to the probable significance of these findings were made. R 5

5086
Slater-Hammel, A.T. EFFECT OF BLINKING UPON REACTION-TIME MEASURES. Res. Quart., Oct. 1954, 25(3), 338-343. (Indiana University, Bloomington, Ind.).

The possible effects of normal involuntary blinking upon reaction time measures were investigated through a comparison of blink rates and the incidence of blinking in relation to preparatory signal, response signal, and the S's response. Analysis of the data revealed that: a) the frequency of blinking was markedly decreased during reaction time responses, b) blinking was generally inhibited between presentation of the preparatory signal and the S's response, and c) blinks coincided with presentation of the response signal in only 0.1 per cent of the cases. The results indicated that blinking has little effect upon reaction time measures. R 8

5087
Slater-Hammel, A.T. REACTION TIME TO LIGHT STIMULI IN THE PERIPHERAL VISUAL FIELD. Res. Quart., March 1955, 26(1), 82-87. (Indiana University, Bloomington, Ind.).

In an experimental situation involving binocular vision, the reaction time to light stimuli both directly and indirectly perceived was investigated. From the results obtained, it was concluded: a) reaction time increased as the distance of the response stimulus increased from direct vision; b) the direction of the response stimulus from direct vision was not a significant variable; and c) reaction time to response stimuli directly perceived provided an excellent relative index of reaction speed to stimuli indirectly perceived. R 1

5091

Stoan, L.L. RATE OF DARK ADAPTATION AND REGIONAL THRESHOLD GRADIENT OF THE DARK-ADAPTED EYE: PHYSIOLOGIC AND CLINICAL STUDIES. *Amer. J. Ophthalmol.*, June 1947, 30(6), 795-720.

Data are given showing the range of variation among normal subjects in a) the dark-adaptation curve of a single retinal region and b) the threshold gradient of the fully dark-adapted eye in the horizontal meridian of the retina. The same tests were given to 5 subjects on diets low in vitamin A. 2 showed no significant change in the adaptation curve or the threshold gradient after 30 and 195 days respectively on the diet; 2 showed only slight increase in the thresholds after 41 and 91 days; and one showed a very marked rise in the thresholds after 42 days. 2 of the 5 developed concentric contraction of the visual fields which returned to normal after vitamin A was restored to the diet. Studies were also made of 9 patients with elevated light thresholds which were restored to normal following vitamin therapy. The findings indicate that riboflavin in addition to vitamin A may sometimes be required to bring about complete recovery. The results of these studies suggest that concentric contraction of the visual field occurs frequently in patients with ocular vitamin A deficiency and probably indicates cone as well as rod involvement.

R 23

5088

Slater-Hammel, A.T. INITIAL BODY POSITION AND TOTAL BODY REACTION TIME. *Res. Quart. Amer. Assoc. Health, Phys. ed. & Recreation*, March 1951, 24(1), 91-96. (Indiana University, Bloomington, Ind.).

The total body reaction time was measured under the following starting positions: a) The knees straight with weight distributed over feet, b) knees bent with weight on the balls of feet, c) knees bent with weight distributed over feet, d) knees bent with weight on balls of feet. The starting positions with the body weight distributed over the feet were significantly shorter than those positions with the weight over the balls of the feet. For each weight distribution group, no significant differences were found for starting reactions involving the positions of the knees. A post-experiment study of the changes in weight distribution revealed that most subjects consistently rocked back on their heels in completing a reaction. It was suggested that starting reactions from the balls of the feet require more time because the time required to lower the heels to the floor was included in the reaction time.

R 6

5093

Stone, L.J. & Jenkins, W.L. RECENT RESEARCH IN CUTANEOUS SENSITIVITY: I. PAIN AND TEMPERATURE. *Psychol. Bull.*, May 1940, 37, 285-311.

This review of research on pain and temperature aspects of cutaneous sensitivity covers a period from 1930 through 1939 in both English language and foreign language publications. The various topics subsumed under pain are as follows: pain as a specific modality, new theories of the neural mechanisms of pain and hyperalgesia, chemical factors in pain and analgesia, visceral and referred pain, phenomena of plural stimulation, localization of pain, and adaptation of pain. Topics treated under temperature are the following: attempts to identify receptors, theories of receptor action, adaptation, mapping, paradoxical warmth, heat, genetic studies, phenomena of plural stimulation, and perceptual phenomena.

R 153

5098

Vallance, T.R. SUGGESTIBILITY OF SMOKERS AND NON-SMOKERS. *Psychol. Record*, Sept. 1940, 10(10), 138-144. (Miami University, Oxford, Ohio).

5098

To determine the presence or absence of a relationship between tobacco smoking and one measurable form of positive suggestibility, 47 subjects, of whom 25 were smokers and 22 were non-smokers, were tested for amount of body sway that could be induced by suggestion. Subjects were told that the purpose of the experiment was to determine their acuteness of equilibrium; the suggestion of falling or swaying forward was then given several times under conditions of voluntary eye-closing and a blindfold. Amount of body sway was measured and compared for smokers and non-smokers.

T. G. P 3

5092

Schmitt, W.A. THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VIBRATION ON HUMAN PERFORMANCE. Contract DA 49 007 MD 757, Prog. Rep. 2, Jan. 1959, 62pp. *Bostron Research Labs., Milwaukee, Wisc.*

5092

To investigate the effects of low frequency, high amplitude vibration (of the type found in work vehicles) on human performance, 18 subjects were exposed to vibrations (while seated on a wooden chair on a mechanical shake table) of 2.5 and 3.5 cps at two displacements for 90-minute periods. Pre- and post-control measures were taken before and after each session. Their performance was compared to a no-vibration condition on these tests: 1) hand tremor, 2) visual acuity, 3) compensatory tracking, 4) foot pressure constancy, 5) foot reaction time, and 6) body equilibrium. One human subject and three dogs were exposed to frequencies in the one-to-eight cycle range and various physiological measurements were made.

T. G. I. R 25

5099 Vanderplus, J.M. THE APPARENT SIZE OF OBJECTS VIEWED THROUGH TELESCOPES. Proj. 6334, WADC Tech. Rep. 54-459, Oct. 1954, 15pp. Air Research and Development Command, USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

When objects are viewed through telescopes or periscopes having restricted fields of view, they often appear to be of a different size or distance than when they are viewed with the naked eye. This creates a serious problem in certain aircraft uses where it is important that size and distance judgments be accurate. While no completely satisfactory explanation of this phenomenon has been offered, a previous study has ruled out the effects of refraction in the visual field as major contributors. This report reviews several factors, inherent in the design of optical systems, which might conceivably operate to produce apparent size and distance alterations. Some phenomena of visual perception of size and distance are discussed and these phenomena are related to factors in the design of sighting telescopes for accurate perception of size and distance. Several possible theoretical approaches are suggested to the solution of the problem of object appearance when viewed through telescopes and periscopes.

R 15

5103 Hansen, R.G. THE EFFECT OF STATIC AIR PRESSURE IN THE EXTERNAL AUDITORY MEATUS ON HEARING ACUITY. WADC Tech. Rep. 55-95, April 1955, 61pp. Air Research and Development Command, USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

The specific purposes of this study were to determine the effects of various static air pressures in the external auditory meatus on a) threshold sensitivity and b) hearing acuity at 2 loudness levels above threshold. To determine the effect of a pressure differential across the tympanic membrane on the threshold sensitivity, measurements were obtained by the Method of Adjustment for 10 ears at each of 41 frequencies from 100 to 8000 cps at each of 4 pressure conditions (-10, -20, +10, +20 cm H₂O). For all pressures used, threshold sensitivity was generally decreased for frequencies below 1500 cps with a slight increase in sensitivity for frequencies between 1500 and 2300 cps and a general decrease in sensitivity for frequencies between 2300 and 8000 cps. To test the effect of pressure on loudness, 5 subjects made equal loudness balance judgments for 6 frequencies (200, 400, 1000, 1600 and 4000 cps) at 30 db and at 60 db above threshold under each of the 4 experimental pressure conditions. As in the threshold sensitivity study, results indicated a general decrease in sensitivity for frequencies below 1000 cps, and only slight effects on the higher frequencies. The effect of static pressure on speech intelligibility was also studied and in the range investigated was found negligible.

R 11

5100 Wasserman, H.M. A UNIFYING THEORETICAL APPROACH TO MOTOR LEARNING. *Psychol. Rev.*, July 1952, 59(4), 278-284. (New York University, New York, N.Y.).

5100 Five current theories of motor learning are reviewed. Certain disparate experimental data on motor learning are discussed, and an attempt is made to account for them in terms of a proposed extension of Hull's performance inhibition theory.

R 16

5102 McFarland, R.A., Moore, R.C., & Warren, A.B. HUMAN VARIABLES IN MOTOR VEHICLE ACCIDENTS: A REVIEW OF THE LITERATURE. 1955, 203pp. Harvard School of Public Health.

5102 This review and interpretation of literature integrates the results of observation and research on the role of human variables in causing or contributing to motor vehicle accidents. Those findings most useful for the prevention of accidents are identified and areas for research and continued study are indicated. The various chapters include: the magnitude of the vehicular accident problem, analysis of causes of accidents, susceptibility to accidents of driver, other characteristics of the driver in relation to accidents (sensory, psychomotor, intellectual, emotional, biographical), temporary states and limiting conditions (fatigue, toxic substances), selection and training of drivers, vehicular factors (defects, design), environmental factors (visibility, weather, highway design), and driver behavior and the social environment. A topical index is included. R 1031

5104 Ferris, H.M., Fox, R.H., & Lind, A.P. PHYSIOLOGICAL RESPONSES TO HOT ENVIRONMENTS OF YOUNG EUROPEAN MEN IN THE TROPICS: VII. THE ENERGY EXPENDED IN THE COMPONENT ACTIVITIES OF A STEP CLIMBING ROUTINE. R.N.P. 54/818, C.E.S. 417, T.R.U. 51, June 1954, 14pp. Medical Research Council, Royal Naval Personnel Research Committee, Cambridge, England.

These experiments formed part of a series of experiments performed at the Royal Naval Tropical Research Unit, Singapore, designed to investigate the effect of work on the responses of naturally acclimatized young men exposed to hot climates. The aim of the experiments described here was to measure the energy expended by 4 Ss while resting seated and while step-climbing on and off stools, 1 ft. high, 12 times a min. The mean energy expenditure of the 4 Ss was 54.8 kcal/m²/hr. while resting and 166.9 kcal/m²/hr. while step-climbing. The results are compared with those of 2 earlier series, one at Singapore and one in London. The resting energy expenditure of the Ss in the present series was higher than in the earlier Singapore series, probably as a result of a small difference in the posture adopted by the Ss in the 2 series. With this qualification, the 2 Singapore series are in agreement and suggest that when performing the same standardized exercises the Singapore Ss expended less energy than those in London. Possible causes for the differences between the results obtained in London and in Singapore are discussed. It is considered that with the data available, it would be most unwise to attribute the difference to an acclimatization effect.

R 11

5105
Fisher, M.B., & Birren, J.E. AGE AND STRENGTH. *J. appl. Psychol.*, Oct. 1947, 31, 490-497.

5105
To investigate the relation between age and hand strength, six groups of subjects were tested on the hand dynamometer with three groups of subjects serving to test the reliability of the procedure. Results are discussed in terms of statistical design, sampling factors, particular aspects of aging (e.g. organic deficit, vocational participation, etc.), and the relation between present findings and previous studies of a similar nature.
T.G.R.18.

5106
Alluisi, E.A. & Harker, G.S. THE STEREO-OPTOMETER--A SIMPLE HAPLOSCOPIC INSTRUMENT FOR THE STUDY OF BINOCULAR SPACE PERCEPTION. *Science*, June 1953, 117, 682-683.

The design and operation of an instrument for the study of binocular space perception is described. The requirements met were that the instrument a) approximate the visual tasks of the operator of a binocular stereoscopic range finder; b) be as psychologically simple as possible; and c) be adaptable to use both in controlled laboratory situations and in actual field situations. Schematic diagrams of the reflex sight and of the stereoptometer are given. (MEIAS)

5107
Archer, E.J. POSTREST PERFORMANCE IN MOTOR LEARNING AS A FUNCTION OF PREREST DEGREE OF DISTRIBUTION OF PRACTICE. *J. exp. Psychol.*, Jan. 1954, 47(1), 47-51. (University of Wisconsin, Madison, Wisc.).

5107
In a study of reminiscence in a motor task, 243 college students performed an inverted-alphabet printing task for 20 trials under one of three inter-trial intervals and then for five more trials after a rest period. Pre- and post-rest performances by the three experimental groups are discussed in terms of habit strength and reactive inhibition.
T. G. R 8

5108
Arnoult, M.D. LOCALIZATION OF SOUND DURING ROTATION OF THE VISUAL ENVIRONMENT. *Amer. J. Psychol.*, Jan. 1952, LXV, 48-58. (University of Texas, Austin, Tex.).

5108
To investigate the effect of visual-auditory interaction on the localization of sounds, the experience of rotating was induced visually by rotating the entire visual environment--a large striped cylinder in which the subject was seated. Ten subjects tested individually were required to report the location of a sound in the horizontal plane under three conditions: 1) while experiencing rotation to the right, 2) the same to the left, and 3) while stationary. The sound stimulus was a loud buzz made by headphones placed in the horizontal plane at ten degree intervals (40 degrees left to 40 degrees right). Mean localizations, latencies, post-rotational effects, and eye movements were analyzed.
T. G. R 11

5109
Arnoult, M.D. SHAPE DISCRIMINATION AS A FUNCTION OF THE ANGULAR ORIENTATION OF THE STIMULI. *J. exp. Psychol.*, 1954, 47(5), 323-328.

Pairs of 2-dimensional nonsense figures were presented tachistoscopically to Ss who were required to judge them for identity of shape. Each shape could be rotated clockwise or counterclockwise in its own plane to any of 8 angular positions. The combinations of the angular positions of the 2 shapes in each pair resulted in angular separations of the shapes in multiples of 30° between 0° and 180°, inclusive. The accuracy and latency of shape discrimination were studied as a function of the angular separation of the shapes. The results may be summarized as follows: On the trials on which the 2 shapes were actually identical, errors increased as a function of increased angular separation. The range of errors was from 20% to 40%. On the trials on which the 2 shapes were actually different, errors showed an initial decrease (30° separation), followed by an increase (60°-150°) and a final drop at 180°. The range of errors on these trials was from 12% to 15%. Latencies on the "S" trials were consistently higher than on the "D" trials. The changes in latency as a function of angular separation were statistically significant, though irregular. Generalization of these results is limited by the fact that, in the case of both errors and latencies, a significant interaction was found between angular separation and the variable of shape. The use of 'shape' as an independent variable is difficult because it is impossible to specify the procedure for selecting a representative sample of shapes to be used as stimuli.

R 3

5110
Baker, L.W. & Taylor, W.M. THE RELATIONSHIP UNDER STRESS BETWEEN CHANGES IN SKIN TEMPERATURE, ELECTRICAL SKIN RESISTANCE, AND PULSE RATE. *J. exp. Psychol.*, Nov. 1954, 48(b), 361-366. (Purdue University, Lafayette, Ind.).

5110
To study the relationships between skin temperature changes and other physiological changes previously associated with emotional responses, polygraph recordings of skin temperature, skin resistance, and pulse were made of 32 subjects. Two conditions were used: 1) an assumed emotion-provoking (jumping electrical spark by means of an electric coil), and 2) induced muscular tension (hand dynamometer at subject's optional level). Changes in the three measures under the stress conditions were measured against the measures taken in a resting condition.
T. R 19

5111
Bell, H.M. REST PAUSES IN MOTOR LEARNING AS RELATED TO SNOODY'S HYPOTHESIS OF MENTAL GROWTH. *Psychol. Monographs*, 1942, 54(1, Whole 243), 1-38. (Department of Psychology, Chico State College, Chico, Calif.).

5111
This experiment tested the hypothesis that two processes of "mental growth" occur at different stages in the learning process. The Ss, 457 college students divided into 11 groups, practiced a pursuit rotor task for 20 trials; longer intertrial intervals were introduced after the fifth trial for some groups and after the fifteenth trial for others. The data, scores during acquisition and retention, are compared for the groups and are discussed in terms of "warming-up" and interference effects.
T. G. R 35

5112

Berdie, R.F. EFFECT OF BENZEDRINE SULPHATE ON BLOCKING IN COLOR NAMING. *J. exp. Psychol.*, Sept. 1940, 27, 325-332.

An experiment was conducted to determine the influence of 15 mg. of benzedrine sulphate on blocking during a color naming task and of speed of response. 15 Ss were each given 4 10-min. trials in naming 100 colored squares (yellow, blue, black, red, and green) arranged on a square card. Responses, time in secs, and errors were recorded. The first trial was for practice; the second was also alike for all Ss; in the third the Ss were randomly divided into 3 groups (drug, placebo, nothing); the final trial was alike for all Ss and was given 4 days later. The analysis of data warrants the following conclusions: a) 15 mg. benzedrine sulphate has no effect on length or number of blocks occurring in color naming; b) the same amount of the drug slightly increases speed in color naming; and c) most of the variation in blocking and speed of response is due to individual differences. (HEIAS)

R 21

5113

Berkeley, A.W. LEVEL OF ASPIRATION IN RELATION TO ADRENAL CORTICAL ACTIVITY AND THE CONCEPT OF STRESS. *J. comp. physiol. Psychol.*, Oct. 1952, 45(5), 443-449. (Worcester State Hospital, Worcester, Mass.).

31 normal men performed a level of aspiration test under both success and failure conditions. The stressfulness of this task was evaluated in terms of change in rate of urinary 17-ketosteroid excretion during the test period as compared with a pretest control period. The extent of discrepancy between aspiration and achievement with respect to both success and failure conditions was related to increase in rate of 17-ketosteroid excretion. Greater discrepancies were accompanied by increases in steroid excretion, a coefficient of multiple correlation of .70 taking both conditions into consideration. These results are related to previous psychological interpretations of goal behavior in the level-of-aspiration setting. The concept of stress is discussed with reference to the synthesis of divergent findings in the area of level of aspiration and as a means of bringing goal behavior into the framework of the integrated adaptive activity of the organism.

R 12

5114

Bevan, W. & Dukes, W.F. COLOR AS A VARIABLE IN THE JUDGMENT OF SIZE. *Amer. J. Psychol.*, April 1953, LXVI, 283-288.

5114

To study the effect of color on judgments of size under conditions approximating those of ordinary experience, 16 Ss selected from a series of 14 neutral gray reference cards (from 9 by 18 centimeters to 22 by 44 centimeters) those judged equal to 16 test cards of four colors (red, yellow, green, blue) and various sizes (from 11 by 22 centimeters to 20 by 40 centimeters). The experiment was conducted in bright sunlight outdoors with stimulus targets attached at eye-level to poles and trees in the area. The data are expressed as ratios of judged area to actual area and analyzed for significant errors of estimation.

T. R 3

5115

Bevan, W. & Zener, K. SOME INFLUENCES OF PAST EXPERIENCE UPON THE PERCEPTUAL THRESHOLDS OF VISUAL FORM. *Amer. J. Psychol.*, July 1952, 65, 434-442.

5115

To investigate some aspects of past experience upon perception of visual form, 12 Ss performed under the following conditions: 1) 24 simple, relatively nonmeaningful designs were projected on screen with subliminal intensities and illumination increased until S reported seeing something. He then reproduced his perception by drawing; the procedure was repeated until reproduction was accurate. 2) Supraliminal exposures, 12 of the same figures, and 3) first procedure repeated with original 24 plus 20 new figures. The data are analyzed in terms of limens at three levels (first, incomplete, and complete perception) as a function of practice.

T. G. I. R 6

5116

Bevan, W. & Dukes, W.F. VALUE AND THE WEBER CONSTANT IN THE PERCEPTION OF DISTANCE. *Amer. J. Psychol.*, Oct. 1951, 64(4), 580-584. (Emory University, Atlanta, Ga.).

Using the method of average error of classical psychophysics, 40 college students each made 20 judgments of distance with a modified Howard-Doman distance-perception apparatus. Stimulus-objects were 2 light green cardboard rectangles, equal in size to U.S. currency. On the basis of both the Ss' average and constant errors, 2 comparable groups were formed. Several days later the control group repeated the original task while the experimental group made their judgments with \$20 bills as stimulus-objects. Comparison of the results from the second-session performance of the 2 groups showed a significantly smaller average error for the experimental group ($t = 3.00$, $df. = 38$, $P < 0.01$). These results emphasize the role of motivational variables in a response system traditionally described in terms of purely cognitive functions.

R 13

5117 Bevan, W. THE INFLUENCE OF FIGURAL AFTER-EFFECTS UPON VISUAL INTENSITY THRESHOLDS. *J. gen. Psychol.*, 1951, 45, 189-207.

3 series of experiments were carried out in order to explain the influence of the figural after-effect upon visual intensity thresholds. The general procedure consisted of determining thresholds for certain figures (test figures) using a modified form of the method of limits, before and after the S had fixated other figures (inspection figures) for a set period of time. 98 Ss were used in the tests. In Series I, in which the inspection figures were simple geometrical outlines and the test figures were pairs of small dots or geometrical figures presented inside and outside the inspection figure area, it was found that the thresholds for test figures presented inside the inspection figure area were higher than those falling outside this region. This increase in threshold level was statistically reliable both in terms of magnitude and frequency of occurrence. This effect was more systematically explored in 2 further series. In these the inspection figure was a narrow vertical line of light, the test figure a dot of light presented various distances from the locus of the inspection figure. The results of these series confirmed those of Series I and in addition indicated that the strength of figural after-effect (amount of increase in threshold) varied with the distance between inspection and test figure positions.

R 14

5118

Birren, J.E., Bick, M.W., & Fox, Charlotte. AGE CHANGES IN THE LIGHT THRESHOLD OF THE DARK ADAPTED EYE. *J. Geront.*, Oct. 1948, 3, 267-71.

5118

To investigate age changes in the light threshold of the dark adapted eye, minimum light thresholds following three minutes of light adaptation were determined on 130 subjects ranging in age from 18 to 83 years. In addition, mean thresholds following 28 to 30 minutes of dark adaptation were used for comparative purposes. The pupils of all subjects age 40 or over were dilated with ephedrine. Results are discussed in terms of change in light threshold with age in both institutionalized and community-residing subjects.
T,R15.

5119

Birren, J.E., & Botwinick, J. AGE DIFFERENCES IN FINGER, JAW, AND FOOT REACTION TIME TO AUDITORY STIMULI. *J. Geront.*, Oct. 1955, 10, 429-32.

5119

In order to discover whether slowing of reaction time is correlated with path length of the peripheral nerves, two groups, defined according to age (19 to 35 and 61 to 91 years) of 32 subjects each were investigated with regard to differences in finger, jaw, and foot reaction time to auditory stimuli. Results are presented and discussed in terms of differences between age groups and the implications of the findings with finger, jaw and foot reaction for the neurological site of response latency.
T,G,R15.

5120

Webster, J.C., Beltscher, H.R. & Silkwood, J.A. ACOUSTIC ATTENUATION OF NOISE SHIELDING DEVICES. AS 02503, NEL 182, Rep. 482, March 1954, 13pp. *USN Electronics Lab.*, San Diego, Calif.

Tests were made of the relative capabilities of the following types of noise attenuating devices for use in aircraft: experimental shields covering the head, PDR-8 donut cushions (NAF 48490-1) in various mounts, insert type earphones (Airphone D-98), and combinations of these devices. It was found that, in the frequency range near 800 cps which is the most important for existing sonars, the most effective attenuators are the shields, followed in order by the donut cushions and the insert type phones. For listening comfort over long periods, the order of merit is exactly opposite.

5121

Birren, J.E., & Botwinick, J. SPEED OF RESPONSE AS A FUNCTION OF PERCEPTUAL DIFFICULTY AND AGE. *J. Geront.*, 1955, 10, 433-436. (National Institute of Mental Health)

5121

In order to investigate speed of response as a function of perceptual difficulty and age, 30 subjects aged 19 to 36 years were compared with 43 subjects aged 61 to 91 years in a task requiring judgment of size of two tachistoscopically presented vertical lines. The results are treated in terms of differences in performance between the age groups per se and for progressively more difficult perceptual discriminations as defined by smaller differences between line lengths.
T,R9,G.

5122

Birren, J.E., & Botwinick, J. THE RELATION OF WRITING SPEED TO AGE AND TO THE SENILE PSYCHOSES. *J. consult. Psychol.*, 1951, 15, 243-249.

5122

To determine the relation of speed of writing to age and to senile psychoses, 554 subjects aged 16 to 89 years, and 35 patients diagnosed as senile psychotic were presented with digit and word writing tasks. Results are presented and discussed in terms of differences in performance among age groups and differences between the senile psychotic group and a group comparable in age and education. The diagnostic use of writing tests and the possible factors accounting for functional loss reflected in the aging process are also discussed.
T,G,R10.

5123

Birren, J.E., Allen, W.R., & Landau, H.G. THE RELATION OF PROBLEM LENGTH IN SIMPLE ADDITION TO TIME REQUIRED, PROBABILITY OF SUCCESS, AND AGE. *J. Geront.*, 1954, 9, 150-161.

5123

To investigate the relation of the length of a simple addition problem to the time required for solution, the probability of success, and the age of the individual performing the task, 413 subjects ranging from 16 to 90 years of age were required to add single columns of digits ranging in length from 2 to 25 digits. The results are treated in terms of performance differences among age groups, per se, and as a function of problem length and number of operations required to solve the task.
T,G,R17.

5124

Birren, J.E., Casperson, R.C., & Botwinick, J. AGE CHANGES IN PUPIL SIZE. *J. Geront.*, 1950, 5, 215-221.

5124

To investigate the relation between size of pupil and age, photographic measurements were made on 222 subjects, ranging in age from 20 to 89 years, under both light and dark conditions. The results are discussed in terms of correlations between age and pupil size and the relation of pupil size to dark and light conditions with age held constant.
T,G,R7.

5125

Birren, J.E. & Shock, N.W. AGE CHANGES IN RATE AND LEVEL OF VISUAL DARK ADAPTATION. *J. appl. Physiol.*, Jan. 1950, 2(7), 407-411. (National Institute of Health, Bethesda, Md. & Baltimore City Hospitals, Baltimore, Md.).

5125

To investigate the relation of age to rate and level of visual dark adaptation, a Hecht Shlaer adaptometer was used to measure the light thresholds of 91 Ss ranging in age from 40 to 83 years. The pupils of all Ss were dilated with ephedrine for both light and dark adaptation periods. Results are discussed in terms of rate of cone and rod adaptation and individual thresholds as related to age.
T. G. R 12

5126

Slankenship, A.B. & Whitely, P.L. PROACTIVE INHIBITION IN THE RECALL OF ADVERTISING MATERIAL. *J. soc. Psychol.*, 1941, 13, 311-322. (Franklin and Marshall College, Lancaster, Penn.).

5126

In a test of proactive inhibition in the recall of advertising material, 85 students were required to study a grocery advertisement for five min. and to recall the items on it immediately and after an interval of 48 hours. Prior to this task, the Ss learned a list of similar material, learned a list of dissimilar material (nonsense words), or underwent no prior training. Proactive inhibition is measured in terms of the difference in mean number of items correct on the immediate and delayed tests of retention.
T. I. R 6

5127

Boring, E.G. A COLOR SOLID IN FOUR DIMENSIONS. *Année Psychol.*, Cinquantième année, Vol. Jubilaire, 293-304. Presses Universitaires de France.

The tridimensional color system is based on an attributive analysis of color and places every color in relation to the others with respect to hue, brightness, and saturation. The double pyramid (Ebbinghaus), the double cone (Troland), and the sphere (Mundt) are the familiar forms of the color solid. A different conception of the relations of the colors is given by component analyses where there are assumed 7 fundamental components corresponding to 7 unique colors: red, green, yellow, blue, white, black, and gray. This leads to a 4-dimensional figure; the complementary colors are paired as mutually exclusive plus gray. The possibility of constructing and using an orthogonal figure is considered and rejected since such a figure lacks didactic and demonstrational value. (HEIAS)

R 9

5128

Boring, E.G. THE SIZE OF THE DIFFERENTIAL LIMEN FOR PITCH. *Amer. J. Psychol.*, 1940, 52, 450-455.

The size of the differential limen for pitch has always been of especial interest because it is supposed to fix the minimal differentiation in the inner ear that a place theory of pitch, like Helmholtz's must have. The conventional values that are usually cited for the chief investigations are inspected; it appears from casual appearances that the limens, consistently small in the early days, got suddenly larger about 1900. This paper presents a critical investigation of methods used in each investigation and of the factors besides the fundamental frequency of the stimulus that affect the size of the differential limen: practice, individual differences, method of limits vs. method of right and wrong cases, continuous change vs. abrupt change, fixed vs. variable inequality between the standard and comparison stimuli, presence of overtones and transients, and loudness. In conclusion, the writer feels that at the present time there is no way of determining the maximal sensitivity of the ear to difference of frequency without artifacts, but he does present some guides by which maximal sensitivity and comparable results might be obtained. (HEIAS)

R 11

5129

Boring, E.G. SIZE CONSTANCY AND EMmert's LAW. *Amer. J. Psychol.*, 1940, 52, 293-295. (Harvard University, Cambridge, Mass.).

This note demonstrates the mutuality of Emmert's law and the principle of size constancy and shows that the validation of the one hypothesis indicates the validation of the other, and conversely. This note does not discuss the validity of either hypothesis, however; it merely shows the nature of their relationship. (HEIAS)

R 3

5130

Boring, E.G. THE MOON ILLUSION. *Amer. J. Physics*, 1943, 11, 55-60. (Harvard University, Cambridge, Mass.).

The moon illusion (horizon moon is perceived larger in size than moon in heavens) is discussed in terms of several explanations that have been put forward. Some experiments regarding to the conditions of the illusion are summarized with the following conclusions: There is no satisfactory further theory for explaining the phenomenon. It is not due to physical causes outside the visual mechanism since differences do not appear in photographic measurements. It is not due to the greater brightness of the moon in elevation, when the atmospheric haze is diminished. It does depend on raising or lowering the eyes. Movements of head, neck, and body do not cause it. A tentative suggestion is made that the effort of raising or lowering the eyes shrinks the perceived size of the moon - a theory of inhibition or drainage might be plausible. (HEIAS)

R 9

5131

Boring, E.G. THE PERCEPTION OF OBJECTS. *Amer. J. Physics*, March-April 1946, 14(2), 99-107. (Harvard University, Cambridge, Mass.).

5131

This paper presents a discussion of the various factors involved in perceiving an object as constant under varying conditions which tend to alter the immediate sensory impressions. Topics discussed in detail are: the principles of reduction and regression, perceived size and distance (history and measurement), the processes involved in perception, and the biological uses of perception.

G. I. R 14

5132

Bridgman, C.S. THE LUMINOSITY CURVE AS AFFECTED BY THE RELATION BETWEEN ROD AND CONE ADAPTATION. *J. opt. soc. Amer.*, Sept. 1953, 43(9), 733-737. (University of Wisconsin, Madison, Wisc.).

Previous experimental determination of the luminosity curve of the eye at intermediate intensities has shown a series of transitional curves intermediate between rod and cone, the appearance of which has been attributed to rod-cone interaction. However, examination of mesopic curves predicted on the basis of no interaction indicates that their major characteristics are dependent instead on the relation between rod and cone functional levels. Residual discrepancies between predicted and empirical curves require the assumption of summation between the 2 mechanisms at wavelengths for which sensitivity is nearly equal for both. In addition to contributing to an understanding of relations between rod and cone function, the analysis emphasizes the lack of validity of mesopic curves for photometric calculation.

R 16

5133

Bridgman, C.S. AN ANALYSIS OF TAYLOR'S DATA ON RELATIVE LUMINOUS EFFICIENCY OF VARIOUS COLORS. J. opt. soc. Amer., May 1954, 44(5), 391-396. (University of Wisconsin, Madison, Wisc.).

Taylor's data on the relative luminous efficiency of various filter colors at intermediate intensities have been examined for evidence of rod-cone interaction. Shorter wavelengths show relatively less evidence of combined rod-cone function, with the "transition range" limited to approximately one log unit of intensity. Longer wavelengths show evidence of a broader transition range. Relationships of this sort are of significance to the theoretical basis of intermediate level photometry and to the understanding of the transition between rod and cone vision.

R 5

5135

Peters, R.W. THE EFFECT OF CHANGES IN SIDE-TONE DELAY AND LEVEL UPON RATE OF ORAL READING OF NORMAL SPEAKERS. J. Speech & Hearing Disorders, 1954, 19, 483-490. (USN School of Aviation Medicine, Pensacola Air Station, Fla.).

This article is concerned with the effect of accelerated side-tone transmission times upon rate of oral reading. The results would seem to indicate: a) that speakers, under instruction to read naturally, read at faster reading rates under conditions of accelerated side-tone delay than they do under the condition of side-tone delay which approximates the transmission time of normal side-tone; and b) that speakers, under instruction to read naturally, read at a progressively faster reading rate as the sound pressure level of side-tone is decreased. Similar results of retarded rate of speech with increased side-tone delay time and increased side-tone sound pressure level were noted with the speakers reading at their maximum rates. To the extent that the experimental conditions duplicated the normal side-tone experience, the normal external side-tone transmission time may be said to constitute a retarding influence upon the rate of oral speech.

R 8

5136

Riopelle, A.J. & Bevan, W. THE DISTRIBUTION OF SCOTOPIC SENSITIVITY IN HUMAN VISION. Amer. J. Psychol., Jan. 1953, 66, 73-80. (Emory University, Atlanta, Ga.).

Estimates of monocular scotopic brightness sensitivity were obtained from 8 Ss for 8 positions on each of 16 equally-spaced radii using a modified method of limits. Isometric sensitivity contours constructed from these estimates are generally ovoid in character with the major axis in the horizontal dimension. Maximal sensitivity is found on either side of the fovea on the horizontal meridian in the neighborhood of 20-30° eccentricity. While thresholds are generally lower for the superior than for the inferior retina, the range of low thresholds is not as wide as for the horizontal meridian. These results are discussed in terms of available information on the distribution of retinal structure.

R 10

5137

Rohrer, J.H. & Hoffman, E.L. AN APPARATUS FOR STUDYING THE PERCEPTION OF LIGHT-MOVEMENTS. Amer. J. Psychol., 1954, 67, 145-146. (Tulane University, New Orleans, La.).

An apparatus for studying the perception of light-movements is described. It was designed to meet the following requirements: a) a light-source should be moved at a given constant speed over a given distance; b) the direction of movement should be readily variable; c) the movement should be automatically repeatable; and d) the timing controls should make it possible to turn on and off a stationary light-source while attendant cues produced by movement of the lamp-housing are provided. A photograph and schematic wiring diagram of the apparatus are included with some data on its reliability for producing a constant speed of movement. (HEIAS)

5138

Roscoe, S.N. DESIGNING THE COCKPIT FOR HIGH-SPEED FLIGHT. Aeronaut. Engng. Rev., Dec. 1954, 13(12), 47-58. (Hughes Aircraft Company, Culver City, Calif.).

5138

This article presents an extensive discussion of the human engineering aspects of cockpit design for high speed flight. Included in this discussion are the following topics and problems: the role of training in the effective utilization of high-performance aircraft, the design of controls and displays for maximal efficiency in such aircraft, the effects of transferring between inside-out and outside-in displays, and so forth.

5139

Severin, D.G. APPRAISAL OF SPECIAL TESTS AND PROCEDURES USED WITH SELF-SCORING INSTRUCTIONAL TESTING DEVICES. Abstr. Doctoral Dissertations, 1953, (68), 323-330. (Ohio State University, Columbus, Ohio).

5139

To evaluate a self-instructional punchboard device that provides immediate knowledge of results in a multiple-choice test, various groups of college students were given tests with this device on vocabulary and on scientific material. Scores obtained by these groups on an "end test" are compared with scores obtained by control groups who had not used the punchboard. About 2000 Ss participated in the experiment.

5140

Wallach, H. & O'Connell, D.M. THE KINETIC DEPTH EFFECT. *J. exp. Psychol.*, April 1953, 45(4), 205-217. (Swarthmore College, Swarthmore, Penn.).

When a 3-dimensional form, solid or wire-edged, is turned behind a translucent screen and its shadow on the screen is observed, the shadow will appear as a real as a 3-dimensional rigid object which turns quite similar to the physical object behind the screen. This happens notwithstanding the fact that S actually looks at a plane figure which is being deformed. One condition seems to be essential for the occurrence of this effect: the shadow must display contours or lines which change their length and their direction simultaneously. If this condition is not fulfilled, a plane distorting figure like the one on the screen is perceived unless an influence of previous perception operates. This effect is believed to operate widely under ordinary circumstances. When one moves about, objects near one's path are successively seen from different angles, and this change in orientation of the object to S is the same as comes when the object is turned by an equivalent angle. Thus, the object's retinal projection undergoes the same deformations as do shadows in our experiments, and the same perceptual processes should result.

R 4

5141

Wallach, H. & Calloway, Alice. THE CONSTANCY OF COLORED OBJECTS IN COLORED ILLUMINATION. *J. exp. Psychol.*, April 1953, 45(4), 115-125. (Swarthmore College, Swarthmore, Penn.).

The effects of color constancy and of color contrast were compared and were found to be identical. In every experiment a situation yielding a constancy effect was presented for simultaneous comparison with a contrast situation of a geometrically similar arrangement of colors. When the colors in the 2 situations were so chosen that the lights reflected by corresponding regions were equal as to brightness and hue, the constancy and the contrast effects were found to be equal in every respect. It turned out that the mode of appearance of the effective color by which constancy was supposed to be distinguishable from contrast was without influence. Only the quality of the reflected lights and their geometrical arrangement seemed to matter.

R 1

5142

Webster, J.C., Miller, P.M., Thompson, P.O. & Davenport, E.M. THE MASKING AND PITCH SHIFTS OF PURE TONES NEAR ABRUPT CHANGES IN A THERMAL NOISE SPECTRUM. *J. acoust. soc. Amer.*, March 1952, 24(2), 147-152. (USN Electronics Lab., San Diego, Calif.).

In an investigation of the effects of a thermal-type noise with a rapidly changing spectrum upon the detection of pure tones, thermal noise was passed through highpass and lowpass filters used separately and in combination to produce noise spectra of the following types: flat noise, highpassed noise, lowpassed noise, and gapped noise. The masked thresholds of pure tones at frequencies near the filter cutoff frequencies were determined by a constant stimulus psychophysical method. It was concluded that: a) pure tones at frequencies near the center of an octave gap in a thermal noise can be detected at levels 25 db below the intensity necessary for detection at frequencies outside the octave gap; b) a false indication of doppler may be observed when pure tones are partially masked by thermal noise, since under these conditions the pitch of the tone is raised; c) when thermal noise is passed through a lowpass filter, the pitch of a pure tone is 1) slightly raised at the filter cutoff frequency and 2) inordinately raised at frequencies immediately above the filter cutoff point; d) when the flat noise is passed through a highpass filter, the pitch of pure tones at frequencies immediately below the filter cutoff point is either unaltered or lowered slightly; e) the loudness of pure tones is affected by frequency components in the noise that are one octave or more removed from the frequency of the pure tone. It is recommended that an investigation be made of the effectiveness of introducing shaped thermal noise into electronic or other work areas in order to reduce the distracting effect of unwanted sounds.

R 9

5143

Webster, J.C. & Schubert, E.D. PITCH SHIFTS ACCOMPANYING CERTAIN AUDITORY THRESHOLD SHIFTS. *J. acoust. soc. Amer.*, Sept. 1954, 26(5), 754-758. (Res. Rep. 570, USN Electronics Lab., San Diego, Calif. & State University of Iowa, Iowa City, Iowa).

A method was developed for getting a continuous and running record of pitch matches between the 2 ears, using a) the synchronized frequency and paper-drive features of a "Bekes" type audiometer and b) the S's adjustment of the frequency knob of a second oscillator to drive the recording pen. A one-second tone from the motor-drive (standard) oscillator (controlling the pen writing mechanism) is presented alternately to the other ear. The S, who controls the frequency of the variable tone, is instructed to keep the 2 alternating tones matched in pitch. 10 music students made these pitch matches (90 matches per octave) from 150 to 9500 cps. In the ear in which the standard tone was heard various types and amounts of hearing loss were simulated by masking noises. The pitch tended to shift away from a region of hearing loss to a region of no, or less hearing loss. Downward shifts were observed but were never as marked as the upward shifts.

R 18

5144

White, C.T., Cheathan, P.G. & Armitage, J.C. TEMPORAL NUMEROSITY: II. EVIDENCE FOR CENTRAL FACTORS INFLUENCING PERCEIVED NUMBER. *J. exp. Psychol.*, Oct. 1953, 46(4), 283-287. (USN Electronics Lab., San Diego, Calif.).

The purpose of this experiment was to determine if the perceived number of flashes was limited by temporal characteristics of the retina. Human ERG records were studied to ascertain the relationship of retinal response to the objective number of flashes at several flash rates. The ERG results showed that the light-adapted retina reacted to each separate flash in a series of flashes, up to the highest flash rate used, 45/sec. It was concluded that the retina is not responsible for the temporal patterning of perceived number, but that this phenomenon must be determined by some higher process. Perceptual data from stereoscopic studies supported the conclusions based on the ERG results.

R 9

5145
Williams, S.W. VISIBILITY OF RADAR SCORES.
Navy Human Factors in Undersea Warfare, Ch.
4, 1949, 101-130. (Johns Hopkins Univ.)

5145
The general design of cathode-ray tubes is discussed in relation to the visual requirements of a human observer, with the chief emphasis on intensity modulated scopes of the type used in search. Research on the radar parameters which determine visibility is reviewed with the aim of highlighting the major problems and disclosing areas of ignorance.

5146
Mize, L.G. PHYSIOLOGICAL NEED, WORD FREQUENCY, AND WORD ASSOCIATION. J. Abnorm. Soc. Psychol., April 1954, 62(2), 227-234. (Ohio State University, Columbus, Ohio).

5146
To study the relationship between association and physiological deprivation, 50 subjects were deprived of food and water for zero, ten, and twenty-four hours. A word association list of 24 words that had been matched for commonness and need-relevance was presented to each subject upon termination of the deprivation period. The number of act, object, instrumental, affective, and neutral word association responses were analyzed as a function of length of deprivation period.
T. G. = 14

5147
Mize, L.G. & Dransbarn, N.C. PHYSIOLOGICAL NEED, WORD FREQUENCY, AND VISUAL DURATION THRESHOLDS. J. exp. Psychol., July 1953, 46(1), 25-32. (Ohio State University, Columbus, Ohio).

This experiment was designed to test the hypothesis that with increased deprivation, need-relevant stimulus words would be recognized more rapidly than neutral words, and to determine what part word frequency played in this process. 3 groups of 20 Ss each were deprived of food and water, and their recognition thresholds for need-relevant and neutral words were obtained at 0-, 10-, and 24-hr. deprivation. The stimulus words were matched for commonness and food-water relevance. The principal findings were: a) that word-commonness was the single most important factor, b) that need-related words were recognized more rapidly as need increased, and c) that word-commonness was not a significant interactive factor. The relationship between physiological deprivation and recognition thresholds for need-relevant stimuli is not a simple linear one, however, for there is a slight increment in the recognition-time thresholds at the 24-hr. period. Analysis of the presolution responses revealed that at 10 hr. there was an increase in the number of need satisfiers and "eating" and "drinking" words, with a drop at 24 hr.; while the responses denoting acts instrumental to obtaining need-satisfaction decreased at 10 hr. and increased at 24 hr.
R 20

5148
Sims, R. A FACTOR ANALYTIC DESCRIPTION OF THE PERFORMANCE OF ENLISTED PERSONNEL. Task Assignment SD1062.2.2, NAVPERS 18483, Jan. 1956, 37pp. USN Personnel Research Field Activity, San Diego, Calif.

5148
To obtain basic data necessary for the development of a new evaluation instrument for enlisted men in the United States Navy, descriptions of 200 enlisted men were obtained from division offices and chief petty officers on 20 different ships. Descriptive items (240) were selected representing 18 "a priori" factors and arranged in two check lists--one for non-rated men which excluded all leadership items and one for petty officers including such items. Officers on various ships and shore installations used the check list to describe the performance of a sample of enlisted men serving under them. Separate factor analyses were carried out for each form to establish basic factors for an enlisted rating form.
T. R 4

5149
Witkin, H.A. INDIVIDUAL DIFFERENCES IN MODE OF SPACE ORIENTATION. Brooklyn College, Brooklyn, N.Y.

A series of investigations were conducted to examine the nature of individual differences in mode of space perception when the upright indicated in the visual field is in a different position than that indicated by postural impressions. 3 tests (tilting room - tilting chair, rod- and-frame, rotating-room) were given to large groups of Ss, resultant intercorrelations among the tests and among basic parts of each test showed that individual differences were consistent from test to test. A second testing after an interval of a year established the stability of individual differences (correlations of .85 and .86 for men; .86 and .87 for women). Relations between perceptions in varied conditions (embodied figures, body balance, auditory-visual conflict, etc.) was found to maintain the same consistency. Sex differences were significant and in the same direction - women tend to go with the visual field more than men and responding less to bodily experience. The relationship between perception and personality (Interview, Morscnach, Thematic Apperception, etc.) revealed positive findings. Further, developmental changes were shown in studies with children. On the basis of these findings it is concluded that any theory of perception will have to include psychological factors within individuals along with field and sensory factors. (HC:AS)
R 13

5151
Porchel, P. THE VESTIBULAR ORGANS IN SPACE ORIENTATION. Percept. Mot. Skills, 1955, 2, pp64. (University of Texas, Austin, Tex.).

In a previous study compensatory functioning of the kinesthetic organs was proposed as an explanation for the superior performance of the vestibular-deficient Ss. It was suggested that had the experiment involved longer distances, the results might have been different. The present report deals with the role of the vestibular organs over long distances. 2 groups of 15 totally deaf Ss were divided on the basis of the presence or absence of vestibular sensitivity. Each S was blindfolded and fed over the 2 72-ft. legs of an isosceles triangle laid off on the playground, and was then asked to return over the 114-ft. base to the original starting point. Each S was given 5 trials, and both distance from the starting point and angular deviation from the base were calculated. The results showed no significant differences between the 2 groups on angular deviation, but the group with no significant differences between the 2 groups on angular deviation, but the group with vestibular organs returned significantly closer (between 10% and 5% level) to the starting position than the vestibular-defective group. It was concluded that kinesthesia is effective over short distances, but the vestibular organs play a dominant role over long distances.
R 1

5152

Kly, J.H., Thomson, R.M., & Orlansky, J. DESIGN OF CONTROLS. Contract AP 33(616)-419, Proj. 7180, Task 71501, WADC-TR-56-172, Nov. 1956, 97pp. Aero Medical Laboratory, WADC. Wright-Patterson AFB, Ohio. (Dunlap and Associates, Inc.).

5152

This report provides a compilation of human engineering recommendations concerning various aspects of control selection and design. Whenever the recommendations are the direct outgrowth of research in this field the appropriate studies are cited. The main parts are: selection of proper control, general control considerations for specific controls. Tables and figures are used frequently as a means of presenting recommendations. Line drawings are used to illustrate many of the concepts. A table of contents and a subject index are provided. T. G. I. R 85

5159

Ereland, K. & Ireland, Marian K. LEGIBILITY OF NEWSPAPER HEADLINES PRINTED IN CAPITALS AND IN LOWER CASE. *J. Appl. Psychol.*, April 1944, 28(2), 117-120. (University of Minnesota, Minneapolis, Minn.).

5159

To study the legibility of newspaper headlines printed in capitals and lower case, materials were prepared consisting of 120 five-word newspaper headlines (*New York Times*), single column, two lines printed in 24-point Cheltenham bold-face, extra-condensed type in both all capitals and in lower case. Ss (22) viewed the material for 50 msec. and then wrote as many of the words as he could. Legibility scores were the number of words correctly reported, and were analyzed for differences due to type form. T. R 3

5154

Edwards, W. & Boring, E.G. WHAT IS EMERT'S LAW? *Amer. J. Psychol.*, 1951, 64, 416-422. (Harvard University, Cambridge, Mass.).

The question of just what Emert's Law says is the subject of this note. The author points out that Emert was not the first to note that the apparent size of after-images increases with their projection distance, but his paper on this subject pointed out that the ectopic images increase in apparent size as the distance of their projection is increased and that the apparent size of entoptic after-images were usually smaller than the object, thus inferring that their estimated distance must be small. It was the fact that Emert's paper was, for the most part, about apparent size that led the senior author of this note to characterize Emert's "law" as a function between apparent size and projection distance, not a law of the physical sizes of after-images. (HEIAS)

R 18

5156

Fletcher, J.L. AN INVESTIGATION OF PURE TONE THRESHOLDS FOLLOWING NARROW BAND FILTERED NOISE. AMRL Proj. 6 95 20 001, Rep. 214, Dec. 1955, 21pp. USA Medical Research Lab., Fort Knox, Ky.

Pure tone pre-exposure thresholds were found for subjects who were then exposed to filtered or unfiltered noise stimuli at either 20 or 100 decibel (db) sensation level (SL). Post-exposure thresholds were determined for the tone and the pre- and post-exposure thresholds were compared. Subjects stimulated with unfiltered noise had higher post-exposure thresholds for pure tones within the filtered gap than did subjects exposed to the filtered noise. Fatigue resulted for all test-tones after stimulation by 100 db SL unfiltered noise. Following 20 db SL filtered noise, only the 100 and 600 cycles per second (cps) tones were fatigued. The 100 db SL filtered noise stimulation produced sensitization for the 162 and 255 cps test-tones, and fatigue for only the 100 and 600 cps tones. Following filtered noise at 20 db SL, sensitization was found only at 350 cps.

R 23

5157

Ferres, H.M., Fox, R.H. & Lind, A.R. PHYSIOLOGICAL RESPONSES TO HOT ENVIRONMENTS OF YOUNG EUROPEAN MEN IN THE TROPICS. VIII. THE EFFECT OF DIFFERENT WORK ROUTINES, HAVING THE SAME TOTAL ENERGY REQUIREMENTS, ON SWEAT PRODUCTION. R.N.P. 54/817, C.E.S. 416, T.R.U. 50, June 1954, 21pp. Medical Research Council, Royal Naval Tropical Research Unit, Royal Naval Personnel Research Committee, Cambridge, England.

The experiments described here were performed in the tropics and were designed to investigate certain aspects of the effect of work on the responses of naturally acclimatized young men exposed to hot climates. The specific aim of the present experiment was to determine whether experimental routines having the same total energy expenditure over a reference period but with different patterns within the period would produce the same total sweat losses. 4 young Ss were divided into pairs and studied while resting seated or walking on a treadmill at one climatic temperature (90°F dry-bulb temperature, 80°F wet-bulb temperature, and air speed 300 ft/min). The 3 routines were a) 15 min. periods of resting alternating with 15 minute periods of working. It was found that the amount of sweat loss for each kcal. of energy expended on walking did not differ significantly in the 3 routines. Measures of rectal and skin temperature levels gave evidence that total heat exchanges were the same. (HEIAS)

R 5

5158

Ferres, H.M., Fox, R.H. & Lind, A.R. PHYSIOLOGICAL RESPONSES TO HOT ENVIRONMENTS OF YOUNG EUROPEAN MEN IN THE TROPICS. VII. THE RESPONSES OF FOUR SUBJECTS WALKING ON A TREADMILL AT SIX SPEEDS AND AT ONE LEVEL OF CLIMATIC STRESS. R.N.P. 54/816, C.E.S. 415, T.R.U. 49, June 1954, 81pp. Medical Research Council, Royal Naval Personnel Research Committee, Cambridge, England.

Experiments reported here were designed to investigate certain aspects of work on physiological responses of young men exposed to hot climates (tropics). Energy expenditure, sweat production, skin and deep body temperatures, and pulse rates were measured on 4 naturally acclimatized Ss while resting and while walking at 6 graded levels of energy expenditure (2-4 rph) and at one climate level (dry-bulb temperature 90°F, wet-bulb temperature 80°F, air speed 300 ft/min). Rates of energy expenditure of 3 Ss were in close agreement with values reported for unacclimatized individuals residing in a temperate climate; one S showed unusual economy in energy expended while walking. It was found that sweat loss provided the most accurate indication of changes in thermal load produced by changes in rate of working and also reflected most accurately differences between individuals in their patterns of energy expenditure. In the climate studied here, a change in level of activity from resting seated to walking 4 rph produced 5-fold increases in sweating rate; sweat rate was more than doubled when speed increased from 2 to 4 rph. A good agreement was found between heat gains through metabolism and heat losses from Ss to their environment; major avenue of heat loss was by evaporation of sweat. A possible form for a heat stress index based on magnitude of heat exchanges is tentatively suggested. (HEIAS)

R 27

5160

Bauer, H.J. DISCRIMINATION OF TACTUAL STIMULI. *J. exp. Psychol.*, Dec. 1952, 44(6), 455-459. (Loyola University, Chicago, Ill.).

This experiment was designed to determine which, of a number of randomly designed tactual stimuli, are sufficiently discriminable to be feasibly employed for the purpose of texture coding typical control knobs, levers, and push buttons. 10 different surface textures were used. 3 different methods of serial exploration were permitted. It was found that simple, 1-sec. tactual contact with the textures was not as efficient as 1-sec. exploration permitting movement. Even the introduction of a thin cotton glove between the stimuli and the finger tips did, in some instances, facilitate identification. The stimuli were ranked according to per cent correct identifications. The cues used by Ss were found to be based primarily in touch, perception of form, kinesthesia, vibration, and sound. Accuracy of discrimination between textures was, in the majority of cases, significantly better than would be expected by chance alone. It was deemed feasible to investigate the extent to which textured surfaces, such as those used in the experiment, might be utilized in coding control surfaces of levers, knobs, and push buttons on military and naval devices.

R 8

5166

Buxton, C.E. RETROACTION AND GAINS IN MOTOR LEARNING. III. EVALUATION OF RESULTS. *J. gen. Psychol.*, 1940, 22, 309-320. (Department of Psychology, Northwestern University, Evanston, Ill.).

5166

This paper discusses certain factors, including work methods and fatigue, that are considered to affect retroaction and reminiscence in the retention of motor performance. The results of several experimental studies are reviewed and the problem of defining similarity in motor tasks is discussed.

R 22

5167

Divita, S.P. MEASUREMENT OF STAFF WORK. Dissertation for the Degree Master of Business Administration, Ohio State University, 1956, 57pp.

5167

To study the problem of measurement in staff work, a search of pertinent literature and conferences with individuals intimately concerned with the problem was made. The need for measurement was determined, existing techniques of measurement were analyzed, and the method of work sampling was analyzed in detail. Work sampling was defined, its mathematical basis presented, the application of the method to staff work was outlined, and the limitations of the method discussed.

I. R 57

5168

Bitterman, M.E., Krauskopf, J. & Hochberg, J.E. THRESHOLD FOR VISUAL FORM: A DIFFUSION MODEL. *Amer. J. Psychol.*, June 1954, 67, 205-219. (University of Texas, Austin, Tex.).

Foveal form thresholds for luminous figures briefly exposed in a dark room were measured in terms of the intensity of illumination required for correct identification. In accordance with a diffusion model derived from the Köhler-Wallach theory of figural after-effects, form threshold was found to vary directly with the ratio of perimeter to area and inversely with the magnitude of critical detail. Data on the pre-threshold appearance of selected forms were related to results obtained with a physical diffusion model.

R 23

5171

Barch, A.M. THE RELATIVE CONTRIBUTIONS OF I_R AND C_{IR} TO THE TOTAL INHIBITORY POTENTIAL. *Percept. Mot. Skills Res. Exch.*, 1952, 4, 27-31. (State University of Iowa, Iowa City, Iowa).

5171

This is a review of four experimental papers that deal with recovery from work decrement in pursuit rotor learning. The data presented in the papers are interpreted in terms of inhibitory potential and conditional inhibition.

R 6

5173
Shepherd, A.J. PERFORMANCE CHARACTERISTICS OF THE NITROGEN METER, WITH PARTICULAR REFERENCE TO THE EFFECT OF CARBON DIOXIDE. *FPAC 936*, Sept. 1955, 5pp. Royal Air Force Institute of Aviation Medicine, Flying Personnel Research Committee, London, England.

Some performance characteristics of an A/C nitrogen-meter are described. A discharge current of 4.0 mA allows operation over wide range of vacuum pressures (400 - 3,000 μ Hg.), and the discharge stability is then little below the optimum. Water vapour produces a decrease in the nitrogen-meter readings, apparently by decreasing the nitrogen content of the gas mixture. Temperature has no significant effect over the physiological range. Carbon dioxide produces an increase of scale readings although the effect decreases progressively as the vacuum pressure is increased. In the range 1500 - 2500 μ Hg., the scale reading approximates to a linear function of carbon dioxide concentration; several practical difficulties limit the use of this relationship as a method of rapid gas analysis. The vacuum pressure selected for nitrogen measurements (2500 μ Hg.) is a compromise between maximum nitrogen discharge and minimum carbon dioxide effect. If measuring low concentrations of nitrogen, it is advisable to estimate or absorb carbon dioxide.

R 10

5174
Whittingham, D.G.V. RECENT TRENDS IN THE DEVELOPMENT OF RAP SURVIVAL EQUIPMENT. PPRC, Memo 65, Sept. 1955, 5pp. PPRC, RAP Institute of Aviation Medicine, Farnborough, Hants, England.

5175

This paper reviews the general changes which have occurred in the development of Royal Air Force Survival Equipment. The equipment is described under five headings: (1) environmental protection (clothing, dingy, sleeping bags); (2) rapid location (radio, sea cells, flares, etc.); (3) water; (4) food; and (5) auxiliary aids (stoves, watches, compasses, fishing nets and lines, first-aid equipment). General trends are discussed together with principles guiding the design and development of survival equipment.
R 6

5177
Anastasi, Anne. AN EMPIRICAL STUDY OF THE APPLICABILITY OF SEQUENTIAL ANALYSIS TO ITEM SELECTION. *Educ. Psychol. Measmt.*, Spring 1953, 13(1), 3-13. (Fordham University, New York, N.Y.).

In summary, the application of sequential analysis to 2 sets of test items showed very close agreement between the decisions reached through sequential sampling on a total of 30 cases, and the item-criterion correlations obtained on larger samples of 188 and 100 cases, respectively. The 2 parts of the study differed in a number of respects. The 1st was high school students in one, Air Force student pilots in the other. The first was concerned with items from an achievement test, the second with items from a non-verbal, projective personality test. One employed Pearson correlations estimated from the upper and lower 27% of the total sample; the other, phi coefficients on 50 upper and 50 lower criterion cases. Finally, in the first, most of the items had high validity, while in the second none reached an acceptable level of validity. The results obtained in both parts of the study provide empirical evidence for the effectiveness of sequential sampling techniques in the evaluation of psychological test items. A further aid to the selection of the most valid items may be found in the consistency of decision regarding any 1 item in successive samples. Finally, the amount of separation between the 2 extreme samples, with regard to the criterion variable, is an important factor in the successful application of sequential analysis to item selection.
R 12

5178

Archer, E.J. & Underwood, B.J. RETROACTIVE INHIBITION OF VERBAL ASSOCIATIONS AS A MULTIPLE FUNCTION OF TEMPORAL POINT OF INTERPOLATION AND DEGREE OF INTERPOLATED LEARNING. *J. exp. Psychol.*, Nov. 1951, 42(5), 283-290. (Northwestern University, Evanston, Ill.).

5178

To assess the effect of degree of interpolated learning and the time at which it occurs on retroactive inhibition, 90 students divided into nine experimental groups were required to learn a list of paired adjectives and then to recall this list after learning another list. Interpolated learning occurred 0, 24, or 48 hours after original learning and was carried out to one of three criteria. Correct responses and intrusions on the recall test were analyzed with respect to the experimental variables.
T. G. R 18

5180
Traxler, A.E. MEASUREMENT IN THE FIELD OF READING. *The English Journal*, March 1949, 38, 143-149.

Various aspects of measurement in the field of reading are discussed. Measurement of silent-reading ability is the focus of most of the work in this area. Techniques of measurement are contrasted: eye movement photography and paper-and-pencil test. Since the latter are more useful for school purposes, the remainder of this discussion is devoted to reading tests in current use. Other evaluative procedures to supplement such reading tests as are listed here are indicated. (HEIAS)
R 22

5186

Wallach, H., O'Connell, D.N. & Neisser, U. THE MEMORY EFFECT OF VISUAL PERCEPTION OF THREE-DIMENSIONAL FORM. *J. exp. Psychol.*, May 1953, 45(5), 360-368. (Swarthmore College, Swarthmore, Penn.).

5186

In a study of the effect of previous experience on visual perception in three dimensions, 112 college students, divided into six groups, viewed shadows of three-dimensional wire figures, which appeared two-dimensional, on a translucent screen. The shadows were then made to appear three-dimensional by being moved; the subjects subsequently re-judged the stationary shadows. Results include shifts in judgments of depth after the interpolated experience.

5187

Wallach, H. & Austin, Pauline. RECOGNITION AND THE LOCALIZATION OF VISUAL TRACES. *Amer. J. Psychol.*, June 1954, LXVII, 338-340. (Swarthmore College, Swarthmore, Penn.).

5187

This is an experiment on the recognition of a visual form as it depends on the locus of prior stimulation on the retina by the form. The subjects, 48 college undergraduates, were presented with an ambiguous form in three orientations in either of two retinal positions. Perceptual judgments by the subjects are discussed in terms of hemisphere dominance in the cortex and the locus of cortical memory traces.
I.

5191

Lockman, R.F. & Poe, A.C., Jr. A PROGRESS GRADE FOR NAVAL AIR TRAINING. Proj. Rep. NM 001 058.17.02, Dec. 1954, 26pp. *USN School of Aviation Medicine*, Pensacola Air Station, Fla.

5191

This report described a preflight progress grade developed by a multiple regression technique to predict final training grades for student, in the Naval Air Training Program. The predictor variables were chosen on the basis of degree of relation to a pass-fail criterion for 2000 cadets.
T. R 6

5194

Smith, R.G. & Staudohar, F.T. CRITICAL REQUIREMENTS OF BASIC TRAINING TACTICAL INSTRUCTORS. Proj. 7705, AFTRC TN 55 5, June 1955, 13pp. USAF Personnel Research Lab., Lackland AFB, Tex.

5194

This report analyzes 6615 instances of effective or ineffective behavior (critical incidents) on the part of tactical instructors. The instances were reported by basic airmen, tactical instructors, and training supervisors. An outline of critical requirements for tactical instructors is presented, and recommendations are made for the selection and training of tactical instructors and for the training procedures to be employed by them.

I. R 5

5195

Naval Air Test Center. EVALUATION OF EXPERIMENTAL LAMPS FOR AIRCRAFT FUSELAGE LIGHTS. REPORT NO. 1, FINAL REPORT. Proj. TED PTR EL 52030, Rep. 1, April 1956, 6pp. Naval Air Test Center, U.S. Naval Air Station, Patuxent River, Md.

5195

To determine optimum brightness of fuselage lights when used for formation flying, several combinations of lamps (six, three, 1/3, 1/4 candlepower) and cover glasses (clear, diffusing, clear and sandblasted, and frosted) were installed on two carrier-type airplanes. Observations were made of the intensities afforded during night formation flights by two experienced pilots. Comments obtained from the pilots were used to rate the combinations in order of preferability. Recommendations are included.

I. R 3

5196

Case Institute of Technology. COMMUNICATIONS IN THE PRESENCE OF AN INTELLIGENT NOISE SOURCE. Contract AF 30/602/1847, Tech. Note 1, Sept. 1958, 15pp. Operations Research Group, Case Institute of Technology, Cleveland, Ohio.

5196

Two models are described to handle the problem of how best to transmit information in the presence of an intelligent noise source whose objective is to prevent transmission. In the first model times for switching frequencies, sending messages, searching and jamming are deterministic. In the second model these times are given only subject to probabilistic distributions. Problems of: 1) determining suitable codes for given channels, 2) need to know the courses open to the jammer simultaneously with the transmitter, and 3) of lost transmission time while switching frequencies, are discussed separately and as they are related. Strategies and counter strategies are developed and a diagram of possibilities is given. Rather than conclusions, suggestions for further work are made. I. R. 3

5200

Flanagan, J.C., Sanford, F.H., Macmillan, J.W., Kennedy, J.L., et al. CURRENT TRENDS IN PSYCHOLOGY IN THE WORLD EMERGENCY. University of Pittsburgh Press, 1952, 198pp.

This book contains 8 lectures delivered in 1952 at the University of Pittsburgh, each dealing with the current activities of psychologists as related to the defense efforts of the United States. Titles and authors are Psychology in the World Emergency, John C. Flanagan; Research in Military Leadership, Fillmore H. Sanford; Problems in the Administration and Utilization of Contract Research, John W. Macmillan; The Uses and Limitations of Mathematical Models, Game Theory, and Systems Analysis in Planning and Problem Solution, John L. Kennedy; Military Requirements for the Systematic Study of Psychological Variables, Arthur W. Melton; Psychological Warfare, Strategic Intelligence, and Overseas Research in the World Emergency, Frederick W. Williams; Matching Personnel and Jobs, Donald E. Baier; and Organizations and Opportunities in Services Programs of Psychological Research, Glen Finch. (HEIAS)

R 70

5201

Sell, H.M. RETENTION OF PURSUIT MOTOR SKILL AFTER ONE YEAR. J. exp. Psychol., Oct. 1950, 40(5), 648-649. (Department of Psychology, Chico State College, Chico, Calif.).

5201

In a test of the retention of a pursuit rotor skill, 47 Ss (college students) performed the task for 20 trials with a one-min. intertrial interval one year after performing on 20 training trials with intertrial intervals of ten minutes to 30 hours. Retention scores were compared with original learning scores of a control group for whom the intertrial interval was one minute.

G. R 2

5204
Office of Naval Research, Psychophysiology Branch. PSYCHOPHYSIOLOGICAL FACTORS IN SPATIAL ORIENTATION: A SYMPOSIUM. NAVEXOSP 986, Oct. 1950, 89pp. Office of Naval Research, Psychophysiology Branch, Washington, D.C.

The purpose of the symposium was to review the results of current research, exchange information, discuss needs for further research, and implement the practical application of knowledge of psychophysiological factors in spatial orientation to flight operations. The experimental papers covered the following topics: neurophysiological factors, orientation to visual and postural vertical, and accelerative forces effects. The theoretical papers were concerned with: the operating principle of the vestibular mechanisms, the relation between visual and postural determinants of the phenomenal vertical, and visual perception of motion. (HEIAS)

5205

Orlansky, J. THE EFFECT OF SIMILARITY AND DIFFERENCE IN FORM ON APPARENT VISUAL MOVEMENT. *Arch. Psychol.*, 1940, No. 246, 85pp.

This is a quantitative study of the effect of similarity and difference in form on apparent visual movement. Combinations of similar and dissimilar figures were presented under conditions favorable for the apprehension of apparent movement. Determinations were made of the range of time-intervals between successive stimulations within which apparent movement occurred, the types of movement effects observed, and the S's estimate by ranking of the ease with which the combinations seemed to move. The following relationships were observed: a) The greatest ranges of movement are found for combinations of the most similar figures; range decreases as the differences between forms increase; differences due to area, spatial separation and plane of spatial orientation are less potent factors than those in form. b) Similar effects on the range can be produced with combinations of equal figures by varying their relative spatial arrangements. c) Stimulus-combinations of figures objectively dissimilar show the smallest of all ranges. d) The appearance of different types of movement is determined to some extent by the time-interval between successive stimulations; longer intervals favor movements over longer apparent distances while shorter ones favor direct courses. e) Fusion is a movement effect that appears when different stimulus-figures unite to form a novel figure composed of parts of each. (HEIAS)

R 35

5206

Smith, K.R. INTERMITTENT LOUD NOISE AND MENTAL PERFORMANCE. Contract AF 33(038) 786, E.O. 695 63, AF Tech. Rep. 6368, Dec. 1950, 8pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio. (Pennsylvania State College, University Park, Penn.).

An attempt was made to ascertain the effects of the administration of intermittent 100-db noise upon performance in 2 standard mental tests. A pool of 69 human Ss was randomized into a control group and an experimental group; only the latter worked in the noisy environment. Group comparisons indicated that the effect of the sound was to increase quantity and decrease quality of response, but the differences discovered appeared to be negligible for practical purposes.

R 4

5207

Smith, K.R. INTERMITTENT LOUD NOISE AND MENTAL PERFORMANCE. *Science*, Aug. 1951, 114(2953), 132-133. (Psychology Dept., Pennsylvania State College, State College, Penn.).

It has thus been found that the effect upon short-term mental performance of bursts of intense noise is to increase the quantity and decrease the quality of response, but that these effects are of such magnitude as to suggest that they are practically negligible. It may be that the allegedly malignant effects of extraneous noise are to be found primarily in terms of depreciation in sustained performance, or of interference with functions other than adequate output.

R 4

5208

Smith, K.R. THE SATIATIONAL THEORY OF THE FIGURAL AFTER-EFFECT. *Amer. J. Psychol.*, 1948, 61, 282-286. (Princeton University, Princeton, N.J.).

This note raises a number of considerations which weigh strongly against the satiation theory of the figural after-effect (FAE). This theory accounts for the FAE in terms of neural interaction within the visual cortex. The writer contends that the theory is not really testable, however, he presents several independent lines of evidence that reflect negatively upon the theory. (HEIAS)

R 22

5209

Smith, K.R. 'ATTRACTION' IN FIGURAL AFTER-EFFECTS. *Amer. J. Psychol.*, 1954, 67, 174-176. (Pennsylvania State College, University Park, Penn.).

Generally speaking, the figural after-effect (FAE) is characterized by a perceptual shift of some part of the test-figure away from the area previously occupied by the inspection-figure; however, the shift is occasionally seen to take place in the opposite direction. A recent discussion has denied the existence of this phenomenon, therefore some new observations are reported here which seem to demonstrate the reality of the effect. (HEIAS)

R 4

5211

Alper, Thelma G. THE INTERRUPTED TASK METHOD IN STUDIES OF SELECTIVE RECALL: A REEVALUATION OF SOME RECENT EXPERIMENTS. *Psychol. Rev.*, Jan. 1952, 59(1), 71-88. (Clark University, Worcester, Mass.).

5211

This paper reviews several experimental studies on selective recall induced by the interrupted task technique. Relevant variables that pertain to instructions and to personality factors of the Ss and that might account for apparent discrepancies in results are discussed. The suitability of intra-rather than inter-session recall scores is defended.

T. R 25

5213

Greenhill, L.P. A STUDY OF THE FEASIBILITY OF LOCAL PRODUCTION OF MINIMUM COST SOUND MOTION PICTURES. Contract NSGONR 269, SPECDEVEN Proj. 20 E 4, Tech. Rep. 269 7 48, July 1955, 44pp. USN Special Devices Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

5213

This is a report on the filming of five low-cost motion pictures to be used as training aids by inexperienced personnel at a Naval training base. Included are descriptions of the procedures and apparatus, summaries of the contents of the films, and general evaluations of the technical quality of the films and of their usefulness as training aids.

I.

5214

Payne, R.B. THE AFSAM COMPENSATORY BALANCING TEST MODEL A. Proj. 21 02 011, Rep. 1, Nov. 1948, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

This is the first of a series of reports describing the development and evaluation of the AFSAM Compensatory Balancing Test, Model A. 2 copies of this test have been administered to some 1800 Naval Aviation Cadets at Pensacola Naval Air Station, Florida, for the purpose of validation against a flight proficiency criterion. Although criterion data have not yet matured, the test data of 1339 of these cases have been analyzed in order to evaluate score reliability, score distribution characteristics, and operational stability of equipment. The performance scores obtained were found to be reliable to a degree which is satisfactory in view of the purpose for which the test was intended. Score distributions were found to be sufficiently normal for the performance of conventional statistical operations on the data. Such differences as were found to exist between copies of the test were discussed in relation to electromechanical features of the equipment.

5215

Payne, R.B. & Hauty, G.T. THE EFFECTS OF EXPERIMENTALLY INDUCED ATTITUDES UPON TASK PROFICIENCY. J. exp. Psychol., 1954, 47(4), 267-274. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

5215

To examine experimentally the supposition that subjective dispositions affect task proficiency, 20 subjects received preliminary training on a complicated compensatory pursuit task involving simulated aircraft instruments and controls. They then continued work four hours after having been distributed among ten combinations of two motivational and five pharmacological conditions. The treatment effects were appraised in terms of subjective dispositions and task performance, and the functional connection between these outcomes was explored.

T. G. R 17

5221

Irwin, I.A., & Dice, R.F. QUALITATIVE PERSONNEL REQUIREMENTS INFORMATION FOR C-130, COMBAT AIR TRANSPORT SYSTEM (400L). APPTRC-TN-56-45, Feb. 1956, 19pp. APPTRC, Lackland AFB, Tex.

5221

Qualitative personnel requirements information for C-130, combat air transport system were developed for equipment-oriented personnel programming and training agencies. Information from the prime contractor for this aircraft on ground maintenance and support positions, duties of aircrew members and functional requirements for training devices was collated with existing operational plans, Air Training Command training plans, and Air Force Specialty Code structures to determine what personnel and training actions are required for the C-130, but have not been taken. Recommendations are presented to assist appropriate action agencies in eliminating minor deficiencies in personnel and training plans.

T. R 1

5222

Ross, B.H., Rupe, J.W. & Grant, D.A. EFFECTS OF PERSONAL, IMPERSONAL, AND PHYSICAL STRESS UPON COGNITIVE BEHAVIOR IN A CARD SORTING PROBLEM. J. abnorm. soc. Psychol., April 1952, 47(2), 546-551. (University of Wisconsin, Madison, Wisc.).

The effect of impersonal distraction, personal "heckling," and physical threat upon abstract behavior as defined by the Wisconsin Card Sorting Test (WCST) was studied in a tri-factorial design involving 160 college students as Ss. The WCST consists of response cards, each of which may be sorted for color, number, or form under 4 stimulus cards. The task requires Ss to sort according to color, and then, after 10 correct responses, to shift to form, then to number and back through color, form and number in 6 stages. No cues are given to shifts except that each card sorted is called "right" or "wrong". The WCST provides 3 scores: a) total correct responses required to learn each new response; b) the number of perseverative errors; and c) the number of nonperseverative errors. These scores are available for each of the 6 stages. The principal findings were as follows: a) Electric shock, the physical threat, alone or in combination with other factors, was the only variable which degraded performance on the WCST to a statistically significant extent as revealed by the analysis of variance. b) The deterioration of performance which did take place was general in that all the 3 objective scores were affected. c) The Ss seemed to recover rapidly from the effects of shock, because no significant effects were found at Stages 3, 4, 5 and 6. It was pointed out that the relative imperviousness to extrinsic threat exhibited by the abstract behavior was remarkable. The fact that nonperseverative error scores and total correct response scores showed more deterioration than did perseverative errors indicated that the degradation of behavior was general and provided little or no indication that G.V. Hamilton's "persistent nonadjustive reaction" was present.

R 16

5224

Taubman, R.E. THE EFFECT OF PRACTICE WITH AND WITHOUT REINFORCEMENT ON THE JUDGMENT OF AUDITORY NUMBER. J. exp. Psychol., April 1944, 34(2), 143-151. (Columbia University, New York, N.Y.).

5224

The effects of practice on the estimation of auditory numerosness were studied in an experiment where two groups of Ss, consisting of three and four college students, judged series of one to six brief tones presented at three rates (10 to 18 per second). Only one group was provided with knowledge of results after each trial. Scores for judged number and percent correct judgments for each stimulus array were compared for the two groups.

T. G. R 25

5225

Taubman, R.E. STUDIES IN JUDGED NUMBER: I. THE JUDGMENT OF AUDITORY NUMBER. *J. gen. Psychol.* 1950, 43, 167-194. (Columbia University, New York, N.Y.).

An experimental study was conducted of the functional relation which obtains between judged auditory number, where the stimuli are series of short tones, and a) stimulus number (1 through 10) and b) time interval between successive tones (.125, .100, .083, .071, .062 sec.). 5 trained Ss were studied. The following results were found: a) The primary direction of the mean judged number is towards underestimation of the stimulus magnitude. All numbers are correctly perceived at .125 sec.; 1 and 2 are generally perceived correctly at all time intervals; thereafter, underestimation increases as a function of increasing number within a particular time interval. b) The per cent correct judgment data also show a fall as a function of stimulus number and time interval between tones. c) An absolute scale for I's developed in terms of response category usage, bears an orderly relation, to the stimulus continuum at the various time intervals between tones. The obtained category threshold data, when plotted for each time interval in relation to response category, constitute a family of straight-line functions for intervals shorter than .125 sec. d) The mean stimulus number necessary to evoke each of the response categories at all times is shown. Practical implications for Morse Code learning are discussed. (HEIAS)

R 18

5226

Taubman, R.E. STUDIES IN JUDGED NUMBER: II. THE JUDGMENT OF VISUAL NUMBER. *J. gen. Psychol.* 1950, 43, 195-219. (Columbia University, New York, N.Y.).

An experiment was conducted to obtain the functional relation between judged visual number where the stimuli are series of successive short light flashes, and a) stimulus number, and b) time interval between successive flashes. The stimuli ranged in number from 1 to 10, each flash equal to .04 sec., with 5 intra-stimulus intervals: .500, .333, .250, .200, and .143 sec. 5 trained Ss were studied. The main findings are a) The mean judged number indicates a predominant tendency toward underestimation of stimulus number which increases from 0 at interval .500 sec. as a function of both stimulus number and intra-stimulus time interval. b) The percent correct data indicate that interval .500 sec. is a 100% interval at all stimulus magnitudes, and that from this interval on, interval curves can be constructed which are generally differentiated from one another on the basis of percent correct. There is a trend for the percent correct to fall as a function of stimulus number and time interval. c) An absolute scale was developed for I's on the basis of response category usage; it is stimulus-anchored with respect to the various intra-stimulus time intervals. The category thresholds, when plotted for each interval as a function of response category, constitute a family of straight-line functions. d) Data on the mean stimulus number necessary to evoke each of the categories of response indicate, in general, that the rise in mean stimulus number is a function of interval and response category magnitude. (HEIAS)

R 14

5227

Sell, R.G. & Motts, N.C. THE AMOUNT AND ORDER OF USE OF THE CONTROLLERS IN A STRIPPER CRANE. PE/AE/25/57, Aug. 1957, 17pp. The British Iron & Steel Research Association, London, England.

5227

This report describes a trial carried out on a stripper crane to determine the amount and order of use of controllers. Records were made on punched tape every time the driver moved his controller. The tape was analyzed on an electric computer. On the basis of the findings a suggested layout of the controls in the cab was made. The technique for study and analysis are discussed in detail and further trials are being arranged. T. I.

5230

Schroder, H.M. & Rotter, J.B. RIGIDITY AS LEARNED BEHAVIOR. *J. exp. Psychol.*, Sept. 1952, 44(3), 141-150. (Ohio State University, Columbus, Ohio).

5230

In a study of rigidity as learned behavior. 104 subjects received training on the grouping of a series of figures on the basis of various combinations of color, inside form or outside form. An experimental series of figures was then presented under varied conditions of expected difficulty of shift from training to problem-solving criteria of grouping. The results are presented and discussed in terms of the relative degree to which rigidity may be a phenomenon of learning.

5228

Verplanck, W.S., Collier, G.H. & Cotton, J.W. NONINDEPENDENCE OF SUCCESSIVE RESPONSES IN MEASUREMENTS OF THE VISUAL THRESHOLD. *J. exp. Psychol.*, Oct. 1952, 44(4), 273-282. (Indiana University, Bloomington, Ind.).

This experiment was performed in order to determine whether the successive responses of S given in measurements of his visual threshold are statistically independent of one another. This is implicit in several theories of sensory thresholds. 16 Ss were presented, on 4 successive days, with 300 consecutive stimuli of a luminance which had been found previously to be reported 50% of the time. On 2 days these stimuli were presented automatically at 5-sec. intervals. On the other 2, S presented them to himself. Critical ratios of serial-correlation coefficients were computed on the time-ordered sequences of responses at Lags 1, 3, 5, 7, 9, 11 and 20. Under the conditions of this experiment the mean 50% absolute visual threshold for each subject elicited, on the average, 50% frequencies of responses on immediately subsequent days. When S is presented with a discrete, dim flash of light, his response to it will depend not only upon the luminance of the flash, but also, among other things, on how he has responded to preceding flashes of light of the same luminance. Each response is dependent upon previous responses, or perhaps both are dependent upon a third variable which varies in time. This nonindependence is exhibited with statistical significance when as many as 10 responses intervene between the correlated responses. The value of CR_p seems to be a monotonically decreasing function of the lag. No statistically significant differences appeared between the data obtained under the 2 conditions of stimulation.

K J1

5229

Smith, K. THE STATISTICAL THEORY OF THE FIGURAL AFTER-EFFECT. *Psychol. Rev.*, 1952, 59, 401-402. (Pennsylvania State College, College Park, Penn.).

In 1948 the author of the present note outlined a number of rather basic objections to the satiation theory of the figural after-effect. (See 5208) Since that time a statistical theory has been advanced to explain the same phenomenon. The same criticisms leveled against the satiation theory seem applicable here and are restated. (HEIAS)

R 9

5231

Coombs, C.H. & Beardslee, D. ON DECISION-MAKING UNDER UNCERTAINTY. Decision Processes, Chap. 17, 1954. (University of Michigan, Ann Arbor, Mich.).

This chapter has presented a general system designed to organize the field of decision-making under uncertainty and to suggest experiments in that domain. It attempts to clarify the differences between certain situations, and suggests explanations for differing behavior. A number of experiments in the field of decision-making under uncertainty have been analyzed in terms of this theory.

R 12

5233

Baker, Katherine E. & Gagne, R.M. TRANSFER OF TRAINING TO A MOTOR TASK IN RELATION TO STIMULUS SIMILARITY. Contract N70NR 316, Proj. NR 783 003, SDC-Prof. 20 M 1A, SDC TR 316 1 8, Aug. 1949, 33pp. USN Special Devices Center, Port Washington, N.Y. (Connecticut College, New London, Conn.).

5233

In a study of the relation between transfer of training and stimulus similarity, five matched experimental groups, each consisting of 25 Navy men, learned to respond differentially to one of six stimulus lights separated by equal j.n.d. units. Each group then performed a similar task with a different critical stimulus. Errors per stimulus light on the second task were compared for each group and a matched control group that had no prior training. Response time scores and amount of transfer per similarity step were also presented.

T. G. R 7

5234

Wenzel, Bernice M. THE CHEMICAL SENSES. Ann. Rev. Psychol., 1954, 5, 111-126. (Barnard College, Columbia University, New York, N.Y.).

5234

This is a review of recent studies concerned with the chemical senses--gustation and olfaction. Under each sense, the work in neurophysiology, individual differences, studies on insects, and methods is reviewed. Industrial problems in olfaction are also included.

R 59

5235

The Toilet Goods Association. SYMPOSIUM ON OLFACTION. The Toilet Goods Assoc., Dec. 1950, 14, 16pp.

This symposium on olfaction deals with the following five topics: "Toward Scientific Method in the Study of Olfaction", E. Sagarin; "Present Theories of Olfaction", J.W. Middleton; "Olfactory Abnormalities", J.H. Herish; "Practical Applications of Olfactometry", Bernice M. Wenzel; and "Future Pathways of Olfactory Research", D. Foster. (HEIAS)

5237

Baker, Katherine E. & Wylie, Ruth C. TRANSFER OF VERBAL TRAINING TO A MOTOR TASK. J. exp. Psychol., Oct. 1950, 40(5), 632-638. (Connecticut College, New London, Conn.).

5237

In a study of the transfer of verbal training to a motor task, 54 female college students were required to learn the appropriate manual response to each of four visual stimuli presented sequentially. One group of Ss was pretrained for 24 trials to give a word descriptive of the required response when presented with the word descriptive of the stimulus. A second group was given eight such trials, and a third group was given none. Time and error scores were compared for the three groups. Results were interpreted in terms of stimulus and response generalization.

T. G. R 6

5238

Baker, Katherine E., Wylie, Ruth C. & Gagne, R.M. THE EFFECTS OF AN INTERFERING TASK ON THE LEARNING OF A COMPLEX MOTOR SKILL. J. exp. Psychol., Jan. 1951, 41(1), 1-9. (Connecticut College, New London, Conn.).

5238

In an investigation of how an interfering task introduced at different stages of practice affects the course of learning, six matched groups of 22 male Ss performed the S.A.M. Complex Coordination Test for six blocks of 26 settings. Each group was required to perform an additional task concurrently on the Coordinator beginning with a given block. Interference for each group is measured by time scores on the main task.

T. G. R 1

5239

Gagne, R.M. & Baker, Katherine E. STIMULUS PRE-DIFFERENTIATION AS A FACTOR IN TRANSFER OF TRAINING. J. exp. Psychol., Aug. 1950, 40(4), 439-451. (Connecticut College, New London, Conn.).

5239

In a study of stimulus predifferentiation in transfer of training, 150 college undergraduates were trained to make a verbal response to each of four stimulus lights prior to performing manual responses to the lights for 60 trials. Three experimental groups each received 8, 16, or 32 predifferentiation trials. The experimental groups and a control group that had received no prior training were compared with respect to response-time and error scores on the second task.

T. G. R 8

5240

Baker, Katherine E., Wylie, Ruth C. & Gagne, R.M. TRANSFER OF TRAINING TO A MOTOR SKILL AS A FUNCTION OF VARIATION IN RATE OF RESPONSE. J. exp. Psychol., Dec. 1950, 40(6), 721-732. (Connecticut College, New London, Conn.).

5240

In a study of transfer of training, five matched groups of 31 male college students performed a tracking task requiring one of four rates of movement of a crank and then performed a second task that required a different rate of movement. Eight one-minute trials were given on each task. Amount of transfer for each group was measured as percent increase in time scores and was analyzed with respect to similarity between rates of responding on the tasks.

5241

Gagne, R.M., Baker, Katherine E. & Foster, Harriet. TRANSFER OF DISCRIMINATION TRAINING TO A MOTOR TASK. J. exp. Psychol., June 1950, 40(3), 314-328. (Connecticut College, New London, Conn.).

5241

In an investigation of transfer of discrimination training, 140 Navy enlisted men were divided into three matched groups. A control group was trained for 60 trials to perform one of four manual responses to one of four stimuli, each of which differed from the others in either position or color. One experimental group was pretrained on the color discrimination only, and the other on the position discrimination only. Transfer to the final task was measured in error and response-time scores.

T. G. R 3

5242

Gagne, R.M., Baker, Katherine E. & Foster, Harriet. ON THE RELATION BETWEEN SIMILARITY AND TRANSFER OF TRAINING IN THE LEARNING OF DISCRIMINATIVE MOTOR TASKS. Psychol. Rev., March 1950, 57(2), 67-79. (Connecticut College, New London, Conn.).

5242

This paper presented an analysis, based on concepts of stimulus and response generalization, of the relation between stimulus and response similarity and transfer of training. Intrastask similarity between stimuli or responses was considered a major variable. The results of certain experimental studies were discussed in terms of the hypotheses presented, and rules for predicting transfer were set forth.

T. R 16

5243

Alluisi, E.A., Harker, G.S., Enoch, J.M., Wicksarham, R.A., et al. BINOCULAR STEREOPTIC ACUITY AND SPATIAL LOCALIZATION AS CRITERIA FOR THE EVALUATION OF CONTACT LENSES. Projs. 6 95 20 001 & 6 64 12 028, Rep. 70, Dec. 1951, 25pp. USA Office of the Surgeon General, USA Medical Research Lab., Fort Knox, Ky.

An exemplary experimental evaluation of 2 contact lenses has been presented. A preliminary test has been made of the hypotheses that changes in binocular stereoptic acuity and changes in spatial localization take place when contact lenses are worn. The hypothesis concerning binocular stereoptic acuity is neither strengthened nor weakened by the results because the absolute values of all these scores obtained were too great to be considered due to anything other than to weaknesses in apparatus and procedure. The hypothesis concerning spatial localization appears tenable in light of the findings of some statistically significant differences between mean rangings when contact lenses were worn. After modification as recommended, both the apparatus and the procedure should be suitable for the experimental evaluation of contact lenses with measures of binocular stereoptic acuity and of spatial localization as criteria.

R 5

5244

Brogden, W.J. THE TRIGONOMETRIC RELATIONSHIP OF PRECISION AND ANGLE OF LINEAR PURSUIT MOVEMENTS AS A FUNCTION OF AMOUNT OF PRACTICE. Amer. J. Psychol., Jan. 1953, LXVI, 45-56. (University of Wisconsin, Madison, Misc.).

5244

In an investigation of the relation between the precision of a tracking response, the angle from the body at which the movement is made, and amount of practice, eight groups of five right-handed male college students practiced linear pursuit movements at various angles for 160 trials. Learning curves based on a transformed error score were compared for the groups in order to ascertain differential effects of practice.

T. G. R 3

5246

Walter, N. A STUDY OF THE EFFECTS OF CONFLICTING SUGGESTIONS UPON JUDGMENTS IN THE AUTOKINETIC SITUATION. Sociometry, May 1955, XVIII(2), 138-146. (Northwestern University, Evanston, Ill.).

5246

This study investigates the effect upon judgments in the autokinetic situation of: repeated judgments, prestige suggestion, prestige suggestion opposite to an equally potent former suggestion, and discredited prestige suggestion. Prior to the experimental session, fifteen subjects were administered a questionnaire to determine educational institutions having high prestige for each subject. Control and experimental groups participated in four sessions with manipulation of information concerning the prestige school for the experimental group. The data is analyzed in terms of shifts of norm and variability for each condition, and significance of changes determined by the Median Test.

T, R 4

5247

Chapanis, A. THE EFFECT OF REFRACTIVE ERROR ON ABILITY TO SEE AT NIGHT. Serial TSEAL3C 695 48, July 1945, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Johns Hopkins University, Baltimore, Md.).

5247

This report presents data on the effect of refractive error on ability to see at very dim illumination. It refers to a study in which 28 subjects with varying amount of refractive error were tested six times with the Johnson Foundation Luminous Plaque Adaptometer. During half of the trials the subjects wore their correction and during the other half were tested without the correction. The results are discussed in terms of the role of corrective eye-glasses with myopic and hyperopic subjects in ability to see at night.

5249

Chapanis, A. SOME APPLICATIONS OF EXPERIMENTAL PSYCHOLOGY TO MACHINE DESIGN. Res. Rev., June 1954, 4-11. Office of Naval Research, Department of the Navy, Washington, D.C. (Johns Hopkins University, Baltimore, Md.).

The partnership between experimental psychologists and practical engineers in the field of human engineering - the engineering of machines for human use and the engineering of human tasks for operating machines - is discussed. Fundamental contributions made by psychologists are said to lie in their knowledge of the field of individual differences and their use of experiments for experience and facts for opinions. A few typical studies in visual means of communication from machines to man are described to show what has been done in this new field of engineering psychology. (HEIAS)

5250

Chapanis, A. & Rouse, R.O. RESULTS WITH THE LUCKEISH-MOSS-ARMY AIR FORCES ANOXIA DEMONSTRATION CHART, TYPE AAF 1, AT SIMULATED ALTITUDES OF 15,000 AND 16,000 FEET. Serial ENG 49 695 12 0, Sept. 1943, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

5250

This article investigated the utilization of the Luckeish-Moss-Army Air Forces Anoxia Demonstration Charts, Types AAF-1 and AAF-2, during high altitude indoctrination flights. These charts, designed to measure the effects of anoxia on brightness discrimination, were presented to 100 Ss at each of two simulated altitudes, 15,000 and 16,000 feet. The results were presented and discussed in terms of the degree to which anoxia affected performance on each chart.

5251

Chapanis, A. & McCleary, R.A. INTERPOSITION AS A CUE FOR THE PERCEPTION OF RELATIVE DISTANCE. J. gen. Psychol., 1953, 48, 113-132. (Johns Hopkins University, Baltimore, Md.).

5251

To investigate the stimulus condition of interposition (if, at the intersection of two figures, one contour turns a sharp corner, it will be seen behind the other), a series of stimulus figures containing two overlapping figures were varied at intersection points to provide clear, ambiguous, or contradictory cues, and varied in meaningfulness from nonsense figures to familiar figures. In a series of experiments over 600 Ss made judgments as to which figure was in front of the other, or in the same plane, or impossible to judge. Analysis of the results was made in terms of relative importance of junction-point cues and Gestalt (overall form) cues.

T. J. R 12

5252

Chapanis, A. SUMMARY AND EVALUATION OF THE STATUS OF RESEARCH ON THE EFFECT OF THE OPTICAL QUALITY OF TRANSPARENT AIRCRAFT PANELS ON VISION. TSEAA 696 93, Aug. 1946, 14pp. USAF Aero Medical Lab., Randolph Field, Tex.

A considerable amount of experimental evidence and research data has been summarized briefly in this report to show the effect of the optical quality of transparent aircraft panels on vision. These studies, without exception, emphasize the fact that the angle of incidence of the panel to the pilot's line of sight is relatively more important than the inherent flaws or defects in the panel. This means, in effect, that panels with extremely few inherent defects become objectionable when they are used at high angles of incidence. There are 3 important aspects of this problem which require further investigation: a) The relationship between the optical quality of panels and visual functions, other than those already investigated, should be explored further. b) A satisfactory method of specifying and measuring distortion should be devised and incorporated into appropriate specifications. This method of test should take into account the fact that distortion is essentially a change of deviation of light rays; it should be easy to use, and should be rapid enough to permit the grading of panels coming off a mass-production line. c) The specification of the maximum amount of distortion tolerable in aircraft panels should be subjected to frequent critical reevaluation. This specification should attempt to effect a rational compromise among the conflicting requirements of visibility, aerodynamic efficiency of the aircraft, weight, and cost.

R 25

5253

Chapanis, A. RESULTS WITH THE LUCKINSH-MOSS ARMY AIR FORCES ANOXIA DEMONSTRATION CHART, TYPE AAF-2, AT A SIMULATED ALTITUDE OF 16,000 FEET. Memorandum Rep. ENG-49-695-37, Dec. 1943, 9pp. Aero Medical Lab., Army Air Forces Materiel Command, Engineering Division.

5255

Chapanis, A., & Schachter, S. DEPTH PERCEPTION THROUGH A P-80 CANOPY AND THROUGH DISTORTED GLASS. Order 695-42, TSEAL3-695-46W, Oct. 1945, 15pp. Engineering Div., Air Materiel Command, Wright-Patterson AFB, Ohio.

5253

To compare the effectiveness of Type AAF-1 and AAF-2 charts for demonstrating the effects of anoxia at altitude, 100 men were tested at simulated altitudes of 15,000 and 16,000 ft. The results are summarized statistically, discussed, compared for the two charts, and the author includes certain recommendations.

5255

This is a report of experiments designed to demonstrate the effect of distortion in the front section of the P-80 canopy on depth perception and to assess the nature of the visual impairment of depth perception through distorted glass. Utilizing the Howard-Dolman apparatus to measure depth perception, experiments were conducted in which the subjects' performance occurred under conditions of sighting through various portions of the P-80 canopy, through five samples of glass graded in amount of distortion, and with glass samples at various angles of incidence. The results of each of the experiments are presented in terms of the relative effect of the sighting condition upon depth perception.

T. I. R some

5254 Chapanis, A. & Halsey, Rita M. PHOTOPIC THRESHOLDS FOR RED LIGHT IN AN UNSELECTED SAMPLE OF COLOR-DEFICIENT INDIVIDUALS. Contract NSORI 166, T.O. 1, Proj. Design. NR 507 470, Unpub. Res. Rep., Oct. 1952, 13pp. Naval Research Lab., Systems Coordination Div., Office of Naval Research, Washington, D.C. & Johns Hopkins University, Baltimore, Md.

It is generally assumed that luminosity losses in the red end of the spectrum can be used to distinguish protanopes and protanomalous trichromats from deutanopes and deutanomalous trichromats. To test this hypothesis, we studied 47 color-deficient men, selected solely on the basis of their being "color blind." 16 color-normal persons were also examined. Each subject viewed a flashing light of 640 mμ monocularly, using central fixation, and adjusted an optical wedge to locate his threshold. The results show that the average amount of energy required for threshold vision, and the variability between subjects, is less for color-normal than for color-deficient persons. For the color-deficient group, the thresholds form a continuous distribution rather than 2 distinct groups. There is, however, some slight evidence of bimodality in the distribution. A few of the color-deficient subjects make chromaticity confusions characteristic of deutans, but appear to have luminosity losses in the red characteristic of protans. Taken as a whole, the data support the hypothesis that "darkening of the red" is not uniquely characteristic of a particular group of color-deficient individuals.

R 14

111 - 555

5256 Chapanis, A. SPECTRAL SATURATION AND ITS RELATION TO COLOR-VISION DEFECTS. J. exp. Psychol., Feb. 1944, 24(1), 24-44. (Yale University, New Haven, Conn.).

Saturation thresholds were measured at 19 spectral points by finding the proportion of hue which had to be added to white of 5000°K. to make the mixture appear just discriminably colored. 8 Ss, 2 normal and 6 with varying degrees of color vision defect, were used in the experiment. The results may be summarized as follows: a) Spectral saturation for the color blind observers is generally lower than for the normal observers. The extent of this difference appears to be related to the degree of color defect; the curves for the true dichromats deviate most from the normal values, while those for the color anomalous lie between the 2. b) A shift in the relative saturation of various spectral hues is related to the degree of color defect. The greatest change in saturation occurs in the blue-green region of the spectrum and the least in the yellow and yellow-green regions. Blue-green for the normal observer is a highly saturated hue, for the color anomalous it is less saturated, and for the dichromat it is completely desaturated, i.e., it matches white. 2 hypotheses regarding the nature of color blindness are possible with a tri-receptor color theory. The data reported here are inconsistent with both of these hypotheses. The practical value of the findings is that they may provide a basis for the construction of a quantitative scale of color blindness.

R 27

5257

Brozek, J. QUANTITATIVE CRITERIA OF COORDINATE PERFORMANCE AND FATIGUE. *J. appl. Physiol.*, Nov. 1949, 2(5), 247-250. (University of Minnesota, Minneapolis, Minn.).

The consistency of 5 eye movement characteristics, measured in photographic records obtained for each of 6 normal young men on 6 occasions, varied from very high (fixation time, rate of movements), high (extent of corrective movements during fixation), moderate (movement time) to low and very low. In the course of a "stress" consisting in shifting the line of regard through about 14° at a submaximal rate for 5 minutes, all eye movement characteristics changed in the direction of deterioration but none of the changes reached the level of statistical significance. In a more severe stress which involved eye movements carried out at the maximal attainable rate for 4 minutes, the rate of movements declined, due primarily to a marked increase in the fixation time; the velocity of movements decreased and the extent of corrective movements during fixation increased. In the third stress situation consisting of 3 hours of hard inspection work at a very inadequate illumination, the fixation time and the corrective movements increased, while the rate of movements decreased. The changes were much less pronounced than in the preceding experiments. The lengthening of the fixation time, reaching at times the magnitude of a "central block," as well as the increase in the corrective movements during fixation were interpreted as fatigue phenomena localized in the central nervous system. Muscular fatigue was much less evident or was absent.

R 77

5258

Brozek, J. & Keys, A. CHANGES IN FLICKER-FUSION FREQUENCY WITH AGE. *J. consult. Psychol.*, March-April 1950, 2(2), 87-90. (University of Minnesota, Minneapolis, Minn.).

Measurements of flicker fusion frequency (FFF) were carried out with 56 Ss. 42 were doing clerical work and 14 microscopic work. The FFF determinations were made in the first and last hour of the day's work. Within the age limits studied the decrease in FFF with age was small but consistent with a distinct drop in the late forties. Alterations in FFF level associated with "general fatigue" from the day's work showed no relation to age. The flicker fusion frequency test would be a useful tool in systematic gerontological studies.

R 11

5259

Brozek, J., Simonson, E. & Keys, A. A TEST OF SPEED OF LEG AND ARM MOVEMENTS. *J. appl. Physiol.*, March 1952, 4(3), 753-750. (University of Minnesota, Minneapolis, Minn.).

A test for measuring the speed of flexion movements of the leg and forearm was described. Practice had little effect, beyond the initial stage of getting thoroughly acquainted with the procedures, on the speed of the movements. The standard error of the individual test scores, based on 5 repeated measurements, was about 5 msec. Data were presented on deterioration of the speed of movement under conditions of physiological stress (anemia deficiency and starvation) and in disease (poliomyelitis). The test of the speed of leg and arm movements represents a useful addition to the existing measures of the neuromuscular aspects of "fitness".

R 13

5260

Brozek, J. & Simonson, E. VISUAL PERFORMANCE AND FATIGUE UNDER CONDITIONS OF VARIED ILLUMINATION. *Am. J. Ophthalmol.*, Jan. 1952, 35(1), 33-46. (University of Minnesota, Minneapolis, Minn.).

The effects of varied intensity and spectral composition of mixed white light were studied using a specially designed work test, a series of tests of visual functions measured before and after 2 hours of work, and a discomfort questionnaire administered at the completion of each testing session. The visual work involved recognition of small, moving details, briefly exposed to the view, and thus represented a schematic miniature of industrial inspection of objects transported on a conveyor. The design of the main series of experiments involved 3 factors—intensity of illumination (3 levels), spectral quality of illumination (3 illuminants), and subjects (6)—with replication of each experimental condition. The results were analyzed in terms of a complex analysis of variance, yielding sensitive tests of the statistical significance of the differences between the mean scores obtained under different conditions of illumination. In addition, a biologic evaluation of the relative importance of the differences between the experimental conditions was attempted. It consisted in expressing the differences as percentages of the maximum difference (difference between the best and worst score for a given function). The stress conditions used to establish the limits of deterioration involved strenuous visual work carried on for 2 hours at 2 foot-candles and for 4 hours at 5 foot-candles, and were close to the limit of tolerance.

R 15

5261

Brozek, J., Simonson, E. & Taylor, H.L. CHANGES IN FLICKER FUSION FREQUENCY UNDER STRESS. Contract AF 33(072) 21914, Proj. 21 32 004, Rep. 3, Oct. 1953, 5pp. *USAF School of Aviation Medicine*, Randolph Field, Tex.

Within a framework of studies on changes in "fitness" the flicker fusion frequency (FFF) was determined during a control period and under the following conditions: a) moderate visual strain; b) strenuous visual strain; c) nutritional stresses; d) miscellaneous severe stresses—hard physical work, work in hot environment, and lack of sleep. The mechanism involved in the depression of fusion level in situations where such a change has been demonstrated (starvation, strenuous visual work) is not clear and most likely it varies. From the results presented in this report it seems clear that the decrease of the fusion level cannot serve as an index of the degree of involvement of the central nervous system in biologic stresses of the type applied in this study or that this involvement is minimal.

R 7

5252

Brink, J. CHANGES OF BODY COMPOSITION IN MEN DURING MATURE AND THEIR NUTRITIONAL IMPLICATIONS. *Exposition Data*, Sept. 1952, 11(3), 734-735. (University of Minnesota, Minneapolis, Minn.).

5253

A study of changes in body composition taking place during the process of aging was made in an effort to increase the precision of description of the nutritional status, specifically its caloric aspect. The subjects were men of normal condition in two age groups: 19-25 and 40-44. Methods of measuring fatness were determinations of specific gravity and measurements of skin folds. The basic data on age differences in fatness are presented in tables and graphic form. Some conclusions are drawn as to desirable caloric intake during maturity with tentative suggestions for suitable changes in present caloric intake tables.

T. G. R 39

5254

Sasser, L.R. & Whitefield, C.E. THE EVALUATION OF DEODORANTS FOR USE IN AIRCRAFT CLOTHING. Contract D.O. 33(515) 52 10, Proj. 6356 (3155, Tech. Rep. 55 132, Aug. 1955, 31pp. USAF Wright Air Development Center, Aero Medical Laboratory, Wright-Patterson AFB, Ohio.

5255

To select deodorant chemical formulations best suited for use in aircraft chemical toilets and to establish minimum performance characteristics for deodorant chemicals acceptable to the U.S. Air Force, 55 such aspects were studied. Physical and chemical characteristics (physical form in unit doses and in water, odor, shelf stability, corrosivity) were established. Two threshold odor dilution methods and two odor source materials were used to measure the effectiveness of odor control of the deodorant chemicals. A suggested list of performance characteristics is given.

T. I. R 6

5256

Pinson, E.A., Rosofsky, W.J., Chapanis, A. & House, R.C. VISUAL FACTORS RELATING TO THE DESIGN AND OPERATION OF AIRCRAFT. Tech. Note, Serial No. TSNAL 3-8, June 1945, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

5257

This report summarized visual functions critical to aircraft designers of fighter aircraft and related these functions to problems of aircraft design and operation. The field of vision in 11 fighter aircraft was measured and recommendations as to minimum requirements were made. In like manner, the design of transparent sections in regard to optical qualities (displacement, deviation, and distortion), and provisions for night vision were studied.

T. G. I. R 9

5266

Schachter, S. & Chapanis, A. DISTORTION IN GLASS AND ITS EFFECT ON DEPTH PERCEPTION. Expen. Order 655 42, Serial TSNAL 3 655 428, April 1955, 35pp. Aero Medical Lab., USA Air Forces, Air Technical Service Command, Engineering Div.

Depth perception, as measured by the Howard-Dolman apparatus, is impaired when pieces of glass which contain distortion are placed in the line of sight. At all angles of incidence the amount of impairment is directly proportional to the amount of distortion in the glass. Large angles of incidence increase distortion and decrease depth perception markedly for all glass samples. The difference between the amount of distortion at a large angle of incidence e.g., 70°, and distortion at a small angle of incidence, e.g., 20°, is much greater than the difference in distortion between a Grade A and Grade C type glass viewed normally. This impairment of depth perception is not caused by simple deviation and/or loss of transmission through the glass at large angles of incidence

R 7

5267

National Research Council. EFFECT OF TINTED WINDSHIELDS AND VEHICLE HEADLIGHTING ON NIGHT VISIBILITY. Highway Research Board Bull. 68, 1953, 61pp. (Report from: "Thirty-second Annual Meeting, Jan. 13-16, 1953".) National Academy of Sciences, National Research Council, Washington, D.C.

This bulletin contains five lectures, delivered on 13-16 January 1953 at the annual meeting of the Highway Research Board, on the effects of tinted windshields and vehicle headlighting on night visibility. The topics and authors were as follows: "Effect of Tinted Windshields on Nighttime-Visibility Distances", W. Heath & D.M. Finch; "Nighttime Seeing Through Heat-Absorbing Windshields", V.J. Roper; "Development of the Guide 'Autronic Eye'", G.W. Onksen; "Design of the Meeting Beam of the Automobile Headlight", A.J. Harris; and "Glare from Passing Beams of Automobile Headlights", G. Grime. (HEIAS)

3749 National Research Council. NIGHT VISIBILITY. Highway Research Board Bull. 68, 1953, 25pp. (Report from: "Thirty-third Annual Meeting, Jan. 12-15, 1954".) National Academy of Sciences, National Research Council, Washington, D.C.

This bulletin contains papers on night visibility presented at the Thirty-third Annual Meeting of the Highway Research Board on 12-15 January, 1954. The topics covered and their authors are as follows: "A Substitute for Road Tests of Automobile Headlights", G. Grime; "Sign Placement to Reduce Night Accidents", E.B. Davis & J.T. Fitzpatrick; "Effect of Planting in Median Strip on Night-Visibility Distances", E.A. Ricker & V.J. Roper; "Reflection Characteristics of Pavement Surfaces", A.V. Christie; "Evaluating Disabling Effects of Air Proaching Automobile Headlights", G.A. Fry; "Visual Detection at Low Luminance Through Optical Filters", H.R. Maclellan; "Effect of Wave-length Contrasts on Discrimination Thresholds Under Mesopic Vision", J.A. Stone & A.H. Lauer; "Signal Lighting for the Movement of Traffic in Fog", F.C. Breckenridge and "Effective Use of ReflectORIZED Materials on Railroad Boxcars", H.L. Stalder & A.R. Lauer. (HEIAS)

5269

Koppe, D.R. & Lauer, A.R. FACTORS AFFECTING THE PERCEPTION OF RELATIVE MOTION AND DISTANCE BETWEEN VEHICLES AT NIGHT. Bull. 43, Nov. 1951, 1-17. Highway Research Board, Washington, D.C.

Studies were undertaken to obtain certain quantitative data relating to a driver's reactions to various conditions of visibility and perceptual value of a vehicle being overtaken on the road at night. Time and difficulty for perception of the direction of speed differential and estimates of distance between the vehicles were obtained. Size, contrast, and overall illumination were used as independent variables for changing the perceptual cues of the lead vehicle. Two experiments used actual road conditions and one used laboratory conditions. Special apparatus was used to record time for perception and time for a judgment response.

T. G. I. R 4

5270

National Research Council. REFLECTORS AND NIGHT VISIBILITY. Highway Research Bull. 34, 1951 5pp. (Report from Twenty-ninth Annual Meeting, 1949.) Highway Research Board, National Research Council, Washington, D.C.

This bulletin contains papers presented at the twenty-ninth annual meeting of the Highway Research Board in 1949. Under the general topic of reflectors and night visibility, the following subjects were discussed: "An Acrylic Reflecting Material Which Offers New and Unique Applications for Traffic Signs", R.F. Hibbert; "Automobile Glare and Highway Visibility Measurements", E.P. Bone; "Reflex Reflector Performance Criteria", C.W. Finch; "Photometric Tests for Reflective Materials", S.M. Pocock & C.E. Rhodes. (HEIAS)

5271

Heath, W.M. & Fitch, J.M. DETERMINATION OF WINDSHIELD LEVELS REQUISITE FOR DRIVING VISIBILITY. Bull. 56, Jan. 1952, 1-17. Highway Research Board, Washington, D.C.

To determine the extent of glazed areas permissible while allowing for driving visibility, a study of driving visibility was made. Data on current passenger cars of the areas available for seeing by 25 percent of the driving population (California) were derived from statistics on adult human dimensions. Visibility angles required for observation of traffic signals were calculated and a method suggested for determining the levels requisite for driving visibility applicable to any automobile for various percentages of drivers. Recommendations are made for a specification to be included in the American Standard Code for Safety Glazing Materials on Motor Vehicles.

T. I. R 5

5272

Snell, C.A. THE USE OF OZONE FOR ODOR CONTROL IN INHABITED SPACES. ca. 1955, 2pp. Foster D Snell, Inc.

The problem of odor control in occupied spaces is of considerable importance because of the need to supply a minimum of replacement air in the interests of economy. Ozone has been used for several years to reduce the odor level and thus permit a greater percentage of recycle air. Ozone and its use for such odor control is examined in this brief paper: its preparation, its proved effectiveness on a variety of odors in the laboratory, the amount needed for various sized spaces, and the location of the ozone generator or ozonizer.

R 3

5273

Office of Naval Research, Physiological Psychology Branch. SYMPOSIUM ON PHYSIOLOGICAL PSYCHOLOGY. Rep. ACR-1, Mar. 1955, 302pp. ONR, Physiological Psychology Branch.

5273

This is the report of a symposium representing the research program of the Physiological Psychology Branch of the Office of Naval Research. Included are 23 papers, and discussions relating to them, dealing with recent research conducted by each of the participants. The papers are arranged in a definite functional sequence beginning with nature of the stimulus and continuing through the appropriate sensory modality to the level of perception or integration with other systems. Major topics: taste, cutaneous senses, vision, and audition.

T. G. I. R 23

5275
Ferreos, H.M., Fox, R.H., Jack, J.M., John, R.T., et al. PHYSIOLOGICAL RESPONSES TO HOT ENVIRONMENTS OF YOUNG EUROPEAN MEN IN THE TROPICS. V. THE EFFECT OF INCREASING THE MEAN RADIANT TEMPERATURE OF THE SURROUNDINGS. ANP 24/812, CES 413, Feb. 1956, 145pp. Medical Research Council, University of Malaya, Singapore, China.

3 series of experiments were performed to assess in terms of physiological measurements (sweat loss, skin and rectal temperature, and heart rate) the effect of increasing the mean radiant temperature under varying conditions of air temperature, humidity, and air speed. 28 young men were studied under alternate periods of rest and exercise (step-climbing), wearing shorts or overalls. Examination of the physiological measures show that variation in the amount of sweat loss, when expressed in terms of body weight, provides a satisfactory measure of the increase in environmental stress produced by the effect of increasing the mean radiant temperature varied with the existing level of other factors and no absolute value can be assigned. However, as measured by sweat loss, increasing mean radiant temperature 30°F above air temperature, at air temperature of 100°F, produces approximately the same strain increase as air temperature increases from 10° to 110°F. Even at the highest levels of radiant heat employed (132.4°F), the wearing of overalls imposes a greater strain than the wearing of shorts alone. (HEIAS)

R 34

5277

Belanger, J.E. & Woods, J.A. A STUDY OF THE RELATIONSHIP BETWEEN PHOTOPIC AND SCOTOPIC VISUAL ACUITY. Bull. 43, Nov. 1951, 17-32. Highway Research Board, Washington, D.C. (USA Human Factors Research Branch, Adjutant General's Research & Development Command, Washington, D.C.)

To determine the relation between photopic and scotopic visual acuity in order to ascertain the feasibility of a single instrument for measuring both, 202 soldiers after 30 min. dark adaptation, were given the Army night-vision tester, NVT-222, modified Landolt ring, Army Snellen, quadrant variable contrast chart, line resolution, and Orthonator tests. Light under scotopic conditions varied between 3.51 and 5.26 microns/lamberts and, under photopic conditions, was 10.5 ft.-c on charts and between 6 and 10.5 ft.-c in the booth. Photopic and scotopic measures were correlated and the practical implications of the findings were discussed.

T. C. R. 22

5278

Harvett, J.H. & Pasco, A.C., Jr. FIELD AND LABORATORY EVALUATION OF ROADSIDE SIGN SURFACING MATERIALS. Bull. 43, Nov. 1951, 32-42. Highway Research Board, Washington, D.C.

Physical and optical characteristics of sign materials and design and application of a reflectometer devised by the Kentucky Department of Highways are discussed. Accelerated weathering procedures and specification standards are described. Field studies paralleling laboratory work and a possible correlation between the two are described. The field work includes several thousand observations covering 30 different sign surfacers made during night visibility conditions. Ordinary sealed-beam headlights, polarized headlights, and viewers are used.

G. I. R 3

5279

Stilaon, C.B., & Nello, E. FIELD EVALUATION OF PLASTIC CUSTOM-MOLDED EAR DEFENDERS. Rep. 55-63, Aug. 1956, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

5279

To evaluate the acoustic protection provided by custom-molded earplugs and by standard (NSA) ear defenders, personnel at Randolph Air Force Base exposed to 100 db of noise level or above were fitted with the plastic earplugs. Free-field audiometric tests were given to 43 individuals without ear defenders, with NSA defenders, and with custom-molded ear defenders. The arithmetic mean of attenuation provided by each type of defender was calculated with the difference indicating relative excellence of protection. The potential protection offered by the two ear defenders is discussed.

T

5280

Sternberg, R.E. SOCIO-PSYCHOLOGICAL FACTORS IN INDUSTRIAL MORALE: I. THE PREDICTION OF SPECIFIC INDICATORS. J. Appl. Psychol., 1952, 36, 73-82. (Dept. of Psychology, Los Angeles State College, Los Angeles, Calif.).

5280

Various tests of morale were constructed to analyze the relative predictive value of two major hypotheses for specific indicators in the work situation. The hypotheses were 1) that morale is a group phenomenon and 2) that morale is the acceptance of formal organization by members of the group. The indicators of morale were performance variables such as tardiness, short time absences, trips to medical aid unit for reasons other than injury or disease, and merit rating. Hourly-paid employees of a large aircraft manufacturing plant completed the questionnaires. Union and management established the qualitative criteria.

T. R 8

5281

Sternberg, R.E. SOCIO-PSYCHOLOGICAL FACTORS IN INDUSTRIAL MORALE. III. RELATION OF AGE TO MORALE. Psychol., Astoria, 1954, 2(3), 395-399. (Los Angeles State College, Los Angeles, Calif.).

5281

To investigate differences in morale attributable to age, data from a study of 850 hourly paid employees of an aircraft plant were analyzed by making covariance adjustment for length of service in the work organization. Available data included age, length of service, and scores on two morale tests—a group test and an attitude test. A separate analysis was made with respect to each morale test when adjusted for age and for length of service. Suggestions are made for differential reward systems for younger and older workers.

T. R 5

5282

Zeitlin, L.B., & Cramer, R.L. FURTHER STUDIES ON FREQUENCY DISCRIMINATION OF PURE AND COMPLEX TONES. Proj. 6-95-20-001, Rep. 248, Jan. 1957, 7pp. AMRL, Fort Knox, Ky.

5282

To investigate the ability to discriminate small changes in frequency of pure and complex tones for frequencies over 1000 cycles per second, sixteen subjects made judgments as to whether the middle tone (sequence of three) was higher or lower than the end tones. Tone frequencies were 1500, 3000, and 6000 cycles per second for two sets of sixty stimuli (sinusoidal and complex 15 microsecond pulse duration). Error data were analyzed for differences due to type of tone. The data were combined with data from a previous study which used frequencies below 1000 cycles per second and an empirical formula is given for determining the relative efficiency of discriminating frequency changes of complex over pure tones.

T. O. R 4

5283

Bellows, R.M., Estep, M.F. & Scholl, C.E., Jr. A TOOL FOR ANALYZING TRAINING NEEDS: THE TRAINING EVALUATION CHECK LIST. Personnel, March 1953, 1-8. (Personnel Research Center, Wayne University, Detroit, Mich.).

5283

This report described the development and application of the Training Evaluation Checklist, a device used to analyze training needs. The items of the checklist reflect such general areas as adequacy of aids and materials, instructor training problems, and the psychological requirements, physical provisions, organization and management of training. The results of the application of the checklist to a training program were presented along with a discussion of its value as a diagnostic tool.

1.

5284

Lauer, A.R. FILTER STUDY OF THE EFFECT OF CERTAIN TRANSMISSION FILTERS ON VISUAL ACUITY WITH AND WITHOUT GLARE. *Bull.* 43, 1957, 45-51. Highway Research Board, Washington, D.C.

To determine the effect of filters on visual acuity throughout the spectral range, 20 representative filters were selected for study. Eleven Ss of near-normal vision made 15 separate sets of observations using one eye at a time. Each S's visual acuity without filters was measured first, and then acuity with the filters was obtained with an opposing light and under normal conditions of vision. The relation between acuity and filter transmission factors and decrement due to filter were calculated.

T. G. R 3

5285

Peckham, R.H. EFFECT OF EXPOSURE TO SUNLIGHT ON NIGHT-DRIVING VISIBILITY. *Bull.* 56, Jan. 1952, 17-25. Highway Research Board, Washington, D.C.

To study the effect of exposure to sunlight on night-driving visibility, a group of 24 young men were required to drive automobiles along country highways for six hours per day for five days without sunglasses. Critical flicker rates were measured at two levels of brightness both morning and evening. The difference between average rates for the two periods was calculated and analyzed for changes in retinal sensitivity due to exposures. These data are used to predict safe driving conditions. The effect of use of sunglasses is discussed.

G. R 12

cf. 5256

5285

Stalder, H.L. & Lauer, A.R. EFFECT OF PATTERN DISTRIBUTION ON PERCEPTION OF RELATIVE MOTION IN LOW LEVELS OF ILLUMINATION. *Bull.* 56, Jan. 1952, 25-36. Highway Research Board, Washington, D.C.

To study effect of pattern distribution and driving speed on discrimination of relative motion in low illumination, a simulated night driving test (scotometer) was administered to thirty subjects (19 to 54 years of age). Three target treatments were presented at 10, 20, 30, 40 and 50 miles per hour, both with and without opposing lights (calculated to give lighting conditions equivalent to standard road-light illumination). The task was to report whether the target was moving toward or away from observer and to estimate speed difference between target and observer, difficulty of judgment and distance of target ahead. The data were analyzed for differences due to type of target and speed of target. Findings are discussed with reference to night driving safety.

G. I. R 3

5287

Chernikoff, R. & Taylor, F.V. REACTION TIME TO KINESTHETIC STIMULATION RESULTING FROM SUDDEN ARM DISPLACEMENT. *J. exp. Psychol.*, Jan. 1952, 52(1), 1-8. (OSR Research Lab., OOR, Washington, D.C.).

To determine the role of kinaesthesia in the control of precise hand and arm movements, it is first necessary to know how rapidly a human can respond to a kinaesthetic stimulus. This study was an attempt to determine the reaction time to a kinaesthetic stimulus initiated by suddenly dropping S's splinted arm which was held horizontally by an electromagnet. In one situation S responds by releasing a key with his other hand upon awareness of arm fall, and in the second situation he responds by dropping his falling arm as quickly as possible. For purposes of comparison, auditory and tactile reaction times were obtained, with the key release as the response. The kinaesthetic reaction time with the arm-stop response differed significantly from the other 3 conditions; no other differences were significant. The difference in kinaesthetic reaction time with the arm-stop response and the key release response was confirmed by a supplementary study. The shorter kinaesthetic reaction time obtained with the arm-stop response is probably a function of the use of an accelerometer to indicate the onset of the response. However, it is still within the range of reaction times for other modalities. It is concluded that kinaesthetic reaction time is too long to permit continuous voluntary control of short duration hand and arm movements by information furnished through feedback. A dual mechanism of control is suggested, wherein the volitional processes serve the function of intermittently issuing "orders" and the nonvoluntary, lower centers execute these orders without additional voluntary guidance.

R 11

5288

Crampton, G.H. & Young, F.A. THE DIFFERENTIAL EFFECT OF A ROTARY VISUAL FIELD ON SUSCEPTIBLE AND NONSUSCEPTIBLES TO MOTION SICKNESS. *J. comp. physiol. Psychol.*, Dec. 1953, 46(6), 451-453. (State College of Washington, Pullman, Wash.).

2 groups of Ss, one susceptible and the other not susceptible to motion sickness, were subjected to a rotating room situation in which they remained stationary. The resulting nausea symptoms were categorized on an arbitrary 4-point scale. The results indicate that individuals susceptible to motion sickness are also susceptible to nausea in a rotary visual field situation, and, conversely, nonsusceptibles are resistant. It is concluded that some of the individual differences in regard to nausea found in previous studies utilizing rotary visual fields may be related to the motion sickness susceptibility of the Ss.

R 9

5289

Berrien, F.X. & Young, C.W. THE EFFECTS OF ACOUSTICAL TREATMENT IN INDUSTRIAL AREAS. *J. Acoust. Soc. Amer.*, Oct. 1946, **18**, 453-457. (Psychology Dept., Colgate University, Hamilton, N.Y.).

In this study of the influence of acoustical installations on manufacturing personnel, employee comfort and morale plus a systematic evaluation of intelligibility was made in 3 plants where acoustical treatments had already been completed and in 3 plants before and after acoustical treatment. Individual interviews; tests of attitude toward the company, and working conditions; tests of intelligibility before and after treatment; and studies of records pertaining to production, turnover, absenteeism, quality controls, accidents, and health were the techniques used. The following conclusions appear to be justified: a) Acoustical treatment results in increased ease and accuracy of verbal communication with at least 15% improvement; b) Both management and employees are generally convinced that acoustical treatments lessen noise discomfort and there is some indication that headaches, ringing in the ears and nervousness are reduced; c) No support to the thesis that morale and attitude toward the company are generally improved by acoustical treatment was found; d) There is considerable indication that accident rates are reduced; and e) There was no significant increase in production as a result of treatment. (MEIAS)

R 3

5290

Berrien, F.X. THE EFFECTS OF NOISE. *Psychol. Bull.*, March 1946, **52**, 141-151. (Colgate University, Hamilton, N.Y.).

This review summarizes critically those studies pertaining to the effects of noise on human beings with occasional reference to studies of animals to point up certain areas. The literature included was primarily produced during a 17-year period, from 1925 through 1945. Consideration is given in turn to the effects of noise on output speed and accuracy, fatigue and energy expenditure, the course of noise-adjustment, stimulation deafness, and to the examination of these problems. The methods of measuring noise and their limitations are summarized. (MEIAS)

R 2

5291

Spector, W.S. (Ed.). HANDBOOK OF BIOLOGICAL DATA. Contract AF 33(633)-2174, Proj. 7158, Task 71501, Tech. Rep. 56-273, Oct. 1956, 564pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

5295

Jones, E.R., & Garrett, C.A. ANALYSIS OF TRAINING REQUIREMENTS FOR ACCIDENT PREVENTION IN A JET FIGHTER AIRCRAFT. Proj. 7716, Task 37050, Tech. Memo. 61-TX-57-15, Oct. 1957, 31pp. Operator Lab., AFPMSC, AIDC, Randolph AFB, Tex.

5291

This Handbook presents tabular data, graphs, charts, and diagrams in the broad areas of plant, animal, and preclinical medical sciences. The data are arranged under the following categories: (1) biochemical and biophysical characteristics; (2) genetics, cytogenetics, and reproduction; (3) development and morphology; (4) nutrition, digestion, and metabolism; (5) respiration and circulation; (6) other physiological activities and performance; (7) biologically active compounds; (8) environment and survival; (9) symbiosis and parasitism; and (10) ecology and biogeography. Tables present for each variable, whenever possible, a representative value and the range of variation. Essential information as units, methods, and conditions of measurement, conversion factors, glossaries, and taxonomy lists are given. An appendix and index are included. T. G. I. R

5295

To obtain information that could be used to design flight simulators and in conducting training programs for teaching pilots to cope with emergencies, an analysis of 215 accidents that occurred in the F-80, a high performance jet aircraft, was made. From this analysis a machine relationship was hypothesized which covered most of the accidents reported. Additional data were obtained from interviews with pilots who had experienced near accidents in some type of aircraft. The implications of the results for training are discussed.

T. G. I.

5292

Chernikoff, R. OPTICAL TARGET DESIGNATION EQUIPMENT: HUMAN ENGINEERING OF. PART II. CONTROL UNIT FOR TDT Mk 19. N7L Prob. 35R13 05 Bureau Request O 214, Rep. R 3500 5754/52, Dec. 1952, 5pp. USN Research Lab., Psychology Branch, Radio Div. III, Washington, D.C.

In a previous report the Psychology Branch of Radio Division III, Naval Research Laboratory recommended certain modifications of the optical Target Designation Transmitter (TDT) Mk 19 to obtain more efficient performance without changing the basic engineering design of the instrument. One of these recommendations involved separation of the Control Panel now on the TDT Mk 19 to a position at the station of the officer responsible for optical target evaluation and director assignment. This report suggests human engineering recommendations for a panel layout and the needed displays and controls for this Control Unit. (MEIAS)

R 2

5293

Corso, J.F. AN ELECTRONIC DEVICE FOR THE PRODUCTION AND MEASUREMENT OF MARBLE-TONES. *Am. J. Psychol.*, June 1955, **68**, 305-311.

This paper describes an inexpensive device for producing frequency-modulated tones and outlines a specific procedure for calibrating the rates and the extents of modulation. A circuit diagram of this electronic device is included. (MEIAS)

R 5

5294

Corso, J.F. EVALUATION OF OPERATING CONDITIONS ON A BEKESY-TYPE AUDIOMETER. *A.M.A. Arch. Otolaryng.*, June 1955, **61**, 649-653. (Pennsylvania State University, University Park, Penn.).

A Reger model of the Bekesy audiometer was used to obtain test-retest right ear audiograms on a group of 90 volunteer male and female subjects between the ages of 17 and 25 years. A 2-factor analysis of variance design was used with 3 testing times (5, 10, 20 min.) and 3 rates of signal attenuation (0.5, 1, 2 db/sec.). Each of the 9 operating conditions was assigned at random to each of 10 subjects. No subject served for more than a single one-hour session. All threshold measurements were made in a soundproof room and all retest audiograms were obtained after a 5-minute rest period. In the treatment of data, analysis of variance techniques were used to evaluate the effects of testing time and attenuation rate on 3 criterion measures. The results of the study showed that a) testing time and attenuation rate have no effect on mean threshold value at 1000 cps; b) attenuation rate has a significant effect on threshold variability, and c) attenuation rate has a significant effect on test-retest reliability. It is concluded that, with respect to the 3 criteria considered simultaneously, optimal performance on the Bekesy audiometer is obtained by using an attenuation rate of 0.5 db/sec. combined with a total testing time of 5, 10 or 20 minutes.

R 4

5296

Richards, O.W. VISION AT LEVELS OF NIGHT ROAD ILLUMINATION. *Bull.* 56, Jan. 1957, 35-66. Highway Research Board, Washington, D.C.

This paper discusses and summarizes visual information pertinent to night driving. The following topics are covered: 1) illumination range of night driving; 2) dark adaptation; 3) colored glasses and vision; 4) acuity and contrast; 5) speed of vision; 6) specific factors of the eye; 7) night myopia; 8) aniseikonia; 9) general factors (sex, individual variation, diseases, age, fatigue, psychological factors, night blindness); 10) glare; and 11) special conditions of night driving vision. Cf. 5285
G. R 96

5297

Lillehei, J.P. & Balke, B. STUDIES OF HYPERVENTILATION. *Rep.* 55 62, July 1955, 6pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

Lowering the alveolar carbon dioxide tension below 25 mm. Hg by hyperventilating normal young men caused a significant impairment of psychomotor performance as tested on the USAF SAM Complex Coordination Apparatus. Hyperventilation of normal young men resulted in tetany with severe spasms of the wrists and fingers when on the average approximately 3.5 liters of CO₂ per square meter of body surface area were lost from the reservoir of carbon dioxide in the body. The size of this reservoir was apparently not affected by the ventilation rate or total time of hyperventilation within the ranges tested (25-52 liters/min. and 15-60 minutes respectively).
R 10

5298

Thring, E.J. MASKED THRESHOLD AND ITS RELATION TO THE DURATION OF THE MASKED STIMULUS. *J. Acoust. Soc. Amer.*, 1956, 28 (4), 606-610. Contract AF 15(500)-571, AFOSR-15-56-50. Operational Applications Laboratory, AFOSR, Bolling AFB, Washington, D.C. (Indiana University).

5299

This study attempts to determine the dependence of the masked threshold of a pure tone on its duration. Eight male listeners adjusted the loudness of a 100-5000 cps flat noise in accordance with two judgments: (1) to just mask a 1000 cps pure tone in loudness, and (2) to just mask the same tone. They were exposed to the same pure tone for 0 to 12 minutes after making two pre-exposure sets of judgments. Two further experiments (24 and 4 subjects respectively) examined the effects of the frequency of the pure tone, and in a fourth experiment (4 subjects) a pure tone of 700 cps was substituted for the masking noise. The implications of the results with respect to the assumed excitation pattern of a pure tone are discussed in relation to adaptation.
G. R 9

5299

Irwin, I.A., Milosky, E.W. & Levy, B.I. A PROCEDURE FOR EVALUATING INSTRUCTOR TECHNIQUE DURING CRITIQUES OF CREW PERFORMANCE. *Proj.* 7712, Task 7723, AFHRC TX 56 37, Feb. 1956, 32pp. USAF Crew Research Lab., Randolph AFB, Tex.

5299

The characteristics of effective instructor behavior in critiques were first outlined. A critique-scoring procedure was then designed to measure how well instructors conformed to the model. Critiques of 32 student crews were scored by specially trained observers; most of these crews were observed twice. The reliability of the measurement procedure was tested by calculating correlation coefficients for interobserver agreement, interrelationships of critique items, and consistency of measures from first to second observation. Also examined were relationships between critique score and student reaction, instructor perception of student reaction, student attitude change, end-of-training attitude, and instructor ratings of crew effectiveness. I. R 9

5300

Brogden, H.E. STATISTICAL THEORY AND RESEARCH DESIGN. *Annual Review of Psychol.*, 1954, 2, 377-400.

The literature on statistical methods and research designs appearing in 1952 and the early months of 1953 were reviewed in terms of trends in the area having special interest to psychologists. Special topics covered were test theory; correlation, regression and selection; personnel classification; factor analysis; analysis of variance and related designs; tests of significance; truncated distributions; scaling; and general texts. No very definite or novel trends seemed noticeable in the literature on statistical methods and research designs during the period covered by this review. Increasing specialization seemed pretty generally evident. Although few publications have appeared on the topic, increased activity in applications of statistical problems to high speed computers suggests that such devices will soon have marked influence in this field. Foreseeable effects include the tabling of functions hitherto regarded as unmanageable, and the use of more exact but computationally difficult methods, such as principal component solutions in factor analysis. It was concluded that some of the more significant advances were achieved in the areas of test theory and personnel classification methods.
R 55

5301
Hovens, J.H. & Fred, A.C., Jr. SPHERICAL LENS OPTICS APPLIED TO RETRODIRECTIVE REFLECTION. *Bull.* 56, Jan. 1957, 66-77. Highway Research Board, Washington, D.C.

This paper describes some applications of elementary optical principles to the evaluation of glass-bead reflectorizing systems for highway signs and markers. Performance criteria for highway signs and markers. Performance criteria for reflective highway signs is established, the different types of reflectors are discussed, the optical function of spherical lenses in achieving reflex reflection is illustrated, and the optical design of reflex reflectors is discussed and analyzed.
I. R 5

5303
Tallierico, R.B., Montague, W.F. & Denenberg, V.J. THE MAP-USING PROFICIENCY OF BASIC TRAIN-
CES. Tech. Rep. 11, Sept. 1954, 52pp. USA Human Research Unit No. 1, Fort Knox, Ky.

4 basic training companies were tested in evaluating map reading as taught by the Army Training Program (ATP). 2 were examined before instruction, 2 after. These latter 2 com-
panies plus 4 more were employed in evaluating the special lesson plan. On the basis of ap-
titude tests the soldiers were separated into high and low intelligence groups. Findings:
a) before training high-intelligence trainees read maps significantly more skillfully than
trainees with low intelligence. b) both groups benefit from ATP instruction, but the high-
intelligence group does so more. c) after training the low-intelligence trainees is still less
skilled than the high-intelligence trainees before instruction. d) soldiers who had an oppor-
tunity to review or apply what they have learned in the classroom tended to retain or improve
their skill. e) practical field training seems preferable to classroom training, particularly
for trainees of low intelligence. f) there is a need for simplifying the vocabulary of map
reading; g) the Map Patrol Test and the Map Skills Test could be used as general training
techniques, and could be adapted for operational use by the Army. (MCTAS)

5304
Saul, E.V. & Jaffe, J. HUMAN ENGINEERING SERVICES
IN THE DESIGN OF SMALL ARMS. FINAL SUMMARY REPORT.
Contract DA 19 020 ORD 3461, Proj. TD 1 1000, Nov.
1955, 11pp. Institute for Psychological Research,
Tufts University, Medford, Mass.

5304
This is the final report of a research project concerned with the application of human engineering to the
design of small arms and the assessment of the effects
of rifle recoil on marksmanship performance. A sum-
mary of the project's results is presented along with
the results of subsidiary research on such aspects as
the following: (1) a recoil simulator; (2) a rifle
steadiness apparatus; (3) the use of high speed motion
photography in investigating recoil; and (4) the percep-
tual discriminability of levels of recoil energy. Spe-
cific recommendations for the design and conduct of
marksmanship research are offered.

5305
Ladhams, G.H. A NEW METHOD FOR TRAINING OPERATORS.
Personnel, May 1952, 28, 471-477.

5305
This is a report concerning the application of
training aids following the utilization of the "Analyti-
cal Method" of evaluating the training situation, i.e.,
detailed analyses of the separate skills involved in an
operation. The author presents the theoretical princi-
ples underlying the method and the results of its appli-
cation in terms of such factors as acquisition of skills,
retraining, training time, level of output, versatility
of the operator, etc.
T. G. I.

5306
Saul, E.V. & Jaffe, J. THE EFFECTS OF RIFLE RECOIL ON MARKSMANSHIP PERFORMANCE. Contract
DA 19 020 ORD 3461, Proj. TD 1 1000, Nov. 12, Nov. 1955, 41pp. Springfield Armory, Spring-
field, Mass. (Tufts University, Medford, Mass.)

The purpose of this experiment was to assess the effects of variation in rifle recoil on
marksmanship performance, subjective report of comfort, observable tissue damage, and fre-
quency of voluntary termination of firing. The experimental procedure required each of 4
groups of 5 (5 males/group) to fire one, and only one, lot of 4 lots of experimental am-
munition. The 4 lots of ammunition gave comparable dispersion patterns when fired from the
M-1 rifle but produced 4 recoil energies of 11.0, 14.8, 19.3 and 25.5 ft. lbs. respectively.
The 5s fired up to 100 test rounds on each of 3 successive days from a standing position with
rifles resting on a sandbag emplacement. The range was 200 yards. The results of the ex-
periment indicated that variations in rifle recoil were associated with differences in mark-
smanship performance, shooter comfort, tissue damage, and frequency of voluntary termination
of firing. An upper limit of rifle recoil for moderately proficient marksmen appears to be
approximately 19.3 ft. lbs. of free recoil energy. Implications of the obtained results for
military application and future research are discussed.
R 10

5307
Schroeder, P. de N. ANATOMY FOR INTERIOR
DESIGNERS AND HOW TO TALK TO A CLIENT.
New York: Whitney Publications, Inc., 1948.

5307
Upon the assumption that the average man is 5'9"
tall and the average woman is 5'8" the author presents
illustrated recommendations on the size standards to
be used in the design of home and office furniture,
stairs and passageways, office and home layout, stor-
age areas, public and private dining facilities, re-
creational areas, etc. A final portion of the pre-
sentation is concerned with the relationships be-
tween the industrial designer and his client.

5308
Ministry of Supply, Technical Information
Bureau. A BIBLIOGRAPHY OF UNPUBLISHED REFER-
ENCES. PART III. CLOTHING, EQUIPMENT &
GENERAL STORES. TIB/SIB(n) 3 Part 3, May
1955, 254pp. Ministry of Supply, Tech.
Information Bureau, Personnel Research,
London, Eng.

5308
An annotated bibliography of some 380 unpublished
reports on a wide variety of types of clothing, per-
sonal equipment, personnel shelters, rations, clothing
materials, etc., studied by agencies of the United
States and the United Kingdom.

5309

Travis, R.C., Kennedy, J.L., Mead, L.C. & Allphin, W. MUSCLE ACTION POTENTIALS AS A MEASURE OF VISUAL PERFORMANCE COST. *Illum. Engng.*, 1951, 45, 182-187.

A study of the use of muscle action potentials to measure physiological cost of visual performance was conducted. Reading rate and tension level were measured for different levels of illumination, the level changing so slowly as to be unnoticed by the reader. Eye-movement recordings were used as a measure of reading rate and muscle action potentials for tension level measurement. Illumination changes were from 40 down to 0.2 ft.c. 4 Ss were studied. Although the preliminary nature of the tests precludes more than tentative conclusions, the data show that for reading 10-point type in a surround providing comfortable brightness ratios, the physiological cost (tension levels) does not increase at very low levels of illumination for periods of from 10 to 30 min. Under the same conditions, except that reading rate is maintained, the physiological cost increases somewhat at low levels of illumination. When the severity of the task is increased (8-point type of poor contrast) reading rate becomes more directly proportional to the illumination and physiological cost increases both with lower illumination and elapsed time. (HEIAS)

R 14

5311

Travis, R.C. PERCEPTION AND BODY ADJUSTMENT UNDER CHANGING ROTARY ACCELERATION: A NEW TECHNIQUE. *Amer. J. Psychol.*, 1944, 52, 466-481. (Stanford University, Stanford, Calif.).

The primary purpose of this paper is to describe a new apparatus and technique for producing and recording accelerative movements in the rotation-chair and to record experiments carried out with it upon the perceptive and the adjustive effects of rotation. In view of the facts that the tasks of the experiments simulate rudder-control and sensory experience in airplane flight, that learning is manifested in a steady progressive manner in one task and not in another, that great individual differences are evident, and that wholly unlike functions were under study in the 2 tasks, the author believes that his method seems to warrant further research of an experimental nature. (HEIAS)

R 16

5312

Travis, R.C. AN EXPERIMENTAL ANALYSIS OF DYNAMIC AND STATIC EQUILIBRIUM. *J. exp. Psychol.*, 1945, 35, 215-234. (Stanford University, Stanford, Calif.).

An experimental analysis of various components of dynamic and static equilibrium and a number of correlations among these components are reported in this paper. The various measures were taken on 22 college men and 22 college women. The major conclusions are summarized as follows: The dynamic component of equilibration is unrelated to the static component as indicated by a practically zero correlation between performance on a stabilometer and the amount of body sway at the head in standing position. There is practically no correlation between balancing skill on the stabilometer and ability to maintain manually orientation of a rotation chair which is continually being displaced. A disparity between perceptual sensitivity to passive body motion and voluntary motor adjustment is revealed by low correlations between perceptual and motor components of body orientation on the rotation chair. Relatively, weight is of great and height of little importance in dynamic stabilometer performance. Weight and height have no bearing on body sway scores, rotation scores, steadiness, and manual pursuit. Both types of equilibrium are aided when visual cues are present. Mild exercise has little effect on dynamic stabilometer performance, but increases body sway. A steadiness factor in balancing skill and eye-hand coordination is indicated. (HEIAS)

R 10

5315

Travis, R.C. BALANCING SKILL AS A MEASURE OF RECOVERY FROM ROTATION. *Amer. J. Psychol.*, 1945, 58, 351-378. (Stanford University, Stanford, Calif.).

2 experiments were conducted to investigate the rate of recovery from the effects of bodily rotation. Balancing skill in the standing position was measured on 156 men and women before and after 5 rotations at rate of 10 revolutions in 22 sec.; rate of recovery was considered to be ratio of the 2. The same procedure was again used but the number of rotations varied from 2 to 8; 60 Ss were used. Reliability coefficients for balancing performance on the stabilometer ranged from .68 after 2 rotations to .92 in normal performance. A significant increase of about 14% in performance from first to second trials was found. A definite tendency for weight to influence recovery from rotation adversely was found with negative correlations of -.43 and -.42. Recovery rate varied inversely with the number of rotations. No relation was found between reported incidence of motion-sickness of various kinds and recovery rate scores. Adequacy of normal balancing skill before rotation has a definite bearing on rate of recovery of postural balance after rotation ($r=.52$). (HEIAS)

R 6

5317

Travis, R.C. A NEW STABILOMETER FOR MEASURING DYNAMIC EQUILIBRIUM IN THE STANDING POSITION. *J. exp. Psychol.*, 1944, 34, 418-424. (Stanford University, Stanford, Calif.).

The stabilometer, an instrument for measuring dynamic equilibrium in a standing position, is described and details of the design are given. It meets the objectives a) of presenting a real challenge to the individual, b) of being duplicable in other laboratories, and c) of giving an objective score. Experimental data obtained on 164 college men and 157 college women are presented: mean performance scores and the variability for each weight group and each height group; the relationship between height, weight and balancing scores; sex differences; reliability correlations for first 3 trials (.86, .85 and .80); practice effects; and effect of visual cues. (HEIAS)

5321
Touss, R.C. VOLUNTARY RESPONSE TO VESTIBULAR STIMULATION WITH SMALL AMPLITUDE OF PASSIVE ROTARY OSCILLATION. *J. exp. Psychol.*, 1941, 23, 248-251. (Western Reserve University, Cleveland, Ohio).

This experiment was conducted to investigate what part or phase of a bodily movement constitutes the real stimulus in eliciting a vestibular response and thus perception of body motion. A rotation platform was used for subjecting 5 to passive motion; 3 rates of oscillation (from 0.27 to 1.86/sec.) for each of 3 amplitudes ($1/2$, $1/4$, and $1/8$) were used. Ss were blindfolded and instructed to move a stylus in the direction of and at the same rate as any perceived movement. 21 Ss were studied. The results were analyzed in terms of adequacy of response to the perception of passive rotary oscillation with varying rates and amplitudes of oscillation; the following conclusions were drawn. Magnitude of change in acceleration and deceleration was the significant factor in vestibular stimulation. Changes in amplitude alone did not affect the adequacy of voluntary response and average velocity was a direct one. The 75% threshold for perception of rotary oscillation in terms of average velocity was about 0.90/sec. (NCIAS)

5323

Smith, W. & Wilson, Edna A. A MODEL OF THE AUDITORY THRESHOLD AND ITS APPLICATION TO THE PROBLEM OF THE MULTIPLE OBSERVER. *Psychol. Monographs*, 1953, 67(9), 1-35. (University of Washington & Massachusetts Institute of Technology).

5323

To present an adequate theory of the multiple observer a model of the threshold that takes false reports into consideration was developed. Two sets of experimental data were fitted to the model. In the main experiment 23 groups of five observers each listened for an 800-cycle tone; 0.41-second duration, against a background of noise; 12 groups were instructed to be conservative in reporting tones as heard and 11 were given liberal instructions. In addition, ten observers were given a large number of trials with instructions to make a four-category judgment on each tone. A theory of the multiple observer was worked out from this model. Agreement of theory and observation was checked.

T. G. I. R 8

5324

Smith, M.H., Jr. INSTRUCTIONAL SETS AND HABIT INTERFERENCE. *J. exp. Psychol.*, Oct. 1952, 44(4), 267-272. (University of Washington, Seattle, Wash.).

5324

This is a study of the interactions between instructional sets and previous practice as factors in habit interference. Thirty-six Ss were shown a series of letters one at a time with instructions to respond motorically when any one of a set of pre-designated letters appeared. After five trials the Ss were divided into three groups on the basis of being assigned: 1) the same letters, 2) an entirely new set of letters, and 3) half new and half old letters. The results are treated in terms of the degree of positive and negative transfer reflected by each of the groups.

T. R 6

5326

Jenkins, W.L., & Olson, M.W. THE USE OF LEVERS IN MAKING SETTINGS ON A LINEAR SCALE. *J. appl. Psychol.*, 1952, 36, 269-271. (Institute of Research, Lehigh University).

5326

This study was designed to define the significant factors involved in the utilization of levers in making linear scale settings. Levers were compared with knobs in a total of six experiments in which the subject was required to match the position of a lighted insert in a black bakelite scale with a pointer controlled either by a lever or knob. Scales were varied in terms of tolerance, levers in terms of length, inserts in terms of width, and a variety of lever-knob ratios were employed. The results are discussed in terms of specifying the optimal criteria for each of the specific experimental variations as well as indicating the primary factors which define the efficient performance.

G. I. R 1

5327

Jenkins, W.L., Kaas, L.G., & Rigler, D. INFLUENCE OF FRICTION IN MAKING SETTINGS ON A LINEAR SCALE. *J. appl. Psychol.*, 1950, 34, 434-439. (Institute of Research, Lehigh University).

5327

Having defined an optimal ratio between pointer-movement and knob-turn in previous experiments, the present study concerns itself with evaluating the effect of artificially equalizing the friction at all ratios on the optimal ratio and the general performance in making settings on a linear scale. Four subjects were required to match the position of a lighted insert in a black bakelite scale (with a knob-controlled pointer) under conditions of equalized friction, requiring a pull of 300 grams, and varied friction at the optimal ratio (i.e., 100, 400, 700, 1000, and 1300 grams). Results are discussed in terms of the relative influence of equalized friction and added friction upon adjusting time, travel time, and action potentials of the active forearm.

T. I. R 1

5328

Jenkins, W.L., & Marr, A.C. THE USE OF A JOY-STICK IN MAKING SETTINGS ON A SIMULATED SCOPE FACE. *J. appl. Psychol.*, 1954, 38, 457-461. (Institute of Research, Lehigh University).

5328

This study was designed to evaluate the role of certain variables in the utilization of a joy stick in making settings (in two dimensions) on a simulated scope face. A series of experiments were conducted in which a total of approximately 80 subjects were required to bring a cursor controlled by a joy stick onto a lighted insert under varied experimental conditions. Mean setting times, variability, and mis-settings were computed for the following variables: lever length, movement of lever tip and movement of pointer (L/P) ratios, starting positions of cursor, direction of movement, and so forth, and varied combinations of these variables. The relevant variables are outlined and discussed.

T. I. R 1

5329

Jenkins, W.L. & Connor, Minna B. SOME DESIGN FACTORS IN MAKING SETTINGS ON A LINEAR SCALE. *J. appl. Psychol.*, Aug. 1949, 33(4), 395-409. (Lehigh University, Bethlehem, Penn.).

5329

To investigate the design factors influencing the ease of setting a pointer on a linear scale by means of a control knob, the subject was required to set the pointer to a position indicated by a lighted insert. Time consumed in making the setting and the relative action potential developed in the active forearm were measured separately for travel to approximate location and for final adjustment. Systematic variations in ratio, knob diameter, backlash, etc. were introduced. Three to five subjects were used in various parts of the study. Optimal design factors are discussed.

T. G. I. R 1

5330

Gebhard, J.V. PSYCHOLOGICAL PROBLEMS IN CODING THE INFORMATION FOR VISUAL DISPLAYS. Contract NS 01 166, T.O. 1, Proj. NR 784 031, Rep. 166 1 93, May 1949, 7pp. USM Special Devices Center, ONR, Washington, D.C. & Johns Hopkins University, Baltimore, Md.

It is important that the individuals who make crucial decisions from displays be given information which is already partially interpreted in a form that is easy to understand. An analysis of the psychological problems in visual coding of displays and of interpretability of coded displays led to the following statements: a) The conventional 2-dimensional display is only satisfactory for presenting 2-variable information; b) It is desirable to get more variables into a 2-dimensional display; c) Coding the target spots provides a way of doing this; d) Coding may be done by varying the target spots in color, brightness, size, intermittence, and shape. These may be used in combination; e) To assess the utility of these codes will require much fundamental research on discriminability, scaling, and learning; and f) A display of many targets, each complexly coded, may make a single display completely incomprehensible. Therefore, the problem of interpretability must be studied in the final phase of the work on coding. (HEIAS)

5331

Garner, W.R. & Miller, G.A. DIFFERENTIAL SENSITIVITY TO INTENSITY AS A FUNCTION OF THE DURATION OF THE COMPARISON TONE. J. exp. Psychol., 1944, 34, 450-463. (Harvard University, Cambridge, Mass.).

In order to show the relationship between the duration of the comparison tone and the intensity necessary to excite one additional neural unit, i.e., to produce the judgment of one j.n.d. in loudness, 3 functions were obtained with each of 2 Os. Each function had a different frequency and sensation level of loudness as constant parameters. A ratio as high as 3 was found between the highest and the lowest ΔI ratio in any one function. The reciprocal of ΔI was used as a measure of the sensitivity of the organism to intensive changes, and several hypotheses were presented to explain the form of the sensitivity function, all of which were rejected as being inconsistent with the obtained data. 2 possible explanations of the too rapid bending of the lower portions of the curves are given: a) there may be a mechanical as well as a neural threshold which the stimulus must overcome, and which would make the wave front of the stimulus exciting the neurons different for the short and for the longer tones, or b) transients in the tone which may be below the neural threshold for the longer tones (with a smaller amplitude) will come above the threshold for the shorter tones (with an increased amplitude).

R 13

5332

Garner, W.R. THE VALIDITY OF PREDICTION FROM LABORATORY EXPERIMENTS TO NAVAL OPERATIONAL SITUATIONS IN THE AREA OF HUMAN ENGINEERING AND SYSTEMS RESEARCH. Rep. 156-I-133, Reprint June 1957, 13pp. Psychological Lab., Institute for Cooperative Research, The Johns Hopkins University.

5332

This discussion deals with the feasibility and validity of predicting what will happen in operational situations from data obtained in laboratory research. The general philosophy of experimental work in laboratories is explored. Two criteria of prediction - precision and generality - are discussed in relation to experimental and operational research conditions with advantages and disadvantages of each considered. Examples of prediction from laboratory data as to the comparative value of two machines or systems, of relative performance of systems, and of absolute numbers are discussed.

5334

Duncan, C.P. TRANSFER IN MOTOR LEARNING AS A FUNCTION OF DEGREE OF FIRST-TASK LEARNING AND INTER-TASK SIMILARITY. J. exp. Psychol., Jan. 1952, 45(1), 1-11. (Northwestern University, Evanston, Ill.).

5334

This is a study of transfer between two tasks as a function of the degree of learning of the first task and the similarity between the tasks. The responses of 25 Ss in each of 12 conditions, four degrees of learning of a task (pairing lights with slots) and three degrees of intertask similarity, were obtained. Results are discussed in terms of degree and direction of transfer, performance, decrement, differential positive transfer, and interaction between learning and similarity.

T. G. I. R 6

5335

Duncan, C.P. & Underwood, B.J. RETENTION OF TRANSFER IN MOTOR LEARNING AFTER TWENTY-FOUR HOURS AND AFTER FOURTEEN MONTHS. J. exp. Psychol., 1953, 46(6), 445-452. (Northwestern University, Evanston, Ill.).

5335

To study the retention of transfer in motor learning as a function of degree of learning of training task and intertask similarity, a total of 300 Ss were used in four experimental and two control groups on perceptual motor tasks under conditions of varied degree of learning of initial task and varied degree of similarity of second task. The results are discussed in terms of differential retention of transfer, proactive inhibition of transfer, and the degree and direction of transfer as related to degree of first-task learning and intertask similarity.

T. G. R 7

5336

Cofor, C.N. & Shevitz, R. WORD-ASSOCIATION AS A FUNCTION OF WORD-FREQUENCY. Amer. J. Psychol., Jan. 1952, 65(1), 75-79. (University of Maryland, College Park, Md.).

5336

To study the relationship between word association and word frequency, two groups comprising a total of 101 Ss were presented with low and high frequency nouns and adjectives and asked to write their associations to these words. Two-minute time intervals throughout a 10-min. exposure of each word were recorded. The results are treated in terms of association output as related to word frequency and to word recognition.

T. R 11

5337

Cofor, C.N. & Ford, T.J. MEDIATED GENERALIZATION AMONG SYNONYMS. Contract N7CNR 397, Tech. Rep. 19, 17pp. University of Maryland, College Park, Md.

5337

To investigate whether generalization of conditioning would occur to synonyms of a word in amounts corresponding to the closeness of meaning of the synonyms to the original word, gradients of similarity of meaning of words were constructed. Each of 25 Ss was then presented with a "standard" word to be repeated out loud by the S and a "synonym" word to which he had to associate another word. Throughout a series of such pairs, reaction times for "standard" and "synonym" words were recorded. Results are discussed in terms of the relationship between amount of mediated generalization among synonyms and degree of similarity of meaning between any given word and its synonyms.

T. R 14

5339

Cofor, C.N. ANOTHER INVESTIGATION OF ASSOCIATIVE FACTORS IN REASONING. Contract N6NHR 397, Task III, Tech. Rep. 16, ca. 1952, 4pp. University of Maryland, Baltimore, Md.

5339

The influence of past associative patterns on the frequency of pendulum type solutions to the Maier two-string problem was investigated. To obtain an index of past associative patterns, free associations were obtained to nine stimulus words, one of which was "rope". If a subject responded to this word with the word "swing" or some variant, he was assumed to have a "swinging" association that would facilitate the occurrence of pendulum type solution a week later on the two-string test. Test results were examined in terms of this hypothesis.

T.

5343

Hall, M.B. Jr., & Bennett, E.W. EMPIRICAL ASSESSMENT OF HANDRAIL DIAMETERS. *J. appl. Psychol.*, 1956, 40 (6), 381-382. (Dunlap & Associates, Inc. (Hall); Tufts University (Bennett)).

5343

To assess existing size specifications for hardwood handrails used in public stairways, four experimental sections of handrail (1.5, 1.75, 2.00 and 2.25 inches diameter) were placed on a stairway in a public building. Fifty-one female clerical employees were asked to use the rail in ascending and descending the stairs. Questions relating to preference and felt safety were asked (double forced-choice method). Analyses were made of distribution of diameters scored as first choice (highest preferred and highest felt safety) and of distribution of mean for both scores. Recommendations as to size of handrail are included.

G. R 2

5344

Burnham, R.W. A COLORIMETER FOR RESEARCH IN COLOR PERCEPTION. *Amer. J. Psychol.*, Oct. 1952, 65, 603-608.

The colorimeter described here has several desirable features for research in color perception. It operates by the additive mixture of colored lights and is unique only in the method by which the colors are mixed. In general, an illuminated frame containing the filter-primaries is moved across one end of an optical integrating bar to introduce desired proportions of the primaries into the integrating system, and the integrated light is then viewed as a uniform color at the other end of the bar. The obvious advantages of the instrument are that it is small and compact, it gives large test-fields, and depending upon the reflectance and luminance of the surround, its test-patch may be seen as a surface or aperture color. (HEIAS)

R 8

5345

Edwards, W. THE PREDICTION OF DECISIONS AMONG BETS. *J. exp. Psychol.*, Sept. 1955, 50(3), 201-214. (USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.).

5345

This paper presents a very simple mathematical model for predicting choices among bets and an experiment in which that model is tested. The model is based on the concepts of utility and subjective probability and the theory of games.

T. G. R 13

5346

Cowan, E.L. THE INFLUENCE OF VARYING DEGREES OF PSYCHOLOGICAL STRESS ON PROBLEM-SOLVING RIGIDITY. *J. abnorm. soc. Psychol.*, April 1952, 47(2), 512-519. (University of Rochester, Rochester, N.Y.).

5346

The hypothesis that increasing degrees of experimentally induced stress will elicit increasing amounts of problem-solving rigidity (tendency to adhere to an induced method of solution when it does not represent the most direct method), 75 subjects were assigned to a control, mild stress, or a strong stress group. All subjects took a water-jar test of problem-solving rigidity, on the basis of which four quantifiable rigidity indices were computed. Analysis of variance was used to study differences among groups on these measures.

T. I. R 24

5347

Cowan, E.L. STRESS REDUCTION AND PROBLEM-SOLVING RIGIDITY. *J. abnorm. Psychol.*, Dec. 1952, 47(6), 425-428. (University of Rochester, Rochester, N.Y.).

5347

This is an exploratory study on the effects of reduction of induced stress perception on problem-solving rigidity. The design of the experiment was such as to induce a perception of stress in all subjects as they entered the criterion (problem-solving) situation. This was achieved by administering a projective personality test and by advising subjects that those with maladaptive features would be called back for further testing. Fifty subjects from a larger group were selected at random and assigned alternately to a stress (informed their records were undesirable) or praise (informed their records were very good) group. Problem-solving rigidity was calculated from their subsequent scores on the water-jar test.

T. R 14

5349
Heade, R.D. & Eckenrode, R.T. PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF GUN BLAST WITH SPECIAL REFERENCE TO RECOLLUS RIFLES. A PRELIMINARY LITERATURE SURVEY. Proj. TS4 4018, Rep. R 1283, Human Engng. Rep. 7, Sept. 1955, 34pp. Pitman-Dunn Labs., Frankford Arsenal, USA Ordnance Corps, Philadelphia, Penn.

The effects of blast have been discussed with orientation toward the problem of the maximum blast that man can tolerate with no permanent ill effects. Gross anatomical trauma from intense blast, effects on lungs and viscera, effects on the nervous system and acoustic mechanisms are elaborated. It appears that the acoustic mechanism tolerance will determine the upper physiological limits that man can withstand. This upper limit is not yet settled due to lack of experimental data. Effects of blast on various psychological processes suggest that these, rather than permanent physiological damage, may set the limits. A brief discussion of individual differences is presented and the need for development of tests for the detection of men unusually susceptible to blast damage is expressed. A glossary of terms is included in an attempt to bridge any possible communication gap that may exist between individuals schooled in different disciplines.

R 72

5350

Briggs, G.E. & Bregden, W.J. BILATERAL ASPECTS OF THE TRIGONOMETRIC RELATIONSHIP OF PRECISION AND ANGLE OF LINEAR PURSUIT-MOVEMENTS. *Amer. J. Psychol.*, July 1953, LXVI, 472-478. (University of Wisconsin, Madison, Wisc.).

5350

This study was designed to determine the functional relation between precision and angle of linear pursuit movements of the left hand and arm, and also, the nature of bilateral transfer. Forty-eight Ss performed on a tracking apparatus in which the angle of the track was systematically varied (from 0 to 150 degrees). The results are presented and discussed in terms of the degree of positive bilateral transfer and the relation between precision and angle of linear pursuit movements.

5351

Gelbard, J.M. ASHBURN'S STUDIES ON ELECTRIC EXCITATION OF THE HUMAN EYE. *Psychol. Bull.*, March 1953, 59, 73-111. (Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.)

A preliminary review of the main results of the experiments of electric excitation of the human eye by Prof. Naoki Ashburn and his associates at the Physiological Laboratory of the Tokyo University, Sendai, Japan, is presented here. These workers have been ingenious in their use of the threshold of an electrical phosphene (visual perceptions caused by inadequate stimuli are called phosphenes) as a means of analyzing the effect of phosphenic stimulation on the activity of the visual mechanism. In some 40 papers from about 1949 through 1952, they have touched upon matters of brightness and color discrimination, color blindness, contrast, spatial summation, inhibition, flicker effects, visual illusions, and a new visual method of measuring fatigue. The details of Ashburn's method, apparatus, procedure, and measurements are described. His results are organized and presented under the following sections: a) The excitability of the eye--sensitization, adaptation level, time, position, and intensity; b) Color discrimination--wave length, intensity, color deficiency, color inhibition, and micro-stimulation; c) Summation, contrast, and optical illusions; d) The stimulus strength-frequency relationship; and e) A new measurement of general fatigue. Critical comments are included. (NEIAS)

R 88

5352

Gelbard, J.M., Monbray, G.W. & Bylton, C.L. DIFFERENCE-LIMENS FOR PHOTIC INTERMITTENCE. *Quart. J. exp. Psychol.*, May 1955, 7, 45-55. (Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.)

Difference limens for visual intermittence were measured in the range of 1 to 45 cps on 2 Ss. The standard deviations obtained varied from 0.22 to 0.41 cps and the relative difference limens, $\Delta f/f$, computed from the average deviations, were from 0.025 to 0.034. This surprising capacity of the eye to react to differences in intermittence resulted in 375 j.n.d.'s in a range of only 45 cps. (NEIAS)

R 5

5353

Gelbard, F.A. HEARING THROUGH THE SKIN. *Res. Rev.*, Oct. 1954, 15-20. (Psychological Lab., University of Virginia, Charlottesville, Va.)

An analysis of the possibility of exploiting the receptive properties of the human skin for communication purposes is made. On the basis of known factors, mechanical vibration is suggested as the preferred communication medium. Experimental results have shown that the dimensions of mechanical vibration that can be put to work in such a system are intensity, duration, and body locus. Experimental investigations have been made in which the chest region was selected as the body locus for practical reasons; it was then determined that with an amplitude of the order of 0.5 mm, there are from 3 to 5 absolutely identifiable steps; for durations within the range of 0.1 to 2.0 sec. there are from 3 to 7 steps. Employing 3 levels of intensity, 3 durational steps, and 4 well-spaced contact areas on the chest, a system of communication has been worked out with these 36 elements that can communicate in much the same way as the 36 elements of the alphabet plus the digits. Other kinds of information could be transmitted such as directional signals, warning signals, and the like. The possibilities of successful communication here are many. (NEIAS)

5354

Gelbard, F.A. SOMESTHESIS AND THE CHEMICAL SENSES. *Ann. Rev. Psychol.*, 1950, 71-86. (Psychological Lab., University of Virginia, Charlottesville, Va.)

A review of the literature on somesthesia and the chemical senses, covering the period from April, 1940, to July, 1949, is presented. The discussion of somesthesia covers the following categories: basic mechanisms, neural correlates, clinical techniques, abnormal sensitivities, and miscellaneous. Organized under the chemical senses are olfaction and gustation. (NEIAS)

R 62

5357

Monbray, G.W. & Gelbard, J.M. DIFFERENTIAL SENSITIVITY OF THE EYE TO INTERMITTENT WHITE LIGHT. *Science*, Feb. 1955, 121, 173-175. (Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.)

In a study of the eye as a temporal analyzer, speed of response was measured by obtaining DL's for intermittent white light at 16 frequencies (1 to 45 cps). At least 20 thresholds were determined by each of 2 practiced Ss for all frequencies. The average deviation (average absolute error) of the comparison frequency from the standard was found never to exceed about 0.6 cps while for the lower frequencies it was sometimes less than 0.1 cps. The range for relative difference limens was 0.005 to 0.030 with 10 of the points below 0.02. The number of j.n.d.'s for photic flicker between 1 and 45 cps was found to be 280 by integrating the DL's by graphic methods. Comparisons of these visual data were made with auditory DL's for interrupted white noise as reported in the literature. (NEIAS)

R 4

5358

Black, J.W. EFFECTS OF VOICE COMMUNICATION TRAINING. *Speech Monographs*, 1946, XIII(2), 64-68. (Kenyon College, Gambier, Ohio).

5358

This is a report of the effectiveness of a training program in voice communication in which voice training is measured by intelligibility tests. Data are presented on the effects of experience in communicating in flight, on the increment in intelligibility following an experimental training situation, on the increment following training under noise conditions, on increment following various amounts of training and finally, data on increment attained by Ss following a training program and analyzed according to pre-training intelligibility scores.

T.

5359

Black, J.M. THE RECEPTION OF REPEATED AND OVERLAPPING SPEECH PATTERNS. *J. acoust. soc. Amer.*, May 1955, 27(3), 494-496. (Speech Dept., Ohio State University, Columbus, Ohio).

Recorded nonsense syllables (CVC) were fed to the headsets of listeners via 2 channels simultaneously, a direct line and a line that introduced controlled amounts of delay from 0.00 to 0.33 sec. The amount of delay was varied in 0.03 sec increments and the effects of this variable upon the reception of the syllables was measured. Although the intervals of delay affected the reception scores differentially, no time of delay in the double presentation yielded intelligibility scores that were higher than the scores obtained through a single, direct playback of the stimuli.

R 5

5360

Black, J.M. THE PERSISTENCE OF THE EFFECTS OF DELAYED SIDE-TONE. *J. Speech Hlth. Dis.*, March 1955, 27(3), 45-48. (Ohio State University, Columbus, Ohio).

5360

To investigate the persistence of delayed side-tone effects on reading, 56 Ss were requested to read a series of ten lists of five-syllable phrases under varied conditions of side-tone delay. The results are presented and discussed in terms of the effect of side-tone delay on reading rate and relative sound pressure level. The relative duration of these effects is also treated.

5361

Black, J.M. THE INFORMATION OF SOUNDS AND PHONETIC DIAGRAM OF ONE AND TWO SYLLABLE WORDS. *J. Speech Hlth. Dis.*, Dec. 1954, 12(4), 397-411. (Ohio State University, Columbus, Ohio).

5361

To estimate the information of sounds and phonetic diagrams, elementary techniques of information theory were applied to phonetic probability. One- and two-syllable words were sampled with respect to: (1) relative frequency of speech sounds and their occurrence at different positions in the word, (2) the probability of two sounds occurring in succession, that one sound follows another, and that a sound will precede another. Three students of speech transcribed 1549 one-syllable and 2151 two-syllable words phonetically; the resulting sounds were then analyzed. Limitations on the application of the results are discussed.

T. R 26

5361. Black, J.M. SOME EFFECTS UPON VOICE OF HEARING TONES OF VARYING INTENSITY AND FREQUENCY WHILE READING. *Speech Hlth. Dis.*, 1950, 12, 3-6. (Ohio State University Research Foundation, Columbus, Ohio).

A study was made to find in what manner the reading voice was influenced in pitch (frequency of the fundamental) and overall intensity when the speaker hears tones of varying intensity and frequency as he reads. Stimulus tones of 5 frequencies were chosen to be within the limits of the fundamental of the human voice (90, 121, 161, 216, and 287 cps). Recordings of these tones were made in 2 series: a) at intensity levels such that the play back would produce 55, 75, and 95 db intensity; b) so the levels would correspond with 3 Fletcher-Munson equal-loudness contours of 40, 60, and 90. Ss heard the tones through earphones for 4 sec, then read syllables from a pack of cards. Records of the intensity of reading voice and frequency of the fundamental were made and analyzed. The data indicate that significant changes in both vocal intensity and frequency accompanied gross increases in the intensity of the stimulus tones, whether successive levels were equal in loudness or not. Significant changes in both intensity and frequency also accompanied stimuli of differing frequency and like intensity. No significant differences accompanied stimuli of like loudness levels. (HEIAS)

5362

Black, J.M. THE PRESSURE COMPONENT IN THE PRODUCTION OF CONTINUANTS. *J. Speech Hearing Disorders*, Sept. 1950, 15, 207-210. (Ohio State University, Columbus, Ohio).

An investigation was made of the relative amounts of air pressure in the mouth that accompany the saying of consonants of different types: voiced-voiceless and continuant-plosive. A Kollsman altimeter and a Hill stall-pressure indicator were selected from instruments that respond directly to quasi-stationary pressure and were used for measuring in-the-mouth air pressures. 3 consonants were selected to represent the 2 types and arranged in 3 positions (initial, medial, and final) with 3 vowels -- 7 stimuli in all. 21 Ss read successive stimuli (typed on cards) with each measuring instrument. The data were treated by analysis of variance. The 2 devices were found to yield essentially the same results, however the rate-of-climb indicator had the greater range of raw values. Further analysis of the data from this instrument showed that voiceless consonants had greater amounts (1% level of confidence) of pressure than the voiced ones at all positions. The consonant was accompanied by diminishing pressure as it receded in the word in both cases. These differences were significant. Relative pressures for plosive and continuant consonants in the 3 positions showed greater pressures with the continuants except in the medial position. The difference in pressure attributable to position is again apparent. (HEIAS)

R 5

5363

Black, J.M. ACCOMPANIMENTS OF WORD INTELLIGIBILITY. *J. Speech Hearing Disorders*, Dec. 1952, 17, 409-418. (Ohio State University, Columbus, Ohio).

A study was made of the relationships between the relative intelligibility of words and aspects of their syllabic pattern, word familiarity, and phonetic characteristics. A sample of 3697 words of medium intelligibility were drawn from Thorndike's *Teacher's Word Book*, were recorded in quiet by 10 speakers in lists of 150 words, and were played back to panels of 9-12 listeners in quiet and in noise. A complete analysis of the various aspects of the words in relation to intelligibility (accuracy of write-down tests) indicate that the more familiar words (assuming that the Thorndike word list conforms to a cultural pattern of listener-familiarity with words) possess a characteristic of being more accurately identified. Words with many sounds and more than one syllable are more intelligible than ones with few sounds and only one syllable. Phonetic elements are associated with the correctness with which a word can be identified (18 sounds tend to enhance and 7 to detract) but the prediction of word intelligibility from phonetic content alone would be virtually impossible. (HEIAS)

R 17

5365

Black, J.M. SYSTEMATIC RESEARCH IN EXPERIMENTAL PHONETICS: II. SIGNAL RECEPTION: INTELLIGIBILITY AND SIDE-TONE. *J. Speech Hearing Disorders*, 1954, 19, 140-144. (Ohio State University, Columbus, Ohio).

This presentation attempts to sketch one view of a systematic study of the non-contextual aspects of the speech process. The state of current knowledge with respect to intelligibility and side-tone and about signal-reception is discussed. (MEIAS)

R 4c

5366

Black, J.M. THE EFFECT OF DELAYED SIDE-TONE UPON VOCAL RATE AND INTENSITY. *J. Speech Hearing Disorders*, 1951, 15, 56-60. (Office of Naval Research, Washington, D.C. & Ohio State University Research Foundation, Columbus, Ohio).

A study of the effect of delayed side-tone upon vocal rate and intensity was conducted on 22 Ss. Each S read 11 series of short phrases (equal in duration and intensity) with each of 10 periods of delayed side-tone and with 1 condition of no-delay: .30, .03, .06, .09, .12, .15, .18, .21, .24, .27, and .30 sec. Measures of the duration and intensity in the reading of the phrases were analyzed. The general effect of delaying the side-tone was found to be a retarding of speech with rate progressively retarded with increase in delay. The effect of increasing the delay from .33 to .06 sec. was disproportionately greater than the effect of any other comparable .03 sec. increment within the range of the study. Numerically, intensity of reading increased progressively as delay of side-tone was introduced and extended throughout the range. Changes beyond the ones produced by delay of .09 sec. were not statistically significant. (MEIAS)

R 6

5367

Black, J.M. TRAINING FOR VOICE COMMUNICATION AT HIGH ALTITUDES. *J. Acoust. Soc. Amer.*, 1946, 18(1), 34-38. (Kenyon College, Gambier, Ohio).

5367

This report presented a summary of some of the techniques and experimental results of researches dealing with the general problem of voice communication at high altitudes. It included such data as the effects of pressure altitude, anemia, trained versus untrained speakers using throat microphones, the use of two microphones, throat versus mask microphone and variation in pitch upon intelligibility and also the effects of training on speakers of different pre-training ability.

Y.

5371

Goss, A.E. TRANSFER AS A FUNCTION OF TYPE AND AMOUNT OF PRELIMINARY EXPERIENCE WITH TASK SIMILAR. *J. exp. Psychol.*, 1953, 46(5), 419-428. (University of Massachusetts, Amherst, Mass.).

5371

This is a study to determine whether experimentally introduced verbal responses will result in positive transfer to a discriminative motor task over and above the facilitative effects attributable to one or both of these processes, and whether prior habit arousal inhibits newly learned verbal discriminations. One hundred and four Ss were presented with a verbal-motor discrimination task following various degrees of pre-motor and verbal learning experience. The results are discussed in terms of the comparative effects of verbal learning and pre-motor experience upon the performance of the task.

T. G. R 19

5368

Black, J.M. & Tomlinson, V.B. LOUD VOICE: IMMEDIATE EFFECTS UPON THE SPEAKER. *Speech Monographs*, 1952, 19, 299-302. (Office of Naval Research, Washington, D.C. & Ohio State University Research Foundation, Columbus, Ohio).

The aim of this study was to measure the changes in the O_2 - CO_2 balance of the blood in a speaker during a period of sustained intense speaking (oral reading). Secondary measures were obtained relative to pulmonary flow and reading performance. 40 Ss participated in the study, reading as loudly as possible for 20 min., followed by a 30 min. rest period. The principal analyses of physiological data obtained during reading and recovery periods indicate that Ss underwent continuous physiological changes of a type related to exertion and fatigue. Hyperventilation occurred, and with cessation of reading the O_2 content of the blood dropped markedly. Normal O_2 - CO_2 balance was restored within a 30 min. rest period. Rate of progress in reading (words/min.) was reduced during reading period, however error-rate was not affected. (MEIAS)

R 4

5369

Black, J.M. & Mason, H.M. TRAINING FOR VOICE COMMUNICATION. *J. Acoust. Soc. Amer.*, Oct. 1946, 18(2), 441-445. (Kenyon College, Gambier, Ohio & Rutgers University, New Brunswick, N.J.).

5369

This is a report of an experimentally defined training program for the improvement of speech intelligibility of Air Force personnel in aircraft radio and interphone communication. The differential effects of the training program are contrasted with such factors as "partial" training, pretraining ability, experience as a training device, and so forth.

T.

5374

Bornstein, A.M. A STUDY OF AUDITORY "BRIGHTNESS". *J. exp. Psychol.*, 1952, 39, 45-49. (Rutgers University, New Brunswick, N.J.).

This experiment attempted to demonstrate that brightness, as a sensory attribute, is specific to the visual sense. In one part of the study, 24 Ss made judgments as to which of 2 visual stimuli (either two of a series of grays ranging in brightness from black to white or two of a series of hue-red, orange, yellow, green, blue, and purple, matched for chroma and brightness) was most like a tone (150 dz) which was sounded simultaneously with the visual presentation. Using the method of paired comparison with each series of stimuli, a total of 162 judgments was obtained from each S. In the second part, the procedure was identical except for the tone, now a high-pitched 5750 dz. When using a low tone, there was a high percentage of 15.0 preference for the middle gray; with the high tone the choice shifted to a near white with 75.2%. For the hue dimension, the high percentages for the low tone favor yellow, red, and purple but shift with the high tone toward blue and green. The interpretation of these data is that since it is possible to correlate both visual hue and visual brightness with auditory pitch in a consistent manner, it cannot be stated that brightness is a sensory attribute common to all modalities. (MEIAS)

R 2

5376

Bulgal, M.C. THE INFLUENCE OF BODY POSITION ON MENTAL PROCESSES. *J. clin. Psychol.*, 1952, 8, 190-199. (Long Island University, Long Island, N.Y.).

An experiment was conducted to test the possibility that the physical position of the body influences the expression of thoughts and feelings. A stimulus (picture or letter) calling for interpretation and other responses was applied to each of 12 Ss, once in each of 3 positions—sitting, standing, and reclining. Hypnosis was used so that analysis could be induced after each stimulation. An analysis of the responses leads to the following tentative conclusions. The reclining position tends to remove the processes of perception, thinking, and emotion from reality considerations, favoring expansion of suggestions and associations but inhibiting the tendency to action. The standing position stimulates action and forceful expression of emotion but the field tends to be narrowed and less suggestive of new thoughts. The sitting position seems to favor an equalization between these tendencies but is closer to standing than reclining. Possibilities for further research are advanced. (MEIAS)

5377

Bergatta, E.F., Bales, E.F. & Crook, A.S. SOME FINDINGS RELEVANT TO THE GREAT MAN THEORY OF LEADERSHIP. *Ann. Soc. Res.*, Dec. 1954, 19(6), 755-759. (Russell Sage Foundation, New York, N.Y. & Harvard University, Cambridge, Mass.).

5377

To explore some aspects of the great man theory of leadership, data gathered from 166 sessions of three-man groups are presented. The subjects were 126 Air Force personnel. The purpose of the sessions was represented as being the observation of how small groups work together and the task set was that of role-playing. Eleven great men were selected on the basis of their performance in the first session; the indices of performance were task ability (ratings from co-workers and I.Q. score), individual assertiveness (number of initiated acts per unit of time), and social acceptability (sociometric ratings). In subsequent sessions, as the great men were shifted about, scores were obtained for great man and non-great man groups on productivity, tension, and solidarity. T. R 6

5378

Williams, J.A.C. HEAT STRESS REST ALLOWANCES IN THE STONE: A NATIONAL BASIS. Rep. CM/78/4. The College of Aeronautics, Cranfield, Department of Aircraft Economics and Production.

7980

This report presents a national basis for the assessment of rest allowances for workers under conditions of heat stress. Suggestions are based upon a wide survey of present knowledge in work physiology and are intended to be used as a basis of discussion with Work Study practitioners in industry. The general subject of heat stress and the various types of temperature and measurement are discussed. An index of heat stress is proposed accompanied by a diagram for calculating the index from measurable factors. Values of rest allowances, based upon the nationalized system, are given in the Appendix. Validation in actual job situations is suggested. T. G. R 13

5378

Brown, K.T. METHODOLOGY FOR STUDYING FIGURAL AFTER-EFFECTS AND PRACTICE EFFECTS I. THE MÜLLER-LYER ILLUSION. *Amer. J. Psychol.*, 1953, 66, 629-634. (USAF Aero Medical Lab., Wright-Patterson Air Development Center, Wright-Patterson AFB, Ohio).

On the basis of recent findings of the author, certain controls are required in two kinds of experiments. One kind is often used to study figural after-effects (FAE); the other deals with "practice effects" in the Müller-Lyer illusion. The first involves the use of an outline inspection-figure on one side of a fixation point. After a period of viewing, the figure is removed and 2 outline test-figures are shown, one on each side of the inspection point and the FAE measured by apparent differences in size. The author describes his experiments in which differences in apparent size between opposite halves of the visual field have been found, even without an inspection figure. Thus the common method produces contaminated results. The second instance discusses this same finding with regard to the Müller-Lyer illusion which usually diminishes with repeated testing. The author's interpretation is that some of the characteristics of change are caused by factors not specific to the illusion. (MEIAS)

R 13

5379

Black, J.W. & Tolhurst, G.C. THE RELATIVE INTELLIGIBILITY OF LANGUAGE GROUPS. *Quart. Rev. Speech*, 1955, 41, 57-60. (Ohio State University, Columbus, Ohio).

An investigation of the relative intelligibility of English dialect as spoken by different language groups and the effect upon intelligibility of the listeners' familiarity with a dialect was conducted. 12 French, 12 British, and 24 American Ss were studied. The results indicate that intelligibility of test items in English, spoken in a French dialect, were equally unintelligible to French listeners and to British and American listeners. When the test was read by either British or American, the native language listener groups obtained higher scores than the French. Irrespective of whether the test items were read in a foreign dialect or a native language dialect (British), reception scores were improved when listeners were familiarized with the particular dialect of the speakers for 1 hr. (MEIAS)

R 5

5332
Battiff, P. THE ROLE OF PHYSIOLOGICAL MYSTAGMUS IN MONOCULAR ACUITY. J. gen. Psychol., 1952, 45, 163-172. Contract N6on-143, T.O. II, Proj. NR-140-388. Ohio State University.

5332 To determine the role of physiological myastamus in monocular acuity, three subjects fixated, monocularly, on a horizontal field. For a period of 75 milliseconds, this field was replaced by a parallel bar acuity test object after which the fixation field was restored. At the time of exposure of the test object, the horizontal eye movements were recorded and the subject reported the orientation of the bars. Small changes in the position of the eye per unit time to give for correct and incorrect judgments, as well as significance of differences obtained.

5337
Davis, E., Eldredge, D.E., & Usher, J.R. (Eds.). THE TESTING OF HEARING IN THE ARMED SERVICES. Contract N6on-1151 (Q1), CEAS Rep. 5, Tech. Rep. 5, Oct. 1955, 124pp. OHE, Committee on Hearing and Bio-Acoustics; Central Institute for the Deaf.

5337 This report presents the proceedings of the third meeting (1957) of the Committee on Hearing and Bio-Acoustics. The major topics in the testing of hearing in the armed services is divided into three sub-topics: what is normal hearing? why do we use audiometry? and problems in getting the job done. The first topic includes papers on the American and British standards for audiometric zero and problems of measurement. Tests of audiometry by industry for placement and compensation for hearing loss, standards of physical fitness as established by the Army, Navy, and Air Force, and other relations between hearing and military service make up the second topic. And last, technical problems in audiometry are treated. Working group reports are included. T. O. R 22

5383
Grilovsky, J. STUDY OF EXTERIOR LIGHTING FOR NAVY AIRPLANES: III. FLIGHT TESTS OF SOME EXTERIOR LIGHTING SYSTEMS TO FACILITATE RENDEZVOUS AND FORMATION FLYING OF NAVAL AIRCRAFT AT NIGHT. Rep. TED N6on-313335, July 1946, 45pp. USN Air Materiel Center, Philadelphia, Penn.

This is the third in a series of reports on a long-term study of exterior lighting for Navy aircraft and reports the results of flight tests evaluating several new systems of lights for night rendezvous and formation flying. The following conclusions were drawn on the basis of these results: a) standard lights are likely to cause confusion in the air and are least preferred by pilots who have had an opportunity to observe other lighting systems; b) with some modifications of standard equipment (described in text) 2 80 cpi section lights form the basis of a color-coded and automatic letter-blinking system of lights found to be extremely effective for night rendezvous of aircraft; they are easily distinguishable at distances up to 14 mi; c) lights for formation flying should permit brightness control (levels reported in text). Extremely low candlepower settings are preferred for close-in formation flying, or lacking that, no lights at all. Medium settings are far too bright. A system of lights for formation flying is described which embodies: downward formation lights, dim section lights, wing-tips simultaneously flashing on-and-off, and a tail light alternately flashing white-and-amber. (HEIAS) R-15

5384
McCleary, R.A. PSYCHOPHYSIOLOGICAL EFFECTS OF COLD. I. THE ROLE OF SKIN-TEMPERATURE AND SENSORY SENSITIVITY IN MANUAL PERFORMANCE DECREMENT. Proj. 21-1202-0004, Rep. 1, Jan. 1953, 16pp. USAF School of Aviation Medicine, Randolph Field, Tex.

72 Ss were timed on a manual performance test at 6 different ambient temperatures (70°, 32°, 0°, -10°, and -20°F.). Percent decrement in performance increased as a positively accelerated function over this temperature range. The rate of decline of digital skin-temperature and sensory sensitivity to cold as measured in a separate test session in the cold were both shown to differentiate the Ss significantly with regard to their ability to perform in low temperatures. Cold tolerance may also be related to complexion differences. R-14

5385
McCleary, R.A. PALMAR SWEAT AS AN INDEX OF ANXIETY. A FIELD METHOD SUITABLE FOR LARGE GROUPS. Proj. 21-1207-0004, Rep. 1, Oct. 1953, 11pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

5385 A method for measuring palmar sweat, as an index of anxiety, in large groups of Ss simultaneously under non-laboratory conditions is described. The method requires an S to grasp a bag of crystals whose color shifts with increasing hydration. The color of the crystals, as judged by comparison with a set of standards, yields a measure of the amount of palmar sweat secreted over a 15-minute test period. An experiment involving both anxious and nonanxious Ss studied at three ambient temperatures (40, 70, and 100 degrees F) is also reported. A further field study involving 248 infantry troops under simulated combat conditions is described to indicate the general usefulness of the technique. G. I. R-7

5388
Stewart, K.H. A METHOD FOR ASSESSING THE FREQUENCY OF DANGEROUS VISIBILITY CONDITIONS. M.R.P. 1047, S.C.III/233, April 1957, 7pp. Meteorological Research Committee, Air Ministry, London, England.

5388 Using temperature and humidity soundings made in fog at Cardington / report as the basis for obtaining fog height, client visibility (deduced from horizontal visibility at ground level) is expressed as a function of height of fog-top and estimates of frequency of dangerous visibility condition at Cardington and London airports were made. Limitation and usefulness of the method are pointed out and specific areas in need of further investigation are discussed. G. R 1

5386
Hastorf, A.H. & Way, K.S. APPARENT SIZE WITH AND WITHOUT DISTANCE CUES. J. gen. Psychol., 1952, 47, 181-188. (Dartmouth College, Hanover, N.H.).

This study was concerned with what would happen to the phenomenon of size constancy when all distance cues to an object were eliminated. This was accomplished by means of making Ss view monocularly, darkening the surrounding milieu, and placing a reduction screen between S and the stimulus. One series of judgments were made under these conditions with the physical size of the standard stimulus directly proportional to the distance from S (retinal image was maintained a constant size); a second series of size judgments were made with visual cues present but using the same standard stimulus; a third series of judgments were again made with all distance cues eliminated but this time the standard stimulus remained constant in size regardless of the distance. The results of the first 2 series of judgments demonstrate conclusively that there must be cues to the distance of an object if there is to be apparent size constancy. The results of the third series showed that apparent size was in direct proportion to the retinal stimulation under conditions of reduced distance cues. (HEIAS) R 5

5382
Goffard, S.J. & Macdonald, Rita G. THE PERCEPTION OF STUDENT MOTIVATION IN AN ARMY TECHNICAL TRAINING SCHOOL. ca. 1952, 61pp. Human Resources Research Office, General Headquarters, Washington, D.C.

5385
This is an extensive survey of problems of motivation and morale among students in an Army Technical Training School (The Signal School, Fort Monmouth, New Jersey). By utilizing a self-administered questionnaire with a representative sample of students, data were collected concerning such areas as: sources of motivation, the role of the training program, etc. Analysis of the data leads to some specific conclusions about efficiency of techniques for arousing motivation, the level, source, and goals of motivation, the source of difficulties, and so forth.
T. G.

5387
Carpenter, E.H. RECOMMENDATIONS ON THE LOGISTICS OF VIDEO FILM PRESENTATION FOR MILITARY TRAINING. Spec. Rep. 2, Aug. 1951, 40pp. Instructional Film Research Program, Pennsylvania State College, State College, Penn.

5387
This is an extensive report dealing with the general problem of determining how sound motion pictures may be made and used for effective training of military personnel, and for aiding adjustment to a variety of service situations. It presents suggestions and ideas concerning such areas as: criteria to determine appropriateness of this technique for certain instructional objectives; the steps necessary in producing an effective training film; bases for evaluating films, etc. A list of reports of the Instructional Film Research Program of the Pennsylvania State College is included.

5390
Geldard, F.A. THE PERCEPTION OF MECHANICAL VIBRATION: II. THE RESPONSE OF PRESSURE RECEPTORS. *J. gen. Psychol.*, 1940, 22, 271-280. (Psychology Dept., University of Virginia, Charlottesville, Va.)

Using an improved method of measuring vibratory thresholds, one based on direct observation of movements stroboscopically, the order of vibratory sensitivity of 2 selected populations of skin spots has been determined. In an area of 4 square centimeters on the volar side of the wrist there were found 40 spots meeting an arbitrary criterion of high pressure sensitivity and 19 spots unresponsive to relatively strong mechanical pressure. The vibratory threshold of each of the 59 spots was measured for a frequency of 256 cycles. Pressure sensitive spots had an average threshold of 13.6 micro whereas that of the pressure insensitive points was over 8 times as large. Phenomena of conduction of forced vibrations and primary summation were observed and interpreted. The conclusion is drawn that vibratory sensations fall into a perceptual pattern of feeling of which pressure is but another temporal expression.

5391
Geldard, F.A. THE PERCEPTION OF MECHANICAL VIBRATION: III. THE FREQUENCY FUNCTION. *J. gen. Psychol.*, 1940, 22, 281-288. (University of Virginia, Charlottesville, Va.)

The problem of the range of frequencies yielding sensations of vibration is reviewed and, whereas it is found that little agreement exists as to what the upper and lower limits are, various curves uniting frequency and threshold amplitude are somewhat univocal. Recomputation of the data of several previous investigations permits the conclusion that, for relatively large vibratory contactors applied to the finger tip, the frequency function is a concave one revealing maximum sensitivity in the region of 250 cycles. An experiment is reported in which 2 populations of spots on the volar side of the wrist, selected for their high and low sensitivities to pressure, were measured for vibratory sensitivity. 5 test frequencies were employed: 64, 128, 256, 512, and 1,024 cycles. The pressure sensitive spots yielded low and reliable vibratory thresholds; spots insensitive to pressure gave high and variable values. Differences in average thresholds between the 2 populations were reliable at all frequencies. Of chief interest was the form of the frequency function for the sensitive spots. It proved to be a practically flat one and thus contrasts sharply with all previous determinations of the frequency-amplitude relation. Regardless of the frequency of stimulation vibratory thresholds of local spots having high sensitivity to pressure remain constant. The skin, in its response to vibratory movement, is thus not to be regarded as an energy transformer. Amplitude of movement or size of deformation, not energy, is the stimulus correlate of intensity of vibratory sensation.

5392
Geldard, F.A. THE PERCEPTION OF MECHANICAL VIBRATION: IV. IS THERE A SEPARATE 'VIBRATORY SENSE'? *J. gen. Psychol.*, 1940, 22, 291-308. (University of Virginia, Charlottesville, Va.)

The literature of the problem as to whether there is a separate vibratory sense abounds in arguments for such a sense as distinct from all others. Arguments for the vibratory sense are stated and formal answers to them are supplied by the writer who contends that since it has already been proven that pressure receptors, and presumably only pressure receptors, participate in the vibratory response, there is no reason to postulate a separate vibratory sense. (HEIAS)

R 214

5396
Collier, R.M. THE EFFECT OF INSTRUCTIONS AND TYPE OF TASK UPON ANTITROPIC BILATERAL MOVEMENT. *J. exp. Psychol.*, 1940, 27, 172-183. (University of Vermont, Burlington, Vt.)

The present experiment was designed to investigate the effects of instructions and type of movement upon motor leads when continuous antitropic pronation-supination movements are contrasted with discrete movements of the same character. The method included 4 variations or series. In Series I the S made rapid continuous pronation-supination rotations of both forearms from signal 'Go' to 'Stop'. Series II was different only in one respect; the S read aloud. In Series III each pronation and each supination was a separate or discrete movement. The S attempted to initiate movements in each of the 2 directions simultaneously. Series IV was the same as Series I except that the work period was extended in order to study the effects of decrement upon motor leads. The results permit the following conclusions: a) When bilateral antitropic forearm movements are continuous, frequency and temporal extent of motor lead correspond with the normally preferred side. b) Both a distracting task and a prolonged work period operate slightly to accentuate this lead. c) When type of task and instructions require separate or discrete responses rather than continuous movements, there tends in some cases to be no consistent motor lead; in other cases the motor lead tends to correspond with the non-preferred side. d) With a continuous series of movements the average lateral priority of response is about 25 to 30 milliseconds with a standard deviation of approximately 25 milliseconds.

R 16

5398

Brown, R.T. & Grether, W.F. THE EFFECTS OF PURE RED AND LOW-COLOR-TEMPERATURE WHITE INSTRUMENT LIGHTING UPON DARK-ADAPTED VISUAL THRESHOLDS. *ERGONOMICS*, 41, AF Tech. Rep. 6470, April 1952, 18pp. (Naval Medical Lab., Wright-Patterson AFB, Ohio).

5398

The effects of pure red and low color temperature white flood lighting upon completely dark adapted visual thresholds were determined. The red light was adjusted to brightness levels which pilots have been found to use as the minimal, normal, and maximal levels for night flying. For each brightness level of the red light, a brightness was found for the low temperature white light at which aircraft instruments were equally legible under the two lighting systems. Both a simulated instrument panel and a pure white panel were viewed. Six subjects were tested under each condition for changes in threshold from complete dark adaptation. T. G. 1, R 5

5399

Brennan, Josephine G., Burnham, R.W., & Newhall, S.M. COLOR TERMS AND DEFINITIONS. *Psychol. Bull.*, 1948, 45, 207-230. (Eastman Kodak Company, Rochester, N.Y.).

The list of terms and definitions presented here was abstracted from the new Comparative List of Color Terms compiled by the Color Terms Subcommittee of the Inter-Society Color Council. The aim of that comparative list is to bring together in one place the color terms used by various branches of industry and science, and to show in a logical way the relationships of the terms as defined by the various groups. The present list is intended to include only the terms and usages which are of interest to psychologists. A strictly psychological definition of color was adopted as the type most likely to be acceptable to psychologists; and then, with this as a basis, numerous existing definitions were revised as necessary and a number of new terms and definitions were added. Warren's *Dictionary of Psychology* was used as an important though partial check list and Harry Nelson supplied some essential terms with definitions not to be found there. A Comparative List of Color Terms, based on a survey of terminology by the Problems Committee of the Inter-Society Color Council, also was consulted. This list was compiled by Forrest L. Birnack and mimeographed at Hobart College in 1939. Quite a few recent definitions by Deane B. Judd of terms relating to defective color vision were adapted and included in the new list. All of the members of the A.P.A. Delegation to the Inter-Society Color Council were asked to suggest desirable terms and definitions. As is quite evident, the scope of the list was not confined strictly to color but includes numerous allied terms having to do with vision and light. R 2

5400

Burnham, R.W., Evans, R.M. & Newhall, S.M. INFLUENCE ON COLOR PERCEPTION OF ADAPTATION TO ILLUMINATION. *J. opt. soc. Amer.*, Sept. 1952, 42(9), 597-605. (Eastman Kodak Company, Rochester, N.Y.).

6 experienced observers made consistent determinations of various colors which appeared the same with adaptation to tungsten light and to artificial daylight. These observations were made with each eye viewing a different color patch and with the patches appearing juxtaposed at the middle of a fused binocular field. The method was to make the juxtaposed patches match by adjusting one of them, sometimes when both eyes were adapted to the same illumination and sometimes to the different illuminations. Plots of the data in the CIE chromaticity diagram indicate a systematic shift in color appearance toward the blues when adaptation was changed from daylight to tungsten; or toward the yellows when adaptation was changed from tungsten to daylight. The magnitude of this color shift was substantial, at least in the considerable color region investigated, for here the average length of the representative vectors was 0.10 in CIE terms or of the order of 20 just perceptible color differences. Qualitatively, the results confirm those of Hunt and of Minch and Young. The theoretical implications will be discussed in a later paper. R 11

5401

Corklin, J.E. SENDERS ON RESPONSE SEQUENCES. *Amer. J. Psychol.*, June 1954, 67(2), 363-365. (Ohio State University, Columbus, Ohio).

5402

Corklin, J.E. THE HUMAN OPERATOR. *Northwest Science*, 1954, 28(4), 139-150. (Department of Psychology, Montana State College).

5402

This paper holds that the field of engineering psychology is devoted to the analysis of the human operator as an integral link in a man-machine system. The need for an adequate understanding of man's engineering properties (sensory and motor limitations and capacities) is discussed. Evidence is cited supporting the notion that many of man's characteristics are non-linear (response intermittency, sensory discontinuity, and the like). Further evidence is given showing a linearity of response (tracking situation where prediction is possible). An attempt is made to explain these two opposing ideas. R 33

5403

Evans, R.M. & Brewer, W.L. OBSERVER ADAPTATION REQUIREMENTS IN COLOR PHOTOGRAPHY AND COLOR TELEVISION. *J. SMPTE*, July 1954, 63(1), 5-9. (Color Technology Division, Eastman Kodak Co., Rochester, N.Y.).

5404

The assumption of response-independence at threshold for series of psychophysical judgments was tested on seven subjects. The method of constant stimuli was used, the subjects being instructed to report on intensive differences between standard and variable tones of 1000 cycles. Five equally spaced intensities were used as the variable--two above, two below, and one identical with the stimulus. Each subject made 100 judgments including 20 where the standard and variable were identical. Threshold responses were analyzed as a function of the preceding supra-threshold responses by autocorrelation method. G. R 2

5403

This paper discusses color requirements for photography and television in terms of producing colors conforming to those required by the adaptation conditions prevailing for the observer of the reproduction. Colorimetric measurements are considered in relation to state of observer eye adaptation and the "first and second black" conditions of color photography are applied to color television. G. I. R 9

5405

Evans, R.M. ON SOME ASPECTS OF WHITE GRAY AND BLACK. *J. opt. soc. Amer.*, Sept. 1949, 39 (5), 774-779. (Eastman Kodak Company, Rochester, N.Y.).

In any system which defines color on the basis of the non-spatial, non-temporal properties of light it is shown that white, gray, and black are not colors. The perception of white is shown to be caused by a physical property of the object not associated with its selectivity. This property is the diffusion of light. White is shown to be one extreme of a series starting at clear and passing through various degrees of pale white to a maximum. Gray is shown to be the perception of the relative visual effectiveness of the light from 2 areas and cannot be seen unless at least 2 areas are present. Black is considered the extreme in lack of relative effectiveness.

5406

Evans, R.M. LIGHT SOURCES AND COLORED OBJECTS. *Illum. Engng.*, 1949, 44, 47-54.

This paper describes the effect of different light sources on colored objects and the physical principles involved as well as the physiological conditions of the eye. Briefly, the author says that when light from a source falls on one or more colored objects either separately or in succession we are dealing with successive absorptions of energy. At each step in the process if the light is viewed by an observer he evaluates this energy distribution by 3 specialized receptors in a definite adaptation state and sees a color determined by the ratios of their outputs. Because of this fact it is not possible for the observer to predict the result of the next step from the color which he sees. A knowledge of the exact energy distribution in the source and the wavelength absorption distribution properties of each object does permit such a prediction and this is the only way it can be done. (HEIAS)

5407

Evans, R.M. PSYCHOLOGICAL ASPECTS OF COLOR AND ILLUMINATION. *Illum. Engng.*, 1951, 46, 176-181. (Eastman Kodak Company, Rochester, N.Y.).

This report to the Committee on Color in Light and Illumination presents the concepts and question of possible psychological factors concerned in color and illuminating engineering. The concepts so presented are the following: absolute white; white; gray and black; selective surfaces; modes of appearance; attributes of the modes of appearance; brightness and lightness; absolute brightness; hue; saturation; size, shape, and location; sparkle, transparency, glossiness, and luster; hue and saturation vs. lightness; diffuse and directional illumination; color of walls; illumination and illuminant; engineer--decorator--designer--architect--consultant; affective response to colors; aesthetic response; character or mood of an environment; attention value of color; warm and cool colors; and psychosomatic effect. The task of the committee is felt to be to collect, analyze, study and publish as much as possible of the above material so that the knowledge can be reduced to practice in the form of a true engineering approach to color in lighting. (HEIAS)

5408

Evans, R.M. & Klute, Jeannette. BRIGHTNESS CONSTANCY IN PHOTOGRAPHIC REPRODUCTIONS. *J. opt. soc. Amer.*, Sept. 1944, 34(9), 533-540. (Kodak Research Laboratories, Rochester, N.Y.).

An experimental study of the problem of photographing a simple scene showing the "brightness constancy" phenomenon supports the following statements: a) All objects in the picture whose illumination is not visibly related to that of the main object must be lighted to nearly the same illuminance as the main object. b) The illuminance in shadowed portions of the main object must be greatly increased. c) The gradation of illuminance from the main source of light must be decreased by auxiliary lighting. d) Distortion of the tone reproduction scale cannot, in the general case, compensate for loss in the brightness constancy effect. e) The density of the print must be so adjusted that the main object appears to have the correct reflectance. With a white border and no simultaneous contrast effects between object and background, this occurs when the lightest part of the main object in the reproduction ("catch lights" excepted) has the same reflectance as that of the object photographed.

R 2

5409

Evans, R.M. VISUAL PROCESSES AND COLOR PHOTOGRAPHY. *J. opt. soc. Amer.*, 1943, 33, 579-614. (Eastman Kodak Company, Rochester, N.Y.).

The possibility that with color photography it is not impossible to obtain a reproduction which may be mistaken for the object itself has led many workers to assume that this is the goal of color photography and that if the reproduction were to meet the requirement that every point of the final picture shall match the corresponding point of the object in chromaticity and luminance, the picture would look exactly like the object. This article considers the subjective phases of color photography in their bearing on the above point. Present knowledge of the subjects involved is reviewed and relative importance indicated by a consideration of the effects observed in the actual operation of color processes. Part I considers brightness relations under the following topics: luminance vs. brightness in photography; brightness constancy in nature; photography of brightness constancy phenomena. Part II treats color adaptation and color constancy under these headings: visual adaptation for color; general color adaptation--point constancy; lateral color adaptation--simultaneous color contrast; local color adaptation--successive color contrast; indeterminacy of color perception; problems of reproduction and viewing. Part III deals with the effect of adaptation level, the nature of this process, and various problems of reproduction and viewing. (HEIAS)

R 30

5412

Burnham, R.W. & Clark, Joyce R. A TEST OF HUE MEMORY. *J. Appl. Psychol.*, 1955, 39(3), 164-172. (Color Technology Division, Eastman Kodak Co., Rochester, N.Y.).

5412

This report deals with the development of a test of hue memory. Utilizing a wheel upon which two sets of hues are mounted, the S is shown one line on the test circle (20 color chips) and following a spin of the wheel is asked to find the corresponding line on the comparison circle (43 color chips). The tests of reliability and validity with 100 Ss are presented and discussed in terms of differential learning effects, correlations with other color memory tests, and the possible influence of such factors as set, motivation, etc.

5413

Burnham, R.W. COMPARATIVE EFFECTS OF AREA AND LUMINANCE ON COLOR. *Amer. J. Psychol.*, Jan. 1952, LXV, 27-38. (Color Technology Div., Eastman Kodak Co., Rochester, N.Y.).

5418

To determine the relative color changes in surface colors for variations in area and luminance, eight observers mixed colorimetric primaries to match test colors (five) subtending visual angles of two and 12 degrees at test-field luminance levels of 0.64 and 6.30 ft.-L. Each match was recorded as the readings of three scales representing the amount of primaries used. Mean values were transformed to the I.C.I. system of color specification and analyzed in terms of direction and extent of color changes relative to area and luminance. Practical applications are noted.
T. G. I. R 10

5413

Burnham, R.W. BEZOLD'S COLOR-MIXTURE EFFECT. *Amer. J. Psychol.*, July 1953, 66, 377-385.

A study was undertaken to determine what factors were involved in the production of Bezold's color-mixture effect. Reported here are 2 experiments, primarily concerned with testing the effect of eye movements and suggestion. In the first, 6 Ss judged the lightness of physically identical blue patches presented with surrounds intended to show the effects of mixture and of contrast to varying degrees; 7 surrounds were used, some with white and some with black borders or overlays. The cards were presented in pairs by the method of paired comparisons and Ss judged whether the left or right patch was the lighter of the two; 4 Ss made judgments while fixating a point between each pair of cards and 2 Ss judged while actively looking back and forth from 1 card to the other. In general the results showed that the effect of color mixture prevailed for the eye-movement group whereas the effect of contrast was dominant for the eye-fixation group. In the second experiment 9 Ss made judgments of lightness of blue as it appeared in 3 border designs, presented this time tachistoscopically for 2 exposure intervals; 0.1 sec. and 2.0 sec. Half of the group was instructed to attend closely to the blue color patch and disregard border lines and background. The reports of these Ss were not affected by differences in exposure-time, complexity of stimuli, or instruction. The mean of all observations showed that 96.6% of all the judgments of "lighter" were made on the basis of color mixture effects. (HEIAS)
R 13

5415

Burnham, R.W. BINOCULAR SUBJECTIVE COLORS AND THE VISUAL MECHANISM. *Amer. J. Psychol.*, Sept 1954, 67, 492-499. (Rochester, N.Y.).

Introspective observations are reported on 2 possibly unique subjective colors which may be described as a brilliant red and a brilliant greenish-blue. The colors seem unique principally because they can be seen only in binocular vision, never, apparently, in monocular vision. Implications for functioning of the visual mechanism are discussed, and a testable 'beat' hypothesis is developed.
R 20

5416

Burnham, R.W. COMPARISON OF COLOR SYSTEMS WITH RESPECT TO UNIFORM VISUAL SPACING. *J. opt. soc. Amer.*, May 1949, 39(5), 387-392. (Color Control Dept., Eastman Kodak Company, Rochester, N.Y.).

The present study is a comparison of ten systems of color specification, for a restricted chromatic area around the neutral at a single luminance level, with respect to their relative adherence to uniform visual spacing. A sample of 20 visually equi-spaced (Munsell renotation) chromaticities at the same luminance were used. Chromatic coordinates for these colors were expressed in each of the 10 systems and plotted in their respective chromaticity diagrams. Then all data were reduced to the same scale, after which radial saturation distances and hue angles were compared to those in the Munsell renotation criterion. Rank orders of departure from the criterion were determined for hue and saturation separately. Results show that all the 10 systems include visually significant departures from a uniform color space. These results may be generalized beyond the present sample because, if other more saturated colors were added to the present sample, there would be even greater departures from uniform spacing. The use of any particular system in any particular instance depends on circumstances, the time and personnel available, the number of points to be transformed, and the accuracy with which it is desired to illustrate visual relationships. Where the accurate expression of visual relationships is of prime importance, Munsell renotation is recommended because it was designed specifically to show equal visual intervals.
R 9

5417

Burnham, R.W. & Newhall, S.M. COLOR PERCEPTION IN SMALL TEST FIELDS. *J. opt. Soc. Amer.*, Oct. 1953, 43(10), 899-902. (Color Technology Div., Eastman Kodak Co., Rochester, N.Y.).

5417

To investigate some factors affecting perception of color in small test fields, two trained observers viewed a test color with one eye and matched it with a variable mixture presented to the other eye. Three series of test fields were used: 1) both area and size varied in five steps (constant width of five min., length varied from five to 100 min. of visual angle), 2) shape constant (square), area varied to equal five areas in first series, and 3) area constant with shape and orientation varied. The matching data were transformed to the C.I.E. standard coordinate system and analyzed as functions of area, shape, and orientation. Practical applications are discussed.
T. G. I. R 6

5419

Burnham, R.W. THE DEPENDENCE OF COLOR UPON AREA. *Amer. J. Psychol.*, Oct. 1951, LXIV, 521-533. (Color Technology Div., Eastman Kodak Co., Rochester, N.Y.).

5419

To measure differences in the appearance of colored surfaces as a function of area, five experienced observers mixed colorimetric primaries to match test colors (red, yellow, green, blue, and purple) varying in visual angles from two to 77 degrees, with uniform field brightness of 1.7 ft.-L. Each judgment was recorded as the amount of red, green and blue primaries mixed to make the match. Averages for each color and area combination were transformed to I.C.I. values and analyzed for direction and extent of color mixture changes with respect to area.
T. G. I. R 19

5420
Blackstock, D.T. & Von Glöcke, H.E. DEVELOPMENT OF AN EXTRA SMALL AND EXTRA LARGE SIZE FOR THE V-51 R EARPLUG. Proj. 7212 71710, WADC TR 56 142, April 1956, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

5420
To extend the satisfactory fit range for the V-51R ear defender, two additional sizes--extra small (XS) and extra large (XL) were added to existing standard sizes. The new sizes have dimensions approximately 10% smaller and 10% larger than the standard small and large sizes respectively. Compression molds were made and sample earplugs produced. A fitting survey was conducted to determine what percentage of the adult male population could be fitted by the extended range.
T. O. I. R 7

5421
Carmichael, L., Kennedy, J.L. & Mead, L.C. SOME RECENT APPROACHES TO THE EXPERIMENTAL STUDY OF HUMAN FATIGUE. *Proc. nat. Acad. Sci.*, Dec. 1949, 35(12), 691-696. (Tufts University, Medford, Mass.).

5421
This paper summarizes briefly three different experimental approaches to the study of fatigue and its characteristics as exhibited in the performance of the total normal adult human being. The first approach was the continuous recording of eye movements during long periods of reading and the testing of reading comprehension changes. A second approach was used to determine conditions under which a decrement could be measured in subjects performing certain military tasks. Sleep deprivation, hard physical labor, environmental stress were some of the factors studied. The third approach used a sensitive measure of muscle tonus to measure lapses in alertness under various conditions.
R-14

5423
Hoag, M.W. AN INTRODUCTION TO SYSTEMS ANALYSIS. RM-1678, April 1956, 21pp. Rand Corporation, Santa Monica, Calif.

5423
This paper is an elementary exposition of some conceptual issues that are relevant for a critical understanding of Systems Analysis. All issues of analytic technique are avoided. Systems Analysis is briefly defined as systematic examination of a problem of choice in which each step of the analysis is made as explicit as possible. Three problems of choice are discussed: (1) What are the relevant alternatives? (2) What test of preferredness should be applied in choosing among alternatives? and (3) How do we go about the process of weighing objectives against costs? The advantages and disadvantages of Systems Analysis as compared with intuitive or staff decisions are discussed.
1.

5424
US Research & Development Board. STATUS REPORT ON GUIDED MISSILES TRAINING RESEARCH AND DEVELOPMENT. PART I. SUMMARY, COMMENTS, AND RECOMMENDATIONS. HTD GM 200/22, July 1952, 15pp. Guided Missiles Training Working Group, Joint Panel on Training and Training Devices, US Research & Development Board, Department of Defense, Washington, D.C.

5424
This is a comprehensive report of the status of guided missiles training research and development compiled on 22 July 1952 and issued by the Guided Missiles Training Working Group. It offers information on such topics as status of training aids and devices; training problems, training evaluation; past, current, and contemplated research, training programs, etc.

5425
Flanagan, J.C. THE CRITICAL INCIDENT TECHNIQUE IN THE STUDY OF INDIVIDUALS. *Modern Educational Problems: Report of the 17th Educational Conference*, New York, N.Y., Oct. 1955, 61-70. American Council on Education, Washington, D.C.

In summary, the use of the critical incident technique in studying individuals has been outlined. The first task is to obtain a comprehensive definition of the activity in terms of critical behavior. This is usually, although not necessarily, done by asking competent observers to report on incidents they have recently noted. The second task is to collect specific critical incidents regarding the behavior of individuals with respect to the categories formulated from the original set of critical incidents. Observations of critical incidents in typical activities afford an excellent source of data. If these data are to be adequate in quantity and quality, many observers must make frequent observations and, preferably, daily records of the incidents observed. Another source of useful descriptive information regarding the individual is the situational performance test. For such a test, standard samples of the individual's behavior in carefully structured situations are observed and recorded on the spot. Results from studies of combat leadership suggest that reliable and valid measures of personality factors can be obtained in this way. Although additional research is needed to develop the full potentialities of this type of test, it is believed that the critical incident technique can be employed in many practical school situations at the present time to obtain valuable, descriptive information about individuals.
R-2

5426
Hirsch, J.A. AN EVALUATION OF CONTACT LENSES FOR GENERAL USE IN THE AIR FORCE. Proj. 7157, Task 71808, Tech. Rep. 56-283, May 1956, 23pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

5426
To determine the feasibility of contact lenses for aircrew members, a survey of the literature and existing data was made. The history of contact lenses, contact lens composition, fitting techniques, optical principles, and indications for use are discussed. A comparison of the functions and relative merits of contact and spectacle lenses is made. A detailed discussion of applications in the Air Force--with main consideration given to flying personnel--is presented.
T. I. G. R 25

5428
Kimble, G.A. & Shatel, R.B. THE RELATIONSHIP BETWEEN TWO KINDS OF INHIBITION AND THE AMOUNT OF PRACTICE. *J. exp. Psychol.*, Nov. 1952, 44(5), 355-359. (Duke University, Durham, N.C. & Brown University, Providence, R.I.).

5428
To determine the shapes of the curves relating reactive inhibition and conditioned inhibition to the amount of practice, 20 Ss were given ten daily practice sessions and a total of 150 50-sec. trials on a pursuit rotor. Half the group received five sec., and the remainder 65 sec. between trials. The results are presented in terms of amount of conditioned inhibition and reactive inhibition as a function of practice and the comparative learning curves of both groups. The results are interpreted in terms of Kimble's theory of motor learning.
G. R 5

5429

Schlesberg, M. & Smiley, W.C. A SIMPLE TEST OF THE NORMALITY OF TWENTY-FOUR DISTRIBUTIONS OF ELECTRICAL SKIN CONDUCTANCE. *Science*, 1953, 117, 35-37. (Brown University, Providence, R.I.).

A graphic test of the normality of electrical skin conductance data at various levels of tension is described. The test is simple and much less time-consuming than conventional statistical treatment. A graphic illustration is provided showing cumulative percentage distributions of 20 5s electrical skin conductance during one period of long division and another period of complex reaction time tests. It is suggested that the square root of conductance is the best measure to use where it is important to have the closest approximation to normality. For most reaction purposes, however, conductance would seem to be an adequate measure. (MEIAS)

R 9

5430

Richards, W.J. THE EFFECT OF ALTERNATING VIEWS OF THE TEST OBJECT ON VISUAL AND KINESTHETIC ACTIVITY. J. Gen. Psychol., 1954, 48, 376-388. (University of Arkansas)

5431

To investigate the effect of size of alternation of stereoscopic and pseudoscopic views of targets on the threshold for depth and the effect of size of alternation of R and L views of the targets on the under threshold, a Bruckholz-type stereoscopic target was used. Alternate views of the targets were presented to each eye by means of prism and motor-driven views. Data were obtained from three subjects by the method of constant stimuli. Threshold values are plotted and the results under the various conditions are discussed and related to possible underlying cortical processes.

5434

Kelly, W.F. THE EFFECT OF KINESTHETIC, VISUAL, AND TACTILE CUES ON THE ACQUISITION OF A LEVER-POSITIONING SKILL. Contract AF 33(616) 21254, AFFORD IN 34 40, Sept. 1954, 25pp. (USAF Personnel & Mater. Studies Lab., Lackland AFB, Tex. (University of Wisconsin, Madison, Wisc.); (Quartermaster School, Fort Monmouth, N.J. 07033), 372-380).

5436

In a determination of the effective time in the acquisition of a lever-positioning skill, 60 college students practiced for 10 sessions each consisting of 60 trials, on a modified Mauthner apparatus. Visual or kinesthetic cues were eliminated and kinesthetic or verbal cues were emphasized for four experimental groups during the middle eight sessions. A control group performed the standard task throughout the sessions. Time and error scores are compared among the various groups. G. 2 22

5432

Donoherty, J.M. A SIMPLIFIED METHOD OF MEASURING KINESTHETIC REACTION-TIMES. *Amer. J. Psychol.*, 1953, 66, 309-311. (USAF Human Resources Research Office, Fort Knox, Ky.).

A simple method for measuring kinesthetic RT's is described and some preliminary results are given. The method is based upon a key release method and requires very little in the way of elaborate equipment—a chronoscope, an electromagnet, a source of direct current, a 2-way switch, telegraphy key, mount for an electromagnet, and a wrist-band. The procedure for using this equipment is detailed and results from 23 Ss are presented. (MEIAS)

R 1

5433

Cortez, H.M. FACTOR ANALYSIS OF SOME REASONING TESTS. *Psychol. Monographs*, 1952, 66(8), Whole 343, 1-21. (North Carolina State College of Agriculture and Engineering, Raleigh, N.C.).

5435

An exploratory factor study in the general area of reasoning ability was undertaken. A battery of tests was devised which included subtests from several standardized tests such as Stanford-Binet Vocabulary Test, Wechsler Similarities and Comprehension Tests, and also tests devised by the author. All tests were administered to 100 subjects selected at random from the junior class of a large high school. From a correlation matrix, eight factors were extracted and interpreted. Lines of future research are suggested.

T. I. R 42

5435

Battig, W.F., Gregg, L.V., Nagel, E.H., Small, A.M., Jr., et al. TRACKING AND FREQUENCY OF TARGET INTERMITTENCE. J. Exp. Psychol., May 1954, 47(5), 309-314. (USAF Human Resources Research Center, Lackland AFB, San Antonio, Tex. & University of Wisconsin, Madison, Wisc.).

Measures of proficiency of tracking on the Pedestal Sight Manipulation Test were obtained at frequencies of intermittent target presentation of 4, 7, 10, 21, 41, 60, 82, and 16.1 cps. Since fusion frequency was at approximately 12 cps, the target at 16.1 cps was perceived as steady. The 15 Ss of the experiment, all male undergraduate college students, received one trial of 8 attacks for each frequency in each of 4 experimental sessions. Separate analyses of variance were completed for the AE and AER measures. A significant differential effect for frequency of intermittent target presentation was obtained. The relation is that of a bowed curve concave downward. As frequency of target intermittence increases, there is an initial rapid rise in tracking proficiency to 1.0 cps, a more gradual increase to a maximum at 8.2 cps, and a decline at 16.1 cps. A significant practice effect was obtained only for the AE measures. Since a light-dark ratio of 50/50 could not be obtained at 4, 7, and 16.1 cps, and since target brightness declined consistently as frequency increased, the obtained curves cannot be said to be a simple function of frequency of intermittent presentation of the target. The gains in tracking proficiency between 1.0 and 8.2 cps, however, are not differentially affected by the constant light-dark ratio of 50/50, and the only effect of target brightness could be one of decreasing the magnitude of the increments. There is, therefore, evidence for a relation of tracking and frequency of the intermittent presentation for which neither light-dark ratio or brightness may be responsible. The obtained curves, however, will require confirmation under conditions that permit adequate control of light-dark ratio and target brightness as parameters. R 6

5435
 Black, C.E., Durfee, W.M., Howell, J.W. & Yushman, K.L.
 EFFECTIVENESS OF MESSAGE MESSAGES IN SMALL INFANTRY UNITS.
 Tech. Memo. OMD T 338, May 1952, 10pp. Operations Research
 Office, Johns Hopkins University, Baltimore, Md.

5436
 To determine the contribution of miniature radios to
 the effectiveness of small infantry units, experiments
 were designed to measure significant aspects of performance.
 Platoon and squad leaders used a transceiver to
 transmit messages; all men in the squad were a receiver.
 Three representative tactical situations were chosen. In
 each situation, critical segments were repeated a number
 of times with and without radio, while measurements were
 made of time required, variations in hit rates on targets,
 exposure of leader and runners, and correctness of re-
 ceived messages. All troops were interviewed immediately
 following participation. Comparison of the data was made
 for the two types of communication systems. Recommendations
 are included.
 T. C. 1: 2 3

5438
 McKelider, J.E.C. AUDITORY RESEARCH AND UNDERSEA WARFARE.
 Serial NRC:OW:0042, Presented at: "Fourth Undersea Warfare
 Symposium, Washington, D.C., 16-17 May 1949," Typ.
 Committee on Undersea Warfare, National Research Council,
 Washington, D.C. (Psycho-Acoustic Lab., Harvard University,
 Cambridge, Mass.).

5438
 This article presents a summary and discussion of
 two articles found to have suggestions for research on
 hearing of relevance to undersea warfare. Such potential
 areas of research as the following are treated: the
 perception of transient sounds and patterns of sound,
 exploitation of the classical psychophysical
 research methods, development of methods of investigating
 the role of the listener, and the potential value
 of fundamental research on the underlying principles of
 hearing.

5439
 Larter, L.H. BASIC RESEARCH IN HUMAN RESOURCES.
 Paper presented at the Fourth Undersea Warfare Symposium,
 May 1949, Serial NRC:OW:0044. Committee
 on Undersea Warfare, National Research Council,
 Washington, D.C.

5439
 This paper reviews briefly the general outcome
 of the first two years of work by the Committee on
 Human Resources, Research and Development Board to
 meet the needs of the military for analysis, evaluation
 and planning of research in the sciences of human
 behavior. Four major sub-divisions have been studied:
 human engineering and psychophysiology; personnel and
 training; man-power; and human relations and morale.
 The status of military research in these areas is
 discussed.

5440
 Allphin, W. SCHOOL LIGHTING AND POSTURE. May 1953, 4pp. Sylvania Electric Products Inc.,
 Salem, Mass.

A study of the relationship between school lighting and the posture assumed by students
 in writing tasks was conducted at the Bowditch School, Salem, Mass. The building contained
 classrooms with windows on one side only and with windows on both sides; some with dark desks
 fastened to the floor and some with light, movable desks; all wall finishes were light with
 artificial lighting from enclosing globes providing low illumination levels. Photographs
 were taken of students engaged in writing; all photographs were unposed. An analysis of
 postures in relation to light source, illumination level, and handedness revealed no connection
 between illumination and posture but distinct differences did exist with handedness.
 Other factors causing tilting and twisting that occurred when the eyes were brought close to
 the work were speculated as being desk height, manner of holding pen, and interest in the
 work. (HEIAS)
 R 1

5442
 American Institute for Research. AGING AND AIRCRAFT PERFORMANCE. RESEARCH NOTES. Res. Note 7, March 1953, 4pp.
 American Institute for Research, Pittsburgh, Penn.

5442
 This report summarizes a study of the type of age-
 related changes in the ability of aircrews to perform
 their jobs. Following a pretest with civilian
 subjects in order to evaluate data - collecting techniques,
 critical incidents were collected from 631
 subjects who were primarily bomber and fighter pilots.
 The results are discussed in terms of effective and
 ineffective behavioral symptoms observed as a function
 of age. Results of the pretest are presented in terms
 of four symphonological areas, e.g., cognitive processes,
 sensory-motor processes, attention and temperament,
 and interpersonal relations and personal adjustment.
 T. C. 2: 2

5444
 Flory, C.D. & Gilbert, Jane. THE EFFECTS OF SODIUM
 SULPHATE AND CAFFEINE CITRATE ON THE EFFICIENCY OF
 COLLEGE STUDENTS. J. Biol. Psychol., April 1943,
 27(2), 124-131. (Lawrence College, Appleton, Wisc.).

5444
 To evaluate the effects of benzedrine sulphate and
 caffeine citrate on speed of action, reading rate, reading
 comprehension, and thinking ability, 129 college
 students were divided into three groups equated as to
 intelligence and sex. The three groups were administered
 one of the two drugs or a placebo (sugar or milk). Tests
 given over a 50-minute period were 1) tapping speed for
 ten seconds, 2) reading test for speed and comprehension,
 3) a second tapping test, 4) multiple-choice vocabulary
 tests with a time limit imposed, and 5) a third tapping
 test. Differences in test scores among the three groups
 were analyzed for measurable drug effects.
 T. C. 27

5447
 Mead, L.C. PSYCHOLOGICAL PROBLEMS IN MILITARY TRAINING.
 Serial NRC:OW:0043, Presented at: "Fourth Undersea Warfare
 Symposium, Washington, D.C., 16-17 May 1949," 16pp.
 Committee on Undersea Warfare, National Research Council,
 Washington, D.C. (Tufts University, Medford, Mass.).

5447
 This is a paper on psychological problems in military
 training that was presented at a symposium on
 Undersea Warfare. The relation between training and
 human engineering is discussed, as are general problems
 in training methodology, the training of instructors,
 the selection of trainees, and the determination of
 training procedures to be used with new installations.

5448

Finger, F.W. & Spelt, D.K. THE ILLUSTRATION OF THE HORIZONTAL-VERTICAL ILLUSION. *J. exp. Psychol.*, June 1947, 37(3), 243-250. (University of Virginia, Charlottesville, Va. & University of Florida, Tallahassee, Fla.).

72 Ss attempted to equate in length the horizontal line and the vertical line in each of 4 figures. In one figure (C) the horizontal line was bisected by the vertical, in the second (B) the vertical was bisected by the horizontal, and in the other 2 (A and D) the lines did not intersect. The 3 predictions underlying the experiment were clearly borne out: a) The error in C was greater than the error in A; b) The error in C was greater than the error in B; c) The error in B was greater than the error in D. The hypothesis on which these predictions were based was thus confirmed: that the error of perception in the inverted T figure is an illustration not simply of the horizontal-vertical illusion, but of the 'bisecting-line' illusion as well.

R 21

5449

Battersby, W.S. & Jaffe, R. TEMPORAL FACTORS INFLUENCING THE PERCEPTION OF VISUAL FLICKER. *J. exp. Psychol.*, Sept. 1953, 46(3), 154-161. (Neurology Dept., The Mount Sinai Hospital, New York, N.Y.).

A study of the temporal factors influencing CFF was performed. Using a "square" wave stimulator, an electronic interval timer, and a gas discharge tube, measures of CFF were taken from 2.0s when the over-all duration of exposure of the intermittent light was varied from 140 to 1000 msec. for each of 3 relative light percentages (light-dark ratios). For both Os, the plot of CFF vs exposure time was a rising function of negatively accelerated slope. The magnitude of the slope of these functions varied with the percentage of the period occupied by light (in the order 50%, 20%, 80%). When the data were replotted in terms of number of light flashes at fusion vs exposure time (as contrasted to frequency of flashes, or CFF, vs exposure time), a linear curve for each light-dark ratio was found. These findings indicate that CFF, expressed in cps, varies systematically as exposure time is shortened, but that the number of flashes per unit time is relatively constant at fusion. When the raw data obtained with each light-dark ratio were equated for total energy content, it was found that the longer the relative dark interval in an intermittent light cycle, the greater the ability of 0 to discriminate between successive flashes. These results are compatible with concepts of "excitation" and "recovery" in the visual system, but are equally predictable from either neural or photochemical theory. It is suggested that the relative merits of these theories can only be appraised in experiments where neural or photochemical factors are directly manipulated.

R 25

5452

Schreiber, R.J. GOOD CONTROLS DESIGN MAKES PILOT'S JOB EASIER. *Aviation Age*, Sept. 1953, 1pp.

5453

The problems of controls arrangement are discussed in this article and some basic rules for avoiding poor control design are enumerated. The following topics are covered: control-indicator relationships, natural design, ease of grasping, shape coding, switch design, and knob diameters.

I.

5453

Schreiber, R.J. PSYCHOLOGISTS TEST JET CHARTS. *Aviation Age*, Sept. 1954, 1-73. (Dunlap & Associates, Inc., Stamford, Conn.).

5453

This article describes the development of new aeronautical charts for high-speed, high-altitude aircraft and includes such items as optimum size of chart, extent of area shown, and types of symbols, colors, methods of illustrating terrain features and type faces for printed matter. Experimental evaluation of two experimental and the standard chart involved readability tests under day and night lighting conditions and opinion questionnaires. Subjects were pilots and college students. Analysis of results leads to specific recommendations for further research. (See Acc. No. 5741 for full report.)

I. R 1

5454

Viteles, H.S. & Smith, K.R. AN EXPERIMENTAL INVESTIGATION OF THE EFFECT OF CHANGE IN ATMOSPHERIC CONDITIONS AND NOISE UPON PERFORMANCE. *ASHVE J. Section*, Jan. 1946, 6pp. (American Society of Heating and Ventilating Engineers, New York, N.Y.).

An experimental investigation was conducted on the effect of diverse atmospheric and noise conditions upon output, feelings, and physiological functions during the performance of tasks roughly analogous to operations carried on by personnel in the plotting and charting rooms of Naval vessels. Experimental tasks: discrimination tests, mental multiplication, number checking, code and location tests, tracking and tracing; atmospheric conditions: effective temperature (ET) of 73°, 80°, 87°, and 94°; noise levels: 72, 80, and 92 db. 6 Ss were studied 6 days per wk, for a period of 7 wks. under various combinations of the above conditions. Performance data were analyzed for significance of differences due to the several experimental conditions. No adverse effects on performance were found at ET's of 72 and 80°, but did appear at 87°; at 94° the Ss could not complete the tasks because of adverse physiological reactions. Noise levels used here did not adversely affect performance. Discomfort, distress, and annoyance were found at the higher levels of temperature but not with increasing noise levels. (HEIAS)

5456

Kemp, J.D., & Ballantyne, R.M. FIELD EVALUATION OF CANADIAN ARCTIC FIVE-MAN INDIVIDUAL RATION PACK, RPX 1F. DRML Proj. 175, PCC Proj. D60-78-70-13, DRML Rep. 173-16, August 1956, 34pp. Defense Research Medical Laboratories, Defense Research Board, Toronto, Canada.

5456

To evaluate the Canadian Arctic Five-Man Ration Pack RPX 1F, a winter field trial was conducted with forty members of the Arctic Instructor's Course at Fort Churchill. By means of questionnaires and the return of unused items by the subjects, data on acceptability, supply, and food rejection were obtained. Recommendations are included.

T. I. R 2

5458

Birnack, F.L. & Olson, R.M. THE INTENSIVE DIFFERENCE LIMEN IN AUDITION. *J. acoust. soc. Amer.*, April 1961, 12(4), 517-525. (Moberg College, Geneva, N.Y.).

In spite of its interest for acoustics, the intensive difference limen for sound has not been determined over a comprehensive range of frequency and amplitude. In the present experiment we have determined the difference limens for discrete intensive discrimination at 5 frequencies ranging from 128 cycles to 1000 cycles with intensities from 0.02 bars rms pressure to 3.4 bars (-65 db to -15 db). Both the physical conditions and the psychological judgment have been carefully controlled. The data yield a value for Δ db of 2.4 db in the middle range of intensities (-35 db to -15 db or 35 SL to 70 SL).

R 12

5459

Bruell, J.M. & Albee, G.W. NOTES TOWARD A MOTOR THEORY OF VISUAL EGOCENTRIC LOCALIZATION. *Psychol. Rev.*, 1955, 62(5), 391-400. (Western Reserve University, Cleveland, Ohio & Highland View Hospital, Cleveland, Ohio).

The relationship between phenomena of visual egocentric localization and processes of involuntary and voluntary oculomotor innervation has been pointed out by many earlier investigators. This paper has attempted to describe the nature of this relationship more precisely. From an examination of empirical data relating to visual egocentric localization, 2 hypotheses were derived to account for the perception of direction and for some phenomena of egocentric apparent movement. Hypothesis 1 states that when dextro- or levorotators of the eye receive voluntary innervation, the space values for points on the retina change in relation to the direction and degree of innervation. Corresponding changes of retinal space values occur with voluntary innervation of the elevators and depressors of the eye. Hypothesis 2 states that when eye position is determined by reflex innervation alone, retinal points do not change their space values. Factors responsible for voluntary and reflex innervation of eye turners were examined, permitting the knowledge of patterns of innervation under various stimulus conditions. Predictions from the hypotheses concerning the effects of voluntary and reflex innervation on space perception were compared with empirical data, and were found tenable for a variety of perceptual experiences.

R 23

5460

Bruell, J.M. & Albee, G.W. EFFECT OF ASYMMETRICAL RETINAL STIMULATION OF THE PERCEPTION OF THE MEDIAN PLANE. *Percept. Mot. Skills*, 1955, 2, 133-139. (Western Reserve University & Highland View Hospital, Cleveland, Ohio).

An experiment was conducted to ascertain the effect of asymmetrical retinal stimulation on the perception of the median plane. 21 Ss adjusted the left or right edge of luminous rectangles to what appeared to them to be straight ahead using binocular vision. Conditions of retinal stimulation included 7 conditions: straight ahead and 16.7°, 11.3°, and 5.7° to both right and left of center. It was found that with asymmetrical retinal stimulation the apparent median plane does not coincide with the objective median plane, but shifts in the direction of stimulation. The magnitude of the displacement was a function of the degree of asymmetry of retinal stimulation. These findings were explained in terms of underlying processes of involuntary and voluntary innervation of the extra-ocular muscles. (HEIAS)

R 5

5462

Vinacke, W.E. ILLUSIONS EXPERIENCED BY AIRCRAFT PILOTS WHILE FLYING. *J. Aviat. Med.*, Aug. 1947, 18(4), 308-325. (University of Hawaii, Honolulu, Hawaii).

5462

In a study of the illusions experienced by aircraft pilots in flight, data was obtained from sixty-seven interviews designed to obtain information concerning aviators' experiences of vertigo. A system of classification was established to parcel out the data of relevance to illusions. The results are discussed in terms of the form and content of visual illusions; non-visual illusions; illusions resulting from conflicting sensory cues; and illusions resulting from general emotional disturbance.

5468

Hollander, E.P. & Bair, J.T. THE SIGNIFICANCE OF ATTITUDES TOWARD AUTHORITY-FIGURES IN DISCRIMINATING BETWEEN NAVAL AVIATION CADETS OF "HIGH" AND "LOW" MOTIVATION. Proj. NM 001-058-05-03, May 1952, 23pp. USN School of Aviation Medicine, Naval Air Station, Fla.

5468

Attitudes toward authority-figures that discriminated between naval aviation cadets of "high" and "low" motivation were evaluated. The "high" motivation group consisted of 65 cadets who had successfully completed Basic Flight Training, and the "low" group included 72 cadets who withdrew from training voluntarily. Both groups were required to complete anonymously an open-ended questionnaire form that instructed them to describe a sample of behavior characteristic of their best and worst instructors. Content analyses were made and frequencies for each content category determined for each group.

T. G. I. R 15

5463

Gogel, W.C. PERCEPTION OF THE RELATIVE-DISTANCE POSITION OF OBJECTS AS A FUNCTION OF OTHER OBJECTS IN THE FIELD. *J. exp. Psychol.*, May 1954, 47(5), 335-342. (USA Medical Research Lab., Fort Knox, Ky.).

An illusion in depth was produced by using a series of similar objects of different sizes. It was found that the adjustment of a binocular disc to apparent distance equality with a part of the binocular illusion was influenced by the line-of-sight position of the disc with respect to the illusion. It is hypothesized that a binocular depth illusion will least disturb the apparent relative distance of the disc from S with respect to that part of the illusion which is most nearly in line-of-sight with the disc. It is suggested that the binocular disparity between the disc and a frontally adjacent (line-of-sight) object is functionally more important than that between the disc and a frontally displaced object, regardless of which of these binocular disparity relations S attempts to use.

R 5

5465

Ford, A. BIOELECTRIC INTEGRATOR GAGES STRAIN AND EFFORT. (AND SUPPLEMENT). *Electronics*, April 1953, 11pp. (Lehigh University, Lehigh, Penn.).

A direct index of strain and effort of human Ss performing various tasks can be obtained by recording the bioelectric effects of the muscles used. Bioelectric output may be quantified by securing the integral of the complex potential waveforms. Instrumentation for these purposes was developed and is described in this paper. (HEIAS)

R 4

5471
Imms, W.A. SYMPOSIUM ON FATIGUE. THE ECONOMICS
RESEARCH SOCIETY COLLEGE OF AERONAUTICS, CRANFIELD
24-27 MARCH 1952. Tech. Rep. CRL 82 52, March 1952,
16pp. U.S. Office of Naval Research, London, England.

5471
A three day symposium on fatigue is summarized.
The discussions were initiated by defining fatigue and
by raising the problem of measurement. The anatomical
and physiological factors involved in fatigue, such as
structure and function of muscles and bones, inadequate
nutrition, and extremes of heat and cold and age, were
described by various speakers. From the psychological
point of view, such factors as motivation, satisfaction,
frustration, practice, spaced learning, and alertness
were discussed at length. Various aspects requiring
further investigation by the psychologist were pointed
out.

5472
Katz, M.S., & Spragg, S.D.S. TRACKING PER-
FORMANCE AS A FUNCTION OF FREQUENCY OF
COURSE ILLUMINATION. J. Psychol., 1956, 40,
181-91. (Univ. of Rochester)

5472
To investigate the effect of varied illumination of
a continuous target course upon accuracy of tracking per-
formance, 18 subjects performed on a tracking apparatus
under six conditions of illumination for each of two
types of courses, a sine wave and an irregular course.
The results were presented and discussed in terms of dif-
ferences in performance on sine wave and irregular course
and the number of tracking error scores as a function of
differences in illumination frequency.
T. G. R:12

5473
Kilpatrick, F.P., & Ittelson, W.H. THREE DEMONSTRATIONS INVOLVING THE VISUAL PERCEPTION OF
MOVEMENT. J. exp. Psychol., Dec. 1951, 42(6), 394-402. (Princeton University, Princeton,
N.J.).

3 demonstrations illustrating various phenomena involved in the visual perception of
movement were described in some detail. The first dealt with the role of continuous size
change as an indication of continuous movement in the radial direction. The next demon-
stration considered indications of radial movement in conjunction with indications of tangential
movement, specifically as integrated in a perception of circular motion. The third demon-
stration treated some aspects of the effect of perceptual conflicts in a situation involving
objective tangential motion. Implications for perceptual theory were briefly discussed.
R 13

5475
Kratwohl, M.C. A THEORY OF WORK HABITS OF INDUSTRIALNESS. J. appl. Educ., 1951, 41(3),
157-163. (Illinois Institute of Technology, Chicago, Ill.).

A study was made of some aspects of work habits of industrialness with particular refer-
ence to college achievement. An index of industrialness was derived from differences be-
tween aptitude and achievement scores of 1255 engineering freshmen in the field of mathemat-
ics. These scores were then used to measure such properties of work habits as industrious-
ness, persistence, and achievement through correlations of the index with grades in college
algebra received from 5 to 10 months later. A further test was made using 308 25 in the field
of English. The following conclusions were drawn: a) The index of industrialness was a
valid measure of industriousness; b) Work habits do affect achievement; c) There
is a tendency for industrious vs. indolent work habits to persist over a period of time; d)
work habits affect the ability of a student to remain in college; and e) Work habits of the
industrialness act very similarly to social habits of honesty, truthfulness, and morality in
that they are specific, instead of general, and that with increasing industrialness comes in-
creased consistency and predictability. (McL)

5476
Kurke, M.I. THE RELATION OF PRACTICE TO DEVELOPMENT
OF VISUAL PERCEPTION. Psychol. Newsletter, 1952, 42,
1-9. (University of Buffalo, Buffalo, N.Y.).

5476
This paper presents a critical review of selected
experimental work on the relation of practice to the
development of visual perception in an attempt to trace
a phylogenetic study of the effect of initial visual
experience. Four dimensions of vision are included:
color, intensity, depth and pattern. The phyletic scale
includes birds, rodents (rat, rabbit), carnivores (cat),
and primates (chimpanzee, monkey, man). The significance
of these studies for an understanding of visual per-
ception is discussed.
T.R:22.

5480
Lorge, I., Tuckman, J., Aikman, L., Spiegel, J., et al.
SOLUTIONS BY TEAMS AND BY INDIVIDUALS TO A FIELD
PROBLEM AT DIFFERENT LEVELS OF REALITY. J. educ.
Psychol., Jan. 1955, 46(1), 17-24. (Columbia
University, New York, N.Y.).

5480
To estimate the difference in the quality of the
solution to a practical field problem presented in four
settings differing in their degree of remoteness from
reality (verbal description, photographic representa-
tion, miniature scale model, with and without manipu-
lation of parts and materials), ten teams of five men
and ten men as individuals were asked to solve the prob-
lem at each of the four levels. The Mined Road Problem,
which requires a plan for getting a group of five men
across a mined road, was adapted for use. A quality
point scoring system was used to evaluate the written
plans and the differences between group and individual
solutions as well as among levels of remoteness from
reality were analyzed.
R. R 2

5481

Large, I. HOW THE PSYCHOLOGIST VIEWS COMMUNICATION. Teach. Coll. Rec., Nov. 1955, 52(2), 72-79. (Teachers College, Columbia University, New York, N.Y.).

The psychologist studies all aspects of communication at all levels. He is concerned with transmission and reception of messages, with learning and comprehending ideas, attitudes, and values, and with appraising the consequences of communication in comprehension, pleasure, and action. His emphases vary from the application of knowledge for the improvement of communication to the development of new knowledge about it. The communications revolution in no small part reflects his contributions. (NEIAS)

5483

Large, I. CAPACITIES OF OLDER ADULTS. (Columbia Univ., Teachers College)

5483

This is an article which presents a discussion and critical review of some of the experimental material dealing with capacities of older adults. The author reviews such areas as learning ability and performance, physiological reaction time, sensory acuity, intelligence, adult interests, etc., and concludes with a presentation of some ideas concerning the adjustment processes occurring in aging along with suggestions for remedial methods of dealing with functional and attitudinal changes. T. B. 29

5487

Kunick, Lillian S. PUPILLARY PSYCHOSENSORY RESTITUTION AND AGING. J. Opt. Soc. Amer., Sept. 1954, 44(9), 735-741. (Fordham University, New York, N.Y.).

5487

In order to investigate possible changes in the psychosensory restitution occurring with age as reflected in the pupillary response to light, cinephotographic pictures of the pupils of 94 Ss ranging in age from 7 to 90 years were taken under light and dark to conditions. Results were discussed in terms of relation of age to pupillary responses and constrictions. J. G. 4. R 4

5489

Squires, P.C. & Lewis, W.G. PHOTOMETRIC SURVEY OF LIGHTING INSTALLATION ON THE SUBMERSIBLE CRAFT X-1 (SSX-1). NM OC 7014.08.12, Memo. Rep. 56 S, Feb. 1956, 6pp. USN Medical Research Laboratory, USN Submarine Base, New London, Conn.

5489

To determine the adequacy of the lighting installation of the Submersible Craft X-1 (SSX-1), a photometric survey of both red and white lighting was conducted. Photometric readings were made with an Ultra High Sensitivity Spectra Brightness Spot Meter. Specific deficiencies and recommendations for improvement are given.

5490

Mishkin, M. & Forgy, D.G. WORD RECOGNITION AS A FUNCTION OF RETINAL LOCUS. J. exp. Psychol. Jan. 1952, 42(1), 43-48. (McGill University, Montreal, Canada).

4 experiments were performed to investigate the accuracy of tachistoscopic recognition of words placed in the left and right peripheral fields of vision. Experiments I and IV demonstrated that Ss recognized significantly more words placed in certain parts of the right visual field than in corresponding parts of the left, confirming the hypothesis of a selective retinal training arising from the reading situation. Several alternative interpretations of this phenomenon were ruled out in Experiments II and III. The results support the theory that a particular perception depends on the excitation of particular nerve cells, and are inconsistent with the theory of a general equipotentiality in vision.

R 5

5492

Note, F.A. & Briggs, G.E. THE RELIABILITY OF MEASUREMENTS OF HUMAN DARK ADAPTATION. J. exp. Psychol., July 1954, 48(1), 69-74. (University of Wisconsin, Madison, Wisc.).

Measurements of dark adaptation were made with a Hecht-Shlaer adaptometer following pre-exposures to 1,244 m. intensity for 2-min. duration. The exp. was carried out over a period of 11 months, the authors serving as Es and Ss. For each S a total of 24 dark-adaptation curves was obtained, 2-curves of 40-min. duration per session for 12 sessions. Statistical analyses were carried out to determine the influence of several factors for the initial threshold value, the value at the rod-cone "break" and the final threshold values. The main results were as follows: a) For each S the total extent of change in threshold values for each curve was approximately 4 logarithmic units. All curves clearly showed both cone and rod dark-adaptation components. b) No significance at any stage in dark adaptation was found to be associated with the factors of forenoon versus afternoon, or first curve versus second curve in a session. c) The factor of experimenter-subject combination was found to be significant at the 5% level of confidence for the initial threshold values and for the values at the rod-cone "break." Further analysis revealed that for the initial threshold values, this is not to be attributed to the Ss, but to 2 of the Es, and is attributable to variation in experience in taking measurements. The significance found for the threshold values at the rod-cone "break" was associated with Ss, not Es, and is an expression of the fact that individuals differ in the threshold level at which the adaptation of the cones is replaced by that of the rods. d) The influence of any factors during the early phase of rod adaptation could not be determined because of day-to-day variability among the individual dark-adaptation curves. e) No practice effect was found.

R 2

5493 Note, F.A. & Briggs, G.E. THE EFFECT OF HIGH INTENSITY AND SHORT DURATION VERSUS LOW INTENSITY AND LONG DURATION OF INTERMITTENT PRE-EXPOSURE UPON HUMAN DARK ADAPTATION. J. exp. Psychol., Aug. 1952, 42(8), 521-525. (University of Wisconsin, Madison, Wisc.).

The influence of intermittent pre-exposure upon subsequent dark adaptation was investigated for 2 intermittent conditions. In one condition the intensity was increased in the same proportion as the amount of light-time in the light-dark ratio was decreased, keeping duration constant. In the other, intensity was constant but the duration was extended to compensate for variations in light-time. Both control intensities were compared with equivalent control pre-exposures to continuous light. The control intensities and durations were 140, 281, and 562 m. and 1 and 3 minutes. The rate of intermittence was 1 cycle/second, and 4 light-to-dark ratios were used. The curves of dark adaptation obtained after intermittent pre-exposures of constant duration but different intensities were almost identical with those after the equivalent control pre-exposure. This was not so for the intermittent pre-exposures of constant intensity but different durations; after the longer durations, dark adaptation was much slower than after the equivalent control condition.

R 5

5494

Note, F.A. S. Reed, Eleanor C. THE EFFECT OF EXTENDING THE DURATION OF VARIOUS LIGHT-DARK RATIOS OF INTERMITTENT PRE-EXPOSURE UPON DARK ADAPTATION IN THE HUMAN EYE. *J. opt. soc. Amer.* May 1952, 42(5), 333-338. (University of Wisconsin, Madison, Wisc.).

The influence of intermittent versus continuous preadaptation upon subsequent dark adaptation was investigated for 2 durations of the continuous: 1 1/2 and 3 minutes. The rate of intermittence for the discontinuous condition was 1 cycle/sec. and 4 light-to-dark ratios were employed. The pre-exposure intensities were 8860, 886, 88.6 and 8.86 m. Differences were found for most of the cases in which a comparison was made between the curves of dark adaptation following the 2 conditions of preadaptation. For the intermittent condition at the highest pre-exposure intensity it was found that the shorter the light-time in the ratio; the lower the initial threshold tended to be and the more rapidly the final dark adapted thresholds for both the intermittent and continuous curves were approximately the same, but the curves for the intermittent were markedly retarded in reaching the final level of dark adaptation.

R 2

5496

Mull, Helen K., Ord, Nancy & Locke, Nan. THE EFFECT OF TWO BRIGHTNESS FACTORS UPON THE RATE OF FLUCTUATION OF REVERSIBLE PERSPECTIVES. *Amer. J. Psychol.*, June 1954, 67(2), 341-342. (Sweet Briar College, Sweet Briar, Va.).

A study was conducted on the effect of 2 brightness factors (contrast between contour and background and illumination) upon the rate of fluctuation of reversible perspectives. 36 Ss divided into 6 groups were studied. A 2 in. Necker cube, drawn with dark gray contour lines, was presented a) on a white ground with 200-w. illumination, b) on a medium gray ground with same illumination, c) on white ground under 15-w. illumination. S fixated a neutral point at center of cube and reported shifts in perspective as they occurred until 10 changes occurred; procedure was repeated 20 times with short rest intervals. Each group observed under all conditions. In condition a) the average length of 20 periods was 30.6 sec.; in b) 29.5 sec.; and in c) 30.0 sec. The critical ratio between averages of a) and b) was 0.31; a) and c), 1.65. Rates of shift were highly irregular for all conditions. Neither of the brightness factors, then, were found to influence fluctuation rate. (HEIAS)

R 3

5498

Stevens, S.S. DECIBELS OF LIGHT AND SOUND. *Physics Today*, Oct. 1955, 8(10), 12-17. (Harvard University, Cambridge, Mass.).

The usefulness of logarithms in the measurement of many stimuli to which human beings are sensitive is discussed, with particular reference to the problems of psychophysics. Where relative magnitudes and ratios between magnitudes of 2 stimuli are of great interest. The use and advantages of the decibel notation in the field of acoustics to express ratios between 2 amounts of power are discussed. Other uses for decibels, particularly in the field of optics, are then indicated. The author argues that since light intensity involves power (radiant energy flow) it would be appropriate to measure light in decibels; the advantages of such a measure are enumerated and illustrated by a comparison between vision and audition. A decibel scale for light and sound is presented, showing the approximate levels of luminance and of sound intensity produced by various sources, together with a few important threshold levels. (HEIAS)

R 14

5501

Warrick, M.J. DESIGN AND USE OF COUNTERS FOR AIRBORNE EQUIPMENT. RDO 694 17, Tech. Note WCRD 52 80, Oct. 1952, 8pp. *Aero Medical Lab.*, USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

It is suggested that counters may be used most advantageously for the presentation of precise quantitative information requiring no interpolation between numbers. It is not recommended that counters be used to present information from which the operator is to derive directional or rate information or to present information which will be used for check-reading purposes. In reference to the design of counters, it is recommended that the numbers snap into place, normally following each other at a rate no faster than about 2 per sec. It is recommended that an upward movement of the counter drum indicate an increase and that an up or clockwise motion of the associated control produce an increase in the counter reading. If a toggle switch is used as a reset control, it is suggested that the reset speeds be no greater than 10 digits per sec. If a manually operated rotary knob reset control is used, it is recommended that it be located to the right of the counter and that for accurate reset to a new number a ratio of about 36° control knob rotation for one-digit counter movement be used.

R 19

5504

Andreas, B.G., Murphy, D.P., & Spragg, S.D.S. SPEED OF TARGET ACQUISITION AS FUNCTIONS OF KNOB VS. STICK CONTROL, POSITIONING VS. VELOCITY RELATIONSHIP, AND SCORING TOLERANCE. Contract AF 30(602)-200, Sci. Rep. 3, July 1955, 20pp. *Rome Air Devel. Center, Human Factors Office.* (Univ. of Rochester)

5505

Bugelski, B.R. & Scharlock, D.P. AN EXPERIMENTAL DEMONSTRATION OF UNCONSCIOUS MEDIATED ASSOCIATION. *J. exp. Psychol.*, Nov. 1952, 44(5), 334-338. (University of Buffalo, Buffalo, N.Y.).

5504

To determine speed of acquisition of stationary targets as a function of given control factors, eight subjects were given practice in a situation presenting display and control characteristics analogous to certain radar tasks. The control variables were: (1) two knob controls versus a miniature X-Y stick control; (2) positioning versus velocity mode of tracking; and (3) a large versus small on-target tolerance. Performance measures were: movement time, settling time, and total time. Analysis, based upon the last trial when performance had become stable, was in terms of performance as a function of type of control, type of tracking, and degree of tolerance. Recommendations are included.

T. G. I. R 3

5505

Twenty college students learned three lists of paired nonsense syllables in an investigation of mediated association in verbal learning. The response items on the first list were the stimulus items on the second list. The response items on the second list were paired on the third list with the stimulus items of the first list. Results were presented as number of trials to learn each pair of items on the third list.

T. R 9

5506

Chalupsky, A.B. A/S PROCEDURAL ANALYSIS: XIII. A SUMMARY OF PROCEDURES. NPOC3014, NPOC3015, PREFASD Rep. 45, March 1954, 1pp. USN Personnel Research Field Activity, San Diego, Calif.

5506

A summary of the procedures used in gathering descriptive data on the sequential tasks of manipulation and operational maintenance of three basic sonar equipments (Sonar Indicator Control, Tactical Range Recorder, and Attack Plotter) is presented. Samples of record forms are included.

I. R 6

5507

Christensen, J.M. & Crannell, C.W. THE EFFECT OF SELECTED VISUAL TRAINING PROCEDURES ON THE VISUAL FORM FIELD. Contract AF 18(600) 25, Proj. 7186, WADC TR 54-239, April 1955, 26pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

5507

These experiments are concerned with the possible effects of training on visual acuity in the periphery of the visual field. The subjects were 39 male college students with normal visual acuity. Tests of dial checking, reading ability, and peripheral vision were administered to all subjects at the beginning and end of the experiment. One experimental group underwent tachistoscopic training and another underwent training in the reading of peripherally presented numbers for 42 interpolated sessions. Gains obtained between pretest and post-test scores of the experimental groups and of a control group are compared. Learning curves for the interpolated tasks are presented.

T. G. I. R 8

5508

Collier, G. PROBABILITY OF RESPONSE AND INTERTRIAL ASSOCIATION AS FUNCTIONS OF MONOCULAR AND BINOCULAR STIMULATION. J. exp. Psychol., Feb. 1954, 47(2), 75-83. (ONR, Indiana University, Bloomington, Ind.).

The effect of monocular versus binocular fixation and viewing conditions on probability of response (Pr) and the amount of intertrial association was investigated. The binocular Pr was found to be greater than the monocular Pr under all conditions, and it was argued that this result was not an artifact of the conditions of observation. Evidence was advanced for the hypothesis that stimulation of 2 eyes is functionally equivalent to doubling the area of stimulation in a single eye under the conditions of the present experiment. On the assumption of the peripheral origin of the associative effect, the expected reduction of the intertrial associative effect was not found, and it was concluded that the effect is nonperipheral in origin.

R 19

5510

Darley, J.G., Gross, N. & Martin, W.C. STUDIES OF GROUP BEHAVIOR: FACTORS ASSOCIATED WITH THE PRODUCTIVITY OF GROUPS. Reprint Series 12. Laboratory for Research in Social Relations, University of Minnesota, Minneapolis, Minn. (Reprinted from: J. appl. Psychol., Dec. 1952, 36(6), 396-403).

5510

This is one of a series of papers reporting the results of a study of the relations among selected sociological and psychological variables in the behavior of small organized groups. An analysis of factors related to group productivity is presented here. The groups studied were 13 women's small residence units organized as a cooperative housing project. An attempt was made to get an estimate of relative productivity of the groups when engaged in a common and meaningful task--preparing a plan for better cooperative living--as a criterion measure against which certain group variables were correlated.

T. R 3

5511

Davis, H. & Eldredge, D.H. NOISE AND THE COMMUNITY. CHABA Rep. 4, Oct. 1954, 32pp. National Research Council, Committee of Hearing and Bio-Acoustics, Washington, D.C.

These proceedings of the second meeting of the Committee on Hearing and Bio-Acoustics held jointly with NACA Special Subcommittee on Aircraft Noise were assembled from notes taken at the meeting where 11 papers were presented dealing with problems of neighborhood responses to noise, particularly aircraft noise. Papers dealing with human aspects of the problem include an assessment of community responses to noise; various community aspects of aircraft annoyance and methods for measuring such attitudes; and a report on some Air Force experiences with noise and the community. The physical aspects of the problem discussed were noise sources and "near source propagation problems"; atmospheric and terrain factors in sound propagation; Air Force planning with regard to noise and the community; other noises in the community; and noise level data applied to the control of community response. A summary paper on present status of research on the physical aspects of sound propagation concluded the presentations. (HEIAS)

111 - 585

5512 Davis, R.C. THE STIMULUS TRACE IN EFFECTORS AND ITS RELATION TO JUDGMENT RESPONSES. J. gen. Psychol., Dec. 1952, 44(6), 377-390. (Indiana University, Bloomington, Ind.).

4 groups of Ss were presented with pairs of tones under 4 different experimental procedures with Ss pressing a key in response to each pair in certain of the conditions constituting a judgment of the relative intensity of the second stimulus. Search for stimulus trace effects was made in the concurrent muscular activity in 4 body locations by electromyographic methods, and the relation of some of these to ensuing judgments was investigated. Under all the experimental conditions there was an increase in muscular activity associated with the first stimulus of each pair, at least in those muscles likely to be involved in the subsequent key pressing. For the simple reaction situation the excitation was highly localized; for the choice-response situations it was more widespread. The temporal course of the excitation varied with the following factors: a) simple vs. choice response; b) regularity vs. irregularity of time interval between stimuli of a pair; and c) duration of the first stimulus of a pair. The proportion of judgments of "stronger" and "weaker" bears no discernible relation to its total amount of activity in the 2 arms prior to the judgment, but is related in a variety of circumstances, to the difference in prior activity of the arms designated to give "stronger" and "weaker" judgments, the more active arm giving the greater number of responses.

R 20

5514

Esso, M.E. & Kafka, J.S. DIAGNOSTIC IMPLICATIONS OF A STUDY IN TIME PERCEPTION. J. gen. Psychol., 1952, 46, 169-183. (New York State College for Teachers, Albany, N.Y. & Emory University, Emory University, Ga.).

5514

In an attempt to relate time perception to other psychological phenomena, 76 subjects were required to estimate two time intervals (15 seconds, two minutes) under four conditions. These were: 1) a tone was heard for five seconds, after which the subject was directed to silence it (key pressing) for the estimated interval, 2) the subject was asked to switch off a light and keep spring switch down for the estimated interval, 3) the reverse of the preceding condition, and 4) the subject switched on the tone and listened to it for the estimated interval. No knowledge of results was given. Differences between estimated and clocked time were analyzed for serial position and for differences among usual and unusual conditions.

T. R 34

5515

Gerall, A.A., Sampson, P.E. & Spragg, S.D.S. AN ELECTRONIC APPARATUS FOR STUDYING TRACKING PERFORMANCE. *Amer. J. Psychol.*, June 1955, 68(2), 297-305. (University of Rochester, Rochester, N.Y.).

The design and operation of a 2-hand tracking apparatus are described. The apparatus was designed and used to study simple tracking but is adaptable to continuous, compensatory tracking. It consists of the following units: a) 55 controls; b) display; c) programmer; and d) recorder. A block diagram of the functional connection of these units is presented along with a schematic diagram of electronic details of the circuit. Limitations and advantages of the device for experimental investigations of perceptual-motor performances are discussed. (MEIAS)

5516

Gibson, Eleanor J. IMPROVEMENT IN PERCEPTUAL JUDGMENTS AS A FUNCTION OF CONTROLLED PRACTICE OR TRAINING. *Psychol. Bull.*, Nov. 1953, 50(6), 401-431. (Cornell University, Ithaca, N.Y.).

5516

This paper reviews the literature on improvement with practice of perceptual judgments. Among the perceptual processes covered are visual and tactual acuity; absolute and differential thresholds for hue, pitch, weight, and visual space; absolute estimation of weight, pitch, hue, brightness, pressure, and visual and kinesthetic extent; and the recognition of patterned stimuli under reduced conditions. Factors influencing perceptual learning, including amount and distribution of practice, reinforcement, and names and labels, transfer, and retention are also discussed.

I. R 211

5517

Girden, E. THE GALVANIC SKIN RESPONSE, "SET," AND THE ACOUSTICAL THRESHOLD. *Amer. J. Psychol.*, April 1952, LXV, 233-243. (Brooklyn College, Brooklyn, N.Y.).

5517

To investigate the role of set in galvanic skin response conditioning, 21 Ss were given paired tone presentations with mild shock reinforcement while learning to read an inverted article. The results are presented and discussed in terms of the thresholds during the task as compared to those following completion of the task. A discussion of the training procedure and implications for further research are also presented.

T. R 11

5518

Williams, A.C., Jr. & Hopkins, C.O. ASPECTS OF PILOT DECISION MAKING. Contract AF 33(616) 5135, WADC TR 58 522, Dec. 1958, 50pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Hughes Aircraft Company, Culver City, Calif.).

5518

To provide an operational definition of pilot decision-making, a detailed analysis was made of the tasks performed by the pilot of a modern airborne weapon system and was presented in a diagram. A way of conceptualizing decision-making so as to include instances of pilot decision-making was proposed. Applicability of each of the more prominent decision theories to this problem was considered. Areas requiring further study were discussed and some approaches to this problem were suggested.

T. I. R 103

5519

Grether, W.F. & Williams, A.C., Jr. PSYCHOLOGICAL FACTORS IN INSTRUMENT READING. II. THE ACCURACY OF POINTER POSITION INTERPOLATION AS A FUNCTION OF THE DISTANCE BETWEEN SCALE MARKS AND ILLUMINATION. *J. appl. Psychol.*, Dec. 1949, 33(6), 594-604. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio & University of Illinois, Urbana, Ill.).

Measurements were made of the accuracy of interpolating pointer position between scale marks as a function of dial diameter and the angular spacing between divisions. Ss were required to estimate the pointer position to within 1/10 the space between graduations. The experimental dials were painted with yellow fluorescing paint on a black background and were read under simulated daylight (45 ft.c.) and night (ultra-violet) illumination conditions. The major results of this investigation may be summarized as follows: a) Dial diameter and angular spacing of the scale marks could be combined into the single variable of length of graduation interval; b) The relative error of interpolation decreased as the length of the graduation interval increased up to approximately 0.5 in., and was very nearly constant at higher intervals. c) The absolute error of interpolation increased very nearly as a linear function of the length of the graduation interval. If there is an optimum interval for absolute accuracy it would appear to be below the interval lengths used in this study. d) Except in the case of the most closely spaced divisions the accuracy of interpolation was independent of the 2 illumination conditions. e) The speed of dial reading was not systematically related to either dial diameter or angular spacing of the divisions, although the measurements were admittedly crude.

R 6

5520 Grether, W.F. INSTRUMENT READING. I. THE DESIGN OF LONG-SCALE INDICATORS FOR SPEED AND ACCURACY OF QUANTITATIVE READINGS. *J. appl. Psychol.*, Aug. 1949, 33(4), 363-372. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

An evaluation was made of the speed and accuracy with which quantitative readings could be made of 9 experimental altitude indicators. The results are considered to apply also to other types of quantitative indication which require very great scale length. Evaluation of the various indicator designs was made by having 57 USAF pilots and 79 college men read 12 settings on each instrument. The instrument faces are reproduced in test booklets which provided spaces for writing in the readings. Both accuracy and speed of reading data were obtained for each of the 9 indicator designs. The major conclusions indicated by the results of this investigation are as follows: a) The combining into a single numerical value of the indication from 2 or more pointers, or from a pointer and rotating subdials, is a relatively difficult task for human beings. Such instruments are conducive to very large errors in readings. b) The ease with which long scale indicators can be read quantitatively appears to depend upon the extent to which the digits are already combined in the proper sequence by the instrument. c) A multiple pointer instrument such as the altimeter with continuous motion of the non-sensitive pointers is frequently read too high by a complete revolution of the sensitive pointer. d) The speed and accuracy of instrument readings are positively correlated, indicating that gains in reading speed can normally be expected to improve accuracy also. e) College men without altimeter reading experience showed virtually the same pattern of results in this study as highly experienced USAF pilots, suggesting that instrument reading difficulties are quite basic in nature and not readily modified by experience.

R 5

5521

Webster, J.C. EAR DEPENDERS: MEASUREMENT METHODS AND COMPARATIVE RESULTS. Res. Rep. 701, Sept. 1955, 42pp. U.S. Navy Electronics Laboratory, San Diego, Calif.

5525

Hilgard, E.R. & Smith, M.B. DISTRIBUTED PRACTICE IN MOTOR LEARNING: SCORE CHANGES WITHIN AND BETWEEN DAILY SESSIONS. *J. exp. Psychol.*, Feb. 1942, 30(2), 136-146. (Stanford University, Stanford, Calif. & Harvard University, Cambridge, Mass.).

5521

The literature on the acoustic attenuation of ear protective devices is reviewed. Typical attenuation values are given for some standard plugs, muffs, and helmets. The variability of the attenuation measurements on a single device is shown for (1) different measurement methods, (2) different laboratories using the same method, (3) different trials on a single person and (4) different persons. Some recommendations are included.

G. I. R 14

5525

This experiment is concerned with the effect of distribution of practice on motor learning--specifically, with the occurrence of reminiscence or warm-up decrement at different stages in learning. The Ss, 78 college students divided into three groups, practiced on a pursuit rotor for 25 one-min. trials a day for four days. For each group the intertrial interval was different (20 sec., 3 min. or 5 min.). Overnight gains and losses and within-session gains in performance are compared for the three groups.

T. G. R 11

5522

Harper, R.S. THE PERCEPTUAL MODIFICATION OF COLORED FIGURES. *Amer. J. Psychol.*, Jan. 1953, LXVI, 86-89. (Knox College, Galesburg, Ill.).

5528

Horwitz, M., Exline, R.V., Goldman, M. & Lee, F.J. MOTIVATIONAL EFFECTS OF ALTERNATIVE DECISION-MAKING PROCESSES IN GROUPS. Contract N60RI 07144, June 1953, 77pp. USN Group Psychology Branch, ONR, Washington, D.C. (Bureau of Educational Research, University of Illinois, Urbana, Ill.).

5522

To study the effect of past experience on the perception of color, five observers viewed three pairs of colored stimulus figures (one member of each pair was a meaningful figure with a characteristic color--apple, heart, lobster--the other was nonmeaningful) against a variable background (from red to yellow) and reported the point at which the figure could no longer be distinguished from the background. The data were given as degrees of red in background color required for indistinguishability of each class of objects and were analyzed for differences due to past experience.

T. R 3

5528

This experiment was designed to test hypotheses concerning rate of psychological oversatiation among group members as a function of characteristics of their groups. The group characteristics were those presumed to affect the difficulty of decision in setting goals for the task. The task itself was a simple assembly of a jigsaw puzzle, repeated as often as possible over a two-hour period. Each member of the group was required to set a goal (speed and accuracy) for each repetition independently of other members of his group. Satiation was measured by means of degree of negative valence exhibited on successive rating scales of interest in the task.

T. I. R 12

5523

Hemphill, J.K. A PROPOSED THEORY OF LEADERSHIP IN SMALL GROUPS. April 1954, 35pp. Ohio State University, Columbus, Ohio.

5523

A theory of leadership is outlined, limited in its range to an accounting for acts of leadership occurring within face-to-face groups, associations, or organizations. Attention is focussed upon acts identified as leadership acts and upon the behavior, attitudes, and expectations of the members of groups. Key theoretical concepts are defined and discussed and relationships between concepts are presented in outline form. A number of hypotheses are suggested which stem from the theory as formulated.

T. I.

5524

Hemphill, J.K. & Sechrest, L.B. A COMPARISON OF THREE CRITERIA OF AIRCREW EFFECTIVENESS IN COMBAT OVER KOREA. *J. appl. Psychol.*, Oct. 1952, 36(5), 323-327. (Ohio State University, Columbus, Ohio).

5524

A study of three criteria of the performance of 94 B-29 aircrews that flew combat missions over Korea during the period extending from March to September 1951 is reported. The three criteria are 1) ratings by superiors of the performance of crews as units, 2) sociometric nominations from crew members, and 3) objective records of combat bombing accuracy. The criteria are described briefly, and compared in terms of their reliability and interrelationship. The general question of dependability of rating data as criteria is discussed.

T. R 2

5529
Karlin, L. THE INFLUENCE OF EQUALITY JUDGMENTS ON THE CONSTANT ERROR. *J. exp. Psychol.*, Nov. 1951, 44(3), 300-301. (New York University, New York, N.Y.).

When stimuli of equal objective magnitude are compared, the CE determined with the use of an equality category is greater than the CE determined with the use of only 2 categories, providing that the former CE is determined from a proportional division of the equality judgments. This result is discussed in terms of an hypothetical tendency to avoid repeating a previous judgment. In general, the evidence in the present study is interpreted to mean that the 3-category situation provides a more valid estimate of the CE.

R 11

5530

Karlin, L. THE TIME-ERROR IN THE COMPARISON OF VISUAL SIZE. *Amer. J. Psychol.*, Oct. 1953, 66, 564-573. (New York University, New York, N.Y.).

This study was undertaken to determine the time-error (constant error resulting from the successive comparison of 2 stimuli) for visual size as a function of stimulus duration and interpolated interval. The stimulus (a black, surface circle, 92 mm. in diameter) was tachistoscopically presented on a clear ground for 1, 3, and 5 sec. with interpolated intervals of 1, 4, and 8 sec. to 9 Ss at 9 different sessions. In each session the method of successive comparison (same stimulus for standard and comparison) was used with stimulus duration and interpolated interval constant for that session. 3 categories of judgment were used: larger, equal, smaller. Individual time-errors were computed and mean errors analyzed in terms of the variables. The results of the present study suggest that the time-error for the successive comparison of circles becomes increasingly negative with increasing length of interpolated interval. It was pointed out that these functions are similar to those obtained in previous studies for stimuli varying in intensive magnitude. It was concluded that the function of the negatively directed time-error may be characteristic of judgments of magnitude in general. These results were further discussed in terms of possible relationships to Gestalt theory based on the phenomena of gamma movement. It was also found that the time-error tends to become less negative when stimulus duration is changed from 1 to 3 sec.; there may be a tendency for this trend to reverse when stimulus duration further increases from 3 to 5 sec.

R:14

5531

Kendricks, E.J., Strughold, H., Haber, H. & Geratlewohl, S.J. MEDICAL PROBLEMS OF SPACE FLIGHT. A SPECIAL REPORT. Aug. 1955, 21pp. *USAF School of Aviation Medicine*, Randolph Field, Tex.

This special report reprinted from the Winter 1954 issue of *Instructors Journal*, a publication of the Air Training Command, contains 4 articles setting forth some of the medical problems of space flight. Developments leading to the establishment of the Department of Space Medicine in the USAF School of Aviation Medicine are described, first followed by a presentation of problems of a living room in space, of the characteristics of the earth's atmosphere, and of the problems of weightlessness. (HEIAS)

5532

Knehr, C.A. & Fuller, Muri. SENSORY VS. AUTONOMOUS CONTROL OF SPAN OF APPREHENSION. *J. Psychol.*, 1954, 37, 65-73. (Payne Whitney Psychiatric Clinic, New York Hospital, New York, N.Y.).

A span of apprehension experiment using 39 subjects was designed to test the hypothesis that varying the size of the visual area over which stimulus dots appeared would alter the response to those stimuli. A second hypothesis assumed that the effect would be differential between control subjects and persons with schizophrenic or other psychopathological characteristics. The evidence provides no significant support for either hypothesis. On the positive side, we have found indications of persistent individual patterns of responses when the results were plotted as scattergrams. The patterns remained on retest from 2 to 15 weeks later in 10 subjects. The factors underlying these individual patterns are unknown to us. No significant relationships were observed between the individual response characteristics and available personality data.

R 7

5533

Knox, G.W. THE RELATION OF DYNAMIC FACTORS TO FLICKER AND FUSION. *Abstr. Doc. Dissertation*, 1941, (35), 67-74. (Ohio State University, Columbus, Ohio).

5533

The author presented a series of experiments designed to investigate the relation of central or dynamic factors to flicker and fusion. The experiments investigated the following aspects of critical flash frequency (C.F.F.): the effects of learning under different attitudes (induced by task instruction) on the C.F.F.; the effect of perceptual shape on C.F.F.; and the phenomenon of auditory-visual flicker induction. The results were discussed in terms of the relative role of the various factors investigated in the C.F.F. experience.

5534

Knox, G.W. INVESTIGATIONS OF FLICKER AND FUSION. I. THE EFFECT OF PRACTICE, UNDER THE INFLUENCE OF VARIOUS ATTITUDES, ON THE CFF. *J. gen. Psychol.*, 1945, 33, 121-129. (Department of Psychology, Ohio State University, Columbus, Ohio).

5534

To investigate the role of practice and attitude on the CFF, three groups of two Ss each made 200 CFF determinations over a period of ten days. Conditions were identical except for instructions: Group I was "set" for flicker, Group II for fusion, and Group III for change of experience. Half the determinations were made with an artificial pupil. Thresholds were plotted for each S as a function of practice and compared for the effects of the different attitudes induced by instructions.

G. R 3

5535
Knox, G.W. INVESTIGATIONS OF FLICKER AND FUSION: II. THE EFFECT OF THE STIMULUS PATTERN ON THE CFF. *J. gen. Psychol.*, 1945, 33, 131-137. (Ohio State University, Columbus, Ohio).

This study investigated the question of whether a series of figures, differing in their degree of stability (simplicity and symmetry), would have the same arrangement in regard to their CFF, but in reverse order. A series of 9 geometric figures having equal areas but differing in degree of stability were selected. CFF's were determined on 5 Ss, with and without an artificial pupil, for each of the 9 stimulus patterns. Both individual and average CFF readings of all Ss for all the patterns and conditions were analyzed. There was no consistent relationship of the results to perceptual stability. (HEIAS)

R 4

5536
Knox, G.W. INVESTIGATIONS OF FLICKER AND FUSION: III. THE EFFECT OF AUDITORY STIMULATION ON THE VISUAL CFF. *J. gen. Psychol.*, 1945, 33, 139-143. (Psychology Dept., Ohio State University, Columbus, Ohio).

A study was made of the effect of auditory stimulation on CFF. 5 Ss were used and a total of 800 CFF readings were taken; each S went through the same procedure (simultaneous visual and auditory stimuli) except that 2 were instructed to attend to the visual stimulus, 2 to attend the auditory stimulus, and 1 had no instructions. The visual CFF readings (half during increase and half during decrease of flash frequency) were taken during one of 4 auditory situations: silence, fusion, fine flicker, and coarse flicker. Under the above conditions no significant effects on the CFF were found for any of the 4 auditory situations. (HEIAS)

R 2.

5537

Knox, G.W. INVESTIGATIONS OF FLICKER AND FUSION: IV. THE EFFECT OF AUDITORY FLICKER ON THE PRONOUNCEDNESS OF VISUAL FLICKER. *J. gen. Psychol.*, 1945, 22, 145-154. (Psychology Dept., Ohio State University, Columbus, Ohio).

A study of the effect of auditory flicker on the pronouncedness of visual flicker was made. The experimental procedure involved a method of measuring the relative increased degree of visual flicker induced by various degrees of auditory flicker. 3 Ss were used, 1 with an auditory set, 1 with a visual set, and 1 with a neutral set. 5 min. of dark adaptation were given before each sitting, and an artificial pupil was used throughout. The auditory stimulus was varied in steps from 15 to 30 cps with the visual flash frequency to give the same degree of visual flicker as was previously present when a non-intermittent sound stimulus was present with either 16 or 24 cps. It was concluded that visual flicker already present does increase in pronouncedness in the presence of auditory flicker. The slower the auditory flash frequency, the more pronounced is both the auditory and visual flicker. When no intermittent auditory stimulus is present, the visual flicker rate tends to increase as the visual flash rate is increased, but when the auditory intermittent stimulation is present, then the visual flicker rate becomes almost independent of the visual flash rate, and tends to keep in step with the auditory flicker rate. Attitude or set may affect the degree of auditory-flicker inter-influence. (HEIAS)

R 11

5538

Knox, G.W. SOME EFFECTS OF AUDITORY STIMULI ON THE PERCEPTION OF VISUAL FLICKER. *Amer. J. Optom. & Arch. Amer. Acad. Optom.*, 1953, 30(10), 520-525. (School of Optometry, Ohio State University, Columbus, Ohio).

A report of 2 investigations on the measurement of auditory influences on visual flicker is presented. a) 5 Ss made a total of 800 CFF judgments taken during 4 auditory situations: auditory silence, auditory fusion, a fine auditory flicker, and a coarse auditory flicker. Half the readings were taken during increase of visual flash frequency and half during decrease. b) 3 Ss attempted to match visual flicker to auditory stimuli of 15, 18, 21, 24, 27, and 30 cps; 1 S was instructed to attend to the visual stimulus primarily, 1 to the auditory stimulus, and the third was given no instructions. Under the conditions of the first study no S showed any significant effects of auditory stimulation on the visual CFF with or without the use of an artificial pupil. Although the auditory stimulus did not induce a visual flicker not already in existence, it did increase the pronouncedness of the flicker if it was already present. In the second study it was possible to match visual and auditory experience of flicker; the influence of instructions was present in that the curve of greatest slope represented the data of the S who concentrated on the auditory stimulus, while the curve of the least slope was for the S who concentrated on the visual stimulus; the neutral S slope was intermediate. (HEIAS)

R 4

5539

Kappauf, W.E. & Payne, M.C. A SELECTED ANNOTATED BIBLIOGRAPHY ON PROCEDURES USES IN ACTIVITY ANALYSIS. Contract AF33(038) 25726, Proj. 507 011.0001, Res. Note Tech. 52 8, July 1952, 10pp. USAF Human Resources Research Center, Lackland AFB, San Antonio, Tex.

The annotated bibliography presented here covers a selected list of references (22) in which various adaptations of the general methods used in making activity analyses are described. These general methods are listed as follows: a) Continuous behavior observations; b) time-sampling observation; c) use of check-list or behavior inventory; d) questioning people who should know about the job. Two research objectives also serve as a further classification: analyzing the nature of the job and discovering the most important or critical parts of the job. (HEIAS)

R 22

5540

Keller, F.S. & Estes, Katherine W. DISTRIBUTION OF PRACTICE IN CODE LEARNING. (FOUR HOURS MASSED VERSUS FOUR HOURS SPACED). Contract OENSR 830, Proj. SC 88, OSRD Rep. 4330, Rep. 2, Nov. 1944, 4pp. *The Psychological Corporation*, New York, N.Y.

5540

A study was conducted to determine the relative effectiveness of two practice schedules in the teaching of International Morse Code to beginners. An experimental group of 74 enlisted men practiced reception of code during hours one through four of the school day for a ten-week period, whereas a second group of 91 men, matched for intelligence and code aptitude with the first group, practiced four hours distributed throughout the school day. Four measures of proficiency were employed in comparing the massed and spaced practice groups.

T.

5541

Keller, F.S. & Estes, Katherine W. THE RELATIVE EFFECTIVENESS OF FOUR AND SEVEN HOURS OF DAILY CODE PRACTICE. Contract OENSR 830, Proj. SC 88, OSRD Rep. 4750, Rep. 3, Feb. 1945, 10pp. *The Psychological Corporation*, New York, N.Y.

5541

In an investigation of the relation of distribution of practice to the learning of International Morse Code, two groups of enlisted men, matched for general intelligence and code aptitude, were taught to receive Morse Code. One group of 165 men practiced for four hours a day for eight weeks; the other group, which consisted of 355 men, practiced for seven hours a day for five weeks. Mean number of hours of training necessary to pass code speeds of seven words per minute, as well as higher speeds, were compared for the two groups after corrections were made for differences in difficulty of material and in preliminary instruction.

T. G. R 2

5542

Keller, F.S., Estes, Katherine W. & Murphy, P.G. A COMPARISON OF TRAINING METHODS AT TWO LEVELS OF CODE LEARNING. Contract OENSR 830, Proj. SC 88, OSRD Rep. 4329, Rep. 1, Nov. 1944, 16pp. *The Psychological Corporation*, New York, N.Y.

5542

To compare the effectiveness of two methods for teaching beginners to receive International Morse Code, a group of 262 enlisted men was trained with the "Code-Voice" method, whereby all signals are learned simultaneously (see 5543). A group of 87 men was trained with the Z-tape method, whereby different portions of the alphabet are learned successively. Number of hours required to reach a criterion of five words per minute and percentage of Ss reaching a given criterion on the seventh day in each group were compared. The effectiveness of a "call-back" technique in teaching code speeds of seven words per minute was also assessed.

T. R 1

5543

Keller, F.S. STUDIES IN INTERNATIONAL MORSE CODE. I. A NEW METHOD OF TEACHING CODE RECEPTION. *J. Appl. Psychol.*, Oct. 1943, 27(3), 407-415. (Columbia University, New York, N.Y.).

5543

This paper described a method for teaching the reception of International Morse Code that employs immediate feedback for responses. About 150 male college students engaged in daily practice in listening to a signal—one of 36 letters and digits—, recording it in an appropriate cell on a "box-score" answer sheet, and then hearing the phonetic equivalent of the signal. The results of the study included a frequency distribution of number of students attaining a given criterion of mastery in given numbers of hours.

G. I. R 1

3544

Keller, F.S. STIMULUS DISCRIMINATION AND MORSE CODE LEARNING. *Trans. N.Y. Acad. Sci.*, 1953, 15 (Series II), 195-203. (Columbia University, New York, N.Y.).

3545

This paper was in part an historical survey of studies on the learning of Morse Code. Some of the literature on the estimation of visual and auditory span—i.e., on the "span of attention"—was also reviewed. Factors that affect the accuracy of code reception—such as number and rate of presentation of stimuli, the sense modality involved, or the method of training—were discussed with reference to concepts of stimulus generalization and codes of discriminative judgment.

T. I. K 20

3546

Landis, C. & Humei, Violet. THE EFFECT OF CERTAIN PHYSIOLOGICAL DETERMINANTS ON THE FLICKER-FUSION THRESHOLD. *J. appl. Physiol.*, March 1954, 6 (9), 566-572. (N.Y. State Psychiatric Institute, New York, N.Y.).

Flicker-fusion thresholds (CFF) in groups of 10 determinations were obtained from 10 normal observers at hourly intervals during 10 working days, together with oral body temperature. Basal metabolic rates were obtained on 9 of the 10 observers and pulse rates on 2 of these observers. Analysis of this material demonstrated that there is a fairly constant diurnal CFF rhythm, the pattern of which is specific for each individual. In 3 out of 10 instances this CFF rhythm was correlated positively with oral temperature; in 5 out of 10 instances it was negatively correlated; and in 2 instances no relationship was found. Various features of the metabolic rate were more highly correlated with the variability of the CFF measures than with the mean of such measures. The relationship between pulse rate and CFF was not clear.

R 9

3546

Landis, C. CROZIER AND WOLF ON FLICKER-FUSION, 1933-1944. *J. Psychol.*, 1954, 37, 3-17. (Psychiatric Institute, Columbia University, New York, N.Y.).

A critical survey of the publications of Crozier and Wolf dealing directly or indirectly with the problem of flicker-fusion is presented. The prime reason for this survey was the relative inaccessibility of their work to many investigators working in the field of vision. The following topics are considered: theoretical assumptions; notation; nature of flicker-fusion; methods and materials; determinants; the F-log I contour; the slope of F-log I contours; Tau prime or the inflection point; and F max; fovea vs periphery; rods vs cones; duplexity theory; area, size, location; intensity; brightness; frequency; time-energy relation; Talbot's Law; light-dark ratio; temperature; genetics; binocular vs monocular effects; division of field; striation; Pecten effect; hue; and sensory effects. Critical comments are placed at the end of the paper. (HEIAS)

K 28

3547

Krendel, E.S. NOTES FROM THE FRANKLIN INSTITUTE LABORATORIES FOR RESEARCH AND DEVELOPMENT. *J. Franklin Inst.*, March 1952, 253 (2), 251-253.

A simplified airplane simulator was built which consisted of a bucket seat, joy stick, and an oscilloscope mounted at eye-level before the pilot. This device was used in preliminary experiments to indicate whether the method of spectral density analysis is applicable to the study of human tracking responses in the larger and more complicated dynamic airplane simulator. The visual stimulus, or input, is presented as a series of step deflections in the horizontal dimension on the oscilloscope screen. The program of deflections of the pip consists of a time series of pulses whose average number of crossings is determined by sampling a Poisson distribution. Frequencies of from zero to about 3 cps constitute this statistical input. The pilot's task is to manipulate the controls to keep the pip on a central vertical reference line; the error signal is the instantaneous position of the pip, and diminishes as the pilot restores the pip to the vertical reference line. Spectral density comparisons for 1 well-trained S are presented graphically. (HEIAS)

3549

Lorr, M. & Fields, V. A FACTORIAL STUDY OF BODY TYPES. *J. clin. Psychol.*, April 1954, 10 (2), 182-185. (US Veterans Administration, Washington, D.C. & USN Bureau of Naval Personnel, Washington, D.C.).

This study tested the hypothesis that there are 3 differentiable independent groups into which the adult human male body type can be classified. The populations consisted of photographs of hospitalized male psychotic patients; 15 photographs were chosen, 5 for each of the 3 somatotypes of Sheldon—the extreme endomorph, ectomorph, and mesomorph. Using 3 aspects of the S's photograph, linear morphological measurements were made; height and weight were taken from information recorded on the photographs, and ratings were made of fatness and muscularity by the 2 authors on a 6-point scale and averaged. The 36 measurements and ratios were converted to standard scores, intercorrelations computed, and the correlational matrix factored by the centroid method. 2 factors were extracted: a) Person factor A was bipolar and defined at either end by the endomorphs and ectomorphs and relates to fatness primarily; b) Factor B was defined by the mesomorphs as a group and relates to muscularity primarily. The existence of 3 distinguishable groups and 2 body factors has been demonstrated; the 3 groups exhibit morphological trait patterns that closely resemble the patterns descriptive of Sheldon's components. The findings also suggest that the 76 somatotypes identified by Sheldon can more simply and economically be defined in terms of measurements on only 2 type factors. (HEIAS)

R 7

5550

Recherer, S. & Scheritz, Anita. A HOMEOSTATIC EFFECT OF MOOD ON ASSOCIATIVE ABSTRACTNESS AND REACTION TIME. *J. Personality*, Sept. 1952, 21(1), 59-67. (Kings County Hospital & State University of New York, College of Medicine, Syracuse, N.Y. & Manhattan State Hospital, New York, N.Y.).

RT and the level of abstraction characterizing responses on Word-Association tests are customarily taken as indicators of affectively charged complexes and as expressively symptomatic of characteristic personality attributes. The hypothesis tested here holds that, in line with the concept of homeostatic defense these 2 measures fluctuate also as a function of the correspondence or noncorrespondence of the affective tone of the stimulus word with the S's prevailing mood. 31 adult Ss were tested with the Depression Scale of the MMPI (criterion for prevailing mood) and with an association word list of 30 positively and 30 negatively toned adjectives. Correlations between MMPI depression and association-test depression were a) for contrast responses .46; b) for adjective-noun responses .33; and c) for RT .45. It was concluded that the prevailing mood of the respondent does operate homeostatically, exercising a selective influence on associative abstraction and RT, depending on the mood implication of the stimulus. Abstract associations (contrast responses) are facilitated when the stimulus word threatens the S's prevailing mood, while concrete associations (adjective-noun responses) are facilitated when the stimulus word corroborates the mood. RT is decreased when the word threatens prevailing mood, and lengthened when it corroborates mood. (HEIAS) R 11

5551

Feyer, D.R. THE STABILITY OF HUMAN GUSTATORY SENSITIVITY DURING CHANGES IN TIME OF FOOD DEPRIVATION. *J. comp. physiol. Psychol.*, Aug. 1952, 45, 373-376. (Ohio State University, Columbus, Ohio).

In this experiment 9 human Ss abstained from all foodstuffs for a period of 34 hr., during which time successive determinations of sweet, salt, and bitter thresholds were made at 3-hr. intervals. The hypothesis under examination was that changes in the threshold concentration of glucose would accompany the reduction of readily available energy compounds. Salt and bitter thresholds were studied to provide controls for the effects of extraneous variables. No systematic changes were found for any of the 3 modalities. The data do not support the suggestion that one concomitant of need is a sensitization of receptors to need-reducing substances in the environment. R 4

5552

Miller, H.G. A STUDY OF THE INTERFERENCE EFFECTS OF HIGH INTENSITY SOUND ON THE RETENTION OF VISUALLY AND AUDITORIALLY LEARNED MATERIAL. AN ABSTRACT OF A DISSERTATION. University Microfilms, 1952, Publ. 3307, 453-466. (Pennsylvania State College, State College, Penn.).

5552

This is an abstract of a study investigating the effects of a high intensity noise similar to that of a jet engine upon retention and recall of verbal material learned by auditory and visual el

5553

Morin, R.E. & Gagne, R.M. PEDESTAL SIGHT MANIPULATION TEST PERFORMANCE AS INFLUENCED BY VARIATIONS IN TYPE AND AMOUNT OF PSYCHOLOGICAL FEEDBACK. Proj. 509 020 0007, Res. Note FAMS 51 7, Oct. 1951, 13pp. USAF Human Resource Research Center, Lackland AFB, Tex.

5553

This study dealt with variations in the kind and amount of supplementary feedback supplied to a ranging response as they affect subsequent performance without on-target information. Performance on the Pedestal Sight Manipulation Test was measured under four experimental conditions: with supplementary feedback (visual or auditory) supplied on a given percentage of trials (100 or 50 percent). Five groups of 20 basic airmen each practiced under a given condition for 11 trials. Adjusted scores for time on target on a final trial with no supplementary feedback were compared with scores obtained by a control group that had had no previous extra feedback. T. G. R 7

5555

Morris, A., Katz, M.S., & Bowen, Jane D. REFINEMENT OF CHECKERBOARD TARGETS FOR MEASUREMENT OF VISUAL ACUITY LIMENS. *J. opt. Soc. Amer.*, 1955, 45, 834-838. (U.S. Naval Medical Research Laboratory, New London, Conn.)

5555

To validate refined checkerboard targets to be used in precise measurement of visual acuity, three observers were used to evaluate each of two modifications of the target. Chi-square tests were used to establish the acceptability of each target.

5556
Murphree, O.D. MAXIMUM RATES OF FORM PERCEPTION AND THE ALPHA RHYTHM: AN INVESTIGATION AND TEST OF CURRENT NERVE NET THEORY. *J. exp. Psychol.*, July 1954, 48(1), 57-61. (US Veterans Administration Hospital, North Little Rock, Ark.).

Cyberneticists and mathematical biophysicists have hypothesized synchronous scanning neurologic processes, particularly the alpha rhythm, which mediate the visual perception of form or shape. From these hypotheses certain deductions (for the most part concerned with a quantum time factor as implied in any scanning process) were made and experimentally tested. The results show: a) There is a significant relation between the alpha rhythm and the temporal aspect of rapid successive spatial perceptions. This relation may be considered as curvilinear, or possibly, linear to the difference between alpha and some other value which in central tendency nearly coincides with alpha. b) Strong support is indicated for the view that maximum rates of form perception, apparent motion, figure-ground reversals (at appropriate rates), and fusion of separate spatial elements into simultaneously perceived composite forms or shapes are mediated by a nerve net of which the alpha rhythm is an integral part. R 7

5557
Rubin, L.S. THE EFFECT OF ATROPINE ON THE DARK ADAPTATION THRESHOLD. CWLR 2019, Proj. 4-06-02-019-01, April 1956, 15pp. Chemical Warfare Laboratories, Army Chemical Center, Md.

5557
To determine the effect of a small (two milligrams) injection of atropine sulfate on dark adaptation and to determine the effect of practice on threshold measurements, twelve naive subjects were tested. The course of dark adaptation was determined (eight subjects) in a preliminary session, one practice trial per day for three days was given and final measurements were made twenty minutes after injection with a saline or atropine sulfate solution. Absolute threshold determinations (four subjects) were obtained over a twenty-minute period beginning 58 minutes after injection and after practice had been given on three previous days. The data were studied by analysis of variance for effects of practice and drug. Recommendations are included.
T. G. R 11

5558
Kinney, Jo Ann S. SENSITIVITY OF THE EYE TO SPECTRAL RADIATION AT SCOTOPIC AND MESOPIC INTENSITY LEVELS. J. opt. Soc. Amer., July 1955, 45(7), 507-514. (USN Medical Research Lab., USN Submarine Base, New London, Conn.).

Spectral sensitivity curves were established for 3 intensity levels above scotopic threshold with a 2-degree field placed 10 degrees from fixation against a dark surround. These curves were compared with the minimum scotopic luminosity curve determined for the same retinal position for each observer. The results showed that a) there is a range of intensities over which relative spectral sensitivity does not change appreciably from the scotopic luminosity function, b) there are irregularities in these mesopic curves which may be attributed to cone activity, and c) the first change in spectral sensitivity with increased intensity is found in the long-wavelength half of the spectrum.
R 18

5559
Gerathwohl, S.J. BRIGHTNESS CONTRAST AND TARGET IDENTIFICATION THRESHOLDS ON THE RADAR PPI. J. Aviat. Med., Oct. 1955, 26, 399-408.

An exhaustive study of brightness contrasts at the various target identification thresholds and appearance levels was completed just recently, which covers the practical range of sweep brightness during radar PPI interpretation. The data have not been evaluated statistically, but they may prove to be a gold mine for the statistician as well as for the engineer. Brightness and contrast differences seem to exist between the 2 types of sweep rotation, 2 degrees of basic sweep brightness, 5 target identification thresholds or video gain settings. This conclusion is made after an inspection of the graphically plotted raw data. These differences, and the effect of the many variables controlled in this experiment, can be expressed quantitatively after a thorough statistical analysis of the results. The major variables in radar scope interpretation, namely, brightness contrast and the uniformity of the viewing conditions, were discussed. Some of the functions relating the visual to the physical variables of the radar display will be better understood, and more improvements in equipment and working conditions furnished when we learn more about the action and interaction of the perceptual factors involved in the interpretation of radar PPI presentation.

5561
Hanawalt, N.G. THE METHOD OF COMPARISON APPLIED TO THE PROBLEM OF MEMORY CHANGE. J. exp. Psychol., Jan. 1952, 43(1), 37-42. (New Jersey College for Women, New Brunswick, N.J.).

5561
In an experimental test of progressive changes in the memory trace of visual form, 447 Ss (female college students) were presented with six simple visual forms and were required after one of three intervals to view the form again and to report whether each was greater or less than the "original" with respect to some specified characteristic. Results were presented as percentage of "greater" judgments for comparison after each interval and were compared with those obtained by other investigators who used a method of successive comparison.
G. I. R 12

5562
Plumb, R.E. ABOVE ELBOW PROSTHESIS WITH CHEST SADDLE PECTORAL CINEPLASTY AND CONVENTIONAL PROSTHESIS. TR 5304, Feb. 1958, 7pp. USA Prosthetic Research Lab., Walter Reed Army Medical Center, Washington, D.C.

5562
This note describes and gives construction details for a special shoulder disarticulation arm. The prosthesis consists of an aluminum forearm and upper arm, chest saddle made of celastic, lined with horsehide and covered with leather with a shoulder joint attachment. This type prosthesis is applicable to above-elbow amputations and provides a normal range of movement. The first prosthesis made was worn continuously for a period of seven years.
I.

5563
Davidson, A.L., Devoe, D.B., Spragg, S.D.S. & Green, R.F. ACCURACY OF KNOB SETTINGS AS A FUNCTION OF: I. THE PLANE IN WHICH THE KNOB TURNS; AND II. THE DIAMETER OF THE KNOB. Contract N600R 241, T.O. 6, Mech Engrg. Rep. SCU 241 6 8, Jan. 1953, 10pp. University of Rochester, Rochester, N.Y.

5563
To determine how the plane in which the control knob rotates and the diameter of the knob affect accuracy of knob settings, an apparatus was constructed permitting the variation of plane of rotation, knob size, and size of angle. The limits of each angle were indicated by a pair of mechanical stops. The subject sampled the angle by turning first one way, next the other, and then made his final setting (bisection or duplication). In the first experiment, tests were made in three planes--front, side, and top. In the second, eight knob diameters, ranging from 0.5 to 5.0 inches, were used. In both, the angular extents tested were 20, 40, 60, and 160 degrees. Design recommendations are included.
G. I.

5566
Deese, J. SOME PROBLEMS IN THE THEORY OF VIGILANCE. Psychol. Rev., 1955, 62(5), 359-368. (Johns Hopkins University, Baltimore, Md.).

5566
This paper is concerned with specifications for a concept of vigilance. The basic assumption is that the maintenance of a given level of vigilance in an observer depends to some extent upon stimulus events extrinsic to the observer. Alternative hypotheses--reinforcement and expectancy--concerning the exact nature of the stimulus events, sufficient for the control of vigilance, are discussed. Experimental evidence is drawn from studies in which observers search for small signals, at near-threshold value, the exact location and time of occurrence being unpredictable. A brief consideration of the need for an inhibitory construct is presented.
G. R 10

5569
Fruchter, B. MEASUREMENT OF SPATIAL ABILITIES. Educ. psychol. Measmt., 1954, 14, 387-395. (University of Texas)

5569
To compare the magnitudes of errors of aim and errors of extent in simple discrete movements carried out at high rate and in different directions relative to the position of the body, 48 subjects were required to draw four lines in succession from a starting point to a target as fast as possible. Four directions of movement were compared. Errors of extent (under- and over-shooting) and errors of aim (deviations to right or left) were recorded as was duration of movement. It is suggested that the results be considered as important for future design of displays and controls for certain specific equipments.
T. I. R 20

5570

Gerathwohl, S.J. INVESTIGATION OF PERCEPTUAL FACTORS INVOLVED IN THE INTERPRETATION OF PPI-SCOPE PRESENTATIONS. Proj. 21 24 009, Rep. 1, Sept. 1950, 17pp. USAF School of Aviation Medicine, Randolph Field, Tex.

This report is a survey of literature dealing with a) tests used for the selection of radar operators, b) psychological experiments in radar, and c) perceptual problems of PPI-scope interpretation. The validity of selection tests for radar observers after World War II showed no well-defined correlation between the individual test scores and the results of radar training. The investigations of the visibility on radar scopes are concerned mainly with the physical and psychophysiological sides of the problem; however, there has been no study of the factors underlying the perceptual processes on the basis of Gestalt psychology. Under actual conditions, however, the radar observer must interpret scope presentations which are due to brightness differences. Therefore, the investigations of the figure-ground relationships, the phenomenon of figure development, the significance of contours, the perception of contrasts, and signal localization on the scope constitute basic problems in target identification. The contribution of Gestalt psychology to the problem of target identification is discussed. The experimental approach to the use of the Supersonic Trainer is outlined.

R 41

5571

Gerathwohl, S.J. CONSPICUITY OF STEADY AND FLASHING LIGHT SIGNALS: VARIATION OF CONTRAST. J. opt. soc. Amer., July 1953; 43(7), 567-571. (Ophthalmology, USAF School of Aviation Medicine, Randolph Field, Tex.)

In the past, 2 measures have been used to express the comparative effectiveness of steady and flashing light signals. These are comparative intensities a) required for threshold; and b) required for equal apparent brightness above threshold. The 2 measures agree in showing that the effectiveness of flashing signals is less than that of steady signals, when the intensity of the light phases of the flashing signal equals the intensity of the steady signal. The present study compares steady and flashing light signals with respect to conspicuity, defined as the speed of response to a signal above threshold. For large signal contrasts the conspicuity of steady and flashing signals is approximately equal. For small contrasts the conspicuity of flashing signals is considerably greater. These results suggest that flashing rather than steady signals be used for warning purposes.

R 7

5572

Gerathwohl, S.J. EYE MOVEMENTS DURING RADAR OPERATIONS. J. aviat. Med., Dec. 1952, 23; 597-607. (USAF School of Aviation Medicine, Randolph Field, Tex.)

The eye movements involved in radar operation are more complex than under normal observational conditions. Using an ophthalmograph in combination with radar equipment, eye movements were recorded during simple tasks of orientation, navigation, target identification, and bombing missions. Special attention was given to the duration and number of interfixation movements and fixation phases, direction and kinematic pattern of the movements, as well as to their stability and synchronization. The following results were obtained: a) During radar observation the eyes do not "ride the sweep" but follow the sweep in jerks, the number of which depends mainly upon the operational task. This number is highest during orientation and decreases with navigation and target identification. b) The duration of the movement depends upon their extension. During orientation, navigation, and target identification the interfixation time amounted to about 30-35 ms; during bombing to about 20 ms. c) The duration of fixation depends upon what the observer is after. It increases from about 430 ms during orientation, to about 475 ms during navigation, to about 830 ms during target identification, finally, to about 1,270 and 1,815 ms for the 2 types of sweep movements during bombing. d) A characteristic kinematic pattern was found with alternating phases of circular and linear eye movements, the periodicity of which is imposed by the continuously rotating sweep. No circular eye movements were recorded during bombing. e) 2 characteristic types of eye movements were recorded: search movements during orientation and also during navigation, and probing movements during target identification and bombing. f) Synchronization of the movements of the 2 eyes and stability of fixation declined with increasing angle and frequency of the eye movements.

R 14

5573

Gerathwohl, S.J. PHYSICS AND PSYCHOPHYSICS OF WEIGHTLESSNESS-VISUAL PERCEPTION. J. aviat. Med., Aug. 1952, 23; 373-395. (USAF School of Aviation Medicine, Randolph Field, Tex.)

The rationale of this study was an investigation of the problem: whether and how visual perception will be affected during the transition of man in the sub-gravity and zero-gravity states. An extrapolation from the literature on the relationship between proprioceptive and visual perception, an extrapolation to the conditions of weightlessness was made on a purely theoretical basis. A consideration of the pertinent anatomical and physiological characteristics of the eye led to the conclusion that the effect of weightlessness would not be important here. However, there is a high probability that visual perception will be affected by psychophysiological stimulations and that visual illusions will occur. The types of illusions are analyzed and their importance for the position and direction orientation in the state of weightlessness are discussed. (HEIAS)

R 67

5574

Gerathwohl, S.J. CONSPICUITY OF FLASHING AND STEADY LIGHT SIGNALS. I. VARIATION OF CONTRAST. Special Rep., April 1951, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A question of some importance in the design of visual warning devices concerns the type of light stimuli used. In order to investigate the conspicuity of steady light stimuli and intermittent light stimuli, which are frequently employed for this purpose, a series of 4 experiments was conducted with constant and flashing light signals at contrast ratios of 100, 74, 52, and 33 percent. In these experiments, the response time to the 2 types of light was considered a measure of their conspicuity. The results obtained demonstrate a) that the conspicuity of the signals is a function of contrast, b) that when a multiple complex reaction test must be performed by the observer--flashing light signals are more conspicuous than steady light signals at medium levels of brightness contrast. The applicability of these findings to the construction of warning devices and in radar research is briefly discussed.

R 3

5575

Gerathwohl, S.J. STUDY OF ACCLIMATIZATION DURING A TWO-WEEK EXPOSURE TO MODERATE ALTITUDE. *J. Aviat. Med.*, April 1954, 25, 156-163. (USAF School of Aviation Medicine, Randolph Field, Tex.).

Complex reaction experiments were made at ground level (761 ft.) and at moderate altitude (10,152 ft.) in order to study the effects of mild hypoxia on psychomotor performance, and to find out whether or not acclimatization occurs during a period of 13 days. From our results the following conclusions can be made: a) Although the statistical analysis of the group scores obtained at ground level and at altitude did not differentiate between the periods at an accepted level of confidence, the group mean scores of correct responses obtained at the first altitude tests are consistently lower than the mean scores of the last pre-altitude tests. This and another statistical analysis of these data (not reported in this paper) indicate a real decline of performance interpreted as a mild hypoxia effect. b) No correlations seem to exist between the total number of responses and altitude. c) The statistical analysis yielded large variations between individuals. This and an inspection of the individual curves revealed characteristic differences in sensitivity to hypoxia. After all, 2 of the 9 SS showed a pronounced loss in performance during the whole altitude period. d) On the other hand, 7 out of the 9 test SS became acclimatized with a period of 13 days. From this it seems desirable to acclimatize flying personnel to the level of cabin pressure used in high-altitude flying, and to eliminate those persons who do not show the altitude adaptation needed for flying safety.

R 9

5576

Pepinsky, H.B., Pepinsky, Pauline N., & Pavlik, W.B. MOTIVATIONAL FACTORS IN INDIVIDUAL AND GROUP PRODUCTIVITY: III. THE EFFECTS OF TASK COMPLEXITY AND TIME PRESSURE UPON TEAM PRODUCTIVITY. Contract N6ori-17, T.O. III NR 171 123, 1956, 91pp. OHR, Ohio State University Research Foundation.

5578

Fiedler, F.E. SOCIAL PERCEPTION AND GROUP EFFECTIVENESS. Contract N6ori 07135, Proj. NR 170 106, Feb. 1956, 10pp. University of Illinois, Urbana, Ill.

5576

To test the effects upon team productivity of complexity of assigned tasks and conditions of time pressure, 24 three-man teams performed two practical tasks, one relatively simple and one more complex. Each task involved the successive assembly and disassembly of an easy wooden replica of a non-representational construction model as possible within a 20-minute work session. Time pressure was manipulated, by varying the frequency of interrupted oral signals giving the amount of time remaining, to establish low, medium and high levels. Productivity data (weighted total of number of correct task operations performed) were analyzed for effects of task complexity, time pressure, order of work session and their interactions. Some implications for research and practical situations are noted. T.I. R 5

5578

This is the fourth annual progress report of a research study concerned with the identification of psychological variables which differentiate between effective and ineffective team work and the development of principles and methods for assembling teams. The progress in each of the following studies of group effectiveness as related to social perception is reported briefly: open hearth steel manufacture which requires the coordinated efforts of several interdependent crews, instructor and student groups engaged in Navy formation flight training, and the board of directors and management in a sales cooperative organization. Two methodological studies are noted as being in progress. A list of reports and publications is appended.

T. R 20

5579

Pepinsky, H.B., Pepinsky, Pauline N., & Pavlik, W.B. MOTIVATIONAL FACTORS IN INDIVIDUAL AND GROUP PRODUCTIVITY: I. SUCCESSFUL TASK ACCOMPLISHMENT AS RELATED TO TASK RELEVANT PERSONAL BELIEFS. Contract N6ori-17, T.O. III NR 171 123, 1956, 117pp. OHR, Ohio State University Research Foundation.

5579

To determine whether the productivity of individual group members is related to their characteristic task-relevant personal beliefs, 14 four-man groups performed two tasks--one requiring organizational leadership for successful completion (money raising), the other scholastic achievement (lecture-study-examination). Subjects were selected on basis of responses to a test designed to yield self-estimates of these two dimensions. Performance scores (Task 1--choices received on sociometric "guess who" type test and ratings of two trained observers; Task 2--number of correct test answers, number of time spent in study and ratio of test answers to study time) were analyzed in relation to dimensions used for selection.

T. R 80

5577

Gerathwohl, S.J. COMPARATIVE STUDIES ON ANIMALS AND HUMAN SUBJECTS IN THE GRAVITY-FREE STATE. *J. Aviat. Med.*, Aug. 1954, 25, 412-419. (USAF School of Aviation Medicine, Randolph Field, Tex.).

A survey of the work done on the investigation of weightlessness, and the progress made during 5 years of research in this field of space medicine is made in this paper. The discussion is limited to the psychophysiological aspects of the problem. These concern mainly the question whether the powers of orientation and sensorimotor coordination are disturbed under subgravitational conditions. Animal studies have shown, by and large, that there are movements and symptoms of disorientation at first but animals learn to compensate by cues of visual orientation. Human studies made during parabolic flight indicate that man also shows symptoms of disorientation and loss of motor coordination during the transition into weightlessness and during its early stage. They perform better when more tactile and visual cues are provided and they become better oriented with successive tests. These findings are taken as indications that it may be possible to adapt to the gravity-free state. (HEIAS)

R 21

5580
Gerathewohl, S.J. & Cibis, P.A. THE SPACE BETWEEN DISTINCT CONTOURS. *Amer. J. Psychol.*, July 1953, 66(3), 436-448. (USAF School of Aviation Medicine, Randolph Field, Tex.)

In a series of experiments the appearance of homogeneous and heterogeneous surfaces was investigated as to their apparent slant and curvature. For this purpose a white H-shaped target was used as test figure. The target was viewed with different retinal illumination in the 2 eyes and when parts of it were shaded. 4 professional draftsmen served as Ss; their task was to reproduce the appearance of the size and position of the target (front view and projection as seen from above) while target was exposed. No time limit was imposed. The results were qualitative in nature representing an analysis of the drawings of the 2-dimensional target, all of which were represented as appearing partly or totally deviated from their actual plane. In all tests the vertical bars were seen as plane; but the horizontal bars as curved in most cases. In the case of shadows producing sharp boundaries, there was an apparent breaking and dislocalization of the illuminated parts of the target, while blurred or faint boundaries elicited an apparent curvature of the surface. The results are interpreted as suggesting that the perception of visual space depends (among other things) upon a) location, size and shape of surface contours or their alteration through differences between the retinal illumination of the 2 eyes and b) the total or partial brightness (luminance) of the object determining apparent shape, slant and curvature of a surface. (HEIAS)
R 10

5581
Gerathewohl, S.J. & Haber, H. STUDY ON THE EFFICIENCY OF AIRCRAFT INSIGNIA AND AIRCRAFT MARKINGS. Aug. 1950, 38pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

5581
To select aircraft insignia and markings which meet the requirements of aviation, a series of experiments were reported concerning factors of recognizability of a visual symbol: 1) conspicuity of colors; 2) color combinations as affected by illumination and as seen through a cloudy medium (haze, fog, snow, etc.); 3) form as affected by size of retinal image, observation time, movement, sharpness and contrast of the individual elements. The data were analyzed in a manner which yielded a ranking order of recognizability for 20 symbols. Proposals for practical application of results were made and discussed.
T. I. R 14

5582
Levi, A., Torrance, E.P. & Pletts, G.O. SOCIOMETRIC STUDIES OF COMBAT AIR CREWS IN SURVIVAL TRAINING. HFORL Memo. TN 54 5, Nov. 1953, 34pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C.

5582
To investigate the relationship of combat crew performance to certain aspects of group structure and to gain a better understanding of the contribution of survival training to changes in group structure, sociometric questionnaires were administered to 70 B-29 crews scheduled for assignment to combat duty. Questionnaires were administered before and after survival training. The questionnaires were based on confidence of aircrew members in themselves, in their leaders, and in other members of the crew. After these crews had flown combat missions over Korea, follow-up data were obtained on 36 of them.
T. I. R 1

5583
Gerathewohl, S.J., Haber, H., Byrnes, V.A., Ripple, P.H., et al. A STUDY OF RUNWAY MARKINGS Proj. 21 24-001, Rep. 4, Jan. 1951, 22pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Based on the findings of the reports on runway markings the usefulness of the chevron as a basic marking and the effectiveness of runway marking patterns were tested under field conditions. Using tar paper frames individual chevrons varying in size and apex angles, groups of chevrons, and longitudinal lines were laid out. Furthermore, 2 systems of marking patterns were painted on both the Zuehl and the Mertindale auxiliary fields. The various patterns were tested with a total number of 6 flight tests and a larger number of passes and simulated landings with various types of aircraft. About 60 observers took part in the field tests. As a result of these tests a runway marking pattern was devised. This pattern, described in detail in this report, is believed to constitute the best compromise between all factors involved.

5584
Gerathewohl, S.J. & Taylor, W.F. EFFECT OF INTERMITTENT LIGHT ON THE READABILITY OF PRINTED MATTER UNDER CONDITIONS OF DECREASING CONTRAST. *J. exp. Psychol.*, 1953, 46(4), 278-282. (USAF School of Aviation Medicine, Randolph Field, Tex.)

The utilization of the Bartley effect for the improvement of readability under conditions of low contrast was investigated. A reading chart with gradually decreasing brightness contrast was read under steady and flicker conditions with 4 different light-dark ratios and 2 flicker frequencies (9 and 15 cps). The number of lines read was accepted as index of readability and, in a more general way, as index of visibility under low $\Delta L/L$ conditions. It was found that the effect of flicker was to lower the number of lines read especially at low illumination levels. For this reason it seems doubtful that flicker can be used for the improvement of visibility under conditions of low contrast.
R 7

5585
Gerathewohl, S.J. & Strughold, H. MOTORIC RESPONSES OF THE EYES WHEN EXPOSED TO LIGHT FLASHES OF HIGH INTENSITIES AND SHORT DURATION. *J. aviat. Med.*, June 1953, 24, 200-207. (USAF School of Aviation Medicine, Randolph Field, Tex.)

A series of experiments were conducted to obtain information about the complete motoric response pattern of the eyes when exposed to light flashes of high intensity and short duration. Responses of the eye were recorded photographically. 20 Ss were studied under various conditions. In the case of an unexpected flash, a blinking reflex occurred in most cases with a latent period from 60 to 80 msec, thus occurring too late to be of any protective value to the eye. The blinking period lasted about 0.3 sec. Only slight eye movements were sometimes observed and seemed to be reactions associated with the lid reflex. In the case of voluntary eye movements (S expected flash and was instructed to move eyes away; S did not know when light would occur and was instructed to move eyes to it) the latent periods are about 3 times longer than those of the blink reflex. Such movements cannot be used as protection against light flashes.
R 10

5591
Galer, E.L. SELECTED PERSONALITY VARIABLES AND THE LEARNING PROCESS. *Psychol. Monographs, Gen. & Applied*, 1952, 66, (17, Whole 349), 1-28. (University of Illinois, Urbana, Ill.).

5599
Levi, M. FIFTEEN SURVIVED: A CASE STUDY OF TWENTY-FIVE SURVIVAL INSTRUCTOR TRAINEES. *CRL:LM 55 212*, May 1955, 24pp. *USAF Crew Research Lab., Lackland AFB, Tex.*

5591
In a study on the relation between certain personality variables and the learning process, 11 college students in a social science class were given Rorschach tests. Scores on their personality traits inferred from performance on the Rorschach test—Anxiety, rigidity, and negativism—were correlated with scores on college aptitude tests, placement examinations, and scores on a comprehensive examination on the social science course. Verbally recalled "thoughts" during class discussion were analyzed for each subject with respect to source, emotionality, orientation, and objectivity.
T. G. R 19

5593
Gagne, R.M. TRAINING DEVICES AND SIMULATORS: SOME RESEARCH ISSUES. Proj. 509 020 0009, AFPRC TR 54 16, May 1954, 13pp. *USAF Skill Components Research Lab., Lackland AFB, Tex.* (Reprinted from: *Amer. Psychologist*, March 1954, 2(3), 95-107).

5593
This article reviews certain broad issues in the area of training devices and simulators. Among the topics discussed are: the general characteristics of training devices; devices for the measuring and for the improving of performance; research on task analysis, practice, feedback, and the effectiveness of training; and the evaluation of training devices.
R 32

5594
Luce, R.D., Macy, J., Christie, L.S., & Hay, D.H. INFORMATION FLOW IN TASK-ORIENTED GROUPS. Contract DA 36-039-sc-100, Proj. 8-102B-0, DA Proj. 3-99-10-022, Tech. Rep. 264, Aug. 1953, 95pp. *Massachusetts Institute of Technology, Research Laboratory of Electronics.*

5594
To study factors governing information flow in task-oriented groups, ten groups of five subjects each were conditioned in one communication network and tested in another. The task was to discover, through seeking and receiving written messages, the number assigned to each member of the group. Attitude and information questionnaires were filled out upon completion of each problem. Group results for time, number and content of messages, and errors were analyzed. Individual message destinations and time data were studied. Subject's knowledge of the network and attitudes toward experiences in the group were examined. Conclusions from this and previous studies were drawn with some generalizations concerning future developments and applications.
T. G. I. R 4

5599
In a test of the hypothesis that success or failure as a survival instructor trainee is related to peer ratings, 25 trainees were observed and were given sociometric tests at four stages of a 110-day training period. Sociograms constructed on the basis of the data yielded by the test are analyzed to reveal changes in the structure of the group during the training period. Failure in training is analyzed with respect to sociometric unpopularity.
T. G. R 5

5600
Miller, G.A. & Mitchell, S. EFFECTS OF DISTORTION ON THE INTELLIGIBILITY OF SPEECH AT HIGH ALTITUDES. *J. Acoust. Soc. Amer.*, Jan. 1947, 19(1), 120-125. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).
With mask-microphone combinations having relatively uniform response characteristic at high altitudes, no significant improvement in the intelligibility of speech was obtained by frequency distortion in the associated equipment. Amplitude distortion in the form of sharp, symmetrical peak clipping had several advantages: a) a more favorable S/N ratio was established, b) a constant percentage modulation can be obtained for A.N. radio speech communications, and c) the range of speech levels at different altitudes was somewhat compressed. Before speech at high altitudes is peak clipped, however, it may be necessary to filter out frequencies below about 500 cps, and for radio transmission it is probably advisable to insert a simple, low pass filter after the clipping circuit in order to reduce the possibility of interchannel interference.
R 3

5601
Miller, G.A. & McGill, W.J. A STATISTICAL DESCRIPTION OF VERBAL LEARNING. *Psychometrika*, Dec. 1952, 17(4), 369-396. (Massachusetts Institute of Technology, Cambridge, Mass.).

5601
A statistical model is presented describing free recall after verbal learning. It is based on the assumption that the probability of recalling a word on a given trial is determined completely by the number of recalls of the word made on previous trials. Three specific cases of the models (1-, 2-, and 3-parameter cases) are examined, each of which makes certain assumptions about the proportions of stimulus elements sampled during conditioning and during recall and about the possibility of the attaining of perfect performance. These three cases are applied to three sets of experimental data obtained from the recall of monosyllables.
T. G. R 5

5602

Berliner, Anna. THE PSYCHOLOGICAL FIELD: A DETERMINANT FACTOR IN VISION. *Optom. Weekly*, Dec. 4, 1952, 43(49), 1959-1965. (Pacific University, Forest Grove, Ore.).

This paper reviews experimental work in 6 areas all showing that other variables than the so-called external stimulus--considered either in isolation or inside the total visual field--may play a role in vision. The 6 areas represented are a) estimation of clusters of stamps and coins with different values; b) the autokinetic movement in group situations; c) size estimations of coins under the influence of needs; d) value and figure-ground; e) threshold experiments under different psychological conditions; and e) color emulations under different preparation. (HEIAS)

R 25

5603

Miller, G.A. THE MASKING OF SPEECH. *Psychol. Bull.*, March 1947, 44(2), 105-129. (ONR, Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

A wide variety of sounds have been investigated to determine the extent to which they interfere with vocal communication. The masking of speech has been determined by articulation-testing methods, and estimates of annoyance have been obtained by the method of paired comparisons. The sounds are classified as noises, tones, and voices. For all 3 types of sound, the stimulus-dimensions determining both masking and annoyance are the intensity, the frequency or spectrum, and the temporal pattern of the sound. Masking depends primarily on the speech-to-noise ratio over the range of frequencies involved in speech. Sounds of low frequency mask this range more effectively than sounds of high frequency. Interruptions in the sound decrease the masking effectiveness. Annoyance also increases as the intensity is raised; but low-frequency sounds are less annoying than high-frequency sounds, and intermittent, irregular sounds are more annoying than continuous sounds. There is no evidence, however, that annoyance interferes with vocal communications in the laboratory situation.

R 23

5604

Miller, G.A. SENSITIVITY TO CHANGES IN THE INTENSITY OF WHITE NOISE AND ITS RELATION TO MASKING AND LOUDNESS. *J. acoust. soc. Amer.*, July 1947, 19(4) Part 1, 609-619. (ONR, Rep. PNR 28, Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

Sensitivity to changes in the intensity of a random noise was determined over a wide range of intensities. The just detectable increment in the intensity of the noise is of the same order of magnitude as the just detectable increment in the intensity of pure tones. For intensities more than 30 db above the threshold of hearing for noise the size in decibels of the increment which can be heard 50% of the time is approximately constant (0.41 db). When the results of the experiment are regarded as measures of the masking of a noise by the noise itself, it can be shown that functions which describe intensity discrimination also describe the masking by white noise of pure tones and of speech. It is argued, therefore, that the determination of differential sensitivity to intensity is a special case of the more general masking experiment. The loudness of the noise was also determined, and just noticeable differences are shown to be unequal in subjective magnitude. A just noticeable difference at a low intensity produces a much smaller change in the apparent loudness than does a just noticeable difference at a high intensity.

R 17

5605

Sim, V.M., & Pattle, R.E. THE EFFECTS OF SOME POSSIBLE SMOG CONSTITUENTS ON HUMAN SUBJECTS. Porton Tech. Paper 547, April 1956, 12pp. Chemical Defence Experimental Establishment, Directorate of Chemical Defence Research and Development, Ministry of Supply, London, England.

5606

To investigate the effect of various substances contributing to atmospheric pollution on human subjects, a large number of men were exposed for periods up to 60 minutes to sulphuric acid mist, sulphur dioxide, and various aldehydes. The effects of adding magnesium oxide smoke and ammonia to sulphuric acid mist and sulphur dioxide were studied. All men were examined clinically before and after exposure; lung resistance to airflow, tidal volumes, and maximum breathing capacity were measured. The findings are assessed in relation to the possible toxic agent in London smogs.

R 6

5608
Miller, G.A. THE PERCEPTION OF SHORT BURSTS OF NOISE. *J. acoust. soc. Amer.*, March 1948, 20(2), 160-170. (ONR, Rep. PNR 42, Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.)

Short bursts of random noise were used to study the perceptual growth and decay of the noise experience. Noise, unlike sinusoidal tones, does not change materially in spectrum as the duration of the sound is varied. A short burst of noise must be more intense in order to be equal in effectiveness to a longer noise. Thus the threshold of hearing is lowered by increasing the duration of the noise up to durations at least as long as 1 sec. The loudness of an intense noise, however, depends upon its duration up to durations of only 65 msec. Judgments of the slowest rate of decay of a noise which sounded indistinguishable from an abrupt termination also led to the concept of a critical time of approximately 65 msec. for the sensation to decay to threshold from any steady magnitude of stimulation. From these data it is inferred that the auditory system acts as if the growth and decay periods of the noise perception depend upon differences in latencies among the various neural paths in transmitting the cochlear activity to the higher centers in the brain. According to this hypothesis, the activity in the slowest pathways arrives at the higher center 65 msec. after the activity of the fastest pathways. By means of this hypothesis it was possible to predict the judgments of time of termination of noises in the 2 ears when the intensity of the noise differed between the ears.

R 20

5611
Geldreich, E.W. SOME PHYSIOLOGICAL CONCOMITANTS OF MENTAL WORK. *Psychol. Monogr.*, 1953, 67(8), No. 358, 1-28. (San Diego State College, San Diego, Calif.).

A study of some of the physiological variables of mental work was conducted. The task was to identify 5 colors presented serially in random order by manual response at rate determined by the practiced facility of each of 10 Ss. Continuous records were made of changes in respiration and heart beat, relative blood pressure, finger volume, palmar skin conductance, and GSR. On 10 different days each S spent 55 min. as follows: a) 4 days of color naming responses; b) 2 days random tapping of the 5 keys while blindfolded; c) 2 days of passively looking at the color presentations; and d) 2 days of rest. On the basis of data analysis and comparisons for the various conditions the conclusions were as follows. The trends of changes in the rate of color naming and blocking are not due to chance but to factors present in the mental work operation and the organization of the worker. Changing physiological activities reflect changes in energy mobilization. As color-naming work output decreases, the amount of energy mobilized decreases. Mental work output is a function of the momentary mobilization of energy, the momentary and previous conditions of the circulatory and neuromuscular systems, and the momentary receptivity of the S to further stimulation. (HEIAS)
R 30

5612
Hoffman, E.L., Swander, D.V., Baron, S.H., & Rohrer, J.H. GENERALIZATION AND EXPOSURE TIME AS RELATED TO AUTOKINETIC MOVEMENT. *J. exp. Psychol.*, Sept. 1953, 46(2), 171-177. (ONR, Tulane University, New Orleans, La.).

A method has been demonstrated for establishing stable predetermined norms of judged extent of light movement which will generalize to judged extent of autokinetic movement. The findings also suggest that duration of exposure of an autokinetic stimulus is a factor which contributes to the magnitude of judgments obtained.
R 6

5621
Fiedler, F.E. ASSUMED SIMILARITY MEASURES AS PREDICTORS OF TEAM EFFECTIVENESS. *J. abnorm. soc. Psychol.*, July 1954, 49(3), 381-388. (University of Illinois, Urbana, Ill.).

5621
To test the hypothesis that group effectiveness is related to the interpersonal perceptions which members of the group have toward one another, a series of correlated studies were made. Interpersonal perceptions were measured by correlating identical questionnaires which subjects were instructed to fill out 1) describing themselves, 2) predicting the responses of their preferred co-worker, and 3) predicting the responses of their rejected co-worker. The first studies used basketball teams and the last used surveying teams. Criteria of effectiveness were proportion of games won and instructor rating on accuracy respectively. The usefulness of this approach to team effectiveness is discussed.
T. I. R 11

5622
Wolfe, W.C. & Walton, W.W. FOGGING OF LENSES. NBS Proj. 0502 20 3258, NBS Rep. 6A195, Sept. 1953, 38pp. National Bureau of Standards, US Department of Commerce, Washington, D.C.

5622
This series of experiments was performed to design a lens for gas masks which will prevent the condensed moisture from forming films which interfere with vision. Theoretical background of the problem is given and several possible solutions are discussed in terms of difficulties encountered in each. In the experiments described, lenses were tested in a Fog Box after being treated in the following ways: 1) with hydrophobic materials, 2) so as to change surface tension of the water, 3) with the following agents: Anti-Dim Cloth, Aerosol OT, "Stepanol" and a variety of permanent type films. Results are given in a series of tables. Terms used are defined and materials used are carefully described in the appendices.
T.

5623
Inter-Society Color Council. A SYMPOSIUM ON COLOR. PRESENTED AT THE ANNUAL MEETING OF THE TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, HOTEL COMMODE, NEW YORK CITY, FEB. 25, 1947 UNDER THE SPONSORSHIP OF THE INTER-SOCIETY COLOR COUNCIL. *Paper Trade Journal*, July-Dec. 1947, 125(2 et seq.).

This symposium on color was presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, held at the Hotel Commodore, New York City, on Feb. 25, 1947. The topics discussed were the following: "The Papermakers Interest in Color", A.H. Croup; "The Description and Specification of Color", R.M. Evans; "Color Order Systems", C.E. Foss; "Relation of Gloss to Color", R.S. Hunter; "Spectrophotometry", N.F. Barnes; "The I.C.C. Standard Observer and Coordinate System and Their Use in Studies of the Color of Paper", J.A. Van den Akker; "Interrelation of Color Specifications", Dorothy Nickerson; and "Color Engineering", F.H. Rahr. (HEIAS)

5624
Bender, H.G. & Feldman, D.S. EXTINCTION OF TASTE SENSATION ON DOUBLE-SIMULTANEOUS STIMULATION. *Neurology*, May-June 1952, 2(3), 195-202. (Mt. Sinai Hospital, New York, N.Y. & Neurology and Psychiatry Dept., New York University College of Medicine, New York, N.Y.).
Studies in taste sensation were made in patients with lesions of the brain. In a patient with a glioma in the right parieto-occipital region there was extinction of taste on the left side of the tongue when both sides of the tongue were simultaneously stimulated. Taste threshold obtained with single stimulations was equal and apparently normal on the 2 sides of the protruded tongue. Alterations in cutaneous sensibility most marked on double simultaneous stimulation were also demonstrated. There was crossed extinction between simultaneous taste and cutaneous stimulation. The significance of these phenomena in relation to patterns of alteration of cutaneous sensibility are discussed.
R 8

5626

Molnar, G.W. HEAT TRANSFER THROUGH THE HAND. AMRL Proj. 6 64 12 028, Rep. 249, April 1956, 45pp. USA Medical Research Lab., Fort Knox, Ky.

5626

This report outlines the problem of heat transfer through the hand and collates published and unpublished data on heat transfer in a steady and unsteady state. The paucity of data on this problem is pointed out and further research recommended.
T. G. R 17

5627

Clark, B., Graybiel, A. & MacCorquodale, K. ILLUSORY ROTATION OF A TARGET DURING TURNS IN AN AIRCRAFT. Amer. J. Psychol., Jan. 1948, 61(1), 50-58. (San Jose State College, San Jose, Calif.)

This study was designed to collect evidence on the apparent motion and displacement of a fixed target in the dark associated with radial and angular accelerations. During both aircraft flights and laboratory simulation, Ss reported on only one aspect of the phenomenon; namely, an apparent rotation of a collimated star about its central axis. Verbal reports were transcribed and analyzed. Both apparent motion and displacement occurred at all degrees of bank from 10° to 60° during entry and also recovery periods; motion was in direction of plane's banking motion and persisted a few seconds beyond recovery. Percentage of occurrence and degree of apparent rotation increased with angle of bank (at 40° it was found at all times); maximal rotary displacement was 15°. The 2 phenomena did not necessarily occur simultaneously. Time lag reported was 4-6 sec. from beginning of maneuver to first appearance with duration of 8.8 sec. for 10° bank to 27.8 sec. for 60° bank. The evidence is interpreted in terms of this illusion being a special case of the oculo-gyral illusion. Effects such as these will occur in the air at night during maneuvers involving angular accelerations above threshold. (HEIAS)

R 7

5629

Clark, B. & Graybiel, A. A DEVICE TO MANIPULATE AND TO INDICATE THE POSITION OF REMOTE TEST OBJECTS. Amer. J. Psychol., April 1952, 65(2), 286-287. (USN School of Aviation Medicine, Naval Air Station, Fla.)

5629

This note describes a simple device which makes it possible for a subject and the experimenter to control a distant test-object independently and at the same time have an accurate record of the position of the target at any moment during the experiment. The advantages of the device for studies of visual space perception are listed.

R 4

5628

Clark, B. & Graybiel, A. VISUAL PERCEPTION OF THE HORIZONTAL FOLLOWING EXPOSURE TO RADIAL ACCELERATION ON A CENTRIFUGE. J. comp. physiol. Psychol., Dec. 1951, 44(6), 525-534. (San Jose State College, San Jose, Calif. & USN School of Aviation Medicine, Pensacola Air Station, Fla.)

3 experienced subjects were exposed to a series of radial accelerations on a human centrifuge to test the hypothesis that changes in the perception of the horizontal will occur during and following stimulation by radial acceleration. The subjects observed a single, isolated horizontal line in the dark while they rotated counterclockwise on a human centrifuge. Part I of the exp. the subject's task was to maintain the line at a horizontal position by means of a switch, during acceleration to a predetermined rate of rotation which was immediately followed by deceleration. In Part II the procedure was the same as in Part I except that the maximum radial acceleration was maintained for 15 minutes before deceleration began. In each experiment a comparison was made between the subject's judgment of the position of the line and the direction of resultant force determined from theoretical calculation. Within the limits of measurement in this experiment significant changes which could be attributed to prolonged exposure to radial acceleration did not occur. Measures of the threshold of perception showed no significant change following stimulation by the radial accelerations. Settings of the line to horizontal showed no change in constant or variable errors 1 min. following rotation. There were no significant differences between the accelerative and the decelerative phases with regard to the accuracy of setting the line, but the subjects tended to set the line at an angle from the horizontal which was greater than the deviation of the resultant force from gravity. Within the limits of the measures used and for the variables studied in this experiment, prolonged exposure to radial acceleration did not produce consistent aftereffects on the perception of the horizontal.

R 10

5630 Clark, B. & Graybiel, A. APPARENT ROTATION OF A FIXED TARGET ASSOCIATED WITH LINEAR ACCELERATION IN FLIGHT. Amer. J. Otol., April 1949, 32(4), 549-557. (USN School of Aviation Medicine, Pensacola Air Station, Fla.)

The purpose of this study was to determine the effects of linear acceleration and deceleration on the visual perception of a target in the dark. Three Ss observed a collimated "star" in the dark while the pilot of an SNJ-6 aircraft executed various degrees of linear acceleration. The Ss gave a running account of the behavior of the "star" using a throat microphone connected to a wire recorder. When the Ss faced to the left in the aircraft, the radiating lines of the star appeared to rotate about the central point to a new position. This rotation was clockwise during deceleration and counterclockwise during acceleration. As the force became smaller, the star appeared to rotate back to its normal position. This illusory rotation occurred at all stimulus levels. There was also a positive relation between the maximum force and the duration of the illusory effect. The results are similar to those observed on a human centrifuge and show that linear acceleration and deceleration during flight have a marked influence upon visual perception in the dark. Although the observed rotations were small, they were clearly defined and may be considered to be factors contributing to disorientation in pilots.

R 13

5631

Clark, B., Johnson, M.L. & Dreher, R.E. THE EFFECT OF SUNLIGHT ON DARK ADAPTATION. *Amer. J. Ophthalmol.*, July 1946, 29(7), 828-836. (USN School of Aviation Medicine, Pensacola Air Station, Fla.)

Individuals exposed to sunlight for 3 to 4 hours a day over a period of 2 weeks show a marked elevation of the night visual threshold immediately following exposure. The degree of elevation persisting overnight is sufficient to cause approximately a 50-percent loss in night visual efficiency. Furthermore, it appears that persons exposed to sunlight for extended periods daily, without protection to their eyes, require in excess of one hour of adaptation to achieve a practical maximum of night visual efficiency. Exposure to brilliant sunlight has been reported as the cause of night blindness that is more or less permanent. However, the present studies on normal individuals indicate that the effects of daily exposure for 3 to 4 hours are only temporary, since the threshold returns to normal after one day's protection from the sun. Persons wearing 12-percent transmission polarizing sunglasses during prolonged exposure to sunlight had significantly lower night-visual thresholds than those who did not. In view of these results, personnel engaging in night duties requiring a high degree of night visual efficiency at starlight intensities should be provided with low-transmission sunglasses to be worn during any daytime activities which expose them to excessive sunlight.

R 11

5632
Clark, B. & Malone, R.D. TOPOGRAPHICAL ORIENTATION IN NAVAL AVIATION CADETS. *J. Educ. Psychol.*, Feb. 1954, 45(2), 91-109. (USN School of Aviation Medicine, Pensacola Air Station, Fla.)

A test of topographical orientation and 7 other tests were given to 248 Naval Aviation cadets to study the types of errors in orientation they make, to identify the factors which contribute to this type of disorientation, and to determine what relation there is between topographical orientation and certain other psychological factors. In the test of topographical orientation, large errors were found to be the rule for orientation to individual geographical points. Deviations of the group from proper orientation were as great as 65.1, while some individual deviations from the proper orientation approximated 180°, the maximum possible error. Errors for cities located abroad were greater than for cities within the United States. Deviations from Mercator headings were large, but these errors were much less than for deviations from great circle headings, particularly for cities outside of the continental limits of the United States. Correlations between total score on the test of topographical orientation and other psychological tests were .21 or below; only 3 of them being significantly different from zero. Naval Aviation cadets are poorly oriented to geographical points, particularly as they actually occur on the globe. The notion of great circle relationships between distant cities does not appear to enter significantly into their judgments of the geographical points. Topographical orientation appears to be a unique characteristic which is independent of the factors measured by the current selection battery for cadets as well as certain other factors such as mathematics, spatial orientation, and spatial visualization.

R 32

5634
Colgan, C.W. CRITICAL FLICKER FREQUENCY, AGE, AND INTELLIGENCE. *Amer. J. Psychol.*, Dec. 1954, 67(4), 711-713. (University of Florida, Gainesville, Fla.)

Measurements of CFF on 2 groups of elderly Ss, 18 in a 65-80 yr range and 22 in an 81-95 yr range, were made to see if CFF might be a measure of the aging process. Mean CFF for each group were determined and compared for significant differences. The difference was found to be significant at the 10% level of confidence. A further test of the intelligence factor (as measured by the Wechsler-Bellevue Scale) provided data for intercorrelations of CFF, age, and intelligence. A significant correlation (+0.36) of CFF and intelligence which was independent of age was found. (HEIAS)

R 6

5633

Roberts, C.A. DRAPE-TYPE CAMOUFLAGE NETS; EVALUATION OF. NCSD Proj. E-953, Oct. 1954, 10pp. Marine Corps Schools, Marine Corps Development Center, Quantico, Va.

5633

This report presents the results of an evaluation of drape-type camouflage nets for Marine Corps use. Physical characteristics were compared with the present camouflage net. Field tests covered: employment (ease of erection and effectiveness of concealment), transportability, ruggedness and durability, and overall efficiency for field use. Recommendations are included.

1.

5635

Dixon, J.C. EFFECT OF EXPOSURE-TIME ON PERCEPTION OF GROUPED DIGITS. *Amer. J. Psychol.*, 1948, 61, 396-399. (University of North Carolina, Chapel Hill, N.C.)

5635

To study some factors in the perception of grouped digits, 108 Ss viewed a series of stimulus cards containing six digits (grouped in three's or two's) and reproduced them on paper. Exposure time was varied from 100 to 700 msec. without use of fixation point and from 100 to 450 msec. with fixation point. Correctness of reproduction was obtained separately for each grouping, and the one each S did best on was given an arbitrary score of "two" and "one" to the next best. Analysis was made with respect to effect of exposure time and eye movements on apprehension of grouped digits.

T. R 4

5638

Harris, J.D., Ramsley, Anita I. & Kelsey, Patricia. STUDIES IN SHORT-DURATION AUDITORY FATIGUE: I. FREQUENCY DIFFERENCES AS A FUNCTION OF INTENSITY. *J. exp. Psychol.*, Dec. 1951, 42(6), 430-436. (USN Medical Research Lab., New London Submarine Base, Conn.).

The method of short-duration auditory fatigue allows for rapid accumulation of data since all effects of stimulation with brief tones disappear in usually less than a second. In this experiment, Tone A of 300 msec. was followed after 80 msec. by Tone B of 30 msec. Both A and B were the same frequency, either 256, 512, 1,024, 2,048, 4,096, 5,747, or 8,192 cps. Tone A was set at intensities ranging from 20 through 70 db sensation level. Fatigue was calculated as the difference in threshold of Tone B preceded and not preceded by Tone A. A comparison of fatigue among frequencies was made when they were equated as to intensity, loudness, and sensation level. Equating as to intensity led to curves which bear similarities to isophonic contours, and lends some support to Lüscher and Zwislocki's view that the frequency characteristic depends upon intensity rather than loudness. A family of fatigue curves equated for loudness shows that, especially at equal-loudness levels of 40 phons and above, fatigue is a decided function of frequency. At the 70-phon level, a tone of 8,192 cps suffers 27 db more fatigue than a tone of 256 cps. This differential effect is considerably less evident when frequencies are of equal sensation level.

R 12

5639

Harvey, O.J. AN EXPERIMENTAL APPROACH TO THE STUDY OF STATUS RELATIONS IN INFORMAL GROUPS. *Amer. Sociol. Rev.*, Aug. 1953, 18(4), 357-367. (University of Oklahoma, Norman, Okla.).

5639

To determine whether the status and role relationships existing in small informal groups can be established by a short-cut experimental technique, ten adolescent cliques were selected on the basis of agreement among teachers' ratings, personal observations, and sociometric results. Three members from each clique--leader, middle, and lowest ranking members--were given the task of estimating their own future performance and that of the other two status occupants on an experimental task (dart throwing). Four of the groups were from a high and the others from a low socio-economic class. Correlations between overestimation on the task and group status, as well as socio-economic class, were interpreted in terms of level of expectation as related to standing in the group. T. R 15

5643

Kleemeier, Lyla B. & Kleemeier, R.W. EFFECTS OF BENZEDRINE SULFATE (AMPHETAMINE) ON PSYCHOMOTOR PERFORMANCE. *Amer. J. Psychol.*, Jan. 1947, 60, 89-100. (Northwestern University, Evanston, Ill.).

This study was designed to test the effects of benzedrine sulfate on psychomotor performance as measured by a series of tests composed of a number of relatively simple tasks so arranged that the S must exhibit the ability to change his "set" (that is, possess flexibility) in order to fulfill the test demands. 32 Ss were given the tests at 5 different sessions, each separated by 1 wk; the first session was the same for all Ss; at the remaining 4 sessions the Ss were divided into 2 groups. Each group was given glucose or benzedrine alternately 1-1/2 hr before testing. Ingestion of benzedrine sulfate reliably facilitated performance on these tests: multiplication, selective substitution, and arithmetic speed. Facilitation was noted on letter series, paper and pencil motor, over and under, and word completion tests but was not highly reliable. These findings are taken as support to the hypothesis that the drug exerts its facilitating influence in part by increasing flexibility of performance. No differential effect was found between the performance of "fast" and "slow" workers on the tests. (HEIAS)

R 14

5644

Kleemeier, R.W. AGE CHANGES IN PSYCHOMOTOR CAPACITY AND PRODUCTIVITY. *J. Business*, 1954, 27, 146-155. (Moosehaven Research Laboratory, Orange Park, Fla.).

5644

This is a review of some of the experiments dealing with age change as reflected in psychomotor capacity and productivity and covers such areas as reaction time, muscular strength, vision, hearing, complex psychomotor activities, job performance, and accidents. The implications of these studies for further research and for understanding the process of ageing are discussed. T, G, R-28.

5645

Kleemeier, R.W. THE RELATIONSHIP BETWEEN ORTHO-RATER TESTS OF ACUITY AND COLOR VISION IN A SENESCENT GROUP. *J. Appl. Psychol.*, 1952, 36, 114-116. (Moosehaven Research Laboratory, Orange Park, Fla.).

5645

This is a study of the relationship between visual acuity and color vision in a senescent group of 128 subjects, ranging in age from 65 to 85 years. Correlations are obtained between the Ortho-Rater color test and tests of visual acuity. The results are treated in terms of the role of acuity in evaluating the color vision function of older individuals. T. G. R 4

5646

Kleemeier, R.W. & Dudek, F.J. A FACTORIAL INVESTIGATION OF FLEXIBILITY. *Educ. psychol. Monst.*, Spring 1950, 10(1), 107-116. (Northwestern University, Evanston, Ill.).

5646

To investigate the nature of flexibility, a battery of 13 tests was constructed. The tests were designed to measure numerical, perceptual speed, and verbal factors. Within each area an attempt was made to make some of the tests univocal (factorially pure) with one test designed to measure flexibility by requiring a shift from one simple task to another. Scores for 205 subjects were intercorrelated and the matrix of intercorrelations was factorially analyzed. The factors extracted were identified and discussed in relation to the postulated factor of flexibility. T. R 7

5648

Kryter, K.D. EFFECTS OF EAR PROTECTIVE DEVICES ON THE INTELLIGIBILITY OF SPEECH IN NOISE. *J. acoust. Soc. Amer.*, Oct. 1944, 18(2), 413-417. (ONI & Harvard University, Cambridge, Mass.).

Articulation tests were conducted to determine the intelligibility of speech in the presence of noise when listeners did not wear earplugs and when listeners wore earplugs (BNC Ear Muffs). It was found that with a reverberating signal from a public-address system and in the presence of noise that raises the open-ear speech threshold by 60 db or more, the wearing of Ear Muffs increases the intelligibility of speech. But, with direct person-to-person speech, the ambient noise must be of sufficient intensity to raise the speech threshold by 80 db or more before Ear Muffs may be used without interfering with the reception of speech. Since in some military and industrial situations noise is generated that raises the threshold for hearing speech by more than 80 db, the use of suitable earplugs, under these conditions will: a) maximize the reception of speech and b) afford protection against the deafening, fatigue, and annoyance effects commonly attributed to sustained intense noise.

R 5

5649

Kryter, K.D. EFFECTS OF HIGH ALTITUDE ON SPEECH INTELLIGIBILITY. *J. appl. Psychol.*, Oct. 1948, 32(5), 503-511. (OSAB, Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

Intelligibility of discrete words over a standard aircraft interphone is shown to decrease during flight from about 65% words correctly heard at 5000 feet to near 40% at 35,000 feet. This deterioration in speech intelligibility is attributable to a depression in the operating efficiency of the voice, the microphone and the earphones as the result of the reduced pressures encountered at high altitude. Anoxia did not play a role since oxygen equipment insured an adequate supply of oxygen to the Ss at all altitudes. The facts show that if speech intelligibility is to be kept at sea level or low altitude efficiency, which is under some circumstances none too high to begin with, adequate compensation in terms of additional interphone amplifier gains must be provided at high altitudes.

R 7

5650

Lauer, A.R. A NOTE ON COLOR NOMENCLATURE. *Iowa Acad. Sci.*, 1953, 60, 524-528. (Iowa State College, Cedar Rapids, Iowa).

It is stated that the basic principles of color constitute a unitary system throughout although interpretations are sometimes at variance. Color is a subjective phenomenon and, as such, often results in the stimulus error being made by psychologists as well as by physicists and artists. It is recommended that quantitative statements be used in describing color by using the wave lengths reflected by physical objects. An extension of the concept of complementary colors to include all possible pairs is presented. In general, a proper understanding and description of color phenomena would eliminate confusion in the science and application of principles of color.

R 9

5651

Lauer, A.R. & McOnagle, J.C. DO ROAD SIGNS AFFECT ACCIDENTS? *Traffic Quart.*, July 1955, 322-329. (Iowa State College, Ames, Iowa & Planning and Traffic Div., Michigan State Highway Dept.).

The effect of roadside advertisements upon driver efficiency was investigated both experimentally and by a statistical analysis of accident data. In the first instance, the driving efficiency of 170 Ss was measured on a laboratory driving apparatus under conditions where the normal features of the landscape were present but with no signs; with the same features of landscape but with signs placed 15-30° to the side, and with signs placed 15-45° at the side. Using RT as the criterion of possible differential efficiency, no significant differences were found among the conditions. The accident data were drawn from a study that included a comprehensive inventory of all design and roadside features with regard to location of each accident. Various analyses of possible effects of advertising signs (one of the design features) included rate of accident-occurrence per large and prominent advertising sign, and accident rate and sign density. None of these analyses were significant. Multiple correlations of all the design and roadside variables and accidents were determined for accidents occurring at intersections and non-intersections. In neither instance did roadside advertising signs have any significant effect; the significant variables at intersections proved to be taverns, vehicle miles, gas stations, other establishments, and stores; at non-intersections they were vehicle miles, private drives, other establishments, restaurants, and taverns. (HEIAS)

R 6

5652

Lauer, A.R. & Silver, E.H. CERTAIN FACTORS INFLUENCING THE TOLERANCE OF LIGHT AND VISUAL ACUITY. *Proc. Iowa Acad. Sci.*, 1945, 52, 265-270. (Iowa State College, Iowa City, Iowa).

5652

To study the perception of stimuli under given conditions of opposing light, three experiments were conducted: 1) acuity measurements with no opposing lights and with an opposing light varied in intensity (from 0.25 to 2.00 ft.-c) at a three-degree angle, or 2) with angle varied from one through five degrees and intensity at one ft.-c, and 3) differential discrimination of colored objects with and without opposing light (angle of three degrees, intensity one ft.-c). Data from 43 Ss were analyzed with respect to effects of angle and intensity on acuity and color discrimination. Practical applications were discussed.

T. R 6

5653

Kisch, R.H., Zemlin, R., Smith, B.D., Roberts, A.E., et al. AIR WARFARE ANALYZER. PROGRESS REPORT NO. 1. Contract AF 33(616) 2489, Proj. 2059, PX 71840, Feb. 1955, 18pp. Engineering Research Associates Div., Remington Rand, St. Paul, Minn.

5653

Work to date on a design study for an "Air Warfare Analyzer," a system which provides to "players" the facility for playing war games with a certain degree of realism, is reported. A report is appended which describes the problem and several basic mathematical expressions. A model air warfare game is developed from which an idea can be formed of the amount and kind of computational, input control, and output display facilities required. These requirements are discussed in general terms.

T.

5654
Leibowitz, M. PHOTOMETRIC SCALES AND THE DUPLICATION THEORY OF VISION. *Amer. J. Psychol.*, Oct. 1952, 65(4), 632-634. (University of Wisconsin, Madison, Wisc.).

Because of the spectral selectivity of the eye and the technical difficulties involved in energy determinations, visual data are more conveniently presented on photometric scales. The establishment of a photometric scale requires the evaluation of spectral radiant flux with respect to its visual effect. One method is to adjust the energy in isolated spectral regions to produce an equality-response when compared visually with a fixed reference field. Energy-values which produce such an equality-response define equal photometric units. When visual data obtained from a homogeneous retinal area are plotted as a function of photometric units, the curves for all wave lengths are superimposed. An alternative method for establishing a photometric scale is based upon the fact that energy-values of the isolated spectral regions which will produce an equal visual response may be predicted from the luminosity data of the eye. By multiplying the radiant flux for a given wave length by the luminosity-factor of the eye for that wave length the visual effectiveness of radiant flux can be evaluated and expressed in terms of a photometric unit. Formulae are given for this method with cautions as to its application. (HEIAS)

R 7

5655
Leibowitz, M., Note, F.A. & Thurlow, W.R. SIMULTANEOUS CONTRAST AS A FUNCTION OF SEPARATION BETWEEN TEST AND INDUCING FIELDS. *J. exp. Psychol.*, Dec. 1953, 46(6), 453-456. (University of Wisconsin, Madison, Wisc.).

By means of a binocular matching technique the interaction between a foveal test field and an equal-sized inducing field was investigated for various separations between the 2 fields. For all separations, little or no effect is produced in the test field when the luminance of the inducing field is less than that of the test field. For inducing field luminances greater than the test field, the test field is inhibited in direct proportion, on a double log plot, to the luminance of the inducing field. The present data are consistent with the assumption that luminance differences in the fovea are exaggerated by an inhibitory mechanism. The ability of inducing fields imaged in the peripheral retina to inhibit activity in the fovea is apparently due to stray light. The relevance of the present data to constancy and other forms of retinal interaction, as well as contrast, is suggested.

R 24

5656
Lichte, W.H. SHAPE CONSTANCY: DEPENDENCE UPON ANGLE OF ROTATION; INDIVIDUAL DIFFERENCES. *J. exp. Psychol.*, 1952, 43, 49-57. (University of Missouri)

5656
To study the influence of angle of rotation upon shape constancy, fifty subjects rotated a square plate on the vertical axis until it appeared equal in shape to a rectangle (length same as standard, five inches, width varied 4.75, 4.25, 3.75 and 3.25 inches). Each setting, angle of rotation from fronto-parallel plane, was converted into a measure of apparent width. Ratios were then computed of apparent width to actual width of variable stimulus (considered an index of constancy), and are analyzed as a function of angle of rotation. Individual differences of constancy are analyzed and discussed.

T.O.I.III.

5658
Lichte, W.H. & Bamford, H.E., Jr. INTERVIEW DATA ON THE RADAR SCOPE INTERPRETATION PROBLEM. Proj. 21 06 003, Res. Note EON: 50 3, Sept. 1950, 12pp. USAF Human Resources Research Center, Mather AFB, Calif.

5658
To explore the problem of factors relating to radarscope interpretation, students and instructors reporting in upon completion of a mission were interviewed using a standardized interview (26 matched student and instructor) or a free interview (18 matched student and instructor and 52 instructors alone). The data were analyzed and classified according to difficulties of over-all performance and reasons for poor performance on the navigation leg and an aiming point identification. On the basis of this analysis a tentative list of variables relating to scope readings was presented.

T.

5657
Lichte, W.H. ATTRIBUTES OF COMPLEX TONES. *J. exp. Psychol.*, June 1941, 28(6), 455-480. (Southern Methodist University, Dallas, Tex.).

A series of studies were undertaken to discover whether or not complex tones have identifiable attributes other than pitch and loudness. 3 series of complex tones, each of which demonstrated a basic type of change in quality or timbre, were selected and psychological scales determined by the method of paired comparisons for brightness, roughness and fullness. Further experiments were then made using the tone series in pitch matching and quality matching. The data on pitch matching showed that the judgments on which the scales were based did not result from differences in pitch among the complex tones. The evidence seemed to warrant the conclusion that complex tones have, in addition to pitch and loudness, at least 3 attributes: brightness, roughness, and fullness (tentative). Brightness is a function of the location on the frequency continuum of the midpoint of the energy distribution. The results of the quality matching study suggest that brightness in complex tones is not similar to that of pure tones. Roughness was present in tones containing high partials above the sixth. Fullness was a function of the relative presence of odd- and even-numbered partials. (HEIAS)

R 12

5659
Lichte, M.H., Steinschneider, A., Eason, R.G. & Daniels, R.S. EFFECTIVENESS OF CONFIGURATION TARGET STUDY ON RADAR AIMING POINT IDENTIFICATION. Contract AF 33(038) 27009, Proj. 7711, Task 77202, AFRL TM 33 1, Feb. 1955, 11pp. USAF Aircraft Observer Research Lab., Mather AFB, Calif.

5659
To study the effect of meaningfulness in radar-scope display perception upon accuracy of aiming point identification, two groups of Ss (30 in each) were first trained, then tested on their ability to identify the aiming point on scope photographs taken during actual runs on seven targets. Two training procedures were used: 1) a "configurational method" emphasized the perceptual patterns in the scope display and gave them names of familiar objects which they resembled, and 2) a "pointer" method used simple linear relationships and gave the returns names of the objects or areas on the ground which they represented. Mean radial errors were analyzed for differences attributable to method.
T. R. 2

5660
Lofchie, S.H. THE PERFORMANCE OF ADULTS UNDER DISTRACTION STRESS: A DEVELOPMENTAL APPROACH. J. Psychol., 1955, 32, 109-116. (Worcester State Hospital, Worcester, Mass.).

5660
To investigate those factors which underlie performance under stress, an analysis was made of the conditions of psychomotor performance under distraction stress. The analysis led to a hypothesis, derived from developmental theory, that those subjects scoring higher on a Rorschach Index of Perceptual Maturity would be better performers on a psychomotor task administered under conditions of stress than would those subjects scoring lower on the same Index. Data were obtained with a group of 35 normal adults on a steadiness task in pre-stress and under stress (air blast, loud horn, flashing lights, etc.) and correlated with scores on the Index.
R. 21

5662
Milton, A.W. PSYCHOLOGICAL RESEARCH TO FILL MILITARY NEEDS. Training Analysis & Dev. Info. Bull., Fall 1952, 3-14. (USAF Human Resources Research Center, Lackland AFB, Tex.).

5662
This paper discusses the need of the military services for basic or fundamental research. Basic research is defined as research conducted in such a way that the scope of applicability of the results extends beyond the range of the particular set of circumstances involved in the investigation. The following topics are discussed: military requirements for psychological research, characteristics of the needed research, and finally, the advantages to psychology of military support.

5663
Michael, D.N. & Maccoby, N. FACTORS INFLUENCING VERBAL LEARNING FROM FILMS UNDER VARYING CONDITIONS OF AUDIENCE PARTICIPATION. J. exp. Psychol., 1953, 46(6), 411-418. Harvard University, Cambridge, Mass. & Boston University, Boston, Mass.

5663
To determine whether factors of motivation or of practice cause audience participation to result in superior verbal learning from films, 12 groups of about 80 high school students were required to view a film and then to answer a test on its contents. The following conditions were varied: 1) inclusion of test periods between sections of the film; 2) overt (versus covert) answering of test questions; 3) knowledge of results after each test period; 4) prior announcement of postfilm test of retention. A control group underwent the test periods but did not see the film. Results, number of items correct on the retention test, were compared among the various groups.
T. R. 11

5664
Christ, W.D. THE ELECTROENCEPHALOGRAPH OF NORMAL AGED ADULTS. EEG Clin. Neurophysiol., 1954, 5, 235-244. (The Moschovits Research Laboratory, Orange Park, Fla.).

5664
In order to investigate the electroencephalogram of normal aged adults, 150 males ranging from 65 to 94 years of age were divided into two age groups (65 to 79 years, and 80 to 94 years) and routine waking EEGs were obtained. Results are discussed in terms of comparisons between both groups and between both of the samples and the norms of young adults previously reported in the literature. The EEG results are treated with regard to alpha, beta, and delta activity and hyperventilation.
T.G.I. 332.

5665
Christ, W.D., & Bissell, L.F. THE ELECTROENCEPHALOGRAPH OF AGED PATIENTS WITH CARDIAC AND CEREBRAL VASCULAR DISEASE. J. Gerontol., 1955, 10, 315-330. (The Moschovits Research Laboratory, Orange Park, Fla.).

5665
This is an investigation of the electroencephalogram of 60 male patients ranging in age from 66 to 91 years, and divided into one normal and three diagnostic groups as follows: cardiac, cardiac and cerebral vascular, and cerebral vascular diseases. The results are discussed in terms of the comparative differences among the groups with regard to alpha and delta activity.
T.G.I. 229.

5666
Pfefferkorn, R.G. & Lauer, A.R. CHANGES IN POSITION OF PRESENTATION AS RELATED TO PERCEPTUAL EFFICIENCY IN STIMULUS IDENTIFICATION. Proc. Iowa Acad. Sci., 1954, 61, 406-412. (Iowa State College, Ames, Iowa).
It was hypothesized that visual perception of incomplete circles is unaffected by position of the gap. The stimulus was composed of points of light arranged to form 2 concentric rings around a central point (inner ring and center light served as fixation point); the outer ring of 8 lights was shown as an incomplete circle by omitting one light and the gap thus formed was varied in position around the circle. 20 Ss each received 50 trials of the various patterns at exposures of .017 sec. Responses consisted of indicating any perceived missing light and marking its position on a prepared chart. Analysis of the results suggested that there are individual differences in perceptual efficiency and that perceptual efficiency of a gapped circular pattern varies as a function of the position of the gap. The upper portion of the pattern was perceived accurately most consistently. Certain possible operational characteristics of the closure phenomenon are suggested. (NEIAS)
R. 3

5668
Stalder, H.L., Hoppe, D.A. & Lauer, A.R. THE SCOTOMETER--A DARK-TUNNEL APPARATUS FOR STUDYING NIGHT VISION OF DRIVERS. Proc. Iowa Acad. Sci., 1951, 58, 397-400.

A device for studying visual perception of changes at fairly long distances, but which would allow for variations in speed of approach or recession of the stimuli and in levels of illumination is described. This device, called a scotometer, is used primarily for studying night vision of drivers and has been shown to produce results consistent with actual road studies. A schematic diagram of the scotometer, its essential features, and typical procedures used for studies are presented. (HEIAS)
R 2

5669
Siddall, G.J. & Molding, D.H. ERRORS OF AIM AND EXTENT IN MANUAL POINT-TO-POINT MOVEMENT. Rep. 63, Jan. 1956, 16pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

Many experiments have been performed to study the relations between such variables as speed, accuracy and amplitude of manual point-to-point movements, but little work has been reported comparing the magnitudes of different types of error when such movements are carried out at a high rate. It is suggested that this could have importance for the future design of displays and controls for certain types of equipment. A comparison was made of the magnitude of errors of aim with errors of extent in simple discrete movements carried out at a high rate and in different directions relative to the position of the S. 40 Ss were required to draw 4 lines in succession from a starting point to a target as fast as possible. A lower limit to the speed was set by demonstration and brief training. 4 directions of movement were compared; left to right; right to left; outwards from the front of the body and inwards towards the body. Errors in extent and deviations to left and right of the target were recorded as was the duration per 4 movements. Errors of extent were significantly greater than errors of aim. Constant errors of extent were overshoots and constant errors of aim were deviations to the right of the target. There were no significant differences in accuracy between the 4 directions of movement. Duration of left-to-right movements was significantly less than movements in the other 3 directions. Speed and accuracy were negatively correlated.
R 20

5670
Baker, H.D. SOME DIRECT COMPARISONS BETWEEN LIGHT AND DARK ADAPTATION. J. opt. soc. Amer., Oct. 1955, 45(10), 839-844. (Office of Naval Research, Florida State University, Tallahassee, Fla.).

Both the absolute threshold and the difference threshold appear to be limited by photochemical conditions in the visual receptor during dark adaptation, and after complete light adaptation to any luminance level. During light adaptation the absolute threshold reflects photochemical conditions but the difference threshold does not. It is suggested that this is because the difference threshold is affected by the near-maximum response of the visual receptor during early light adaptation. Experiments which test this idea are reported.
R 14

5672
Christman, R.J. FIGURAL AFTER-EFFECTS UTILIZING APPARENT MOVEMENT AS INSPECTION-FIGURE. Amer. J. Psychol., Jan. 1953, 66(1), 66-72. (West Virginia University, Morgantown, W. Va.).

An experiment was conducted to test the hypothesis that a greater figural after effect (FAE) would result if satiation were produced by apparent movement than if it were presented by a motionless inspection object. 5 conditions of satiation (1 min. fixation upon central point) were used: a) control, with fixation point and no pattern, b) a stationary pattern of 2 bars, c) alternation of the 2 bars to produce flicker, d) a stationary pattern of one large bar, and e) alternation of the 2 bars to produce apparent motion. FAE was measured by comparison with a 1-sec. exposure of a test pattern of 2 bars on either side of center at intervals of 4 sec. for 10 times. 75 Ss were used. Judgments of equal, left square higher, and right square higher were analyzed for effect of the 5 conditions. The condition in which movement appeared (condition e) produced an after-effect greater than other conditions at high levels of confidence. (HEIAS)
R 5

5673
Christman, R.J. SHIFTS IN PITCH AS A FUNCTION OF PROLONGED STIMULATION WITH PURE TONES. Amer. J. Psychol., Sept. 1954, 67(3), 484-491. (USAF Rome Air Development Center, Rome, N.Y.).

In 2 experiments shifts in the pitch of a standard tone of 600~ were found following monaural stimulation (satiation) with pure tone of 450-800~ and of 1- or 2-min. duration. The pitch of the standard was lowered by satiating tones of higher frequency and raised by satiating tones of lower frequency, the effect being somewhat greater in the former case than in the latter. The magnitude of the effect varied directly with the duration of the satiating tones and inversely with the time between satiation and testing. The results of the experiments can be explained in terms of the Kohler-Wallach theory.
R 17

5675
Clausen, J., Gjessvik, A. & Urdal, A. CHANGES IN GALVANIC SKIN RESISTANCE AS INDICATION OF PAIN THRESHOLD. J. gen. Psychol., 1953, 49, 261-271. (Psychology Dept., University of Oslo, Oslo, Norway).

To determine whether GSR could be used as an indicator of pain threshold (radiant heat), both were measured on the volar surface of the left lower arm on 2 groups of Ss (20 males and 20 females). The first received instruction as to sequence of sensations to be expected, but reported "Now" at reached threshold; at a later day the threshold was determined by using verbal report after each stimulus. The other group received no instruction of the sequence but reported after each stimulus. The data analysis indicated that while most of the stimuli resulted in a decrease of GSR, a pronounced decrease occurred at the pain threshold in the majority of Ss. The various forms of report had no effect on threshold level although instruction caused the critical resistance change to appear at a lower level than when no instructions were given. When the pain threshold was determined twice, the second threshold was lowered. (HEIAS)
R 12

5676

Clausen, J. & King, M.E. DETERMINATION OF THE PAIN THRESHOLD ON UNTRAINED SUBJECTS. *J. Psychol.*, 1950, 30, 299-306. (Tulane University, New Orleans, La.).

An attempt has been made to formulate a standardized method of instrumentation and procedure for the measurement of pain threshold by the Hardy, Wolff, Goodell technique, with particular stress on applications to the untrained S. It has been found that temporal factors, conducted heat, distraction, reporting method, and area of the body stimulated all are directly influencing factors in the thresholds obtained; and that other conditions, such as age and educational level, probably also contribute to the variance obtained with this measure. Some of the additional relevant factors in the measurement of pain sensation which must be further studied have been discussed.

R 9

5677

Clausen, J., Gjesvik, A. & Urdal, A. REPETITION EFFECT IN PAIN THRESHOLD DETERMINATION. *J. gen. Psychol.*, 1954, 51, 185-192. (University of Oslo, Oslo, Norway).

Through the utilization of the Wolff-Hardy-Goodell technique and standard procedure, pain threshold was determined on forehead, arm, and leg on 20 Ss. All 3 areas were stimulated on each of 3 testing days but the sequence was so rotated that each area was tested first in one session. When stimulated first in a session it was found that the forehead had the highest, the arm a somewhat lower, and the leg the lowest threshold. For all 3 areas the threshold was lowered significantly if it was determined immediately following the pain threshold determination of another area. There was evidence of a more pronounced effect in the case of 2 rather than one preceding stimulation. For the leg it was found that the threshold for warmth was higher than for the arm or forehead; that repetition effect occurs also for warmth sensation; and that occasionally the pain threshold was lower than threshold for warmth. It was suggested that physiological rather than psychological factors are responsible for the repetition effect.

R 7

5678

Clausen, J., Urdal, A. & Gjesvik, A. RELATION BETWEEN GALVANIC SKIN RESISTANCE AND REPETITION EFFECT IN PAIN STIMULATION. *J. gen. Psychol.*, 1955, 53, 29-36. (University of Oslo, Oslo, Norway).

12 Ss had threshold determined simultaneously with recording of galvanic skin resistance on 3 consecutive days. 3 body areas: forehead, arm, and leg, were stimulated on each of the 3 testing days, the order of stimulation so rotated that each body area was stimulated first on one of the days. In 95 out of 102 cases it was possible to determine pain threshold on the basis of the GSR record. The pain threshold as determined by GSR was compared with the pain threshold determined by verbal report. This was done for the total number of cases, and for the cases grouped according to day of recording, body area, and series position. None of these comparisons gave a statistically significant difference. The repetition effect -- previously demonstrated for the verbally determined threshold when more than one body area is stimulated in the same experiment, is thus reflected in the GSR record also. This finding is interpreted to mean that the repetition effect is caused by physiological rather than psychological processes.

R 4

5679

Deatherage, B.H. FIGURAL AFTER EFFECTS IN STROBOSCOPIC MOVEMENT. *Amer. J. Psychol.*, June 1954, 67, 259-267. (University of Texas, Austin, Tex.).

The effect of satiation on the time between successive stimulations required for optimal stroboscopic movement was studied in 2 experiments. In the first experiment, the time for optimal movement was increased by the prolonged inspection of stroboscopic movement. This result may be deduced from Korte's law of the relation between time and distance, on the assumption that the inspection of stroboscopic movement increases resistance (functional distance) in the line of movement. In the second experiment, the effect on the time for optimal movement of satiation-produced changes in the size of the stimuli for movement was measured. An increase in apparent size increased the time and a decrease in apparent size had no significant effect, neither result being in accord with predictions made from Korte's law of the relation between intensity and time. Subsequent measurements of the relation between time and physical size contradicted Korte's law, however, and provided results directly comparable to those of the satiation experiment. In both experiments, then, stroboscopic movement was found to be similarly affected by physical and satiation-induced functional changes in selected parameters.

R 2

5680

Elwell, F.S. EXPERIMENTS TO DETERMINE NEIGHBORHOOD REACTIONS TO LIGHT AIRPLANES WITH AND WITHOUT EXTERNAL NOISE REDUCTION. Rep. 1156, 1953, 43pp. *National Advisory Committee for Aeronautics*, Washington, D.C. (Aeronautical Research Foundation).

Experiments to determine neighborhood reactions to the noise of light airplanes with and without noise reduction equipment were conducted at a number of sites which might be convenient locations for landing strips within the metropolitan area of Boston, Mass. 2 standard airplanes and 2 airplanes modified by reduction gears, 4-bladed propellers, and engine exhaust silencers were used. Flights were made close to residential properties of varying income levels, population densities, and proximity to trade centers in order to determine whether the degree of noise reduction previously found to be aerodynamically and structurally practicable produced a significant reduction in neighborhood objections to such aircraft operations.

5681

Faber, S. GROUND-SIMULATOR STUDY OF THE EFFECTS OF STICK FORCE AND DISPLACEMENT ON TRACKING PERFORMANCE. Tech. Note 3428, April 1955, 21pp. *National Advisory Committee for Aeronautics*, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).

Tests were performed on a ground simulator with one degree of freedom, pitch, to determine the desired magnitude of the control-stick forces and displacements in relation to the performance of a tracking task. The dynamics of the simulated airplane were typical of those of current fighters operating at low altitudes and at subsonic speeds and having an undamped natural frequency of 1/2 cycle per second and a damping ratio of approximately 0.8.

R 1

5684
Fox, B.H. FIGURAL AFTER-EFFECTS: "SATIATION" AND ADAPTATION. *J. exp. Psychol.*, Nov. 1951, 42(5), 317-326. (George Washington University, Washington, D.C.).

In 2 experiments, figural after-effects (FAE) with different distances between non-symmetrical inspection (I) figures and a symmetrical test (T) figure were investigated. I figures, mounted on glass, were inspected against a bright background. A similarly mounted movable T figure was placed at different distances from the former position of the I figure with respect to a fixation cross, and adjusted to the apparent horizontal by S. 3 Ss were studied. A comparison of the first and second 5 of 10 trials per session showed that the cumulation of FAE is not universal for some experimental conditions—here a decline in effect occurred as often as an increase. In the second experiment, adaptation to the norm was removed by using a stimulus symmetrically placed with respect to the fixation mark. Smaller increments of distance between I and T figures were used. The "distance paradox" was verified in this experiment where satiation alone was acting. Indications are that the maximum FAE for present conditions occurs with separation between I and T figure boundaries of between 1/4 and 3/8 in. Smaller FAE occurred in the second experiment. (MEIAS)
R 17

5685
Fox, B.H. & Robbin, J.S. THE RETENTION OF MATERIAL PRESENTED DURING SLEEP. *J. exp. Psychol.*, Jan. 1952, 43(1), 75-79. (George Washington University, Washington, D.C.).

5685
To investigate whether learning takes place during sleep, 30 subjects were divided into three equal groups: 1) a facilitation group which heard a different list of 25 words and correct equivalents repeated fifteen times during sleep, 2) a control group which heard music for an equal time during sleep, and 3) an interference group which heard 25 words and incorrect equivalents. Results were discussed as they related to previous studies in this area.
T. R 1

5686
Gilchrist, J.C. THE FORMATION OF SOCIAL GROUPS UNDER CONDITIONS OF SUCCESS AND FAILURE. *J. abn. & soc. Psychol.*, April 1952, 47(2), 174-187. (University of Wisconsin, Madison, Wisc.).

5686
To investigate one aspect of group formation under conditions of success and failure, 234 college students, divided into four treatment groups, were studied. Small groups of four subjects were studied as to their grouping choices (after failing or succeeding as individuals) when group action is required for further possible goal attainment. Under the guise of a test development program, various reasoning tests were used as the experimental tasks; thus an initial level of aspiration was provided for these student subjects. The frequencies of first and second task choices for the systematically varied success-failure conditions were analyzed.
T. R 22

5687
Gilchrist, J.C. & Nesberg, L.S. NEED AND PERCEPTUAL CHANGE IN NEED-RELATED OBJECTS. *J. exp. Psychol.*, Dec. 1952, 44(6), 369-376. (University of Wisconsin, Madison, Wisc.).

5687
A series of experiments were performed in the area of need and perceptual change in need-related objects. Specifically, the effects of hunger and thirst upon the luminance matches of projected pictures of food-related and liquid-related objects were investigated.
T. G. R 6

5688
Grant, D.A. THE DISCRIMINATION OF SEQUENCES IN STIMULUS EVENTS AND THE TRANSMISSION OF INFORMATION. *Amer. Psychol.*, Feb. 1954, 9(2), 62-68. (University of Wisconsin, Madison, Wisc.).

In this presidential address given at the meeting of the Midwestern Psychological Association, May 1, 1953, the author states that psychologists stand on the threshold of a new era in the analysis of behavior; that new statistical procedures and new mathematical models are ushering in changes which should revolutionize the methods of investigation in all areas of psychology. He proceeds to outline in a general way some of these new techniques and models that are now available and indicates how they have already proved useful in some of their initial applications to psychological problems. The new techniques of quantification spoken of here deal with behavior as a time series and are concerned precisely with those concepts of organization and patterning of behavior in individual cases which have been so difficult to approach using the nonothetic, cross-sectional statistical methods that have been available in the past. (MEIAS)
R 32

5690
Jones, G. M. AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE: 9. BODY WEIGHT CHANGES. *FFRC 907.9*, Aug. 1956, 55-58. RAP Institute of Aviation Medicine, Farnborough, Hants, England.

5690
A survey of changes in body weight of 37 aircrew (four crews) during approximately one week of high intensity flying operations was made. All men were weighed before the start and after the end of the program. A record was made of which crew each belonged to, whether he lived in the mess on the camp or outside with his family, and his crew duty. Weight changes were studied for differences which might be attributable to any one of these factors. The findings are discussed in relation to fatigue and morale of the men. Suggestions are included for some changes in procedures of food management.
T. G. R 3

5691
Grant, D.A., Kaestner, N.F. & Schipper, L.M. AUTOCORRELATION ANALYSIS OF GROSS LEARNING SCORES. *Percept. Mot. Skills*, 1955, 2, 53-63. (University of Wisconsin, Madison, Wisc.).

5691
Autocorrelational methods are applied to gross scores of motor performance. Two groups of 24 Ss (college students) were given 90 and 450 20-sec. trials on a standard pursuit rotor. The serial correlation coefficients for learning trials at a given separation, tau, in the time series are plotted against tau for both individual and group performances. The uses of autocorrelational analysis in predicting final achievement, in classifying motor skills in terms of complexity, and in describing performance are discussed. Individual differences and the effect of level of training are discussed also.
G. R 13

5694

Grings, W.W., Bryen, G.L., Svenson, D.W. & LaPorte, H.R. SHIPBOARD OBSERVATION OF ELECTRONICS PERSONNEL: GENERAL CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH. Contract Nonr 228 (02); Proj. NR 153 093, Tech. Rep. 7, July 1953, 30pp. Electronics Personnel Research, Psychology Dept., University of Southern California, Los Angeles, Calif.

This report concludes a series of technical reports based upon shipboard observations of electronics personnel on ships of the destroyer type. The objectives of the research are reexamined and the varying degrees of their attainment are evaluated. Some of the more general conclusions are presented. The report is concluded with a number of suggestions for improvement in the electronics maintenance situation and a series of recommendations for future research.

5695

Grings, W.W. & Rigney, J.W. A COMPARISON OF THE EFFECTS OF FOUR DISPLAY CONDITIONS ON THE DISCRIMINATION LEARNING OF SIMULATED SONAR ECHO-RETURNS. Contract Nonr 228 (02); Proj. NR 153 093, Tech. Rep. 8, Aug. 1953, 23pp. Department of Psychology, University of Southern California, Los Angeles, Calif.

5695

This study investigated the effects of four types of displays on the learning to discriminate stimulus patterns of brief duration (translations of echo-return patterns in a sonar system) that differed in the shape of the amplitude envelope. Five groups of 18 subjects were trained for 20 trials (5 discriminations per trial) to discriminate among 5 stimuli. Knowledge of results was provided by an indicator light. Information was presented to each group aurally, visually, aurally and visually simultaneously, or aurally succeeded by visual, or visually succeeded by aural. Effectiveness of the display condition is evaluated in terms of mean number of correct responses per trial during training and during a post-training test series in which no knowledge of results was provided. T.G.I.R 2

5697

Harris, J.D. REMARKS ON THE DETERMINATION OF A DIFFERENTIAL THRESHOLD BY THE SO-CALLED ABX TECHNIQUE. J. acoust. Soc. Amer., July 1952, 24(4), p417. (USN Medical Research Lab., New London Submarine Base, Conn.).

In this brief note, the ABX technique for making discriminative judgments is described and some of its advantages and disadvantages are indicated. In the ABX technique the S is given 2 successive items, A and B, which differ in some respect. X is then presented, a replica of either A or B. The S is required to tell whether X is more like A or B. This procedure, suitably counterbalanced, is reliable and can be used in difficult discriminations or with complex stimuli because the S need not concern himself with what the nature is of the difference between A and B. Its limitation is that the judgmental process called for is really very involved and the S is not making a single judgment but a compound one, thus data cannot be interpreted as clearly. Evidence shows that the ABX is too complicated to yield the finest measures of sensitivity. (HEIAS)

R 4

5698

Harris, J.D. PITCH DISCRIMINATION UNDER MASKING. Amer. J. Psychol., April 1948, 61(2), 194-204. (USN Medical Research Lab., New London Submarine Base, Conn.).

The present series of experiments opens up the field of pitch discrimination in masking, studying the differential thresholds of pitch for pure tones as a function of frequency, sensation-level, and signal-noise ratio. All stimuli are produced and controlled electronically. Discrimination is studied by the method of constant stimuli. Group-to-group comparisons are made either by noting differences between means of individual thresholds or by graphic methods. The first experiment compared discriminability at 500 cps and 800 cps, at 2 sensation-levels, 30 and 50 db, and 4 signal-noise ratios, 5, 10, and 15 db, and infinity. At all comparable sensation-levels and signal-noise ratios, thresholds at 500 cps were superior to those at 800 cps. Discriminability becomes progressively worse as the signal-noise ratio changes from infinity (no noise) to zero (in-noise threshold). The impression is reached that the introduction of masking will not change the relative characteristics of pitch-discrimination, but that the absolute magnitudes of all thresholds will be markedly altered. At a constant signal-noise ratio, discriminability does not change for the worse when the sensation-level is raised 20 db.

R 8

5699

Heuty, G.T. PRIMARY OCULAR NYSTAGMUS AS A FUNCTION OF INTENSITY AND DURATION OF ACCELERATION. J. exp. Psychol., Sept. 1953, 46(3), 162-170. (University of Rochester, Rochester, N.Y.). (ONR)

A study was made of the extent and duration of eye movements resulting from rotation of widely varying speeds and accelerations and photographically recorded through closed lids at high magnification. Of 3 Ss selected, 1 was subjected to 5 different velocities of rotation, 180°/sec. to 12°/sec., reached by each of 6 different accelerations; the other 2 Ss served in spot-checks at critical stimulating conditions. The total amount of slow-phase eye movement was measured from the photographic records for each 2 sec. of the primary nystagmus up to the point where secondary nystagmus began. Conclusions derived were as follows: a) Intensity of acceleration was directly related to the extent of eye movements occurring in primary nystagmus but did not modify the duration of this response; b) Duration of acceleration was directly related to the duration and extent of eye movements of primary nystagmus, and to the period of recruitment of eye movements; c) Total primary nystagmic response output was directly related to total sensory input, i.e., the product of acceleration and its duration; d) Inter-individual variation was of considerable extent with the greatest variation occurring in the duration and amplitude of slow-phase movement.

R 11

5700

Hess, E.H. 'SUBJECTIVE' COLORS: RETINAL VS. CENTRAL ORIGIN. *Amer. J. Psychol.*, April 1952, 65(2), 278-280. (University of Chicago, Chicago, Ill.).

A rather simple test of the central vs. retinal theories for the origin of subjective colors was made by fusing stereoscopically the components of a total pattern so chosen that the pattern produced subjective color while the components, taken separately, did not. Each of 5 Ss observed such patterns, 1 presented components of the pattern separately to each eye; the other presented both components to the same eye. All reported color in the latter case but not in the first. The writer feels that these results cast considerable doubt upon the validity of a central interpretation of subjective color and are consistent with the explanation in retinal terms.

R 4

5702

Hirsh, I.J. BINAURAL SUMMATION--A CENTURY OF INVESTIGATION. *Psychol. Bull.*, May 1948, 45(3), 193-206. (Harvard University, Cambridge, Mass.). (OMR)

This review attempts to summarize experiments of the last 100 yrs. that have revealed evidence for or against binaural summation. The discussion is organized around 2 topics; binaural summation of loudness and binaural summation at threshold. The experiments reported reveal a considerable amount of evidence on the interaction of the 2 ears of the human organism. A sound is heard more easily and, once heard, sounds louder when an observer uses 2 ears than when he uses only one. More than that, the difference in loudness between a tone heard monaurally and one heard binaurally varies with intensity. The difference between the binaural and monaural thresholds varies as a function of the frequency of the tonal stimulus and as a function of the level of a background noise against which stimuli are presented. Explanations which have been deduced by analogy to mechanical or electrical systems have seemed inadequate in the light of subsequent data. It remains to future experimentation to bring to light the parameters which determine interaural summation at threshold and interaural summation of loudness.

R 36

5703

Hirsh, I.J. BINAURAL SUMMATION AND INTERAURAL INHIBITION AS A FUNCTION OF THE LEVEL OF MASKING NOISE. *Amer. J. Psychol.*, April 1948, 61, 205-213. (Rep. PNR 47, OMR, Harvard University, Cambridge, Mass.).

The difference between the binaural and the equated monaural thresholds for 3 pure tones and speech, as a function of the level of a white masking noise, has been investigated. It was found the binaural summation was maximal in the quiet and decreased as the level of the masking noise increased. For lower frequencies and for speech, not only does this binaural summation decrease to zero, but it also becomes negative. The binaural threshold is shown to be higher than the monaural threshold, indicating some kind of interaural inhibition. For listening to at least certain stimuli in the presence of loud thermal noise, 2 ears are not better than one.

R 12

5704

Hirsh, I.J. & Bowman, W.D. MASKING OF SPEECH BY BANDS OF NOISE. *J. acoust. soc. Amer.*, Nov. 1953, 25(6), 1175-1180. (Central Institute for the Deaf, St. Louis, Mo.).

The threshold of intelligibility for 2-syllable (spondee) words was measured in the presence of different levels of masking noise. 12 different bands were used, one (20 to 6600 cps) approximating a white noise and each of the other 11 containing a band of frequencies corresponding to a pitch interval of 250 mels. The absolute thresholds for these bands were also measured to permit transformation of the noise level from an absolute scale to a scale of sensation level. The results show linear relations between the masked threshold and noise level for white noise and for bands of noise between 394 and 1420 cps. For noise bands above 1420 cps this masking function is accelerated, while the 2 bands below 394 cps yield sigmoid masking functions. Of the bands used, the most effective contained frequencies between 670 and 1000 cps. The signal-to-noise ratio at threshold for this band was about -25 db while for bands above or below it became gradually smaller than -25 db, reaching a minimum of -60 db for the highest and lowest bands. White noise was more effective than any band, giving a threshold S/N ratio of -15 db.

R 10

5705

Hirsh, I.J., Reynolds, Elizabeth G. & Joseph, M. INTELLIGIBILITY OF DIFFERENT SPEECH MATERIALS. *J. acoust. soc. Amer.*, July 1954, 26(4), 530-538. (Central Institute for the Deaf, St. Louis, Mo.).

Articulation scores for nonsense syllables and for monosyllabic, disyllabic, and polysyllabic words were obtained as a function of the cut-off frequency of low-pass and high-pass filters and also as a function of signal-to-noise ratio at different noise levels. Results indicate that eliminating all frequencies above or below 1600 cps does not impair the intelligibility of words seriously. The intelligibility of a word is a direct function of the number of syllables in the word and monosyllabic words are more intelligible than nonsense syllables. The relation between the intelligibilities of each word type and nonsense syllables is not the same when the system is impaired by filtering as it is when the system is impaired by noise. The implications of the lack of consistency from one experiment to the other for the generality of the concept of articulation index is discussed.

R 14

5706

Hirsh, I.J. PSYCHOPHYSICS OF HEARING. *Acta Oto-Laryngol.*, 1950, 40(5-6), 273-282. (Psychological Lab., Harvard University, Cambridge, Mass.).

The way in which the psychophysicist has attacked the problems of hearing and the use of psychophysics by the specialist in hearing problems are discussed. The psychophysicist is said to be interested in the relations between certain measurable aspects of the response of individuals to auditory stimuli that seem to give rise to these responses. The contributions of Fechner's psychophysical methods and systematic approach to psychophysical problems are discussed along with recent advances in both control and measurement. 2 basic measures--absolute threshold for pure tones and threshold of intelligibility for English speech--are said to be well enough established so that there are norms with which to compare similar measures made on patients in clinical work. Other relations, such as the difference limen, masking, maximum articulation score, and loudness, have been well enough established for norms but not placed in the clinical testing program. The author feels that the clinician should make himself aware of the work done on the psychophysics of hearing and he should also put psychophysical method to work, not only to make his present kinds of audiometric tests more reliable, but also to expand his own view of the relations between hearing and its pathologies and the kind of stimuli that evoke specific behavioral response in his patient's repertoire.

R 17

5710

Husband, R.W. INTERCORRELATIONS AMONG LEARNING ABILITIES: IV. EFFECTS OF AGE AND SPREAD OF INTELLIGENCE UPON RELATIONSHIPS. *J. Genet. Psychol.*, 1941, 58, 431-434. (Pennsylvania State College, College Park, Penn.).

5710

To determine the effect of age and spread of intelligence on the intercorrelations among learning abilities, 53 pupils in junior high school were required to perform six learning tasks (code substitution, spool packing, mirror drawing, maze learning, reading comprehension, mental maze). Intercorrelations between the tests and between the tests and I.Q. are presented. The results are compared with data obtained from a previous study that used college students.

T. R 2

5711

Hyman, R. STIMULUS INFORMATION AS A DETERMINANT OF REACTION TIME. *J. exp. Psychol.*, 1953, 45, 188-196. (Johns Hopkins University, Baltimore, Md.).

5711

Considering the choice reaction time experiment as a model of a communication system, the author presented a study of stimulus information as a determinant of reaction time. The reaction times of four Ss were obtained under the following conditions of stimulus variance: 1) the number of equally probable alternatives from which stimulus could be chosen, 2) the proportion of time it could occur, and 3) the probability of its occurrence in terms of the preceding stimulus. The results were discussed in terms of the form of the reaction time regression lines for each manner of varying the amount of information presented.

5712

Imus, H.A. INDUSTRIAL OPHTHALMOLOGY: COMPARISON OF ORTHO-RATER WITH CLINICAL OPHTHALMIC EXAMINATIONS. *Transact. Amer. Acad. Ophthalmol. Otolaryngol.*, Sept.-Oct. 1950, 69-71. (USN School of Aviation Medicine, Pensacola, Fla.).

In order to compare the results of testing vision with the Ortho-Rater and clinical ophthalmic methods, a test-retest experiment was conducted with 100 Ss obtained from the officer, cadet, and enlisted personnel of the Naval Air Training Bases, Pensacola, Florida. The same examiner tested each S with standard clinical devices and with the Ortho-Rater, 1/2 being tested first clinically and the other half on the Ortho-Rater. Standard procedures were used and the retest was conducted without either examiner or the Ss having knowledge of results of the first test. In general, the visual tests of the Ortho-Rater are as reliable as the clinical tests. Heterophoria for distant vision and depth perception measurements were more reliable on the Ortho-Rater: vertical phoria at near vision measures were equal; far visual acuity and near lateral phoria clinical measurements were a bit more reliable. The correlation between the Howard-Dolman test and the test of depth perception of the Ortho-Rater is too low to be considered satisfactory. This may be due in part to the lower reliability of the Howard-Dolman test.

R 18.

5715

Klopfer, F.D. A SEMI-AUTOMATIC BRIGHT-FIELD TACHISTOSCOPE. *Amer. J. Psychol.*, Jan. 1953, 66, 105-109. (State College of Washington, Pullman, Wash.).

The design of a tachistoscope for use in the study of perception, but adaptable to a wide variety of uses, is described in this note. Its essential characteristics are listed and a wiring diagram of the apparatus is given. Both photographs and diagrams are used to illustrate the tachistoscope and its assembly.

R 7

5716

Kiesse, F.H., Peterson, B.H. & Grant, D.A. MULTIPLE RESPONSE TRANSFER AS A FUNCTION OF SUPPLEMENTARY TRAINING WITH VERBAL SCHEMATIC AIDS. Contract AF-33(039) 23294, AFPRC IN 55 34, Oct. 1955, 10pp. USAF Personnel and Training Research Center, Lackland AFB, Tex. (University of Wisconsin, Madison, Wisc.). (Reprinted from *J. exp. Psychol.*, Nov. 1954, 49(5), 381-390).

5716

To test the hypothesis that verbal conceptualization would facilitate transfer of training from one method of coding on a display to another when the data coded (range, azimuth, and elevation of a simulated target) are the same, a task was developed which required the making of a three-component stick response to a stimulus pattern presented on an oscilloscope. Mechanically-instructed groups were told what responses to make to change the pattern's location and character in a prescribed way, whereas the conceptually trained group were told that the patterns represented aircraft in different positions. Two different types of display were used. The 80 subjects were run in a trifactorial design--display, instructions, and transfer.

T. G.

5721

London, I.D. A THEORETICAL RELATION BETWEEN RATE OF FORGETTING AND INTERNAL BODY TEMPERATURE. *J. Genet. Psychol.*, 1952, 46, 151-157. (Russian Research Center, Harvard University, Cambridge, Mass.).

5721

A series of equations was derived which relate rate of forgetting of material that has not been overlearned to body temperature. The assumption was made that forgetting is related inversely to the activation of an engram complex conceived as a distribution of molecules at given energy levels within a neuron.

G. R 3

5722

Luborsky, L. AIRCRAFT RECOGNITION: I. THE RELATIVE EFFICIENCY OF TEACHING PROCEDURES. *J. Appl. Psychol.*, Oct. 1945, 29(5), 385-398. (Duke University, Durham, N.C.).

5722

To assess the relative efficiency of four methods for training in recognition of aircraft, four matched groups of eight students underwent 18 sessions of training in the identification of briefly presented aircraft forms. In one group the exposure time of the stimuli was .62 sec. and for a second group it was one sec.; a third group was trained on only three views of each aircraft; and for a fourth group the training syllabus was presented in half the usual time; after which there was a review of easily confused stimuli. Scores obtained by the groups on post-training tests were compared.

T. G. R 10

5723

Luborsky, L. AIRCRAFT RECOGNITION: II. A STUDY OF PROGNOSTIC TESTS. *J. Appl. Psychol.*, Dec. 1945, 29(6), 449-457. (Duke University, Durham, N.C.).

5723

This study deals with prognostic tests of skill in aircraft recognition. Thirty Ss underwent 18 sessions of training in aircraft recognition. Scores on a final test of achievement after training are correlated with scores obtained on a battery of pre-and posttests (span of apprehension, memory, visual acuity, reaction time, previous knowledge of airplanes, academic grades, intelligence, and study time). A regression equation that includes scores on five of the tests is presented.

T. R 3

5724

Luce, R.D. ON THE INTERACTION OF SUBOPTIMIZATION AND COMMUNICATION STRUCTURE IN GROUP PERFORMANCE. Nov. 1955, 20pp. Depts. of Mathematical Statistics and Sociology and Bureau of Applied Social Research, Columbia University, New York, N.Y.

5724

This paper points to the need for a formal definition of a task-oriented group--a definition general enough to encompass in a natural way both the experimental and the life situations. It is suggested that a task-oriented group be treated as a suboptimizing device, that is, as a game with evaluation. Some experimental data on communication structure and group performance are discussed to illustrate the results obtained with such treatment.

I. R 4

5725

Moser, H., Dreher, J.J. & Oyer, H.J. ONE-SYLLABLE WORDS. Contract AF 19(604) 1577; AFRC IN 55 56, RF Proj. 664, Tech. Rep. 41, June 1957, 140pp. Ohio State University Research Foundation, Columbus, Ohio.

5725

This report presents a systematic listing of the monosyllabic words in American English. These words represent, in the composite opinion of the compilers, all socially accepted monosyllabic words. Arrangement is according to sound with various markings indicating qualifications, such as words considered to be borderline between one and two syllables, words with two pronunciations, etc. Appended material includes a summary of occurrence of word counts, order of occurrence of sounds, a glossary of lesser-known words, and monosyllabic trade names of American manufacturers.

T.

5727

Luce, R.D. CONNECTIVITY AND GENERALIZED CLIQUES IN SOCIOMETRIC GROUP STRUCTURE. *Psychometrika*, June 1950, 15(2), 169-190. (Massachusetts Institute of Technology, Cambridge, Mass.).

By using the concepts of antimetry and n-chain it is possible to define and to investigate some properties of connectivity in a sociometric group. It is shown that the number of elements in a group, the number of antimetries, and the degree of connectivity must satisfy certain inequalities. Using the ideas of connectivity, a generalized concept of clique, called an n-clique, is introduced. n-cliques are shown to have a very close relationship to the existence of cliques in an artificial structure defined on the same set of elements, thus permitting the determination of n-cliques by means of the same simple matrix procedures used to obtain the clique structures. The presence of 2 or more m-cliques, where m is the number of elements in the group, is proved to mean an almost complete splitting of the group.

R 3

5728

Easton, E.C. THEORETICAL AND EXPERIMENTAL RESEARCH IN COMMUNICATION THEORY AND APPLICATION. Contract DA-36-039-sc-42703, SC Proj. 17-132-B-0, Progress Rep. 6, June 1955, 27pp. Rutgers University.

5728

This progress report covering a four-month period, February to May 1955, summarizes experimental and theoretical investigations, and developments on a speech transmission system. In particular, developments in the analyzer and synthesizer units are described and a preliminary experimental evaluation of the system in its present form is presented in which spectrograms of an original utterance of the five basic vowels in succession are compared with those of reproduced sound. Theoretical analyses of moment detection were continued during this period. Some results are incorporated in the report.

T. G. I. R 2

5729

Mandler, G. TRANSFER OF TRAINING AS A FUNCTION OF DEGREE OF RESPONSE OVERLEARNING. *J. Exp. Psychol.*, 1954, 47(6), 411-417. (Harvard University, Cambridge, Mass.).

5729

The relation of transfer of training to degree of overlearning of the initial task was investigated. The Ss, 10 groups of six students, were trained to operate hand switches in response to a visual stimulus up to a criterion of 0, 10, 30, 50, or 100 correct trials. A second task, which required learning 1) a new response to an old stimulus, 2) an old response to a new stimulus, 3) an old response to an old stimulus, or 4) a new response to a new stimulus, was then learned. Transfer in terms of correct responses on 20 transfer trials is compared for the various groups.

T. G. R 9

5730

Hann, C.W. AN ANALYSIS OF THE OCULOGYRAL EFFECT. *J. aviat. Med.*, June 1957, 28, 246-253. (Psychology Dept., Tulane University, New Orleans, La.).

In a recent series of articles, Hayne has suggested that, within the limits of the linearity of the vestibular system, the duration of the subjective effects arising from the stimulation of the semicircular canals is proportional to the angular velocity. He arrives at a formula for the duration of the first effect of the form $Y = ae^x$. The application of this formula to the data of nystagmus in pigeons by Hower and the oculogyral effect obtained by Clark and Graybiel gives a good fit to the exponential curve. In this study an attempt was made to apply Hayne's formula to the first effects during and after rotation in the oculogyral illusion. The curve of the data derived from the total first effects appeared sigmoidal, but a good fit to Hayne's exponential curve was obtained at velocities up to 20 rpm when the formula was applied to the gross visual effects--described in this article as the "picket fence" phase of the first effect. Analysis of the results indicates that the total first effect of the oculogyral illusion is made up of 2 components. One of these is produced by the rapid oscillations of the cupula due to its inertia during and following rotation, and the other by the finer movements of the cupula induced by the inertia of the endolymph of the semicircular canals.

R 6

5731
Mann, C.W. VISUAL FACTORS IN THE PERCEPTION OF VERTICALITY. *J. exp. Psychol.*, Dec. 1952, 44(6) 460-464. (Tulane University, New Orleans, La.).

The experiment was designed to test the hypothesis states by Gibson to the effect that the error in the perception of the vertical under consistent visual-proprioceptive stimulation will be less than that made under discrepant conditions. Consistent visual-proprioceptive conditions occur when the vertical lines of the retinal field are parallel to the direction of the gravitational vertical; discrepant conditions are produced when these directions are not parallel. 9 Ss were tested in 15 experimental conditions of room and body tilt. In each condition S was required to set a target rod in alignment with the gravitational vertical. An analysis of the average and constant errors gives support to Gibson's hypothesis. Comparing the results of this experiment with those of a previous experiment by Boring, one concludes that when visual stimulation is increased to the point at which S can identify himself with the visual frame-work, there is conflict between the visual stimulation produced by the frame-work and the proprioceptive stimulation produced by the gravitational force acting on the statocysts. The hypothesis offered by Gibson needs a qualifying statement to the effect that in the judgment of the vertical, reliance will be placed upon the proprioceptive stimulus variables until the visual factors in the visual-proprioceptive variables become sufficiently effective to offer conflict with the proprioceptive variables. When this happens, a compromise judgment will be made, the judgment lying somewhere between the inclination of the visual field and the gravitational vertical.

R 7

5733
Mann, C.W. SUBJECTIVE EFFECTS OF DIFFERENT ROTATIONAL VELOCITIES. Contract N7onr 434, T.O. 1, Proj. Design. NR 143 455, Proj. NM 001 063.01.24, March 1952, 5pp. *USN School of Aviation Medicine*, Pensacola Air Station, Fla.

Mayne's formula for the duration of the first subjective effect following stimulation of the semicircular canals is of the form $Y = ae^{-kx}$. An attempt was made to apply Mayne's formula to the first effects of the oculogyral illusion during and after rotation. A good fit was obtained to Mayne's exponential curve up to velocities of 20 rpm. for the gross visual effects. The analysis indicated that the total first effect of the oculogyral illusion is made up of 2 components: 1. Rapid oscillations of the cupula and finer movements of the cupula induced by the inertia of the endolymph of the semicircular canals.

R 6

5734
Mann, C.W., Berthelot-Berry, N.H. & Dauterive, H.J., Jr. THE PERCEPTION OF THE VERTICAL: I. VISUAL AND NON-LABYRINTHINE CUES. *J. exp. Psychol.*, Aug. 1949, 39(4), 538-547. (Tulane University, New Orleans, La.).

The precision of judgment of the postural vertical from lateral tilt positions in the absence of visual cues is of the order of 0.08° with a standard deviation of 1.1°. The precision of judgment is significantly decreased when the nonlabyrinthine proprioceptive cues are modified by the introduction of a well padded seat. There is a marked tendency for the mean error of judgment to be in the direction of lateral tilt. The precision of the judgment of the visual vertical when the individual is seated in a vertical position is of the order of 0.3° with a standard deviation of 2.6°; of the visual horizontal, of the order of 0.4° with a standard deviation of 2.9°. These values are significantly increased when the judgment is made in a position of lateral tilt. The visual target, when placed in positions deviating not more than 15° from the horizontal, does not significantly affect the judgment of the postural vertical.

R 14

5735
Mann, C.W. & Boring, R.O. THE ROLE OF INSTRUCTION IN EXPERIMENTAL SPACE PERCEPTION. *J. exp. Psychol.*, Jan. 1953, 45(1), 44-48. (Tulane University, New Orleans, La.).

To test the effect of instructions upon the perception of the gravitational vertical, two groups of subjects were required to set a target rod to the gravitational vertical against a visual framework under various conditions of lateral inclination (30 degrees L, 0 degrees, and 30 degrees R). While one group was made aware of the correct criterion of judgment, the other group was simply told to set the target to the vertical. The results are discussed in terms of differences between the groups in accuracy and variability of judgments as a function of pre-experimental training in the proper criterion of performance.

T. R 6

5736
Mann, C.W., Guedry, F.E. & Ray, J.T. POST-ROTATIONAL PERCEPTION OF APPARENT BODILY ROTATION. *J. exp. Psychol.*, Feb. 1951, 41(2), 114-120. (Tulane University, New Orleans, La.).

This investigation was designed to determine the relative contributions of the visual and postural factors to the post-rotational effects of the oculogyral phenomenon. Comparisons were made of the post-rotational effects produced under conditions of a) no visual stimulus, b) continuous visual stimulus, and c) flickering visual stimulus. 3 sophisticated Ss were used in the investigation. The equipment consisted of a Link Trainer modified to rotate at 20 rpm. Reports by the Ss of the cessation of post-rotational apparent movement under all conditions yielded subjective measures of the duration of the first effect of the oculogyral phenomenon. The duration of the first effect under conditions A, no visual stimulus, and B, continuous visual stimulus, were of the same order. A Phi phenomenon was experienced by observers at the commencement of the first effect. It was of variable duration for each observer, but in each case was of lesser duration than the total visual first effect. It is concluded that the perceptual nature of the first effect of the oculogyral illusion is a result of 2 components: a) a visual component which produces the rapid Phi phenomenon, probably a corollary of nystagmic eye movements, and b) a postural component which contributes the smooth unidirectional apparent motion characteristic of the first effect. It is proposed to designate the postural component the "postural negative aftereffect."

R 8

5738
McGuigan, F.J. AN EVALUATION OF THE TANK GUNNERY PROGRAM UNDER THREE DEGREES OF SPECIALIZATION. May 1952, 6pp. Human Resources Research Office, *George Washington University*, Washington, D.C.

5738

To determine whether an increase in the amount of time devoted to Tank Gunnery is justified by an increase in proficiency in Tank Gunnery skills, four companies of Tank Gunners, Tank Drivers, and nonspecialized Tank Crewmen were trained in three different gunnery programs (108, 197, and 78 hours of Tank Gunnery training). The results were discussed in terms of differences among the groups in gunnery proficiency as reflected in various types of firing exercises.

T.

5739

Benjamin, P.H. THE EFFECT OF PAIN ON PERFORMANCE. *MADG-MA-5612*, Proj. NM 001:103 301, Rep. 10, Sept. 1956, 19pp. U.S.N. Aviation Medical Acceleration Laboratory, *MADG*, Johnsville, Penn.

5739

To study the effect of pain on performance, 26 subjects each serving as his own control were used. Pain was produced by: 1) pressure headgear yielding mild pressure pain of one dol or less; 2) pressure cuff yielding deep aching pain of two to three dols; and 3) ice water immersion yielding cold pain up to four dols. Performance tests were composed of mental test items, memory items, time perception, muscular coordination, reaction time and work (bicycle ergometer). All subjects performed each test once with and once without each of the pain producing stimuli. Differences in performance for experimental and control conditions were analyzed. The findings are discussed and interpreted in light of the present state of knowledge in this area.

T. R.21

5740

Murray, J.E. AN EVALUATION OF TWO EXPERIMENTAL CHARTS AS NAVIGATIONAL AIDS TO JET PILOTS. *J. appl. Psychol.*, 1953, 37(3), 218-222. (Dunlap & Associates, Inc., Stamford, Conn.).

5740

To evaluate two experimental charts designed for use in navigating high-speed, high-altitude aircraft, 198 pilots and 10 college students participated in readability tests under daylight and night lighting conditions and answered questionnaires designed to elicit opinions about preferences. In one test the present standard chart (World Aeronautical Chart) was included for purposes of comparison. Data included both speed and accuracy scores on reading tests and number of responses to items on questionnaires; analysis was in terms of differences between charts in presenting airport, radio, natural and cultural features, and general information. Recommendations were included. (Condensed report, see 5741).

5741

Murray, J.E., Watert, R.H. & Orlansky, J. AN EVALUATION OF TWO EXPERIMENTAL CHARTS DESIGNED FOR NAVIGATION IN HIGH-SPEED, HIGH-ALTITUDE AIRCRAFT. Contract N8ONR 641, ONR Rep. 641 OS 6, May 1952, 103pp. *Dunlap & Associates, Inc.*, Stamford, Conn.

5741

To evaluate two experimental charts designed for use in navigating high-speed, high-altitude aircraft, 198 pilots and ten college students participated in readability tests under daylight and night lighting conditions and answered questionnaires designed to elicit opinions about preferences. In one test the present standard chart (World Aeronautical Chart) was included for purposes of comparison. Data included both speed and accuracy scores on reading tests and number of responses to items on questionnaires; analysis was in terms of differences between charts in presenting airport, radio, natural and cultural features, and general information. Recommendations were included.

T. G. I.

5743

Mystrom, C.O. S. G. R. A. J. A. PERFORMANCE ON A KEY PRESSING TASK AS A FUNCTION OF THE ANGULAR CORRESPONDENCE BETWEEN STIMULUS AND RESPONSE ELEMENTS. *PERCEPT. MOT. SKILLS*, 1955, 5, 113-125. (University of Delaware, Newark, Del.; University of Wisconsin, Madison, Wisc.).

groups of 25 Ss per group performed a key-pressing task which differed between groups in that the stimulus light display took angular orientation relative to a fixed horizontal set of keys of 0°, 45°, 90°, 135°, and 180° counter-clockwise. Orthogonally to this independent variable, half the Ss matched 2-light patterns, the other half matched 4-light patterns. After 9 blocks of 25 2- or 4-light matches, each S was shifted to 4- or 2-light patterns, respectively. It was found that: a) There was a significant difference in the effects on performance due to the stimulus light orientation variable; b) 2-light patterns were matched significantly faster than 4-light patterns, with an overall advantage of 1.10 sec. per pattern on the average; c) The number-of-lights-per-pattern interacted with the stimulus light orientation effect on performance during the first 9 blocks of patterns, in that a somewhat different relationship existed between pattern-matching time and stimulus light orientation depending on whether 2-light or 4-light patterns were employed; d) Greater positive transfer effects were apparent in transferring from 4-light to 2-light patterns than in transferring from 2-light to 4-light patterns; e) Although initially the degrading effect of angular orientation was greater for the 4-light patterns than for the 2-light patterns, after training the angular effect was equal.

5744

Passey, G.E. THE PERCEPTION OF THE VERTICAL. IV. ADJUSTMENT TO THE VERTICAL WITH NORMAL AND TILTED VISUAL FRAMES OF REFERENCE. *J. exp. Psychol.*, Dec. 1950, 40(6), 738-745. (ONR, Tulane University, New Orleans, La.).

5 midshipmen from the Tulane Naval ROTC unit served as Ss. They were required to adjust a chair to the vertical positions from tilted positions in the lateral plane. The chair was located in a room which could be tilted to various inclined positions in the lateral plane. Adjustments were made in the presence of a visual frame of reference consisting of the entire room set 0°, 5°, 10°, 15°, and 20° from the gravitational vertical in the right and left quadrants. 10 determinations were made for each position of room tilt. Ss always began his adjustments from a tilted position of 45°. The theory of Koffka that the accepted vertical will agree with the main lines of visual space though they may be in conflict with the postural cues was rejected under the conditions of this experiment. Adjustments in the presence of a visual frame of reference showed equal variability when the visual cues presented were in conflict with the postural cues, and when the 2 were in alignment. When adjustments were made from tilted positions in the same quadrant as the tilted room the resulting average errors and constant errors in the direction of the tilted room were greater than when adjustments were made from tilted positions in the opposite quadrant from the tilted room. With increasing amounts of tilt of the visual framework there was an increase in the size of average error of adjustment and of constant error in the direction of the tilted room. Statistical treatment revealed that only the differences between conflict in postural and visual cues and no conflict were significant. Implications for the relative importance of postural and visual factors in the perception of the vertical were discussed.

5745
Passey, C.E. & Goddy, F.E., Jr. THE PERCEPTION OF THE VERTICAL: II. ADAPTATION EFFECTS IN FOUR PLANES. *J. exp. Psychol.*, Oct. 1949, 33(5), 706-707. (Psychology Dept., Tulane University, New Orleans, La. & USN School of Aviation Medicine and Research, Pensacola Air Station, Fla.).

16 Ss were required to return a modified Link trainer to 'straight and level' flight following inclination. Inclinations were made in 4 planes passing longitudinally through the gravitational vertical and were designated as medial, left oblique, lateral, and right oblique. 20 adjustments were made in each plane during 4 experimental sessions in which each session was devoted to making determinations in one plane only. 10 adjustments were made from each direction within a plane and half of the trials in each direction were made under conditions of immediate return to the vertical after inclination while half of the trials entailed a 60-sec. delay before readjustment was allowed. When either absolute divergence from the gravitational vertical in degrees or number of errors in direction of initial inclination is considered, there is a significant adaptation effect. Delay also serves to produce significant difference in variability. There is no significant difference in performance shown in comparison of adjustments from different directions of inclination in the same plane. Adjustments in the lateral plane are made with greater accuracy than adjustments in either medial, left oblique, or right oblique. The differences are significant at the one percent level.
R 12

5747
Stewart, Dorothy. INTELLIGENCE AND THE ABILITY TO LEARN. *J. Psychol.*, 1947, 23, 27-43. (Department of Psychology, University of Illinois, Urbana, Ill.).

5747
To investigate intelligence as the ability to learn, nine experimental implications of this theory were evaluated in terms of the test scores obtained by 95 Ss on the Otis Intelligence Test—Form A and B, tests of perception, spatial relations, and memory. The results were discussed in terms of the relations between gains in learning of various tasks and customary indicators of intelligence (such as mental age) as these reflect upon the verification of the definition of intelligence as ability to learn.
T. R 6

5750
Achinstein, R.C. & Ames, R.B. EXPERIMENTAL FACTORS IN VISUAL FORM PERCEPTION: II. LATENCY AS A FUNCTION OF REPERTOIR. *J. exp. Psychol.*, March 1952, 43(3), 173-179. (Indiana University, Bloomington, Ind. & University of Louisville, Louisville, Ky.).

5750
To investigate experimental factors in visual form perception (visual recognition), 24 Ss practiced visual form perception (recognizing the percept he was instructed to find) on two Eriksen foils, then were given ten consecutive trials (exposures to recognition) with each of four percepts based on additional Eriksen cards. Magazine picture naming and staircase reversal tasks were interpolated between exposures (15 seconds duration). Recognition latencies (time from exposure to recognition) were analyzed with respect to practice, interference, and difficulty of percept.
G. R 14

5748
Stevens, K.N. A SURVEY OF BACKGROUND AND AIRCRAFT NOISE IN COMMUNITIES NEAR AIRPORTS. Tech. Note 3379, Dec. 1954, 36pp. US National Advisory Committee for Aeronautics, Washington, D.C. (Bolt Beranek and Newman, Inc., Cambridge, Mass.).

An extensive survey has been made of background and aircraft noise levels in residential communities in 8 cities having major airports. The measurements were made in areas up to a distance of 12 miles from the airports, and the areas were chosen to be under regularly used flight paths. Readings of background noise were obtained primarily in the octave bands 75 to 140, 300 to 600, and 1,200 to 2,400 cps, about 25 such spectra being taken in each area. Octave-band spectra were obtained from magnetic tape recordings of the noise of about 250 aircraft in flight, representing substantially all commercial types.

5749
Trant, J.P., Jr. PRELIMINARY INVESTIGATION OF A STICK SHAKER AS A LIFT-MARGIN INDICATOR. Tech. Note 3351 Feb. 1955, 15pp. National Advisory Committee for Aeronautics, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).

An exploratory study was made to determine whether a pilot could use vibration of the control stick, in which either the amplitude or the frequency, or both, varied with lift or angle of attack, as a means of maintaining a desired lift margin below the stall. The study was made in the laboratory with several Ss, both pilots and nonpilots, by using an apparatus consisting of a control stick, a shaker, and shaker control equipment which provided varying amplitude and frequency with stick displacement. The tests consisted of having a S attempt to maintain a given frequency and amplitude of vibration by moving the stick to compensate for an arbitrary change in frequency and amplitude imposed on the system by an operator independently of the stick motion. A brief study was also made to determine the minimum change in frequency or amplitude a S could detect. The results of these tests indicated that, once established, a given flight condition could probably be maintained by sensing variation in stick vibrations at least over the period of time covered by the tests (35 sec.), provided that the allowable variations from the desired flight conditions produced changes in amplitude of vibration of about 100% or changes in frequency of about 40%, or both. In the ranges of amplitude and frequency covered in the tests, sensitivity-to-amplitude changes increased with increase in amplitude and frequency; sensitivity to frequency changes did not appear to be materially affected by amplitude.
R 6

5754

Culbert, S.S. SYSTEMATIC ERROR IN THE ESTIMATION OF SHORT TIME INTERVALS. *J. crim. Law Criminal.*, Jan.-Feb. 1954, 45(5), 684-688. (University of Washington, Seattle, Wash.).

This report summarizes a classroom experiment on the error of estimation of short time intervals--120 sec. All students in a class were required to estimate the time interval between 2 events under 3 conditions (each at widely separated classmeetings): a) Instructor enters room, announces an experiment in which all will take part, tells students it may be embarrassing if they are not attentive, fills remaining time with other preparations, and finally slaps desk loudly. A questionnaire, including one item on estimate of time lapse was then filled out by each S; b) Instructor walks into room, lectures for 100 sec., and writes V on blackboard. This time only an estimate of time elapsed was required; c) Instructor announced that he was going to ask the students to estimate the time between 2 signals; he then talked informally during this period. In the first instance, the lowest estimate was 2 min. 46 sec., median was 8 min., highest was 20 1/2 min. In the second situation there was over-estimation but not as great, the mean was 2 min. 20 sec. And finally, the mean for (c) was 58.2 sec. with 2/3 underestimating the interval. The importance of these findings to testimony and reliability of witness report is discussed.

R 6

5755

Culbert, S.S. DIRECTIONAL AFTER-EFFECTS FOLLOWING SYSTEMATIC DISTORTION OF THE VISUAL FIELD. *J. Psychol.*, 1954, 37, 81-93. (University of Washington, St. Louis, Mo.).

The study was concerned with the problem of how S's phenomenal horizontal would be influenced by systematic distortion of the visual field. An experiment compared the directional after-effects of 6 geometric transformations of a rectangular grid composed of 10 vertical and 10 horizontal lines, the grid being the only figure in a black visual field. Each of 36 Ss made 240 difficult judgments of whether an exposed line was slanting up or down. The scores were subjected to an analysis of variance. Very considerable individual differences between different orders of presentation indicate that perceptual after-effects bridged the inter-trial rest period of 4 min. and had slight but measurable effects on the next trial series. A detailed analysis of the overall significance of experimental treatment showed that the effect on S's phenomenal horizontal was measurable after the visual stimulus field and visual after-effects had disappeared, and that the amount of the effect was a curvilinear function of the amount of distortion. (NEIAS)

R 10

5756

Moser, H.H., Droher, J.J., & Schwartzkopf, L. J. PHRASEOLOGY OF INTERNATIONAL LANGUAGE OF THE AIR (SENTENCE FORM). Contract AF 19(604)-1577, Proj. 7621, Tech. Rep. 42, AFPCRC-TT-57-51, Aug. 1957, 28pp. *Operational Applications Lab., AFPCRC, Bolling AFB, Washington, D.C.* (Ohio State University Research Foundation).

5756

To consider implications of the International Civil Aviation Organization (ICAO) letter (AOT/30-514) in regard to changes in currently authorized radiotelephone messages, a review of present phraseology (telegraphese) and its advantages was made. An experiment to test comprehension of air messages in three types (recorded sentences, present ICAO form, and experimental form) was performed using both foreign and American listeners. Per cent correct comprehension scores were analyzed for advantages of one type over the other. A seminar group composed of foreign pilots and language instructors of the Air Force Language School discussed preferences in terms of ease of learning and comprehending. Specific suggestions are included.

G. R 4

5759

USN Medical Research Lab. SUMMARIES OF RESEARCH REPORTED ON DURING CALENDAR YEAR 1955. Dec. 1955, 18pp. *USN Medical Research Lab., New London Submarine Base, Conn.*

5759

This article presents a summary and bibliography of the research conducted by the US Naval Medical Research Laboratory during the period January 1955 to December 1955. Of the reports summarized here, the topics include the followings: submarine school success with use of Navy Thematic Apperception Test themes, claustrophobic reactions to stress, and so forth.

5760

French, R.S. IDENTIFICATION OF DOT PATTERNS FROM MEMORY AS A FUNCTION OF COMPLEXITY. *J. exp. Psychol.*, Jan. 1954, 47(1), 22-26. (USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.).

5760

To investigate ease of pattern identification from memory as a function of increased complexity of the pattern, each of 768 basic trainees was required to learn a city name for a group of 12 dot patterns with the number of dots in the patterns varied from one to 12 for independent groups of Ss. The results were discussed in terms of the effects of degree of complexity and type of arrangement of pattern upon ability to recall the identity of the pattern.

G. R 5

5761

Fruchter, B. ABILITY PATTERNS IN TECHNICAL TRAINING CRITERIA. *J. appl. Psychol.*, Dec. 1952, 36(6), 381-384. (University of Texas, Austin, Tex.).

5761

In an attempt to classify occupations on the basis of the profile of aptitudes and traits of the persons who were candidates for technical training in a job, 389 airmen assigned to various technical schools were screened on 19 test variables (e.g., reading vocabulary, arithmetic, general mechanics, etc.). A factor analysis was made to discover the communalities among such training areas as weather observer, draftsman, carpenter, etc. Suggestions were offered for analyzing criteria of training for better understanding the variance in technical-training course grades and other proficiency criteria.

T. R 13

5762

French, R.S. PATTERN RECOGNITION IN THE PRESENCE OF VISUAL NOISE. *J. exp. Psychol.*, 1954, 47, 27-31. (USAF Human Resources Research Center, Lackland AFB, Tex.).

5762

To study pattern recognition as affected by "visual noise" (randomly scattered points of light), 192 different combinations of target patterns composed of a number of dots (2-9) were embedded in random noise patterns (1-8 dots). The target pattern was presented on one side of the screen and the same pattern with noise was presented rotated 36 degrees clockwise or counter-clockwise on the opposite side. Subjects (195) responded by indicating the direction of rotation. Error data were analyzed as a function of increasing complexity of pattern and increasing complexity of "noise." The application of the results to radar scope interpretation was discussed.

T. G. R 5

5764

Gledstone, R. A GROUP TEST OF PALMAR SWEAT. *J. gen. Psychol.*, 1953, 48, 29-49. (School of Education, Oklahoma A. & M. College, Okla.).

A group test of palmar sweating was developed. It is cheap and simple. It was tested for its ability to discriminate between the average palmar sweat of a group when the individuals of that group were at different emotional levels. Essentially 3 different sorts of situations were used to test the validity of the test: situations which are laboratory-like, or staged, in nature; the academic examination; and certain aspects of the normal school situation. The data from all 3 of these situations indicated the validity of the test as a test of intra-individual emotionality on a group basis. Some contra-evidence was obtained, but it is both considerably overshadowed by the positive evidence and of doubtful validity due to certain experimental errors committed. Some data indicate that the test is individually diagnostic if the stress is severe enough. It is concluded that the test promises to be useful. Some variables involved remain to be more fully explored. Use of the test in the solution of psychological problems is to be discouraged at this point of the development of the test unless competent personnel have a thorough understanding of the variables involved.

R 61

5766

Grings, W.W. THE EVALUATION OF EXPERIMENTALLY CONTROLLED CRITERIA. *Psychol. Bull.*, July 1952, 49(4), 333-338. (University of Southern California, Los Angeles, Calif.) (Diss.)

Many of the most relevant objective criteria of performance in military and industrial situations are rendered comparatively useless because of their unreliability. They are often complex and their variance is determined by a multitude of factors other than performance. This paper considers some of the problems of estimating or predicting the improvement that might be expected to result from the exercise of experimental control over selected sources of extraneous variation within the criterion. In particular, a method of randomizing the effects of a given variable with reference to individual performers is developed. (HEIAS)

R 12

5767

Haneman, V.S., Jr. & Sanders, J.W. CORRELATION COMPUTATION. Proj. 7182, Tech. Rep. 55 197, April 1955, 12pp. USAF Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio.

A survey of 16 correlation computers, methods of application, and problems associated with this type of equipment has been conducted. The results of this survey are presented in the hope that it will stimulate thinking to improve the methods of application and computation, to reduce duplication of effort, and to promote a flow of information on correlation computation.

R 23

5768

Harris, F.J. TRAINING THE COMBAT RIFLEMAN IN THE CHINESE COMMUNIST FORCES AND NORTH KOREAN ARMY. Proj. SHOP, Tech. Memo. ORO T 52 (FEC), Jan. 1954, 39pp. Operations Research Office, Johns Hopkins University, Chevy Chase, Md.

5768

This study attempts to describe and evaluate the effectiveness of the methods used by the Chinese Communist Forces and North Korean Army in training riflemen for combat. On the basis of questionnaires administered to 63 Chinese Communists and North Korean Army riflemen, seven prisoner-of-war officers, and analysis of Army intelligence documents, a detailed description of training is offered along with a comparison of this program with the U.S. Army training program for riflemen.

T. G. R 12

5771

Hillmann, Beverly, Lee, G.B. & Sperling, H.G. BRIGHTNESS THRESHOLDS AS A FUNCTION OF TARGET CONTRAST AND RETINAL POSITION. Proj. NM 002 014.09.04, Rep. 266, July 1955, 12pp. USN Medical Research Lab., New London Submarine Base, Conn.

5771

To determine the best method of detecting low-contrast targets, such as ships on the horizon, under various visibility conditions and low illumination, the variations in brightness threshold for targets of differing contrasts were measured on the temporal retina for two dark-adapted Ss who judged the orientation of rectangular test objects (one by one-third degree of visual angle and 16, 26, 38, 51, and 96.4 percent contrast with background). Threshold brightness (50 percent limens) was analyzed as functions of off-center vision (degree from fixation) and target contrast. The practical applications of the findings were discussed.

G. I. R 10

5769

Hastorf, A.H. THE INFLUENCE OF SUGGESTION ON THE RELATIONSHIP BETWEEN STIMULUS SIZE AND PERCEIVED DISTANCE. *J. Psychol.*, 1950, 29, 195-217. (Dartmouth College, Hanover, N.H.).

A study was conducted to determine whether a change in suggestion as to the nature of a stimulus would alter its apparent distance. Thus, one circular stimulus was called a ping-pong ball and later a billiard ball. 32 Ss adjusted the size of the projected stimulus so that it appeared to be the same distance as a fixed marker; at a later time they merely made localization judgments. A comparison of size settings under different suggestion shows that significant differences did occur in the direction expected. Analysis of the localization judgments supports the size setting analysis. The results were interpreted as a demonstration that, under certain conditions, the size of a stimulus can be used as a distance cue and that apparent distance depends upon assumed size of object being judged. The phenomenon of size constancy was discussed in relation to these findings. (HEIAS)

R 21

5770

Hill, C.W. PERCEPTUAL JUDGMENT AS A FUNCTION OF MENTAL SET, ANCHORING POINT, AND METHOD OF JUDGMENT. *J. exp. Psychol.*, Nov. 1953, 46(5), 325-328. (Vanderbilt University, Nashville, Tenn.).

2 heretofore separate lines of investigation into the dimensions of perceptual judgment were integrated by examining the interacting influences of a visual anchoring point and a conflicting mental set upon the formation of a scale of perceptual judgment. The influence of the suggestion-induced set, with or without the presence of the anchoring point, was significant beyond the .1% level of confidence. A gradual increase in the influence of the anchoring point throughout the series of judgments could be accepted at the 5% level of confidence. It was concluded that: a) the influence of a mental set may be a strong determining factor in the perception and subsequent judgment of an unstructured situation; and b) the presence of an anchoring point may be of help in stabilizing the perceptions and judgments, but its influence should not be taken for granted.

R 8

5772
Beehberg, J., & Smith, O. LANDING STRIP MARKINGS AND THE "EXPANSION PATTERN": I. PROGRAM, PRELIMINARY ANALYSIS AND APPARATUS. *Percept. Mot. Skills*, 1958, 5, 81-82. Contract Nonr 401(14). COR, Cornell University.

5772
The perceptual problem faced by the pilot in approaching a landing strip was analyzed theoretically on the basis of relative changes of position and rates of movement of points in the perceptual field. Factors limiting how much of the potential information available to the pilot—visual acuity, effectiveness, "assumptions" (concerning target and relation between target and pilot), and attention, set, and learning—were discussed and defined. Apparatus for empirical measurements was described and a program of research outlined.

I. R 17

5775
Knehr, C.A. INDIVIDUAL DIFFERENCES IN SUBJECTIVE COLOR. *J. Psychol.*, 1953, 36, 289-294. (Cornell University Medical College and Hunter College, New York, N.Y.).

The experiment was designed to investigate the possible role of central activity in subjective color. A standard Benham disc rotated clockwise against a medium gray background at 12.5 revolutions per second. 25 Ss looked at the rotating disc and, after a minute or two, described what they saw, and matched the color against standard color caps. The inner band (of the Benham disc) yielded only 2 colors. Green was seen by 2 Os, while purple or blue-purple was reported by 6 Os. The second band showed a wide distribution of color matching from yellowish-green around through yellow, orange, and red, to blue-purple. The distribution of the third band was quite different with most Os reporting colors from the bluish green around to reddish orange. In the fourth band, most Os reported charcoal or other dark gray. Repeat testing on 6 Ss indicated no appreciable changes in color matching. The large individual differences in subjective color might be attributed to some aspects of central, rather than retinal, functioning. (HEIAS)

R 6

5778
Lacey, J.I. & VanLehn, Ruth. DIFFERENTIAL EMPHASIS IN SOMATIC RESPONSE TO STRESS. *Psychosom. Med.*, March-April 1952, 14(2), 71-81. (Samuel S. Fels Research Institute for the Study of Human Development, Yellow Springs, Ohio).

The responses, to a modified cold pressor test, of blood pressure, heart rate, heart rate variability, and palmar conductance were measured in a group of boys and girls varying in age from 6 to 18 years. Each individual responded with a hierarchy of response. On one measure the subject might appear markedly hyporeactive, on another markedly hyperreactive. The hierarchy of response was fairly reproducible upon immediate retesting. Some methodologic and theoretic implications of these findings for psychosomatic medicine were developed.

R 12

5781
Lauer, A.R. WHAT VISUAL ACUITY IS NEEDED FOR DRIVING. *Optom. Wkly.*, April 1950. (Iowa State College)

5781
In this paper, the importance of good visual acuity for safe driving is reviewed briefly. The author also describes various acuity tests, factors which affect visual acuity, and other anomalies and conditions which are related to safety in driving.

5782
Lewis, D. THE EFFECT OF NOISE AND VIBRATION ON CERTAIN PSYCHOMOTOR RESPONSES. *Res.*, 6, Jan. 1943, 87pp. Civil Aeronautics Administration, Washington, D.C. (State University of Iowa, Iowa City, Iowa).

Experiments were undertaken to learn if there is a decrement in work under noise and vibration conditions similar to those characterizing military aircraft. In the first study, 80 male Ss performed on a Hashburn apparatus for 1 1/2 hrs under conditions of silence (control), noise of 85 and 110 db, vibration 4 to 6 mils, and a combination of the 2 noise levels and vibration. The second study used 36 Ss over a 4 1/2 hr work period. Effects of noise and vibration, respectively, on heart rate, breathing, tilt perception, brain waves, and hearing acuity were studied in addition to work performance on the perceptual motor task. Exposure to loud noise for as much as one hour raised the threshold for hearing somewhat and there was an indication that breathing rate was accelerated during some of the experimental conditions. On the whole, however, the results were negative in the sense that they revealed no consistently significant differences between reactions when noise, vibration, or both were present and when these supposedly disturbing factors were absent. The experimental design did not permit a detailed examination of changes in attitudes and feelings and of possible increases in effort required to maintain "efficiency" under such conditions. (HEIAS)

5786
Miller, G.A. & Frick, F.C. STATISTICAL BEHAVIORISTICS AND SEQUENCES OF RESPONSES. *Psychol. Rev.*, Nov. 1949, 56(6), 311-324. (Harvard University).

5786
This paper is concerned with procedures that can be used to analyze serial dependencies in chains of responses. An approach to experimentation in modern psychology, called "statistical behavioristics", is set forth. Within this area lie the problems that involve sequences of response or courses of action. Methods of approximate representation of the course of action are discussed and an index of behavioral stereotypy (predictability) is defined. An experimental illustration of the procedures is given using data on multiple-choice behavior.

T. G. I. K 5

5787
Bean, E.S., Davenport, E.W., & Harsh, C.M. AIR STATION CONTROL TOWER SURVEY. *NEL/Rep.* 707, Aug. 1956, 28pp. U.S. Navy Electronics Laboratory, San Diego, Calif.

5787
To make a human factors evaluation of air-traffic control towers, 4 military and two civil installations were studied by visits of a survey team or by mailed questionnaire. Data obtained from all towers related to problems of air traffic, control tower operating procedures, communications, equipment in the cab, tower structure and cab environment, and personnel. Numerous recommendations are made for improvement in these areas and the desirability of standardization is discussed.

T. G. I.

5794

Scopino, J.A., Gartner, W.B., Manning, F.E. & Older, H.J. STUDY OF THE PRESENT STATUS OF TRAINING AIDS AND DEVICES IN THE ARMY TRANSPORTATION COMPANY OFFICERS' COURSE. Contract Nonr 1927(00), NAVTRADEVEN Proj. 20 F 16, Tech. Rep. 1927 02 1, June 1956, 65pp. USN Training Device Center, Port Washington, Long Island, N.Y.

A study was undertaken in order to determine the optimum utilization of the current training aids and devices being used in the Transportation Company Officers' Course at the Transportation School, Ft. Eustis, Va. Most of the aids in use were two-dimensional graphics, films, and models; with few exceptions, complex training devices were not employed. Data were obtained from various sources such as vault files, interviews with instructors, evaluation forms, student surveys, and instructors' opinions. The major findings can be summarized as follows: Of the 150 training aids surveyed 78 were judged satisfactory in their present form, 54 were satisfactory if modified, and 18 were unsatisfactory. The most common weakness of the aids was their lack of attention value. Specific recommendations are presented for modification of existing aids, substitutions for the unsatisfactory aids, and optimum utilization of all training aids. (HEIAS)

R 5

5788

Moore, F.A. & Riopelle, A.J. THE EFFECT OF VARYING THE INTENSITY AND THE DURATION OF PRE-EXPOSURE UPON SUBSEQUENT DARK ADAPTATION IN THE HUMAN EYE. ALCOHOL, PHARMACOL. PSYCHOL., Feb. 1953, 46(1), 49-52. (University of Wisconsin, Madison, Wisc.; Emory University, Atlanta, Ga.).

The recovery of dark adaptation was measured following all the combinations of intensities and durations of pre-exposure for 4 intensities (66, 66.4, and 6.64 m.L.) and 4 durations (500, 50, 5, and 0.5 sec.). The measuring instrument was a Nachts-Spieler adaptometer, and threshold tests were made for a parafoveal region, 3° visual angle in extent, centered 7° from the fovea on the nasal portion of the right retina. The pre-exposure stimulus was white from the threshold-exposure stimulus was violet. All pre-exposure and test measurements were made through a 2-mm. artificial pupil. The authors served as experimenters and Ss, and each went through all 16 combinations of intensities and durations 3 times. The raw data were recorded in log micromicrolamberts. The values used in the analysis of the results were the arithmetic means of the 3 sets of logarithmic threshold values. The chief results were as follows: a) As pre-exposure intensity is increased (at constant duration) or duration is extended (at constant intensity), the initial threshold rises and the recovery of dark adaptation is retarded. When the pre-exposure intensity is increased by a given factor, the initial threshold value is raised more than if the duration is increased by the same factor. b) There is a marked variation in the values of the threshold at which color is last seen in the test stimulus; following lower intensities of pre-exposure, colored stimuli are seen at lower threshold values than at higher intensities. c) When the reciprocity relationship of pre-exposure for the different values of intensity and time for which $I \times t = C$ is investigated, it is found that there is little or no difference in the course of dark adaptation following degrees of pre-exposure equal to 3,320 m.L.-sec. and below. For higher degrees of pre-exposure, 33,200 and 332,000 m.L.-sec. marked differences are found; the higher the degree, the greater the difference. R 15

5797

Travers, R.M.W., Marron, J.E., & Post, A.J. SOME CONDITIONS AFFECTING QUALITY, CONSISTENCY, AND PREDICTABILITY OF PERFORMANCE IN SOLVING COMPLEX PROBLEMS. Proj. 7703, Task 77071 and 77073, Res. Rep. AFTRC-TN-55-27, Sept. 1955, 86pp. Personnel Research Laboratory, AFTRC, Lackland AFB, San Antonio, Tex.

5791

This report is a preliminary study of determinants of behavior in solving problems in complex situations. As a first step, theories of problem solving were reviewed for ones concerning the psychological variables that might be related to the problem. Four administrative-type problems were developed in which the quality of solution could be reliably scored and were administered at Lackland Air Force Base without attempt to introduce incentives. Analysis of the scores led to further testing of groups with and without threat (instructions that test results might affect their future) and ratings on basis of anxiety levels. Results were related to scores on certain tests from Airman Classification Battery. Implications of the findings for further research are discussed. T. R 24

5799

Weiss, E.C. THE EFFECTS OF MAGNIFICATION ON VISION IN RELATION TO ORDNANCE OPTICS. Proj. TBI-1000-10, Rep. 4, Nov. 1955, 21pp. Aberdeen Proving Ground, Ordnance Corps, Research and Development Division.

5799

To evaluate the effectiveness of magnification as a visual aid for Ordnance optics, field studies were conducted, under desert conditions, to test the hypothesis that, at specified ranges, visual acuity improves with increased magnification while depth perception performance is independent of magnification. Twenty subjects located the gap in a Landolt ring at 100 yards and made judgments of depth for two tombstone shaped targets at 200, 400, 800, and 1600 yards with binoculars having 1, 6, 7, and 10 x magnification. The data are handled by analysis of variance, the results discussed, and certain recommendations with respect to binoculars and future research are outlined.

5796
Thetford, P.E. & Cuedry, F.E. THE POSTURAL VERTICAL IN UNILATERALLY LAMINECTOMIZED INDIVIDUALS. Contract W60nr 434, T.O. 1, Proj. Designation NA 143 455, Proj. NA 001 063 01 26, Rep. 26, June 1952, 6pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

5 female human Ss with only one functioning labyrinth were tilted 20 degrees right and left under conditions of delay (45 seconds) and no delay in the tilted position. Displacement of the postural vertical in direction of the injured side was not exhibited by these Ss. The results indicate that Ss respond to delay about the same as normal Ss. Adaptation to tilt was not specific to the healthy side.

R 8

5800
Diforo, M.J., Graham, W., & Schreiner, S.
DEVELOPMENT OF NOISE SUPPRESSORS FOR SPEECH
COMMUNICATION SYSTEMS. Contract AF 28(089)-
208, Interim Engng. Rep. 4, Jan. 1951, 6pp.
Air Materiel Command, Watson Laboratories,
Red Bank, N.J.

5800
This is an interim engineering report on the develop-
ment of noise suppression methods to be used in systems
transmitting speech. Progress to date on an experimental
model of a noise suppressor is reported. Changes in the
compressor circuit and problems encountered in equalli-
zing expander channels due to temperature sensitivity and
differences between circuits are discussed. Some signal-
to-noise measurements are included to compare a wide-
band expander with a 30-channel expander.
T. G. I

5801
Vandenberg, J.O. THE FACTS ABOUT HUMAN ENGINEERING: AN IMPORTANT NEW MANAGEMENT TECHNIQUE.
Advanced Management, Nov. 1953, 18(11), 25-27. (Pittsford Arsenal, Dover, N.J.).

In the past 10 years the term "human engineering" has been applied to a new area of psy-
chological endeavor. This area of work is still so new that it not only lacks definition of
boundaries but many psychologists are relatively unfamiliar with what their fellows are
attempting to do. This paper has, therefore, both an historical and definitive purpose. It
traces briefly the history of human engineering and presents a definition which seems appro-
priate to its preferred, current usage.
R 25

5803
Tanner, W.P., Jr. A THEORY OF RECOGNITION. Contract DA 36 039 sc 63203, Proj. 2262, Tech.
Rep. 50, May 1955, 43pp. Engineering Research Institute, University of Michigan, Ann Arbor,
Mich.

The theory of signal detection as applied to the human observer is reviewed. The theory
is then extended to include the simple case of recognizing a signal as one of a set of 2
alternatives, and experiments relating to this case are reported. The principles upon which
the theory can be extended to cover more complex alternatives are developed.
R 12

5806
Hoser, H.M. & Dreher, J.J. RESEARCH ON THE LANGUAGE OF VOICE PROCEDURES. A COMPARISON OF
UNITED STATES - UNITED KINGDOM AND INTERNATIONAL CIVIL AVIATION ORGANIZATION PHONETIC ALPHAB-
BETS. Contract AF 19(600) 316, AF Proj. 519, Rep. 3, Part 11, June 1953, 64pp. Ohio State
University, Research Foundation, Columbus, Ohio

An experimental comparison was made of 2 phonetic alphabets--United States - United King-
dom (US-UK) and International Civil Aviation Organization (ICAO). Articulation tests using
a representative panel of foreign and American speakers and heard by an equivalent panel of
listeners trained in both alphabets and the foreign accents of the speakers were administered.
Under signal to noise ratios (S/N) ranging from 0 to -16 db. Analysis of articulation scores
and confusability scores for each alphabet shows the ICAO to be superior at all S/N levels
above zero, yielding fewer errors and confusions. A rating scale for preference, given to
166 Ss of mixed nationalities before and after training on the 2 alphabets, showed that train-
ing reduces any initial preference for either alphabet. A further test of response tenden-
cies favoring the use of one alphabet over the other showed the ICAO to be favored by the Ss
who took part in the articulation tests. Therefore, revisions in the ICAO alphabet were sug-
gested (on basis of item analysis and also further testing) to improve its original frame-
work. Changes recommended were to change COCOA to CHARLIE, NETNO to MIKE, UNION to UNIFORM,
and EXTRA to X-RAY. (HEIAS)
R 43

5807
Ellis, D.S., Montgomery, V. & Underwood, B.J. REMINI-
SCENCE IN A MANIPULATIVE TASK AS A FUNCTION OF WORK-
SURFACE HEIGHT, PREREPT PRACTICE, AND INTERPOLATED REST.
J. exp. Psychol., Dec. 1952, 44(6), 420-427. (Iowa
State College, Iowa City, Iowa).

5807
This experiment tests reminiscence in a manipulative
motor task as a function of work-surface height, prerept
practice, and interpolated rest. One hundred and eighty
subjects were presented with the Minnesota Rate of
Manipulation Test under various conditions of three
variables: (a) work-surface height: 3 in. below and 8 in.
above S's elbow height; (b) 2, 8, and 16 min. of massed
prerept practice; and (c) 2 min., 10 min., and 24 hr.
rest periods. The results discuss the effects of these
variables upon reminiscence (defined as difference
between postrest performance and extrapolated linear
curve of the mean performance).
T. G. R 23

5805
Platzter, H.L. A NON-LINEAR APPROACH TO HUMAN TRACKING. Contract Nonr 1571(00), Proj. NR 145
099, Interim Tech. Rep. 1 2490 1, Dec. 1955, 32pp. Office of Naval Research, Washington, D.C.
& Physiological Psychology Branch, The Franklin Institute, Philadelphia, Penn.

The phase plane has been used to study response characteristics of the human operator
in tracking problems. This study has revealed strong evidence of non-linear behavior. The
phase-plane can be used as a tracking display, and since it presents more information than
a conventional display, improved performance should be observed. This was found to be the
case, especially when the phase-plane display had an optimum-switching line marked on it.
The disadvantage of the phase-plane display is that it is 2-dimensional. The θ -display was
developed to overcome this disadvantage. The θ -display contains most of the information
contained in the phase-plane display including its optimum switching properties, and has the
advantage of being one-dimensional. Finally, the sampled θ -display was used to study the
essential role played by velocity information in tracking.

5808:
Lindahl, L.G. MOVEMENT ANALYSIS AS AN INDUSTRIAL
TRAINING METHOD. *J. appl. Psychol.*, Dec. 1948, 23(6),
420-436. (Division of Education & Applied Psychology,
Purdue University, Lafayette, Ind.).

5808

This report describes the development of a method of analyzing the hand-foot coordination movements involved in the operation of a contact disc cutting machine. Movement analysis as a training device is examined by comparing new operators trained with this method against previous experienced operators, and against new operators not trained in this method. Finally, data are offered on the effects of this method upon old experienced operators. Results are discussed in terms of comparative quality and quantity of production evidenced by the various groups of operators.
G. I. R 6

5810

Lewis, D. TRANSFER AND RETENTION IN PERFORMANCE ON THE STAR DISCRIMINATOR. *Proc. Iowa Acad. Science*, 1954, 61, 371-377. (Department of Psychology, State University of Iowa, Iowa City, Iowa).

5810

To study transfer and retention in performance on the Star Discriminator (a perceptual-motor task), 74 male Ss practiced successively four different tasks on the Discriminator and then relearned the tasks in the same sequence. Learning trials were 20 sec. in length, with intertrial rest pauses of 10 sec. The results are treated in terms of relative retention of the various tasks and the transfer effects in the relearning of the tasks. A comparison with the Washburn apparatus is made in terms of the particular types of perceptual-motor skills involved in each apparatus.
G. I. R 3

5811

Lewis, D. COMPARISON OF DIRECT-VISION AND MIRROR-VISION PERFORMANCE ON A PURSUIT ROTOR. *Proc. Iowa Acad. Science*, 1953, 60, 529-533. (Department of Psychology, State University of Iowa, Iowa City, Iowa).

5811

This study compares direct-vision with mirror-vision performance on the Koerth-type pursuit rotor. The 35 Ss practiced for 30 trials with direct-vision and later for 40 trials with mirror-vision. Speed of rotor for direct-vision was 60 rpm, and for mirror-vision, 15 rpm; length of work and rest periods were 10 and 20 sec., respectively, for direct-vision, and 30 and 30 sec. for mirror-vision. The results are treated in terms of the differences in performance curves under each condition of vision.
T. G. R 4

5813

Kendler, H.H., Greenberg, A. & Richman, H. THE INFLUENCE OF MASSED AND DISTRIBUTED PRACTICE ON THE DEVELOPMENT OF MENTAL SET. *J. exp. Psychol.*, Jan. 1952, 43(1), 21-25. (New York University, New York, N.Y.).

5813

To investigate the influence of massed and distributed practice on the development of a mental set, 100 Ss were presented with a series of arithmetical problems which could be solved by one method. The set solution was developed during the training situation by insuring its successful utilization. While half the Ss received the problems under massed conditions, the remainder had a 3-min. interval between problems. The results are presented and discussed in terms of comparative strength of set as measured by a problem soluble by a simpler nonset method.
T. R 5

5814

Krendel, E.S. DESIGN OF TRACKING DEVICES WITH REGARD TO HUMAN REQUIREMENTS. *RMS* 200/1, June 1951, 75pp. Department of Defense, Research & Development Board, Washington 25, D.C. (Franklin Institute).

5814

This report is a critical discussion of the problems of tracking in terms of human capabilities and equipment design. The first section defines the problem; the second deals with the characteristics of the human operator (reaction time, movement, visual factors, tolerance levels, perception and set, fatigue and attention) and describes various proposed mathematical models for the human operator in a tracking situation; and the third section discusses engineering efforts to meet human requirements in displays, application of power, linkages, and types of controls. Implications for the military situation are pointed out in a concluding section.
I. R 95

5815

Jesty, L.C. & Phelps, N.R. THE EVALUATION OF PICTURE QUALITY WITH SPECIAL REFERENCE TO TELEVISION SYSTEMS. PART II. *Marconi Rev.*, 1951, 14(103), 25-35.

5815

To evaluate the picture quality of various reproducing systems—television, still and motion picture photography—(see 5816), four parameters (brightness, resolution, contrast, and viewing distance) were varied and their effects on visibility in reproduction determined. The experimental results were analyzed in this paper with respect to system performance. Interactions of resolving power, brightness characteristic, and signal/noise (graininess) were discussed. A method of applying the type of data obtained in these experiments to the determination of television standards was illustrated. Further research needs were indicated.
G. I. R 8

5816

Jesty, L.C. & Phelps, N.R. THE EVALUATION OF PICTURE QUALITY WITH SPECIAL REFERENCE TO TELEVISION SYSTEMS. PART I. *Marconi Rev.*, 1951, 15(102), 1-24.

5816

To evaluate picture quality (television photography, motion pictures), a new method of assessment is described using one standard picture transparency and various test patterns having a range of resolution/contrast/brightness with constant adapting field. Two teams of ten observers made the required judgments of visibility at varying viewing distances. The various tests were: direct viewing of the test patterns with and without additive primary colors, quarter-plate photographs, motion picture films and television. The data are plotted to show zones of visibility (resolving power, the vertical axis is shown in test lines/picture height) as a function of contrast and viewing distance. (See also Acc. No. 5815)
G. I. R 14

5818

Imus, H.A. MANUAL FOR USE IN THE SELECTION OF FIRE CONTROLMEN (STEREOSCOPIC RANGEFINDER OPERATORS). Contract OCMsr 1171, Proj. N-114, OSRD Rep. 4050, Memo. 8, Aug. 1944, 52pp. Office of Scientific Research & Development, NSRD, Applied Psychology Panel, Washington, D.C. (University of Wisconsin, Madison, Wisc.).

This report consists of a manual for use in the selection and classification of Naval personnel for training as stereoscopic rangefinder operators, FC (O). It includes the directions for the organization, equipment and procedure of a testing unit in a Naval Training Center or Naval Receiving Ship. Detailed instructions for the administration of the various tests and for the reporting of the results are presented also. The selection procedure consists of a preliminary elimination by the Selection Office of the Training Center of those men who do not meet certain qualifications on the General Classification, Reading and Mechanical Aptitude Tests. Only men who meet these qualifications and are under 30 are sent to the Vision Testing Center FC (O), where tests for visual acuity and heterophoria at far vision are administered first. The men who meet the specified qualifications are tested then for stereoscopic acuity and their interpupillary distances are measured.

5819

Flexman, R.E. & Smith, J.F. A METHOD FOR PHOTOGRAPHIC RECORDING OF FLIGHT PERFORMANCE IN 3-PLACE T-6G AIRCRAFT. Research Note Pilot: 511, Proj. 21 08 004, March 1951, 2pp. USAF Human Resources Research Center, Goddard AFB, San Angelo, Tex.

A method of obtaining a photographic record of the instrument indications in the rear cockpit in the T-6 aircraft during flight was devised. The requirements met included frequency of recording (often enough to show any significant changes), simplicity of operation, establishment of operating procedures and methods for evaluating the photographic records. A detailed account of the camera installation is included. (HEIAS)

5820

Imus, H.A. & Brogden, W.J. DISTRIBUTIONS OF MEASURES OF INTERPUPILLARY DISTANCE. Contract OCMsr 815, Proj. PDRC 759, OSRD Rep. 1341, Rep. 1, March 1943, 6pp. Office of Scientific Research and Development, NSRD, Brown University, Providence, R.I.

This report was prepared because of request from the National Bureau of Standards and the Frankford Arsenal (see letters in appendix) for data on distributions of measures of interpupillary distances. Measures of interpupillary distance are presented in both tabular and graphic form for 6553 white soldiers and 127 negro soldiers examined at the Stereoscopic Testing Center, Fort Eustis, Va., during the period from June 1, 1942 to February 1, 1943. The distribution for the white population has a mean of 64.65 mm., a median of 64.15 mm., a range of 52-77 mm., and a standard deviation of 2.73 mm. The distribution for the negro population has a mean of 68.18 mm., a median of 67.78 mm., a range from 61-76 mm., and a standard deviation of 3.22 mm. The average interpupillary distance of the negro population is reliably larger than that of the white population, as indicated by a critical ratio of 12.17. The 2 distributions may be subject to a sampling error at the shorter measures of interpupillary distance, since no soldiers less than 5'6" in height were examined.

5823

McFann, H.H. PERFORMANCE ON A MOTOR TASK UNDER DIFFERENTIAL AMOUNTS OF PHYSICAL INDUCED TENSION. Iowa Acad. Science, 1952, 52, 378-384. (Department of Psychology, Iowa State University, Iowa City, Iowa).

5827

Helmstadter, G.C. & Ellis, D.S. RATE OF MANIPULATIVE LEARNING AS A FUNCTION OF GOAL-SETTING TECHNIQUES. J. exp. Psychol., 1952, 43, 125-129. (Iowa State College, Iowa City, Iowa).

5823

To determine the influence of different amounts of experimentally induced muscular tension on performance of a motor task, six groups of female Ss were assigned to one of two tasks on the Discrimination Reaction Time Test. Physical tension was induced by having the Ss exert downward pressure with their left hand on a stirrup attached to a pulley system. Pulley weights were varied among the groups (0, 2, and 4 pounds). The results are discussed in terms of the learning curves obtained under the various degrees of physical tension for both learning tasks.
T. G. R 11

5827

To investigate the effects of four motivational conditions (knowledge of results, self-set-of goal by Ss in terms of past performance, experimenter sets goal based on average performance curve, experimenter sets goal based on the Ss' previous performance and increments on average performance curve) upon performance of a block-turning task, 100 Ss were assigned to the various goal-setting conditions. The results are discussed in terms of the effect of the various goal-setting techniques upon arousal of motivation (with performance as the index of motivation).
T. G. R 8

5826

Hill, H.E., Kornetsky, C.H., Flanary, H.G. & Wikler, A. EFFECTS OF ANXIETY AND MORPHINE ON DISCRIMINATION OF INTENSITIES OF PAINFUL STIMULI. J. Clin. Invest., May 1952, 31(5), 473-480. (National Institute of Mental Health, Addiction Research Center, Public Health Service Hospital, Lexington, Ky.).

The effects of subcutaneous injections of 15 mg. of morphine on the ability of Ss (post-addicts) to judge the intensity of painful electric shock stimuli were studied under 2 conditions: a) formal, proceeding with the experiment without familiarizing the Ss with the potentially fear-inspiring experimental situation; b) informal, preceding the experiment with reassurance, demonstration and explanation designed to allay the Ss' anxiety. In both groups 6 consecutive series of 9 stimuli were delivered in each experiment, and the Ss were required to state whether each stimulus was "stronger" or weaker than a standard stimulus. The strength of each stimulus was controlled on the basis of the power (wattage) value delivered to the S. It is concluded that a) under conditions which promote anxiety or fear of pain, Ss tend to overestimate the intensities of painful stimuli; b) morphine reduces such anxiety; c) under conditions in which anxiety is largely eliminated, little if any overestimation of the intensities of painful stimuli occurs; d) morphine does not affect the ability of Ss to accurately estimate the intensities of painful stimuli when anxiety is dissipated; and e) anxiety, particularly that which is associated with anticipation of pain, is one important variable which must be controlled in experimental investigations of problems related to pain and analgesia.
R 16

5830
Gogel, W.C. & Schneps, J.A. THE SENSING OF RELATIVE DISTANCE. USAMRI Proj. 6 95 20 001, Subtask USAMRI S-2, Rep. 215, Oct. 1955, 30pp. USA Medical Research Lab., Ft. Knox, Ky.

5830
To investigate the task of estimating the depth between a shell burst and a target, 12 Ss using binoculars observed an explosion and then estimated (in yards) the distance between it and a target. Extraneous objects (trucks) varying in number from none to four were placed in different locations throughout a series of three experiments; other cues were reduced due to the desert terrain used for testing. Position and relative depth of burst and target were varied. The data are studied by analysis of variance techniques for effect of presence and position of extraneous objects. Further research is recommended.
T. G. I. R 5

5831
Forbes, T.W. DRIVER CHARACTERISTICS AND HIGHWAY OPERATION. Traffic Engineering, Nov. 1953, 24, 3pp. (National Research Council, Committee on Highway Safety Research, Washington, D.C.).

A growing interest among highway traffic engineers as well as among other traffic groups in driver characteristics, habits, and behavior in relation to highway characteristics is discussed in this paper. Following presentation of human factors information that could improve the design of a specific faulty intersection, these topics are discussed: importance of the unfamiliar driver, highway improvements which cause human factor accidents, human factors on freeways; and one possible cause of rear-end collisions. The writer points out that much human factor information is available and lists some sources for such information. In conclusion the need for more human factor research in traffic studies is discussed. (HCIAS)
R 16

5832
Forbes, T.W. & Reiss, R.J. 35-MILLIMETER AIRPHOTOS FOR THE STUDY OF DRIVER BEHAVIOR. Highway Res. Board Bull., 1952, 60, 59-66. (Institute of Transportation & Traffic Engineering, University of California, Los Angeles, Calif.).

Aerial pictures of highway traffic were obtained using a reasonably priced, 35-mm movie camera modified for the purpose. Satisfactory definition was obtained by projecting the pictures at a magnification up to 40 diameters with a 2- by 2-in.-film slide projector. The use of such a camera will allow 1,200 exposures without reloading, thus making it possible to follow driver behavior on the highway without excessive cost for film. Pictures taken from a light airplane at between 3,500 and 4,000 ft. obtained information on driver behavior which would be very difficult to obtain in any other way. Somewhat greater altitude could have been used to advantage. Rental of a light plane is not excessive in cost, relatively speaking. Further work is necessary on aiming and sighting mechanism for obtaining vertical pictures while following the curvature of highways, and a special intervalometer must be developed for the modified camera. The ordinary aerial-mapping technique of taking photos in straight and level flight is not satisfactory for the study of driver behavior if cost is to be held within the range of most university and traffic research organizations. Acquaintance with the usual problems of air photography and some practice on the part of the pilot in maintaining a track vertically over the highway will be necessary even when these devices are available. However, the method has been shown to be both feasible and promising for the study of driving behavior on the highways. A new type of traffic sample is provided by the sweeping characteristic of the pictures.
R 5

5833
Flanagan, J.C. THE CRITICAL INCIDENT TECHNIQUE. Psychol. Bull., July 1954, 51(4), 327-358. (American Institute for Research & University of Pittsburgh, Pittsburgh, Penn.).

This review describes a method of studying activity requirements, called the critical incident technique, whereby a record of specific behaviors from those in the best position to make the necessary observations and evaluations is obtained. The collection and tabulation of these observations make it possible to formulate the critical requirements of an activity and provide a sound basis for making inferences as to requirements in terms of aptitudes, training, and other characteristics. Procedures in the use of this technique are described and discussed in detail. Uses to which the critical incident technique have been put are also reviewed. (HCIAS)
R 74

5835
Fattu, M.A. & Mech, E.V. THE EFFECT OF SET ON PERFORMANCE IN A "TROUBLE SHOOTING" SITUATION. J. appl. Psychol., 1953, 37, 214-217. (Institute of Educational Research, Indiana University).

5835
Three groups of 18 college students solved six trouble-shooting problems before and after an interpolated period in which group 1 read magazines, group 2 received a lecture on the nomenclature and functioning of gear trains, and group 3 received a lecture on systematic methods in trouble-shooting. The problem apparatus consisted of a pair of complex gear trains. Differences between the experimental groups are analyzed with respect to the proportion of correct solutions reached before and after the interpolated period, and the length of time taken for each trial.
T. G. R 3

5836
Erickson, D. & Lendis, C. THE EFFECT OF INTENSITY, LIGHT-DARK RATIO, AND AGE ON THE FLICKER-FUSION THRESHOLD. *Amer. J. Psychol.*, July 1952, 55(3), 375-388. (Columbia University, New York, N.Y.).

We have determined the flicker-fusion threshold at 6 levels of apparent brightness (frequency-intensity contours) for 7 trained Os, making 12 determinations daily at each brightness for 6 to 10 days with a stroboscopes and for 5 days with an episcope. The stroboscopes provided a fixed flash duration of 20 msec. throughout the frequency-range used, which resulted in a dark period that varied between 95.90 and 99.96% of the stimulus cycle. The episcope provided a flash cycle with equal light and dark periods as frequency varied. For each of the 6 levels of brightness, the average CFF for all Os was higher with the stroboscopes than with the episcope. In 36 of the 42 comparisons the difference was statistically significant. The 5 younger Os (age 22-26 yr.) had significantly higher CFFs than the 2 older Os (age 50-54 yr.) over the middle range of intensity with the stroboscopes and the upper middle range with the episcope. Variability (SD) of CFF bore a regular increasing relationship to increasing apparent brightness for the entire group of Os. This relationship was not systematically related to age. Variability which is often designated as the effect of practice was shown during the first 3 or 4 days with the stroboscopes. We attribute this to a process of establishing a subjective standard of discrimination at the higher levels of brightness. The difference in frequency-intensity contours between the younger and older Os is partly due to shifts in the effective brightness, but to a much larger extent to a lengthened restoration-period in the functioning of the visual mechanism with increasing age. The difference in frequency-intensity contours between the stroboscopes and episcope is due to the difference in the duration of the dark period in each flash-cycle of the 2 apparatus.

R 14

5839
Ellis, D.S. SPEED OF MANIPULATIVE PERFORMANCE AS A FUNCTION OF WORK-SURFACE HEIGHT. *J. appl. Psychol.*, Aug. 1951, 35(4), 289-296. (Iowa State College, Cedar Rapids, Iowa).

An experiment was performed to determine the relationship between work-surface height and speed of manipulative performance of a simple block-turning task. Ss were 48 male college students who performed the task at 6 levels of work-surface height, ranging from a minimum average height of 25.9 in. to a maximum average height of 52.7 in. A Latin-square experimental design was used, in which each S worked at each work-surface height for a 3-minute trial. Analysis of the data yielded the following results: a) Statistically significant variations in speed of manipulative performance were associated with variations in work-surface height. Maximum performance occurred at an average height of 42.0 in., which corresponds to a setting approximately 3 in. below the elbow. Significantly slower performance occurred at higher work-surface heights than at lower heights. b) Significant variations in feelings and locus of muscular strain are associated with variations in work-surface height. An interpretation of the obtained results is offered on the assumption that muscular tension is the variable intervening between work-surface height and performance. The applicability of the construct of reactive inhibition to the data is also noted, and an experiment is suggested to test an hypothesis stemming from the use of this construct. While the results are considered as having only minor immediate practical value for problems of industrial equipment design, they are viewed as indicating that work-surface height is an equipment design variable which is worthy of further investigation.

R 7

5837
Erickson, S.C. DEVELOPMENT OF A LIGHT PLANE PROFICIENCY CHECK TO PREDICT MILITARY FLYING SUCCESS. TECHNICAL APPENDIX. Contract AF 33(038) 23183, Proj. 21 08 006 (PO 2), April 1952, 80pp. USAF Pilot Research Lab., Goodfellow AFB, Tex. (American Institute for Research, Pittsburgh, Penn.).

5837
This is a supplement to a report on the development of a light plane proficiency check to predict military flying success. The following materials are included: abstracts of interviews and conferences with expert advisers held during the course of the project; a thorough statistical treatment of data derived from grade slips of graduated and eliminated basic students; analysis of difficulties of items of the flight check; final form of the flight check and accompanying manual of the instructions.

5838
Erickson, S.C. DEVELOPMENT OF A LIGHT PLANE PROFICIENCY CHECK TO PREDICT MILITARY FLYING SUCCESS. Contract AF 33(038) 23183, Proj. 21 08 006 (PO 2), April 1952, 74pp. USAF Pilot Research Lab., Goodfellow AFB, Tex. (American Institute for Research, Pittsburgh, Penn.).

5838
This report describes the development of an objective-type light-plane flight-check to improve the selection and screening of Air Force student pilots. Procedures followed in developing the flight check included interviewing more than 95 experts, an analysis of the T-6 basic syllabus, and an analysis of deficiencies of students eliminated in basic training.

T. G. I. R 10

5840
Eckstrand, G.A. & Wickens, D.D. TRANSFER OF PERCEPTUAL SET. *J. exp. Psychol.*, 1954, 47(4), 274-278. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

5840
This experiment tests the influence of perceptual sets produced by pre-training upon later learning. In the pre-training tasks the S learned to respond to either the form or color dimension of visual stimuli. This was followed by a standard task in which both dimensions were relevant. In the test task, the relevant pre-training dimension was either absent or present for the various groups tested. The learning measure employed was number of responses to reach a criterion of ten consecutive correct responses.

T. G. R 6

5841
Eckstrand, G.A. STUDIES IN CUE UTILIZATION BEHAVIOR. PART I. THE INFLUENCE OF A RELEVANT BUT "UNUSED" CUE IN TRAINING UPON TRANSFER IN A POSITIVE TRANSFER SITUATION. RDO 694 44, WADC TR 52 79, April 1952, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

5841
This experiment is concerned with the influence of unintentional secondary cues in a training device or simulator upon the learning of primary cues which must be relied upon in the operational situation. In a situation in which Ss pressed one of four reaction keys in response to stimuli in which form, letter, and color were cue dimensions, Ss first learned, on the basis of a secondary cue, a task also containing a primary cue. They were then forced to perform the task on the basis of the primary cue alone, their performance being compared with Ss not experiencing the primary cue during learning.

T. G. R 8

5842

Eckstrand, G.A. & Morgan, R.L. THE INFLUENCE OF TRAINING ON THE TACTUAL DISCRIMINABILITY OF KNOB SHAPES. Proj. 7182 71513; WADC TR 56 8; Jan. 1956, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

5842

To determine the effects of training on tactual discrimination, three matched groups of 20 Ss were required to discriminate tactually among four knob shapes. After a two-sec. visual presentation of a knob shape, the S grasped an unseen knob attached to the top of a lever and judged it same or different from the shape just presented. A buzzer provided knowledge of results after each of 48 discriminations. Performances (error and time scores) of the three groups, which had undergone 1) no previous training, 2) previous training in associating names with the tactually perceived knobs, or 3) previous experience in feeling the knobs only, are compared.

T. R 17

5843

Egan, J.P., Clarke, F.R. & Carterette, E.C. ON A THEORY OF THE TRANSMISSION AND CONFIRMATION OF MESSAGES IN NOISE. Contract AF 18(600) 571, Tech. Rep. AFSCRC TN 55 67, Oct. 1955, 49pp. USAF Air Research & Development Command, Bolling AFB, Washington, D.C. (Indiana University, Bloomington, Ind.).

In a series of experimental studies the severe restrictions imposed upon the communication process by an articulation test were slightly relaxed by increasing the number of events in the communication sequence. This report presents some of the theoretical considerations that have grown out of this research. A communication event refers to the transmission of a message from a talker (source) to a listener (receiver) followed by the return of a message (correct or incorrect) from receiver to source for confirmation. The relation between source and receiver, serving successively as talker and listener, is asymmetric. Since source knows the original message, he must accept or reject the message sent back to him according to some criterion level. Various types of communication events arise depending upon whether or not the receiver correctly hears the message and whether or not the source confirms the message sent back to him. The various probabilities associated with these types of communication events are defined. The behavior of the source and the relations between the 2 conditional probabilities associated with a correct and with an incorrect confirmation are discussed. A simple mathematical model is presented describing the process of sending the same message over and over again until source confirms it. A theorem is established for a wide class of relations between the conditional probability of a correct confirmation and of an incorrect confirmation. (HEIAS)

R 6

5844

Egan, J.P. PERSTIMULATORY FATIGUE AS MEASURED BY HETEROPHONIC LOUDNESS BALANCES. *J. acoust. soc. Amer.*, Jan. 1955, 27(1), 111-120. (USAF Air Research and Development Command & Hearing Communication Lab., Psychology Dept., Indiana University, Bloomington, Ind.).

Perstimulatory fatigue is the decrease in loudness of a steady auditory stimulus during its presentation. In the past it has been measured by requiring a simultaneous dichotic loudness balance between 2 pure tones of the same frequency, one in each ear. Under these conditions the listener hears a single phantom sound whose localization depends upon the relative intensities of the 2 tones. The present investigation shows that the process of localizing the sound image in making the loudness balance is not critical to the occurrence of perstimulatory fatigue. 2 principal conditions were compared. In the first, the frequency of the comparison stimulus was the same as that of the fatiguing stimulus. In the second, the comparison and fatiguing stimuli differed sufficiently in frequency so that the listener always heard 2 pure tones which he could correctly localize in the 2 ears. It is concluded that the amount of perstimulatory fatigue is very nearly the same under these 2 conditions. In the early phases of the present research it was suspected that the loudness balances were influenced by absolute judgments of loudness. A procedure is developed which precludes the formation of a single absolute standard of loudness. This method results in greater measured fatigue than the usual procedure.

R 8

5845

Egan, J.P. & Meyer, D.R. CHANGES IN PITCH OF TONES OF LOW FREQUENCY AS A FUNCTION OF THE PATTERN OF EXCITATION PRODUCED BY A BAND OF NOISE. *J. acoust. soc. Amer.*, Nov. 1950, 22(6), 827-833. (University of Wisconsin, Madison, Wisc.).

The excitation pattern of a tone is markedly altered by a masking stimulus. It should be expected that the pitch of the masked tone, as well as its threshold and its loudness, would be affected. In the present investigation the effect of a narrow band of noise (90 cps wide, centered at 410 cps.) upon the pitch of pure tones of low frequency was measured in a series of experiments. Ss matched the pitch of a tone heard in the presence of a band of noise to the pitch of a tone heard alone. These 2 tones, one partially masked and the other not, were presented to the S in repeated succession. The listener first matched these tones for loudness. He then adjusted the frequency of the unmasked tone until it was the same in pitch as the masked tone. The pitch change was investigated at a number of frequencies and of loudness levels. Systematic changes in pitch were observed. The presence of the noise raised the pitch of a partially masked tone whose frequency is immediately above those of the band of noise. This change in pitch occurs even though the intensity of the masked tone is greater than that of the unmasked tone. In contrast, the presence of the masking noise lowers the pitch of a tone whose frequency is just lower than those of the band of noise, but this change is largely accounted for in terms of the intensity difference required for an equal loudness match. An attempt is made to account for the changes in pitch in terms of a place theory.

R 7

5846

Egan, J.P. & Klumpp, R.G. THE ERROR DUE TO MASKING IN THE MEASUREMENT OF AURAL HARMONICS BY THE METHOD OF BEST BEATS. *J. acoust. soc. Amer.*, May 1951, 23(3), 275-286. (University of Wisconsin, Madison, Wisc.).

The method of best beats has been employed to estimate the intensities of aural harmonics and of combination tones. It has been generally assumed that the listener hears best beats when the exploring tone produces in the cochlea a disturbance that is equal in magnitude to that of the aural harmonic or of the combination tone being measured. However, as the experiments to be reported will show, when the tone to be measured is near the absolute threshold or is partially masked, the most prominent beats will be heard when the intensity of the exploring tone exceeds that of the unknown tone. Consequently, since aural harmonics and combination tones are partially masked, their intensities will be overestimated when the method of best beats is used. The present paper concerns the magnitude of this error of overestimation. A procedure is presented by which a better estimate of the intensity of an aural harmonic or of a combination tone may be made. When the tone being measured by the method of best beats is well above threshold, the listener hears beats over a wide range of intensities of the exploring tone, and the error of overestimation is small. However, when the tone being measured is near threshold, there is a small range of audible beats, and the error of overestimation is of considerable magnitude. It is therefore possible to correct for this error by determining the range of intensities of the exploring tone over which beats are audible as well as the intensity of the exploring tone required for best beats. Application of this procedure to the measurement of a second aural harmonic is illustrated. An explanation is given of the fact that the intensity of a tone near its absolute threshold will be overestimated by use of the method of best beats. This explanation is formulated in terms of the relation of the minimum and the maximum of the envelope of the beating complex to the listener's threshold for the tones that beat.

R 14

5847

Warren, J.M. & Egan, J.P. ON THE ACCURACY OF THE METHOD OF BEST BEATS FOR DETERMINING THE INTENSITY OF A TONE. *J. acoust. soc. Amer.*, Jan. 1951, 23(1), 111-113. (University of Wisconsin, Madison, Wisc.).

The reliability of the method of best beats for determining the intensity of a tone was determined. In all experiments the primary tone had a frequency of 400 cps and an intensity of 50 db; frequency of the secondary tone was varied from trial to trial from 1 to 2 cps (a few trials were given at 35 and 50 cps as well). The task was to listen for a "best beat" when both tones were presented and to adjust the intensity of the secondary tone until these beats were most prominent; 3 Ss were used. Mean SPL's of settings for best beats as a function of frequency show deviations of only a bit over 1 db from the 50 SPL standard. Variability in judgments was surprisingly constant for 2 Ss; the third S reversed, upon questioning, an unusual method of listening leading to a recommendation for emphasizing method to be used during the instructional period. (HEIAS)

R 3

5848

Klumpp, R.G. & Egan, J.P. ON THE CORRESPONDENCE BETWEEN THE INTENSITIES OF TWO TONES FOR BEST BEATS. *J. acoust. soc. Amer.*, Jan. 1951, 23(1), 113-114. (University of Wisconsin, Madison, Wisc.).

In this investigation the relation between the intensity of 2 tones differing by 2.5 cps was determined by the method of best beats. The 2 tones, 590 and 692.5 cps, were simultaneously presented to one ear of S who then adjusted the secondary tone to a point where the beats became most prominent. Intensities of the primary tone varied from 60 to 112 db in 6 steps; 6 Ss were used. The relation between the SPL's of the 2 tones are shown graphically; while individual differences are present, the curve is very nearly linear with a slope of less than one. (HEIAS)

5849

Cole, E.L., McIntosh, B.B. & Grether, W.F. BRIGHTNESS LEVELS OF THREE INSTRUMENT LIGHTING SYSTEMS USED BY PILOTS FLYING AT NIGHT. Tech. Rep. 6031, Aug. 1950, 16pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

The red flood, indirect red, and ultra-violet instrument lighting systems installed in C-47 transports were investigated by several pilots during night flights. Brightness levels used by the pilots were recorded for the 3 systems under the conditions of normal night flying, night instrument (maximum), and minimum brightness necessary for safe flight. For normal conditions the lowest brightness level used occurred under red flood and the highest under indirect red. At maximum levels (night instrument condition) red flood was highest, indirect next and ultra-violet and lowest brightness. At minimum levels, indirect red was the lowest followed by ultra-violet and red flood. Indirect red was preferred by the pilots as being the most pleasant and comfortable system and the red flood system was preferred as being the most effective of the 3.

R 3

5850

Deatherage, B.H. & Bitterman, M.E. THE EFFECT OF SATIATION ON STROBOSCOPIC MOVEMENT. *Amer. J. Psychol.*, Jan. 1951, 65, 108-109. (University of Texas, Austin, Tex.).

Some preliminary observations are reported on the effect of satiation on stroboscopic movement. By means of an Interocular tachistoscope one member of a pair of figures was presented to the right eye alone and the second member to the left eye alone; the figures were presented alternately (at a rate varied over a wide range) and fused stereoscopically. All figures appeared as lighted areas against a dark ground. Several effects have been observed following 1-min. periods of satiation with the binocularly viewed inspection-figures. These are described and diagrammed. (HEIAS)

R 6

5851

Caldwell, L.S. & Herbert, M.J. THE JUDGMENT OF ANGULAR POSITIONS IN THE HORIZONTAL PLANE ON THE BASIS OF KINESTHETIC CUES. Proj. 6 95 20 001, Rep. 216, Oct. 1955, 18pp. USA Medical Research Lab., Fort Knox, Ky.

It was found that adjustive movements of the arm in the horizontal plane are most accurate near the 0° and 90° positions. The 0° position is directly in front of the right shoulder and the 90° position is 90° clockwise from this point. Adjustive movements of the arm toward the 90° end of the scale are more accurate than those toward 0°.

R 2

5855
Barnard, H.R., & Straight, D.E. T-6 STABILITY-
DOWN EXPERIMENT. Proj. 677-7720, Oct.
1944, 6pp. ATTC, Air Research and De-
velopment Command, Goodfellow AFB, San An-
gelo, Tex.

5856
To discover the effect on reliability of flight
check scores of administering a small number of flight
check scores repeatedly during a single flight, 12 Ss flew
with two observers (instructor-pilots) in each of two
T-6 aircraft. Indices of inter- and intra-observer
reliability, based on error scores for six flight manue-
vers, are presented and discussed.

5857
Adams, J.H., Fowler, H.R., & Linn, H.A.
THE RELATIONSHIP OF VISUAL ACUITY TO ACUITY
OF STEREOSCOPIC VISION. Contract OCH-
615, OCS Rep. 2087, Sept. 1943, 15pp.
OCS. Brown University.

5858
To examine the relation between visual acuity
and stereoscopic visual acuity, 172 soldiers who did
not meet the visual 20/20 visual acuity standard
were given tests of stereoscopic vision. The results
are compared with those for individuals with
standard vision and the implications for selection
of candidates for training as height finder observers
are discussed.

5859
Adams, J.H., Belar, D.C., & Linn, H.A. THE RELIABILITY AND PRECISION OF THE HRC AND MARCH
AND LOMB INTERPUPILLIOMETERS. Contract OCH-
615, OCS Rep. 2087, Sept. 1943, 15pp. US Office of Scientific Research & Development, Washington, D.C. (University of
Wisconsin, Madison, Wis.).

A study of the reliability and precision of the HRC Interpupillometer and the March
and Lomb Interpupillometers was made using trained examiners. 81 Ss were measured twice on
both instruments by independent examiners. Data on the last 59 men were analyzed for reli-
ability. The analysis showed that a) the range of measures of interobserver distance ob-
tained was comparable to that of a male army population; b) there were no significant differ-
ences between mean and S.D.'s obtained on the 2 instruments; c) dispersion of differences
between test and re-test was significantly less for the HRC instrument than for the March
instrument; d) a significant proportion of measurements obtained with the HRC instrument fell within the toler-
able limits required for rangefinder operation (± 0.25 mm); e) while coefficients of reliability
for both instruments were high that for HRC instrument was higher; and f) that probable
error of measurement favors this same instrument. Therefore, it was recommended that the
HRC Interpupillometer be used in selection tests for men assigned to use binocular instru-
ments. (HEIAS)

5859
US Office of Scientific Research and Development. TRANSMISSION AND RECEPTION OF SPEECH
UNDER COMBAT CONDITIONS. VOL. 3. Summary Tech. Rep. of Div. 17, NDRC, 1946, 296pp. US Office
of Scientific Research and Development, National Defense Research Committee, Washington, D.C.

The research on this program was carried out at the Psycho-Acoustic and Electro-Acoustic
Laboratories of Harvard University. Topics discussed include sound control, characteristics
of speech and of the ear, design of interphone components, noise reduction, hearing aids,
sonic devices, and others. An index and a bibliography are included. (HEIAS)

5860
UN Air Test Center. COMPARATIVE STUDY OF PILOT FATIGUE RESULTING FROM EXTENDED INSTRUMENT
FLIGHT USING THE STRAIGHT AND BAYLISH INSTRUMENT PANELS. FINAL REPORT. Proj. ATL 801,
Oct. 1939, 44pp. UN Air Test Center, Patuxent River, Md.

In the field test, a group of 6 relatively inexperienced Naval pilots and a group of 6
relatively experienced Army pilots flew a P-51A through 1 hour flight using the Air panel
and 1 hour flight using the Bayliss panel. Both flights being made under simulated instru-
ment conditions. At 3 set intervals during each flight they flew a carefully prescribed
flight pattern which provided a standard work-sample for comparing performance from panel
to panel. During these work-sample portions of the flights, motion photographs were made of
the instrument panel and of the pilot's eyes. Experimental controls were employed to mini-
mize variation and error due to weather, practice effects, unfamiliarity with the airplane
and task, and variations in physical condition of the Ss. No statistically significant
differences in "goodness of flight" scores were found; that is, neither panel is superior
to the other with respect to inducing superior "goodness of flight", as measured by the
grading technique here employed. In fact, it is indicated that a relatively slight amount
of practice has more influence on "goodness of flight" than does an exchange of either panel
for the other. Statistically significant differences between the panels were discovered,
however, with respect to the time spent on various individual instruments. These differences
are directly attributable to differential position of a particular instrument on the 2 panels.
It is therefore indicated that a panel arrangement plays a considerable part in determining
the amount of time pilots spend on a given instrument.

5862
Yaglom, C.P., & Kimball, D. PREVENTION OF
HEAT CASUALTIES AT MARINE CORPS TRAINING
CENTERS. Contract NS-61-07665, Final Rep.,
May 1956, 13pp. NSR, Harvard University.

5862
To develop a rational program for the control of heat
casualties in military training centers, studies were
conducted at three East Coast Marine Corps Training
centers during the summer of 1955. Meteorological observa-
tions (temperature, radiation, humidity, wind) were re-
corded and composite heat indices studied in relation to
heat loads (evaporative sweat loss measurements), heat
stress (changes in heart rate and body temperature), and
peak loads versus long-training hours for four squads
(44 men) during a six-week training period. Incidence of
heat casualties was studied in selected groups of basic
and advanced trainees, using the infirmary logs of camps,
and tolerance limits for work determined in the heat.
Recommendations are included for a program to prevent
heat casualties. T. G. R 4

5863
Miller, N.E. (Ed.). PSYCHOLOGICAL RESEARCH ON PILOT
TRAINING. Rep. 8, 1947, 487pp. Superintendent of
Documents, US Government Printing Office, Washington,
D.C. (Yale University, New London, Conn.).

5863
This volume is a record of pilot training research
carried out by the Psychological Research Project
(Pilot) during 1944-45. Research reported is concerned
with development of objective measures of flying skills;
development of techniques for the evaluation and selection
of flying instructors; analysis of the job of the
student pilot; evaluation of subjective measures of pro-
ficiency and fixed gunnery scores as criteria for vali-
dating pilot aptitude tests; and development of printed
tests of flying information.
T. G. R several

5864
Curvey, M.D. & Knoder, K.L. RESPONSE TIME PATTERNS ASSOCIATED WITH VIBRO DISPLAY-CORREL RELATIONSHIPS. *Acoustics Lab., MIT, 1954, 42(5), 325-327.* (USC Research Lab., Washington, D.C.).

5865
In a study of the response time patterns associated with vibro display-control relationships, two displays and two controls were combined in different ways to create six systems. Six Ss were given a series of trials over a period of 19 days with 150 stimuli presented on each system. On two days the Ss were required to perform an additional task. The results are presented and discussed in terms of the relative efficiencies of the various systems, the effect of practice on performance, and the effect of the introduction of a secondary task on the efficiency of the various systems.

5866
Tuldon, G.D., Cohen, S.L., Silverman, A.J., & Riley, K.B. HUMAN TOLERANCE TO PULSATED ACCELERATION. *Tech. Rep. 56-606, Oct. 1956, 12pp.* Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

5867
To estimate man's tolerance to prolonged positive acceleration, five subjects were run on the human centrifuge under stress conditions representing a complete 180 turn at 2000 miles per hour in high speed aircraft. Each subject's blackout level was determined while wearing a standard WWF anti-g suit and followed by three runs each at 2.5 g for 10 seconds, 4.0 g for 30 seconds, and 6.5 g for 10 seconds. Physiological measures: pulse rate, cardiac integrity, arterial blood pressure, visual symptoms, and galvanic skin response. Psychological measures: subjective report of feelings and attitudes, breathing performance, and subjective estimations of level of performance. The data were analyzed in terms of total performance as affected by increasing of loads. G. H. G.

5869
Licklider, J.C.R. THE INTELLIGIBILITY OF AMPLITUDE-DICHOTOMIZED, TIME-QUANTIZED SPEECH WAVES. *Acoustics Lab., MIT, 1956, 44(6), 870-873.* (Massachusetts Institute of Technology, Cambridge, Mass.).

This paper describes a way of reducing the normally very complicated speech wave to simple geometric form without destroying intelligibility. Reports the results of articulation tests of the simplified speech, and gives two illustrations of things that can be done more simply with the simplified than with the normal wave. Both methods of simplification involve dichotomization of the amplitude scale and then quantization of the time scale. The first step is achieved by subjecting the speech wave to infinite peak clipping. The second by generating a rectangular wave whose switchings from one amplitude level to the other are related to the switchings of the clipped speech wave by one or the other of 2 rules. One of the rules yields marginal intelligibility with quantized 0.2 millisecond in length; the other requires slightly shorter quanta. The relative merits of the 2 methods are accounted for by an elementary application of information theory. Autocorrelation functions, which are especially easy to compute for the simplified waves, are shown.

5866
Morris, J.D. NORMAL HEARING AND ITS RELATION TO ACUITY. *Laryngoscope, Nov. 1954, 64(11), 528-557.* (USC Medical Research Lab., New London, Conn.).

The history is briefly reviewed of how American "Normal Hearing" came to be standardized. It was shown that the standard could be specified in terms of sound pressure level in the ear canal as well as in a brass coupler as at present. The discrepancy usually cited as excessive between hearing norms as collected by large clinical surveys and by laboratory studies is shown to be sharply reduced when the quite correct comparisons are made. Nevertheless, an appreciable discrepancy, though not exceeding 8 db, exists. It is reasoned that the clinical-laboratory discrepancy is not due to selection of Ss, nor of familiarity of Ss with psychophysical judgments, but resides in features of the clinical situation which are correctable. A laboratory standard for audiometer "Normal Hearing" is proposed which would more nearly correctly describe the status of an individual's hearing ability in comparison with young, healthy ears, and which would tend at the same time to have a salutary effect upon audiometric practice.

R 27

5867
Kilpatrick, F.P. (Ed.). HUMAN BEHAVIOR FROM THE TRANSACTIONAL POINT OF VIEW. Contract Nour 496(C1), 1952, 259pp. USN Office of Naval Research, Neuropsychiatric Branch, Washington, D.C. (Princeton University, Princeton, N.J.).

Part I of the manual attempts to convey certain visual phenomena, their implications for perception, and the transactional perceptual theory which has been developed from them. In the second part, experiments are presented which have grown out directly from the theory. They provide evidence for a number of observations and statements, but also reveal gaps and point to the need for further research. In the third part of the manual, the implications of the theory are discussed. The choice of writings was narrowed to those which discuss the findings and systematic approach as they relate to scientific method in the study of human behavior. (MEIAS)

5868
Licklider, J.C.R. A DUPLEX THEORY OF PITCH PERCEPTION. *Experientia, 1951, 7(4), 128-133.* (Massachusetts Institute of Technology, Cambridge, Mass.).

The essence of the duplex theory of pitch perception, as presented here, is that the auditory system employs two kinds of analysis--frequency and autocorrelation. The frequency analysis is performed by the cochlea and has been incorporated into the resonance-place theory of Helmholtz; the autocorrelational analysis, carried out entirely in the time domain, is performed by the neural part of the system. The latter, therefore, is an analysis not of the acoustic stimulus itself but of trains of nerve impulses into which the action of the cochlea transforms the stimulus. The neural mechanism of analysis is developed in some detail and the relations between theory and observation are discussed. The appendix gives a definition of the running autocorrelation function as used in the above argument. (MEIAS)

R 18

5870

Licklider, J.C.R. ON THE PROCESS OF SPEECH PERCEPTION. J. Acoust. Soc. Amer., Nov. 1952, 24(6), 590-594. (Acoustics and Lincoln Labs., Massachusetts Institute of Technology, Cambridge, Mass.).

The process of speech perception is analyzed into 3 main operations: a) translation of the speech signal into form suitable for the nervous system, b) identification of discrete speech elements, and c) comprehension of meaning. The first operation appears to correspond roughly to the transformation made by the sound spectrograph. The second may be carried out by the neural equivalent of a set of matched filters. The third appears to involve a neural form of cross-correlation that exhibits some of the properties of the analogous electronic process.

R 15

5871

Muggins, W.M. & Licklider, J.C.R. PLACE MECHANISMS OF AUDITORY FREQUENCY ANALYSIS. J. Acoust. Soc. Amer., May 1951, 23(3), 290-292. (Massachusetts Institute of Technology, Cambridge, Mass.).

One of the central problems in auditory theory is to reconcile a) the acute perception of slight changes in pitch displayed by the human listener with b) the broad tuning of his cochlear analyzing mechanism. This paper attempts to describe and to relate a number of theoretical solutions to that problem. The hypotheses involve mechanisms, both mechanical and neural, for sharpening the analysis inherent in the cochlear transformation from frequency of stimulation to locus of vibration. These mechanisms operate in the domain of place--they are place theories that supplement the classical place theory.

R 15

5872

McCard, F. THE EFFECTS OF AUDITORY-VESTIBULAR NERVE PATHOLOGY ON THE ADJUSTIVE EYE-ROLLING REFLEX. Contract N00014-54, T.G. 1, Proj. Designation NR 143 455, Proj. NM 001 063.01.32, Jotac Project Rep. 32, June 1953, 4pp. WVA School of Aviation Medicine, Pensacola Air Station, Fla. (Psychology Dept., Tulane University, New Orleans, La.).

The method of measuring the counter-rolling reflex by the use of after-images was applied to a patient with VIII nerve pathology. Virtual absence of adjustive eye-rolling to lateral body tilts in the right quadrant; and minimal values to tilting in the left quadrant were found for the patient. The results support the contention that normal adjustive eye-rolling is dependent upon the functional integrity of the vestibular system.

R 3

5873

Ryan, T.A., Bitterman, R.E. & Cotterell, C.L. INVESTIGATIONS OF CRITICAL FLICKER FUSION FREQUENCY (CFF). Proj. 12, Contract with Research Committee of the Illuminating Engineering Society, 1948-1950, 16pp. Cornell University, Ithaca, N.Y.

A series of experiments were conducted to investigate further the validity of the critical-fusion frequency of visual flicker (cff) as a measure of cumulative fatigue effects resulting from visual work. Studies of conditions and methods of testing were first made to establish the effects of surround brightness, adaptation, base level and rate of increase of flicker upon cff. Thereafter, a visual task of reading for a 3 1/2 hr period was performed under the following conditions: a) 3 illumination levels (2, 11, and 50 ft-l) with cff determinations made before, during, and after reading; in the same illumination as the work, 12 Ss; b) 2 levels of illumination (2 and 50 ft-l) with tests as before only now under varying conditions, 32 Ss; and c) glare light source, 10 Ss. An analysis of mean cff's and changes due to the various test conditions was made. No significant changes, whether of decrease or increase were found. It is suggested that the cff test is not sensitive to the effects of the visual conditions of reading or other tasks where the stress is not primarily of a visual nature. (MEIAS)

5874

Vaughan, J.A., & Daniels, P. Jr. THE PHYSIOLOGY OF LOAD-CARRYING. IX. THE ENERGY COST OF SLED PULLING BY ONE MAN. Tech. Rep. EP-26, Jan. 1956, 25pp. Quartermaster Research & Development Center, Environmental Protection Unit, Attick, Mass.

5874

To establish the relationship between sled loads and energy expenditure in men pulling the load over snow surfaces, 16 conditioned men pulled gross loads varying from 53 to 196 pounds on a plastic boot-type sled at two sites in the Canadian Arctic. In one phase, walking speed ranges were varied to study effect of speed. The energy cost (analysis of expired air), pulse rate, and drag were measured and the mechanical efficiency calculated from the external work done. Snow characteristics were measured and studied in relation to energy expenditure and drag. The results are applied to maximum load conditions for such work.

T. G. R 23

5875

Keating, C.E. 400 DITCHING SEATS. FINAL PROGRESS REPORT. Contract N00s.53 418f, Eng. Rep. 664, May 1954, 26pp. Century Engineers, Inc., Burbank, Calif.

The design and testing of an aircraft seat suitable for ditching or crash landing conditions in multi-engine long range military aircraft are described. Requirements and specifications of design are listed, preliminary designs, using 3 types of construction--nylon webbing, nylon mesh, and polyvinyl webbing, were tested both statically and dynamically. The final design is a seat fabricated of both nylon webbing and mesh with standard A4 hardware. It has harness riser attachments to overhead structure. A modified safety belt is used to help retain occupant during crash conditions. Stowage straps are provided so that seat can be folded and stowed to top of aircraft with upper attachment fittings in place providing quick accessibility.

5875
Kesslake, D. M. FACTORS CONCERNED IN THE REGULATION OF SWEAT IN MAN. *SPAC 879*, May 1954. 25pp. Physiological Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

5876
To test the hypothesis that sweat rate depends on the temperature of receptors situated at some depth in the skin, a series of experiments were conducted. 1) Observations were made on three Ss of skin temperatures and of sweat rates at various rates of working (walking the treadmill) in warm environments of low humidity. 2) The humidity was raised to a moderately high level, and observations were repeated. 3) The same Ss were then studied at rest in warm and very humid environments. On the basis of the findings, suggestions were made as to the factors concerned in the regulation of sweat production in man.
T. G. R 25

5880
Lowell, C. DESIGN AND DEVELOPMENT OF THE R.A.E. DUMMY OF THE STANDARD ALBINO. *Tech. Note Rech. Exp. 176*, May 1954. 27pp. Royal Aircraft Establishment, Farnborough, Hants, England.

5880
A dummy of the standard albino, developed by the Royal Aircraft Establishment for use in dynamic and static tests, is described. It has the dimensions of the average albino, the limbs and complete man have approximately the correct weights and centers of gravity. Its weight is normally 166 pounds but can be varied if desired. The dummy can be dressed in standard aircraft clothing, equipment, and headgear. There are cavities for instruments in the head and in the upper and lower trunks. This dummy has been used in extensive seat ejection trials to test its suitability for experimental use.
T. G. R 3

5877
Krafc, E.L. & Fitts, P.M. A BROAD-BAND BLUE LIGHTING SYSTEM FOR RADAR AIR TRAFFIC CONTROL CENTER. *Contract AF 33(616) 43. WADC Tech. Rep. 53-416*, Jan. 1954. 4pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

This report contains detailed specifications for the installation and use of a Broad-band Blue lighting system for a radar air traffic control center which will permit scope observers, maintenance personnel, and other individuals to work in the same room while engaged in a 24-hour-a-day operation. The essential characteristics of the system are summarized in Table 1, page 3. The varied requirements of a lighting system are stated, the relevant psychophysiological and physical facts summarized, alternative lighting systems are critically evaluated, and the results of preliminary operational suitability tests of the proposed system are given. The basic principle employed is the selective use of the visible spectrum; the shorter wave lengths from 400 to 540 mμ are utilized for room illumination (maintenance, etc.) and the longer wave lengths from 540 to 720 mμ are assigned to the scope observers. The system permits one to carry on essential maintenance operations while working next to a scope observer who can see more than a minute of trail on a conventional P-7 phosphor radar display. With minor modifications the system is applicable to other types of radar control centers.
R 15

5878
Lambertsen, C.J. & Bascom, W. THE PERMISSIBLE LEVEL OF CARBON MONOXIDE IN INSPIRED AIR. *SIO Ref. 53*, Dec. 1953. 10pp. Scripps Institution of Oceanography, University of California, Berkeley, Calif. (University of Pennsylvania Medical School, University Park, Penn.).

The possibility that compressed air breathed by underwater swimmers may contain small amounts of CO which could be dangerous led to a series of letters in which Dr. C.J. Lambertsen, of the University of Pennsylvania Medical School, answered and discussed a series of questions on the subject. These notes, observations, and calculations are assembled in this report. In answer to the question of how much CO can the body stand without perceptible effect, data from the Bureau of Standards (1921) and Henderson (1927) are graphed to show permissible amounts of CO at sea level. An individual doing light work such as walking can breathe 0.0152 CO indefinitely with no symptoms; for conditions of rest, he can breathe 0.02% CO in air for 2 1/2 hrs without ill effect, for hard work 1/3 that length of time. The second question related permissible amounts of CO at depth. Here the degree of CO uptake by the blood depends on inspired CO concentration, time of exposure, exercise level, and ambient pressure. From Henderson's Toxicity Factor, equations were developed taking the above factors into account and, along with the Navy's "no-decompression" table, were used to develop graphs for figuring maximum allowable CO at any depth. The problem of setting a sensible standard which can be rigorously maintained to insure the safety of all concerned still remains. (HEAS)
R 3

5879
Lindner, H.G. NONLINEAR COMMUNICATIONS SYSTEM. A MATHEMATICAL ANALYSIS OF THE EFFECT OF SPEECH CLIPPING ON THE INTELLIGENCE OF SPEECH. *Tech. Memo. R 1520*, July 1953. 34pp. USA Signal Corps Engineering Labs., Fort Monmouth, N.J.

The effect of intelligibility of infinite clipping of speech is analyzed. The approach is based on the assumption that the infinite clipping is equivalent to the action of ideal limiting. The output amplitude frequency spectrum of the ideal limiter is obtained as a function of amplitude samples in the time domain. Next, the power spectrum of directly clipped whispered speech is theoretically determined. Finally in the time domain the mathematical relation for a message function of time, which consists of an amplitude (as a function of time) and a phase (as a function of time) is first differentiated, then clipped and finally integrated. (HEAS)
R 5

5861

Hedderley, D. THE STATISTICAL THEORY OF DETECTION I. OPTIMUM DETECTION OF SIGNALS IN NOISE. Tech. Rep. 36, Nov. 1953, 71pp. Lincoln Lab., Massachusetts Institute of Technology, Bedford, Mass.

5881

A complete theory of detection is presented that is capable of treating general types of signals (periodic, aperiodic, and random waves) in noise of arbitrary statistical character. By proper formulation of the detection problem as a test of statistical hypotheses, the precise structure of the optimum detector is specified and minimum detectable signals can be defined uniquely when suitable decision curves are constructed. Appendices include some results of sampling theory and integral equations associated with optimum filtering.

1. R 37

5884

Townsend, J.C. & Sanford, E.E. ESTIMATION OF ATTITUDE INSTRUMENT FLYING PROFICIENCY BASED ON PERFORMANCE IN A FLIGHT SIMULATOR. Proj. 400K 7710, Sept. 1954, 5pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

5884

To test the feasibility of evaluating pilot performance in single place aircraft by measuring performance in a simulator, 64 pilot trainees were required to perform certain maneuvers twice in a simulator and twice in an aircraft (SKY or CFI electronic instrument flight simulator and T-6 or SKY aircraft). Performances in simulators and aircraft were evaluated according to both an objective flight check and a subjective instructor estimate. The coefficients of correlation between these performances, between simulator performances, and between aircraft performances are presented.

5885

Townsend, J.C. STUDENT AND INSTRUCTOR OPINION OF AN EXPERIMENTAL PRIMARY PILOT TRAINING PROGRAM IN WHICH A CONTACT FLIGHT SIMULATOR WAS USED. Proj. 400K 7710, Nov. 1954, 15pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

5886

This report presents the responses to a questionnaire administered to students and flight instructors who had served in an experiment evaluating the effectiveness of the Link, T-6 contact flight simulator (Type P-1) when used in an Air Force Primary Pilot Training Program. Opinions concerning the use of the contact flight simulator, as well as other aspects of training, were gathered at the end of Primary from both students and instructors and at the end of Basic from students only.

R 2

5887

Straight, D.E. & Verdi, A.P. FLIGHT CHECK ITEMS INVENTORY T-6 PRIMARY PILOT TRAINING CONTACT MANEUVERS. Proj. 400K 7710, Task 77166, Sept. 1954, 150pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

5887

This report contains an inventory of flight check items developed on the basis of an analysis of maneuvers in T-6 aircraft. Each flight check was described in terms of four indices: tolerance limits (allowable error), difficulty level, discriminative power, and reliability. Norms were based on the performances of about 200 student pilots at five levels of training and were checked against their subsequent performance through the final phase. The inventory included general rules and definitions and illustrations of each flight check during the standardization procedure and in the final categorical form. The usefulness of the inventory for the measurement of student performance and the setting of standards for training was discussed.

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5888

Solarz, A.K., Matherly, M.G., Dougherty, Dora J. & Hasler, S.G. THE EFFECT OF ATTITUDE TOWARD LINK TRAINING UPON PERFORMANCE IN THE AIRCRAFT. Contract AF 33(634) 25726, Task D; Misc. Rep. D 12, Sept. 1953, 9pp. University of Illinois, Urbana, Ill.

5888

This experiment was undertaken to investigate the effect of a positive or negative attitude toward the P-1 Link trainer upon transfer of training to the T-6 aircraft. An attitude scale was devised to measure attitude toward the P-1 Link. In one experimental group of four Ss a positive attitude toward the Link trainer was induced, and in a similar group a negative attitude. A control group practiced only on the T-6 aircraft. Performance was measured in both the Link and T-6 in terms of trials to reach criterion on a flight sequence.

T. R 2

5889

Vanderbilt, J.N., & Bone, D.F. DEVELOPMENT OF FIELD SLEEPING GEAR. Proj. 7-82-11-0014, Rep. 13 Tentage & Equipage Series, Aug. 1956, 28pp. Textile, Clothing & Footwear Division, Quartermaster Research & Development Center, Watik, Mass.

5889

This report presents the results of a series of observations on the performance of standard and experimental sleeping gear. Insulation measurements were made in the laboratory utilizing the "dipper" and "hot-plate" techniques yielding insulation requirements for various ambient temperatures in CLO values. Various materials and design changes were evaluated in terms of increased insulation. In addition several experimental bags were evaluated by having 20 subjects sleep in them for five days each in a Climate Chamber at 35 degrees Fahrenheit. An analysis of the functional features necessary for adequate field sleeping gear is included and specific areas for further development are suggested.

T. C. T. R 13

5890

Shafer, P.S. & Nichols, L.A. ANALYSIS OF MANEUVERS OF BASIC MULTI-ENGINE PILOT TRAINING (B-25). Proj. 508 016 0003, Aug. 1953, 33pp. USAF Pilot Training Research Lab., Goodfellow AFB, Tex.

5890

As a step in the development of flight proficiency measures for multi-engine pilot training, this report presents a detailed analysis of maneuvers performed in the B-25 airplane in basic flight training. The analysis includes ground inspection and checks, contact flight maneuvers, instrument flying, and formation flying. Descriptions are in terms of altitude, direction, airspeed, vertical speed, attitude, bank, coordination, power, time, sequence, procedures, ground track, and planning.

5891

Rogers, Barbara R. ANNOTATED BIBLIOGRAPHY OF BASIC PILOT TRAINING RESEARCH PUBLICATIONS. STAFF RESEARCH MEMORANDUM. Proj. 400K 7710, April 1954, 11pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

5891

This is an annotated bibliography of basic pilot training research publications for the period 1951-April 1954. These reports are concerned with such topics as development of objective methods of evaluating flying proficiency, evaluation of flight simulators, predictors of pilot performance, maneuver analysis and performance data, and instrument panel photography.

R 40

5893

McIntosh, B.B., Hilton, J.L. & Cole, E.L. PILOT PERFORMANCE DURING EXTENDED PERIODS OF INSTRUMENT FLIGHT. AF Tech. Rep. 6725, May 1952, 47pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

The purpose of this investigation was to collect exploratory data on pilot performance during extended instrument flights. Each of 3 pilots flew a C-47 aircraft for 10, 15 and 17 hours respectively. Equipment installed in the aircraft permitted recording of a) amount of time flight indicators were kept within tolerance limits, and b) continuous variation of flight indicators and control positions. Pilots' introspections and observations by a safety pilot were also obtained after each flight. To supplement the above measures, addition, illusion, and reaction comprehension tests were given before, during and after the 10 hour flight, pilot reaction time to a signal light was taken during the 15 hour flight and an alertness indicator was operated during the 17 hour flight. The time within tolerance results indicate that the pilots kept the flight indicators within the specified tolerance limits for both precision maneuvers and straight and level flight as well after 10, 15 and 17 hours of instrument flight as they did during the first hours of these flights. The results of the graphic records also gave indications that performance, as measured, was not a function of time, since no decrement appeared between the first and last portions of the flight.

R 7

5894

Martin, W.B. & Johnson, E.E. AN OPTIMUM RANGE OF SEAT POSITIONS AS DETERMINED BY EXERTION OF PRESSURE UPON A FOOT PEDAL. Proj. AMRL 6 95 20 001, Rep. 86, June 1952, 3pp. USA Medical Research Laboratory, Medical Research & Development Board, Fort Knox, Ky.

The object of this study was to determine an optimum range of seat positions for exertion of pressure upon a foot pedal. Tests on 166 men with anthropometric measurements representative of Army male personnel in general revealed that: a) for the positions in which the most pressure was exerted (25% of total positions tested) the mean vertical adjustment of the pedal was 2.4 in. above the seat and the mean horizontal adjustment from seat to pedal was 33.2 in. b) The mean vertical adjustment for the position at which most foot pressure could be applied was 3.5% of the average body height ($SD = 2.7\%$) and the mean horizontal adjustment was 47.5% of the average body height ($SD = 2.3\%$). c) In generalizing for the average height of Army male personnel (58.4 in.) the position at which the greatest pressure could be exerted upon a foot pedal would require a vertical distance from seat to pedal of 2.4 in. plus or minus 0.3 in., and a horizontal distance of 32.5 in. plus or minus 4.25 in.

R 3

5895

Middleton, R.H., & Comfort, Elizabeth. A-20 EXPERIMENTAL CONTINUOUS-FLOW OXYGEN MASK. Rep. WEDP-696-107M, Jan. 1952, 2pp. WADC, Wright-Patterson AFB, Ohio.

5896

To evaluate an experimental continuous-flow oxygen mask, three subjects were selected arbitrarily on the basis of face size to represent the three standard sizes, small, medium and large. The mask was worn under conditions of rest and mild exercise, in which the resting pulmonary ventilation was doubled, in the low-pressure chamber at simulated altitudes of 20,000, 25,000, and 30,000 feet. Minimal oxygen flows designated in the A-9-A oxygen regulator were used. Air samples, obtained from the mask at altitude, were analyzed for nitrogen content at ground level. No evaluation was made for long-term comfort or probable life expectancy. Recommendations are included.

T. R. 1

5897

Lybrand, W.A. PERCEPTUAL ORGANIZATION TASKS AS POTENTIAL INDICATORS OF BEHAVIOR DECREMENT. Proj. DA 49 007 Md 222 (D.I. 19 52), Tech. Rep. 3, March 1952, 14pp. USA Medical Research and Development Board, Washington, D.C.

A rationale has been presented for consideration of perceptual organization tasks. Selected studies employing certain perceptual variables have been reviewed, and recommendations made concerning feasibility of the variables for subject named contract. Recommendations have also been made regarding apparatus and measures for each of the variables.

R 43

5898

Luce, R.D. & Raiffa, H. A SURVEY OF THE THEORY OF GAMES. Contract Nonr 266(21), Proj. NR 042 115, Tech. Rep. 5, April 1954, 108pp. Bureau of Applied Social Research, New York, N.Y. (Columbia University, New York, N.Y.).

As part of a larger work on the theory of games, this report covers the topic of n-person games, discussing the extensive form, normal form, coalitions and the characteristic function, solutions, stability, value, and reasonable outcomes, as well as an empirical study of games. (HEIAS)

R 30

5899

Lowless, H.E. HUMAN TRACKING IN THE FOUR QUADRANTS OF A CIRCULAR SCALE. FPRC 835, May 1953, 14pp. Medical Research Council, Flying Personnel Research Committee, Cambridge, England.

In a compensatory tracking task, the subjects were required to control the pointer on a circular scale by means of a control knob placed vertically below it. 4 targets were used; the top, bottom, left-hand and right-hand cardinal points of the scale. Two control display connections were used: a) "Direct drive," when a clockwise rotation of the control knob caused the pointer to rotate in a clockwise direction. b) "Reversed drive," when a clockwise rotation of the control knob caused the pointer to rotate in a counter-clockwise direction. Each subject was tested on 4 different targets in succession, the drive remaining the same. It was found that the sequence in which the targets were presented greatly influenced the scores, so that these transfer effects tended to obscure any inherent merits which a target might have.

R 11

5900

Lipold, O.C.J. & Boyler, P.F.B. THE DESIGN OF LOAD CARRYING EQUIPMENT FOR THE SOLDIER IN BATTLE. Rep. 11/50, Oct. 1950, 58pp. USA Operations Research Group, Department of the Scientific Adviser to the Army Council, Washington, D.C.

The Physiological principles concerned in load-carrying into battle are explained. Experimental procedures are outlined which may be used in the testing of equipment produced in the future and which were used to enable the deductions to be made. The equipment which was used for load-carrying in the experiments is described and criticised and suggestions are made as to how it may be improved. The military requirements of and for carrying equipment in the Army are considered and it is urged that the whole problem of design of clothing, fighting order, marching order and equipment for portage is co-ordinated before the design of any one of these proceeds further. It is concluded that: a) Carriage of loads on the hips is preferable to other methods; b) Less muscular effort is required to carry loads when these are close to the body and disposed in a balanced fashion.

5901

Light, R.S. THE INVESTIGATION OF CANOPY-OFF COCKPIT BUFFETING IN THE B-47 AIRPLANE. Contract W32 038 ac 22413, March 1952, 72pp. Boeing Airplane Company, Seattle, Wash.

This report describes the test and resulting changes to the B-47 Airplane configuration which were necessary to produce a satisfactory cockpit for high speed flight with the canopy and/or the navigator's hatch removed. The investigation was required because early flight tests of the canopy-off configuration showed buffeting in the cockpit so severe that crew members found themselves on the verge of unconsciousness and unable to perform the operations necessary for emergency seat ejection. The critical buffeting occurred at 430 mph IAS, which is below the ejection seat design IAS of 450 mph. The buffeting was alleviated by the addition of a turtledeck aft of the copilot and a copilot's windshield as shown on Page 2. Flight tests proved this configuration to be satisfactory under all canopy and/or hatch off conditions up to an IAS of 525 mph. The fix was obtained by wind tunnel tests on a detailed model of the B-47 nose and cockpit. The reduction in oscillatory pressure intensity obtained in the wind tunnel by changing the cockpit configuration is shown graphically. It was recommended that the cockpit revisions described in this report be incorporated on all B-47 Airplanes having ejection seats.

R 5

5903

Lazo, J. HUMAN ENGINEERING INVESTIGATION OF INTERIOR LIGHTING OF NAVAL AIRCRAFT. I. COLORING FOR SINGLE SEAT AIRCRAFT COCKPITS. TED EL 52004, Rep. XG T 216, April 1954, 13pp. USN Air Material Center, Aeromedical Equipment Lab., Philadelphia, Penn.

This is a study of the color requirements for the various surfaces in single seat naval aircraft. 11 pilots participated in the flight evaluation of variously painted aircraft interiors. It was felt that the use of higher reflective paints would be advantageous, if paints are neutral, and contrast is provided for such items as control knobs. (NEIAS)

5905

Lauer, H.K. FLOODLIGHTING OF AIRCRAFT INSTRUMENTS. Rep. 119, June 1952, 14pp. Grimes Manufacturing Co., Urbana, Ohio.

The basic illumination problem and installation restrictions and principles for floodlighting aircraft instruments have been discussed and a smaller floodlighting fixture has been made available. The advantages of floodlighting have been enumerated and the fallacy of a single "standard" fixture has been pointed out. Desirable improvements in instrument design from the illumination and viewing aspect have been presented. If such improvements are made it would appear desirable to seriously consider an extensive investigation on the design of a minimum number of floodlighting fixtures which could provide adequate lighting of most aircraft instrument panels.

5906

Kunzman, Betty R. THE LONGITUDINAL STUDY. STAFF RESEARCH MEMORANDUM. Proj. 400K 7710, Task 77166, Aug. 1954, 73pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

5906

This is a correlational study of student pilot proficiency during successive stages of primary training. Errors of 178 student pilots were determined from flight check booklets of 18 hour, 60 hour, instrument, and final flight checks. Data presented include an analysis of items in each of the checks, ride-ride reliabilities, and correlations of error scores on the 18 hour and final check rides.

T. R 3

5907

Krebs, A.T. THE RADIOACTIVITY OF THE NORMAL HUMAN BODY, A CONTRIBUTION TO THE PRESENT SITUATION. AMRL Proj. 6 59 08 014, Subtask AMRL S 1, Rep. 109, Jan. 1953, 11pp. USA Medical Research Laboratory, Office of the Surgeon General, Fort Knox, Ky.

Data on the radioactivity of the normal human body are reviewed and summarized. Recent developments show that the problem of basal radioactivity of the human body is more complicated than anticipated. Using the latest value in connection with figures from investigations on uranium miners and the data known from radium poisoning cases an estimation of permissible total body exposures may be made by applying as a first approach the 1×10^{-6} law.

R 21

5908

Krauskopf, J. THE EFFECTS OF RETINAL IMAGE MOTION ON CONTRAST THRESHOLDS. AMRL Proj. 6 95 20 001, Subtask AMRL S 7, Rep. 221, Jan. 1956, 33pp. USA Medical Research Lab., Fort Knox, Ky.

Contrast thresholds for continuous seeing were determined under varying conditions of retinal image motion. The 'stopped image' technique was used to eliminate normal retinal image motion. Controlled motion at various frequencies and amplitudes was introduced by means of a rotatable mirror in the optical system. Low frequency vibrations (1.2 and 5 cps) of the retinal image were found to be beneficial to maintained vision while high frequency vibrations (10, 20 and 50 cps) were found to be detrimental to maintained vision when compared to vision in the absence of normal retinal image motion.

R 7

5912

Katchmar, L. INDICATORS OF BEHAVIOR DECREMENT. REVIEW OF THE LITERATURE ON REACTION TIME. Proj. DA 47 007 MD 222, Tech. Rep. 5, March 1952, 10pp. USA Medical Research & Development Command, Office of the Surgeon General, Washington, D.C. (Psychology Dept., University of Maryland, College Park, Md.).

5910

Kendall, K. FILM PRODUCTION PRINCIPLES. Information Bull., Fall 1952, 3(3), 73-92. (National Film Board of Canada, Ottawa, Quebec, Canada).

5912

A review of the literature on reaction time is presented. First, the theoretical background is covered, some of the representative types of apparatus for measuring reaction time are described, and finally the general findings on the factors which have been found to influence reaction time (age and sex differences, intensity, size and duration of stimulus, number of categories, distraction, practice, incentives, fatigue and loss of sleep) are covered.

T. R 58

5910

This paper summarizes the results of several research projects that were carried out under the Instructional Film Research Program and that sought to measure the effectiveness of training films. Among the topics discussed are "learning accelerators" in films (e.g., audience participation, level of verbalization), variables that determine the effectiveness of informational and attitude-changing films, the role of music, and certain important "functional factors" (e.g., viewing angle of the screen). The paper also includes a brief evaluation of the research. Some general principles suggested by the research (e.g., specificity of effect of the film, relative effectiveness of visual versus auditory components of films) are enumerated.

5911

Katchmar, L.T. INDICATORS OF BEHAVIOR DECREMENT: AN EXPLORATORY INVESTIGATION IN THE USE OF SELF-PACED TESTS AS INDICATORS OF BEHAVIOR DECREMENT. Proj. DA 49 007 MD 222 (G.I. 19 52), Tech. Rep. 15, May 1953, 43pp. Dept. of Psychology, University of Maryland, College Park, Md.

5911

In a study of the utilization of self-paced tests as indicators of behavior decrement, 18 Ss were required to react to stimulus numbers under three sets of incentive instructions (i.e., general operational, knowledge of results, and praise and reproof instructions) and three different time periods (1.5, 10, 20, and 30 min.). The results are presented and discussed in terms of the relative effect of each type of incentive instruction and the duration of time period on the performance reflected in two types of self-paced reaction time tests.

5913
Katchmar, L. INDICATORS OF BEHAVIOR DECREMENT: THE EFFECTS OF STRESS, ANXIETY AND EGO INVOLVEMENT ON "SHIFT" TASK PERFORMANCE. Proj. DA 49 007 MD 222 (G.I. 19 52), Tech. Rep. 22, Dec. 1953, 57pp. USA Medical Research & Development Command, Office of the Surgeon General, Washington, D.C. (Psychology Dept., University of Maryland, College Park, Md.).

This study is an investigation of the effects of psychological stress on level of aspiration and performance on a highly repetitive task which requires a shifting between 2 well-practiced tasks. The performance test used was the Woodworth-Wells form naming and substitution test. 3 variables were used: level of anxiety, ego-involvement, and failure stress. 54 Ss were selected on the basis of high and low anxiety scores as measured by the Taylor Manifest Anxiety Index. High anxiety Ss showed poorer performance and failure stress showed increase in failure stress. The relationship between performance and failure stress showed increasing levels of failure stress. The ego-involvement instructions did not differentially affect the performance of Ss. (HEIAS)

R 37

5914

Jones, F.W. AN OLFACTOMETER PERMITTING STIMULUS SPECIFICATION IN MOLAR TERMS. Contract N6onr 27515, Proj. NR 140 308, ca. 1954, 6pp. Office of Naval Research, Washington, D.C. (University of California, Los Angeles, Calif.)

Thresholds for olfactory receptors are best given in terms of molecular concentration of stimulating substance in the medium used to convey it to the receptor surface. Control over all other stimulus variables--blast duration, pressure, volume, temperature, and humidity--consequently must be exercised. A simple and relatively unobtrusive apparatus that meets the above qualifications is described and illustrated. The necessary environment of a fairly constant environment is further detailed along with the experimental routine for obtaining threshold values. Sample results from 4 Ss are presented to show the accuracy of the olfactometer and method. (MEIAC)

R 6

5915

Donmenger, J.G. PILOT COMMENTS ON COCKPIT TEMPERATURE CONTROLS IN FIGHTER AIRCRAFT. SED No. 430-296, Tech. Note WCT-53-9, Jan. 1953, 6pp. Directorate of Flight and All-Weather Testing, WADC, AFPC, Wright-Patterson AFB, Ohio.

5915

This report presents the comments of pilots concerning the feasibility of employing manual cockpit temperature control in fighter aircraft. Preference for automatic vs. manual control is reported and recommended.

5917

USN Personnel Research Field Activity. LIST OF REPORTS PREPARED BY THE U.S. NAVAL PERSONNEL RESEARCH FIELD ACTIVITY. SAN DIEGO, CALIFORNIA. (1952-1955). Oct. 1955, 16pp. USN Personnel Research Field Activity, San Diego, Calif.

5917

This is a bibliography of research reports prepared by the US Naval Personnel Research Field Activity, San Diego, between October 1952 and September 1955. The San Diego Field Activity is concerned with research in billet and qualifications, personnel measurement, and training. The training research listed here deals principally with sonarman and radioroman training.

R 115

5918

Flexman, R.E. & Nichols, I.A. STUDENT PILOT PERFORMANCE OF AEROBATIC MANEUVERS. STAFF RESEARCH MEMORANDUM. Proj. 400K 7710, Task 77166, Aug. 1954, 26pp. USAF Basic Field Research Lab., Goodfellow AFB, Tex.

5918

This report presents data on the performance of aerobatic maneuvers in the T-6 G aircraft by 52 student-pilots completing primary training. Data are presented in terms of the percentage of performance falling within acceptable limits on such categories as altitude, heading, airspeed, bank, and coordination. Performance on two flights was evaluated by instructors employing the Performance Record Sheets developed by the Basic Pilot Research Laboratory.

T. G.

5920

Flexman, R.E. & Latham, A.J. ANALYSIS OF THE SPIN MANEUVER. Proj. 508 016 0002, Res. Note Pilots 51 4, Dec. 1951, 31pp. USAF Human Resources Research Center, Lackland AFB, Tex.

5920

This paper presents an analysis of the spin maneuver together with performance data of student pilots at three stages of basic training. With the exception of "maximum airspeed", 21 items were scored on the basis of whether the student did or did not perform that item. Hypotheses are presented concerning sources of error on each item.

G.

5921

Fletcher, J.L., & Ross, S. TESTS OF STEREO-SCOPIC VISION: A REVIEW. Quart. Rev. Ophthal., 1953, 142, 551-562. (Dept. of Psychology, University of Maryland).

5921

In this review of tests of stereoscopic vision the authors present a description of the design, relative efficiency, validity, etc., of the following tests: Howard-Dolan Test, Verhoeff Test, Talbot Test, Eastman Test, Projection Estimation (Stereo-Vertical Test), Keystone Telebinocular Test, Ortho-Rater Test, Boff Test, Testograph Pursuit Apparatus, Dearborn-Johnson Test, Ratic Stereo Trainer, and Navy Mark II Trainer. In addition, several proposed tests are reviewed.

R 46

5922

Fink, R. & Gray, G. EFFECTS OF FOUR ORIENTATION PROCEDURES ON AIRBORNE TRAINEES. Res. Memo. 1, Oct. 1953, 22pp. Human Resources Research Office, George Washington University, Washington, D.C.

5922

This experiment investigated the relative effectiveness of four pre-training orientation procedures for Airborne trainees. The four procedures were "Standard" orientations, "Non-fear" orientations, "Glory" orientations and no orientation. Nine hundred enlisted men divided among the four groups provided data on performance during training, attitudes toward the Airborne and aspects of training, measures of self-confidence and fear, factual knowledge about the Airborne, and opinions concerning orientation.

T.

5924

Dougherty, Dora J., Hasler, S.G. & Matheny, W.G. COMPARISONS OF FLIGHT TASKS PERFORMED IN THE T-6 AIRCRAFT AND P-1 TRAINER. Contract AF 33(038) 25726, Memo. Rep. D 15, Sept. 1953, 20pp. University of Illinois, Urbana, Ill.

5924

This investigation dealt with the relationship between fidelity of simulation and transfer of training for the P-1 trainer and T-6 aircraft, a case in which transfer is high. Patterns of control movements in the T-6 aircraft were compared with those in the P-1 trainer flown through the same maneuvers. Photographic records were made of instrument panel dial readings, including indicators of elevator, aileron, and rudder movements. Comparisons were made of identical performances by skilled instrument pilots on straight and level flight, straight climbs, and level turns.

5926

Day, R.M. EFFECT ON A DIFFICULT COORDINATION OF THE FREQUENCY OF SIGNALS. *FPAC 815*, Jan. 1953, 7pp. Flying Personnel Research Committee, London, England. (Psychology Dept., University of Bristol, England).

The purpose of this experiment was to determine what effect the frequency of signals had on the control of a fugitive spot. Subjects were required to direct, by moving hand and foot controls, a fugitive spot of light into one of 4 positions in accordance with changes in the source of signals. Simultaneously they were required to extinguish 2 lights using a left-hand response, each light requiring a different direction of movement. Results show that: a) Increasing the frequency of signals from 4 successively but irregularly functioning source: resulted in significant increases in "error" scores made in controlling the fugitive spot, but did not affect the other part of the task. b) The order of a sequence of 4 signal frequencies over 4 trials had no effect on the scores made.

R 4

5929

Chalmers, E.L. MONOCULAR AND BINOCULAR CUES IN THE PERCEPTION OF SIZE AND DISTANCE. *Amer. J. Psychol.*, July 1952, *LXX*, 415-423. (Princeton University, Princeton, N.J.).

5929

To investigate primary monocular and binocular cues in the perception of size and distance, a testing situation was provided such that only illuminated triangles (comparison and standard) could be seen. Eight standard triangles, sized to subtend a visual angle of 45 min. at distances varying between 10 and 120 ft., were judged for size by adjusting the variable comparison triangle (positioned at 10 or 120 ft.) to apparent equality; monocular and binocular judgments were made by five observers. The data are analyzed as functions of size and distance for monocular and binocular vision and interpreted with respect to the importance of the cues available.

T. G. I. R 8

5930

Chalmers, E.L. THE ROLE OF BRIGHTNESS IN PRIMARY SIZE-DISTANCE PERCEPTION. *Amer. J. Psychol.*, 1953, *66*, 584-592. (Princeton University).

5930

To investigate the role of brightness in primary size-distance perception, an experimental situation was arranged so that secondary cues were eliminated (see 5929). The observer, using monocular or binocular vision, indicated when the size of a comparison object was the same apparent size as a standard object (seven sizes such that each subtended a constant visual angle at its respective distance--10 to 120 ft.). Brightness of the stimulus objects was 25 ft.-L for half the judgments and 0.025 ft.-L for the other half. Analysis is with respect to effects of decreased brightness and physiological explanation is advanced.

T. G. R 4

5931

Cassel, R.N. EVALUATING INSTRUCTOR TRAINING. *Information Bull.*, Fall 1952, *3*(3), 25-32. (USAF Training Analysis & Development Div., Parks AFB, Calif.).

5931

This article describes an experimental approach to Air Force instructor training evaluation in which final grades of instructor students are compared with a predicted grade based on the student's Technical Specialty Aptitude Score. The discrepancy between predicted and actual achievement is presumed to be a measure of motivation to learn and credit for the presence of motivation is attributed to the teacher. A discrepancy greater than one standard deviation is presumed to be atypical and of concern to training supervisors.

5932
Butler, R.G., Bamford, H.E., Kautz, R.K. & Ornstein, G.M. CLUSTER ANALYSIS OF PILOT PROFICIENCY MEASURES: IV. THE INSTRUMENT FLIGHT CHECK BATTERY. *Staff Res. Memo.*, Proj. 400K 7710, Task 77166, Dec. 1954, 9pp. Basic Pilot Research Lab., USAF Air Research and Development Command, Goodfellow AFB, San Angelo, Tex.

Objective measures of instrument flight proficiency gathered on 179 subjects of an experimental Primary Pilot Training Program were cluster analyzed. The number of sub-measures originally gathered was 204. This number was reduced to 77 by the introduction, successively, of criteria of relevance, difficulty, and generality. Based upon the 77 remaining items 5 clusters and 23 residuals were produced in the reduction. Attempts to identify the obtained clusters met with no success.

5933
Bamford, H.E. & Butler, R.G. CLUSTER ANALYSIS OF PILOT PROFICIENCY MEASURES: III. A METHOD OF COMPOSING CLUSTERS FOR A TAYLOR CLUSTER ANALYSIS. *Staff Research Memo.*, Proj. 400K 7710, Jan. 1954, 7pp. USAF Personnel & Training Research Center, ARDC, Goodfellow AFB, San Angelo, Tex.

This paper explains step-by-step, the mechanics of a method of composing or searching for clusters of congruent measures for further use in cluster analysis. Two measures are said to be congruent if the ratio between the correlations of the two measures with any third measure is equal to a constant.

R 3

5934

Bamford, H.E. CLUSTER ANALYSIS OF PILOT PROFICIENCY MEASURES: II. LOGICAL FOUNDATION. *STAFF RESEARCH MEMO-RANDUM*. Proj. 400K 7710, Feb. 1954, 23pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

5934

This paper is one of a series concerned with the analysis of the pilot's task into a set of measurable component clusters as a step toward an explanatory theory of pilot behavior. This paper presents the logical foundations of the cluster analysis technique to be employed in these studies. A set of definitions and conditions are listed, the general formula for the correlation of sums is derived, and the necessary formal theorems are developed.

R 2

5935

Bamford, H.E. & Townsend, J.C. CLUSTER ANALYSIS OF PILOT PROFICIENCY MEASURES: I. A METHOD OF EXPLORING AN AREA OF SKILLFUL BEHAVIOR. Proj. 508 016 0003, Nov. 1953, 5pp. USAF Pilot Training Research Lab., Goodfellow AFB, Tex.

5935

This paper discusses the means by which an attempt is being made to analyze the pilot's task into a set of measurable component clusters. The method of cluster analysis developed by Tryon is being applied to flight check scores of student pilots on maneuvers of the T-6 Primary Flight Syllabus. The rationale and method of this analysis are described.

R 2

5936

Alexander, I.E. & O'Brien, T.F., Jr. HIGH TONE STIMULATION AND HEARING LOSS. Proceedings National Acad. Sci., Sept. 1954, 40(9):848-852. (Princeton University, Princeton, N.J. & Yale University Medical School, New Haven, Conn.).

Specific and localized cochlear lesions were produced in the ears of guinea pigs by use of an intense high-frequency tone (5,000 cycles). Loss in sensitivity for tones between 200 and 10,000 cycles was measured immediately after the injury and after a period of 5 weeks or more. It was found that hearing loss was uniform and severe for tones between 500 and 5,000 cycles, least severe for the lowest tones, and most severe for tones higher in frequency than the injury-producing tone. The results are discussed with regard to cochlear localization and pitch perception.

n 10

5938

USAF Air Research and Development Command. PERSONAL EQUIPMENT IN THE FAR EAST AIR FORCES. 9 JANUARY 1953 TO 1 APRIL 1953. April 1953, 16pp. USAF Air Research and Development Command Task Team for Personal Equipment, Andrews AFB, Washington, D.C.

In this report the observations and recommendations of the Air Research and Development Command Personal Equipment Task Team which resulted from a study of Personal Equipment in the Far East Air Forces are set forth. The details of discussion, conclusions, and recommendations cover the following categories of equipment: flight clothing and restraining devices, survival and associated equipment, AF personnel type parachute, miscellaneous personal equipment, integration of personal equipment, airborne lifeboats, and crash rescue boats. (HEIAS)

5939

Georgette, H.J. WINTER TRIGGER - M1 RIFLE. Contract DAI-19-509-504-ORD (P)-2036, Rep. 6, Final Narrative Summary Rep., Sept. 1956, 6pp. Technical Design & Development Co., Inc., Milford, Conn.

5939

This is a narrative summary report of the design, development and fabrication of a "Winter Trigger" for use on a United States Rifle, Cal. 30, M1. Design factors considered were safety, positive and easy firing (operator wearing Arctic Mittens), and minimum re-work of existing rifle to incorporate the trigger. A prototype was constructed but no field tests have been made.

5942

Ann, A., Coutu, A.J., & Brackett, D.C. MANUAL FOR PHOTOINTERPRETERS: A COMPARATIVE STUDY OF AERIAL PHOTOGRAPHY ON INFRARED, PAN-CHROMATIC, AND COLOR FILM. Contract AF 33(616) 2262, E.O. N630-90 SA-10, R661-193 10-9, Tech. Note 50, July 1954, 57pp. ORDWES Laboratory, Wesleyan University.

5942

This manual was prepared to aid in decisions concerning the type of photography which may most successfully be used to obtain the particular kind of photographic intelligence needed in a specific situation. Comparisons are made of photographic recordings of the same view on panchromatic and infrared film with occasional comment on the contribution that color film may make. The coverage includes areas representing different regions of the country in all four seasons, with and without snow, on clear and on overcast days. Features covered are topography, vegetation, cultivation, transportation, buildings, industry, power, communications, clouds, smoke, and steam.

5940

USA Medical Nutrition Laboratory. THE EFFECT OF VITAMIN SUPPLEMENTATION ON PHYSICAL PERFORMANCE OF SOLDIERS RESIDING IN A COLD ENVIRONMENT. Rep. 115, Sept. 1953, 99pp. Army Medical Nutrition Lab., Department of the Army, Chicago, Ill.

Under the conditions of this experiment supplementation of an adequate diet with large amounts of ascorbic acid and B-complex vitamins in men subjected to the stresses of high physical activity, residence in a cold environment and, during the latter part of the experiment, caloric deficit, did not result in significantly better physical performance than that of unsupplemented men. Vitamin supplementation of the type used in this study resulted in a reduction in the fall in rectal temperature on exposure to cold. A caloric deficit of 1200 Calories per day for 22 days did not lead to detectable impairment of physical performance. The present study indicates that the current army minimal allowances of water soluble vitamins are capable of supporting good physical performance under the conditions of this study. An ascorbic acid intake of about 60 mg per day (control group) resulted in whole blood ascorbic acid levels of 0.3 to 1.2 mg% with a mean value of 0.7 mg%.

R 96

5943

Flanagan, J.C. SITUATIONAL PERFORMANCE TESTS (A SYMPOSIUM). Pers. Psychol., Winter 1954, 1(4), 461-497. (American Institute for Research, Pittsburgh, Penn.).

This article is an adaptation by its several authors of the proceedings of a symposium on Situational Performance Tests presented at the meetings of the American Psychological Association in Cleveland, Ohio, September 7, 1953. The approach is to the measurement of non-intellectual aspects of human performance--not what the man can do but what he does or will do in the future--by means of standard samples of behavior. This type of test is described, reasons for using the tests are discussed, and some specific examples of their use are presented. These examples include leadership evaluation, small group performance measurement, and evaluation of clinical psychologists. (HEIAS)

5944

Glanzer, M. & Glaser, R. A REVIEW OF TEAM TRAINING PROBLEMS. Contract N70MP 37008, Proj. NR 154-079, Sept. 1955, 65pp. American Institute for Research, Pittsburgh, Penn.

5944

This report is concerned with team training procedures and problems in the Navy. Advantages and disadvantages of descriptive techniques for the study of teams are discussed. Methods developed to describe the activities of Navy teams, based on consideration of the team as a communication network, are presented. Navy team training procedures are described and measurement problems in the evaluation of teams are considered. General principles relating to the construction and training of teams, as well as recommendations for the improvement of team training, are presented.

R

5945

Glaser, R., Glanzer, M., & Morton, A.W. A STUDY OF SOME DIMENSIONS OF TEAM PERFORMANCE. Contract N70MP-37008, Proj. NR-154-079, Tech. Rep., Sept. 1955, 57pp. ONR, American Institute for Research, Pittsburgh, Penn.

5947

Henderson, R.L. REMOTE ACTION POTENTIALS AT THE MOMENT OF RESPONSE IN A SIMPLE REACTION-TIME SITUATION. J. exp. Psychol., Oct. 1955, 44(4), 238-241. (University of Missouri, Columbia, Mo.)

Action potential measurements were taken from a non-participating body member of a group of 20 Ss responding in a simple reaction-time situation to a visual stimulus. The reaction time was found to decline steadily over a period of 6 successive practice days of 100 trials each. The action potential during the foreperiod and at the moment of the response was found to decline during the first 4 days of practice, then to rise on days 5 and 6. Although the terminal rise in action potential was not statistically significant, a tentative hypothesis was advanced which explains the rise in terms of increased general tension arising from increased motivation to improve as the asymptote of learning is reached. (HEIAS)

R 7

5949

Mays, L.L. A DEVICE FOR RECORDING SKIN RESISTANCE WITH THE ELECTROENCEPHALOGRAPH INSTRUMENT. EEG Clin. Neurophysiol., 1955, 5, 313-316. (Army Medical Service Graduate School, Washington, D.C.)

A device for recording skin resistance with the EEG possessing both stability and high sensitivity is described and sample recordings of its performance are presented. The device can be used in measuring any phenomena where a Wheatstone bridge is used, as in skin temperature recording. (HEIAS)

R 3

5945

To develop a general methodology for description and analysis of the behavior of task-oriented groups or teams, an exploratory study was made. The activity of Navy teams was recorded and analyzed in terms of communication structure: input (signals or stimuli that elicit behavior); process (behavior carried out); and output (signals or stimuli resulting from process). Fourteen descriptive variables and measures were derived, with computational procedures for ten, and applied to the following Navy teams: 1) anti-aircraft gunnery; 2) combat information center, airplot and surface plot; 3) flight deck operations, landing and take-off and catapult; and 4) ship control. The computation and interpretation of the descriptive variables for each team are described. Implications for development of procedures for team training are discussed. (T.G. 1)

5946

Hall, W.E. & Cushing, J.R. THE RELATIVE VALUE OF THREE METHODS OF PRESENTING LEARNING MATERIAL. J. Psychol., 1947, 24, 57-62. (Department of Educational Psychology, University of Nebraska, Lincoln, Neb.)

5946

This experiment compared the effectiveness of presenting learning material in the form of films, lectures, and reading materials. Three matched groups of 100 Ss were tested following presentation of theoretical, information, and performance types of subject matter. A second test was given 60 days later. Data are presented in the form of mean achievement scores following each type of presentation, correlations of performance with ACE scores, and correlations of performance under each type of presentation.

T.

5950

Walker, E.L. INVESTIGATION OF VISUAL FACTORS CONTRIBUTING TO NIGHT AIRCRAFT ACCIDENTS, WITH SPECIAL REFERENCE TO METHODS OF LIGHTING PLANES. Proj. X 498 (AV 265 P), Rep. 1, July 1945, 16pp. USN Air Training Bases, Corpus Christi, Tex.

The results of an extensive investigation by questionnaire and statistical analysis of aircraft accidents, it was determined that the most important difficulties experienced by pilots while flying at night were: a) confusion of plane lights with ground lights and stars; b) inability to judge position, attitude, distance and speed of other planes; c) disorientation and vertigo due to or related to auto-kinesis. A 40-inch plexiglass bar 1 in. in diameter was placed upon the upper and lower surfaces of each wing tip and illuminated at each end with the appropriate colored light. An amber colored light was added to the tip of each horizontal stabilizer. Brightness control and a blinker with speed control were added. Motion pictures were taken of the design with and without the blinker in operation. The experimental plane was flown to a number of rendezvous with other planes the pilots of which were asked to rate standard lights, experimental lights on steady and experimental lights blinking. The experimental lights were preferred with blinking and brightness controlled to fit different flight operations. (HEIAS)

5951
Whitfield, T.C.D. THE EFFECT UPON THE MINIMUM VISUAL ANGLE OF DET OF FOCUS BLURRING. *TPRC 873, March 1954, 2pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, England).*

This experiment was undertaken to assess the extent of reduction in pick up range which could be attributed to the involuntary accommodation known as "day myopia". This involuntary accommodation occurs during visual search of an empty visual field. A cycloplegic was employed to fix accommodation and to enable known amounts of out of focus blurring of a collimated test object to be produced by the interposition of suitable spectacle lenses before the eyes. The test object consisted of a number of dots 0.5 mm. in diameter. It was always presented at infinity and its angular size was varied by employing collimated lenses of various focal lengths with the test object always being at the focal point of the lens. Some of the results were that: a) when the S was accurately focussed on the test object at 0 dioptres +0.25 dioptres of blurring could be tolerated; b) when there was more than +0.25 dioptres of blurring the test object size had to be increased to be visible. A conclusion reached was that detection of a target aircraft by a pilot is greatly facilitated by the existence of stimuli at infinity, e.g. clouds in the background. (HE145)

5952
White, H.S. A STUDY OF THE VALUE OF THE PSEUDO-ISOTHERMIC COLOR VISION TEST IN THE SELECTION OF THE MILITARY PILOT. Proj. 12, Rep. 1, Jan. 1942, 3pp. *USAF School of Aviation Medicine, Randolph Field, Tex.*

A study of the value of the Pseudo-Isothermic Color Vision Test in the selection of the military pilot was made by correlating results of Pseudo-Isothermic testing for color vision with practical need of color perception in military flying. 3 normal and 5 color-deficient Ss were tested. Individuals color deficient as revealed on the Ishihara plates, but able to select gross shades of red and green, were shown to be deficient in three of the main requirements of a military pilot with reference to color vision, namely recognition of very pistol signals, navigation lights, and map color shades.

5953
Wigodsky, H.S. CHANGES IN VITAL CAPACITY WITH ALTITUDE. Proj. 27, Rep. 1, April 1942, 2pp. *USAF School of Aviation Medicine, Randolph Field, Tex.*

The purpose of this study was to determine the effect of altitude on vital capacity. The vital capacities of 1500 Ss were determined by means of a wet spirometer at 10,000 ft. simulated altitude. It was found that vital capacity is not affected at this altitude. (HE145)

5954
Weitz, J. EFFECT OF SHAPE AND COLOR CODING OF AIRPLANE CONTROLS ON SPEED AND ACCURACY OF PERFORMANCE. Proj. 335, Rep. 1, Dec. 1944, 6pp. *USAF School of Aviation Medicine, Randolph Field, Tex.*

The maximum forces which could be applied in the vertical direction (up and down) and in a horizontal arc were measured for 37 men in several prone position situations. Much greater forces could be applied to horizontal rotation than to the lifting or depressing movements. Averaging all bed positions the means were 114 lbs. for the "up" movement, 130 lbs. for the "down", and 269 and 250 lbs., respectively, for right and left rotation. When instructed to apply to a given dimension of control movement "as much pressure as you can and still keep enough reserve so that you feel you could retain control over the other movements, and be prepared to make emergency adjustments as would be necessary in the flying situation," these pilots applied about 50% of their maximum forces to the controls. Altering the elevation of the bed and its horizontal distance from the control handles influenced the forces which could be applied.

R 3

5955
Tomdorff, J. & Brogan, F.A. SHORT-DURATION AUDITORY FATIGUE AFTER WHITE-NOISE STIMULATION. Proj. 21 1203 0001, Rep. 3, Feb. 1953, 14pp. *USAF School of Aviation Medicine, Randolph Field, Tex.*

A method is described for routine testing of short-duration auditory fatigue. From the results on normal-hearing Ss, it was found that the combination of white-noise stimulation and click probes may yield the most information for differentiation of Ss as to threshold shift, retrain pattern, and an aftereffect which may either overshoot or consist of a secondary drop. This method is intended for use in a follow-up study to determine whether or not there is a correlation between reversible auditory fatigue and permanent noise-induced hearing loss. The method may then be used to predict susceptibility to noise.

R 21

5956
Tomdorff, J. & Brogan, F.A. PROCEDURE IN NOISE AUDIOMETRY. Proj. 21 27 001, Rep. 3, March 1952, 10pp. *USAF School of Aviation Medicine, Randolph Field, Tex.*

After construction and assembly of suitable equipment a procedure of routine noise audiometry was developed. Pure tone (250-4000 cycles) and speech (spondaic and monosyllabic) tests were conducted in the presence of calibrated white noise, ranging from "quiet" up to 100 db in steps of 10 db. The speech tests are interrelated in such a way that the results of the spondaic test serves as a reference level for conduction of the monosyllabic word test. In this way a characteristic articulation pattern (percent articulation vs. noise) is obtained. The shape of this pattern is explained. Advantages of noise audiometry are discussed.

R 13

5957

Yonck, J. ADDITIVE EFFICIENCY OF THE HAD-OF-HEARING IN NOISE. Proj. 21 27 081, Rep. 8, Sept. 1952, 17pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Pure-tone and speech tests were conducted for 66 Ss with unilateral or bilateral partial deafness. The material was classed in 7 groups displaying characteristic types of hearing loss. Articulation was tested by the intensity step-up method which permits estimation of the maximum level of articulation. Maximum levels were observed to decline with increasing noise in many cases of perceptive deafness. The speech threshold and the maximum articulation level were utilized to derive the "Social Adequacy Index for Hearing". The relative speech impairment with regard to the pure-tone perception was expressed by a ratio between the speech loss and that for pure-tones. The hearing efficiency of impaired ears in noise does not always follow the pattern established for normal-hearing ears. This fact cannot be predicted on the basis of audiometric tests taken in quiet. Although the findings presented in this report are not backed by sufficient experience to warrant establishment of standards in exact numerical values, they are considered as evidence of general trends.

R 16

5958

Yonck, J. COMBINED EFFECT OF NOISE AND HYPNIA UPON THE AUDITORY THRESHOLD. Proj. 21 1203 0001, Rep. 1, March 1953, 9pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The combined effect of hypnia and noise upon the auditory threshold of human Ss was evaluated during and after noise exposure. Although the effect of both agents is similar as to temporary threshold impairment and subsequent improvement, hypnia was shown to act beyond the cochlear level (i.e., upon the central part of the auditory system) while noise is known to affect the organ of Corti directly. This finding aids in comprehending the pattern of masking curves of impaired ears. Incomplete recession was used as a descriptive term; it is now explained as a phenomenon of true nerve-type deafness.

R 17

5959

Strickland, B.A., Nelson, G.L. & Adler, H. EFFECTS OF DRAMAMINE ON AIRSICKNESS. Proj. 21 32 007, Rep. 1, Feb. 1951, 14pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A series of tests were conducted to investigate the usefulness of Dramamine (8-dimethyl-10-phenyl-10H-5-chloro-5H-benzothiazepine) as a preventative of motion sickness. Conditions included simulation of turbulent conditions in aircraft and swing tests. Dramamine proved to be a moderately good preventative of airsickness (216 Ss tested) reducing the sickness rate to 20.7% in contrast to 55.6% for Ss receiving placebo. In 20 susceptible Ss, the drug appeared to be no more effective than a placebo in preventing swing sickness. In comparison of two drugs (Dramamine and hyoscine hydrobromide) the latter was superior to the former in preventing experimentally induced airsickness. Of 205 Ss receiving Dramamine (100 mg) 8.7% experienced undesirable side effects; with hyoscine hydrobromide (0.55 mg) the only side effect in 88 Ss was mouth dryness. In 30 Ss, Dramamine did not adversely affect performance on complex coordination test nor RT. Incidence of sickness as influenced by time interval between last meal and flight was not affected by use of Dramamine. (HEIAS)

R 8

5961

Shriver, Beatrice M. AGE AND BEHAVIOR, A STUDY OF THE EFFECTS OF AGING ON AIRCRAFT PERFORMANCE. Proj. 21-0202-0005, Rep. 3, Feb. 1953, 86pp. USAF School of Aviation Medicine, Randolph Field, Tex.

5961

In this study of the effects of aging on aircrew performance, the Critical Incident Technique was utilized with approximately 800 aircrewmembers who supplied information on a population of approximately 1400 aircrew personnel (mean age 31.2). Utilizing a pretested interview, scale responses were obtained and analyzed within five general areas of change: (1) retention of physical skills pertinent to occupation; (2) learning and improvement of skills; (3) flight performance; (4) interpersonal relations; and (5) morale and job adjustment. Recommendations are offered concerning: (1) the utilization of the results of investigation to provide a diagnostic checklist of symptoms of aging, and (2) research to provide remedial techniques of dealing with aging problems. T.

5962

Schroeder, Rosemary E. PREDICTION OF FLYING ABILITY FROM THE ELECTROENCEPHALOGRAPH BY THE RCAF. Proj. 35, Rep. 1, Oct. 1942, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The object of this report was to determine the validity of flying ability predictions made from EEG. 860 EEGs taken from pilots and flying trainees of the RCAF were evaluated. The chances of passing were estimated for each individual. The actual success rate was not predicted, but a negative correlation between predictions and passing were found to be present. (HEIAS)

5963

Smith, P.K., & Hemingway, A. EFFECT OF THIAMINE CHLORIDE ON SWING SICKNESS. Proj. 142, Rep. 1, Aug. 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Texas.

20 subjects who became definitely ill (vomited in 20 minutes) on the swing were used. The second time they were swung, 10 men received a capsule containing 10 milligrams of thiamine chloride on the day before they were swung and again approximately 2 hours before swinging, and 10 received placebos. The third time they were swung, this was reversed. The minutes before vomiting, if it occurs, are noted and from this and other symptoms exhibited by the subject an arbitrary score is assigned in which 10 represents optimal performance. The drug was given approximately 2 hours before swinging. No significant differences were found between Ss scores with and without the 10 mgm. dose of thiamine chloride.

R 1

5964

Smith, P.K. EFFECT OF V-5 ON SLEEP SICKNESS. Proj. 132, Rep. 1, April 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Texas.

21 subjects who became definitely ill (vomited in 10 minutes) on the swing were used. The second time they were swung 10 men received 2 capsules of V-5 (256 mg.) and 11 received placebo. The third time they were swung this was reversed and 11 men received the drug and 10 received placebo. The minutes before vomiting, if it occurs, are noted and from this and other symptoms exhibited by the subject an arbitrary score is assigned in which 1 represents optimal performance. The drug was given approximately 2 to 2 and 1/2 hours before swinging. No significant differences were found between the scores of S. given the placebo vs. V-5.

R 1

5965

Smith, P.K. THE EFFECT OF SOME CENTRAL STIMULATING DRUGS ON INTELLECTUAL AND PSYCHOMOTOR PERFORMANCE AT 10,000 FEET WITH AND WITHOUT SUPPLEMENTARY OXYGEN. Proj. 114, Rep. 1, March 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The object of this study was to determine whether benzedrine sulfate, d-amphetamine sulfate, pavorin or caffeine affect intellectual and psychomotor performance at 10,000 ft. with or without supplementary oxygen. Benzedrine in doses of 10 mg. significantly improves performance in subjects without supplementary oxygen at 10,000 ft. simulated altitude. Under similar conditions caffeine in doses of 300 mg. does not significantly improve performance. Neither benzedrine, d-amphetamine, pavorin nor caffeine has any appreciable effect on performance at altitude if supplementary oxygen is given.

5968

Smith, P.K. & Henington, A. EFFECT OF BENZEDRINE ON SLEEP SICKNESS. Proj. 113, Rep. 1, Aug. 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

This research was undertaken to determine the effect of benzedrine on swing sickness. Benzedrine sulfate in oral doses of 10 milligrams, given 2 hours before swinging, did not have any significant effect on swing sickness. (MEIAS)

5969

Smith, M.H., Jr. & Haire, M. THE PROFICIENCY OF GRADUATE BASIC GUNNERS DURING TEN SUCCESSIVE GUN CAMERA MISSIONS. Proj. 344, Rep. 1, Jan. 1945, 23pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

5969

This experiment determined the change in flexible gunnery proficiency resulting from a series of ten gun camera missions. Two groups of 16 graduate gunners, trained in gunnery school on the Martin turret and the Sperry lower ball turret, were given ten successive missions of six pursuit curve attacks on which they used Sperry upper turrets and Martin upper turrets. Mean errors for each mission, measured in mils, were presented. The reliability of gun camera mission scores was estimated by rank order correlations between odd and even numbered attacks within groups of missions and between groups of missions in order to determine how many missions were required to obtain scores sufficiently stable to be used as a measure of proficiency.

T. G.

5970

Smith, M.H., Jr. & Haire, M. THE PROFICIENCY OF UN-TRAINED GUNNERS DURING TEN SUCCESSIVE GUN CAMERA MISSIONS. Proj. 343, Rep. 1, Feb. 1945, 9pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

5970

This is an experimental report of the proficiency of untrained men during 10 successive gun camera missions using Sperry upper turrets, Martin upper turrets, and waist guns equipped with K-13 sights. Eighteen men were tested on each type of equipment. Their performance is compared with that of trained gunners tested under similar conditions. Data presented include mean mil error scores for trained and untrained groups on each of the ten missions for Sperry tracking, framing, tracking plus framing, Martin circular error and percent hits, as well as statistical evaluation of significance of differences in performance of trained and untrained groups and improvement of performance of the untrained gunners from the first five to the last five missions.

T. few

5972 Schmidt, Ingeborg. STUDY OF EFFECT OF ILLUMINATION ON INTERPRETATION OF PSEUDO-ISOTHERMATIC PLATES. Special Report, May 1951, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Pseudo-isochromatic plates were studied in artificial daylight of different intensity and different color temperature. A variation of illumination between 25 and 100 foot-candles affected only deuteranomalous subjects, the error percentage slightly decreasing with more illumination. The color temperature of the illuminating light affected the number of errors made by both normals and color defectives. As the color temperature was increased, normals increased slightly in error percentage; deuteranomalous subjects distinctly, and tritanopes less noticeably. Protanomalous and protanopic persons did not change their average error score. Only artificial daylight with standardized color temperature and intensity would be used to obtain comparable results in pseudo-isochromatic plate tests.

R 11

5973

Edwards, R.F. VENTILATION IN SUBJECTS DURING THE SWING TEST. Proj. 333, Rep. 1, May 1945. 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A study of ventilation rates and respiratory rates and patterns during exposure to the Swing Test for motion sickness was conducted using 35 Ss. Findings were: a) Ventilation rates are almost invariably elevated in Ss during the Swing test; b) Increase in ventilation rate tends to be greater in individuals suffering from symptoms of motion sickness than in individuals unaffected by the swing test; c) There is poor correlation in this group of Ss between the increase in ventilation rate and subjective complaint of symptoms which may be attributed to acupnia; d) With one exception, every S studied tended to synchronize his respiratory movements in rhythm with the motion of the swing; e) Overventilation is not considered to be of importance in the etiology of swing sickness; f) Several Ss exhibiting the greatest increases in ventilation rates during the swing test admitted they were apprehensive and excited during the test. It is recommended that ventilation rates along with pulse rates and blood pressures be studied on aviation cadets during their initial flights.

5974

Rowland, Louise S. SELECTION OF COLOR VISION TESTS FOR THE ARMY AIR FORCES: A REVIEW OF STUDIES MADE AT THE AAF SCHOOL OF AVIATION MEDICINE. Proj. 333, Rep. 1, June 1945. 14pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A summary is presented of investigations on the selection of color vision tests for the Army Air Forces which were conducted during the period between June 1942 and June 1945. It had been found that the existing color vision requirements were completely arbitrary; therefore a "job analysis" was made to determine the type of color discrimination required of the various aircrew personnel. It was found that the color discriminations fell into two categories: a) those in which the colors differed markedly in chromaticity, but subjectively were difficult to discriminate because of low intensity, small visual angle, or both (colored light signals, colored reflecting surfaces for daytime signals, and colors used in coding equipment); b) those in which the colors were of low purity and differed only slightly in dominant wavelength, but were of fairly high brightness and large area (colors of the terrain, colored maps, and map colors). These facts were kept in mind in the selection of a battery of color vision tests. A number of available tests were investigated (American Optical Company Pseudo-Isochromatic Charts, SAM Anemoloscope Test, Farnsworth 100-hue Test, Canadian Lanterns, Color Threshold Lantern, etc.) and where indicated modifications were made. In addition, certain new tests were developed (Terrain Test). Tests of the anemoloscope type and those employing pseudo-isochromatic charts were felt to best meet requirements, therefore extensive studies on reliability and validity were conducted leading to a test battery consisting of screening tests and of quantitative tests for further testing when indicated. (HEIAS)

5975

Rowland, Louise S. & Fry, J.H. SELECTION OF COLOR VISION TEST PLATES. II. SELECTION OF 18 PLATE TEST. Proj. 362, Rep. 2, July 1945. 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

An investigation was conducted of the relative efficiency of the various plates of the American Optical Company Pseudo-Isochromatic Charts in separating normal color vision from color-deficient Ss. The test was given to 273 Ss, who were first classified as normal or color-deficient by other means; 200 were classified normal and 73 color-deficient. An analysis of error scores yielding percentages for each group of passing and failing scores was made. A single index for rating the charts in accordance to relative diagnostic efficiency was applied and 18 charts were selected for further testing. (HEIAS)

5976

Rowland, Louise S. & Heagan, F.V. FREQUENCY OF COLOR DEFICIENCY AMONG AIR CORPS CADETS. Proj. 314, Rep. 1, Aug. 1944. 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

3 different groups of air cadets, who had previously been classified as having normal color vision, were tested either with the SAM Anemoloscope or with the Robb's test for color deficiency. Any who failed the initial test were given the abridged American Optical Company test; 695 men were tested in all. The purpose of these tests was to determine whether the low rate of rejection for color deficiency (about 3%) by Aviation Cadet Boards in comparison with the frequency in the general population (about 8%) was due to failure to detect color deficiency, and if so, to study the causes of such failure. It was found that color deficiency frequently passes undetected in classification examinations. Possible causes for this situation were thought to be a) use of yellow artificial light rather than daylight illumination; b) use of only a few charts from the complete tests and poor selection of those chosen; and c) previous coaching of applicants. The abridged version of the American Optical Company charts was found to be more successful than the standard test in detecting the deficiency in those who have been coached, probably because only one chart is presented at a time and they are shown in an unfamiliar order. (HEIAS)

5977

Rowland, Louise S. AN EVALUATION OF THE ISCC TEST FOR COLOR DEFICIENCY IN THE SELECTION OF AIR FORCE PERSONNEL. Proj. 54, Rep. 1, May 1942. 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

An evaluation of the Inter-Society Color Council (ISCC) Test for color deficiency was made in terms of its usefulness in selection of Air Force personnel. 5 Ss (color-deficient on the Ishihara charts) were given 2 or 3 successive tests; 6 normal Ss were tested once. It was concluded upon the basis of analysis of scores that this test was not reliable enough to obtain an estimate of degree of color deficiency from a single test nor was it entirely reliable in detecting color deficiencies. (HEIAS)

5508

Rowland, Louise S. & McDonald, P.R. AN ABRIDGED EDITION OF THE AMERICAN OPTICAL COMPANY PSEUDO-ISOTHERMIC PLATES FOR TESTING COLOR PERCEPTION: COMPARISON WITH OTHER SCREENING TESTS. Proj. 68, Rep. 3, 14 p 1945, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A comparison was made of the American Optical Company (A.O.), the Robbin, and the SAM lantern tests as to their efficiency as dichotomous tests for distinguishing normal from deficient color perception. 495 Ss were tested. Any one of the 3 tests of color vision investigated in this study gives a reliable differentiation between normal and deficient color perception in a high percentage of cases. A definite diagnosis of normal color vision can be made by the abridged A.O. test if 2 or less errors are made, and a definite diagnosis of color deficiency if 6 or more errors are made. The relatively few individuals making 3 to 5 errors may have either normal color vision or a slight defect. It may be possible to eliminate the occasional equivocal findings on the abridged A.O. test by modification of a few of the less satisfactory charts in the series. An analysis of the comparative diagnostic efficiency of the individual charts is described in a following report.

5509

Rowland, Louise S. AN ABRIDGED EDITION OF THE AMERICAN OPTICAL COMPANY PSEUDO-ISOTHERMIC PLATES FOR TESTING COLOR PERCEPTION. Proj. 68, Rep. 2, Oct. 1942, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

In the first report on this project an abridged version of the American Optical Company Pseudo-Isometric Plates for Testing Color Perception was presented. This study compares these data with data from the same Ss on the complete version and with the SAM lantern test. Error scores of 81 Ss who read incorrectly one or more charts of the standard version and for the same Ss on the 17 plates of the abridged version are shown graphically. Both error distributions show a division into 3 groups with the abridged version presenting more definite evidence of separation. The same group of Ss made the fewest errors on both tests and also passed the lantern test. Therefore, a recommendation is made that consideration be given to the advisability of substituting the abridged for the complete American Optical Test as the basic test for color perception. (MEIAS)

5580

Rowland, Louise S. & McDonald, P.R. SELECTION AND VALIDATION OF TESTS FOR COLOR VISION--THE RECOGNITION OF PYROTECHNIC SIGNALS BY NORMAL AND COLOR DEFICIENT SUBJECTS. Proj. 137, Rep. 6, Nov. 1943, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A series of tests were conducted to obtain information as to the ability of both normal and color deficient Ss to identify pyrotechnic signals under night time conditions. A total of 140 Ss, 51 normal and 89 color-deficient, were tested with various signal configurations, color combinations, and instructions; 5 color vision tests for red-green deficiency were administered and test scores compared with performance scores. The conclusions were that pyrotechnic signals (red, green, and yellow) fired at night from a plane at a distance of 6 mi. and altitude of 5000 ft. were not always identified correctly by Ss with normal color vision. About 7% of color deficient Ss made as few errors as normals. Under the same conditions but using only red and green signals, all the normal and about 1/2 the color-deficient Ss identified them correctly. It was therefore recommended that yellow be eliminated in pyrotechnics. The Color Threshold Lantern and a modified RCN Lantern provided a most reliable basis for selection of color deficiencies. (MEIAS)

5581

Rowland, Louise S. SELECTION AND VALIDATION OF TESTS FOR COLOR VISION--THE COLOR THRESHOLD LANTERN AS A QUANTITATIVE TEST FOR RED-GREEN COLOR DEFICIENCY. Proj. 137, Rep. 5, Oct. 1943, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The Threshold Lantern Test, described in this report, was devised as a means of rating individuals with red-green color deficiency in terms of their ability to distinguish colored lights of low intensity. Details of design, testing procedure, and method of scoring are given. The test results from 200 normal and 209 color-deficient Ss are presented. Test-retest correlation of 43 color-deficient Ss is +0.80. 95% of the normal and 12% of the color-deficient Ss make scores of 60 or better. Scores of the remaining 88% color-deficient Ss range from 59 to 9. Comparison of the scores on this test to scores from tests measuring other aspects of color discrimination shows that there is some relation between them. (MEIAS)

5582

Rowland, Louise S. SELECTION AND VALIDATION OF TESTS FOR COLOR VISION: A COMPARISON OF TWO LANTERN TESTS FOR RED-GREEN DEFICIENCY, THE COLOR THRESHOLD LANTERN AND A MODIFICATION OF THE RCN (ROYAL CANADIAN NAVY) LANTERN. Proj. 137, Rep. 4, Oct. 1943, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A comparison of 2 lantern tests for red-green deficiency in recognition of colored lights was made: the Color Threshold Lantern and a modification of the Royal Canadian Navy (RCN) Lantern. The RCN Lantern Test was given to 185 Ss (63 normals and 122 red-green color-deficient) once and to 44 color-deficient Ss twice. The scores were analyzed and compared with data from a previous similar study with the Color Threshold Lantern. It was found that a scoring procedure using only certain errors characteristic of the color-deficient Ss must be used thus eliminating from scoring color confusions made with equal frequency by both groups on the modified RCN Lantern. Compared with results from the Color Threshold Lantern, the RCN Lantern predicted performance on signal identification less well. Test-retest reliabilities of 0.62 for the RCN Lantern and 0.80 for the Threshold Lantern were used. (MEIAS)

5583
Rowland, Louise S. FURTHER STUDIES WITH A SIMPLE ANOMALOSCOPE FOR DETECTING RED-GREEN COLOR DEFICIENCIES. Proj. 137, Rep. 3, Sept. 1943, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A comparison was made of the relative merits of a simple anomaloscope and an abridged version of the American Optical Company Pseudo-Isoschromatic Charts (Abridged A.O. Test) for detecting red-green color deficiencies. Conclusions and recommendations were: a) Of 60 Ss who pass the abridged A.O. test, 39 also pass the anomaloscope test; of 233 who fail the former, 231 also fail the latter. b) The 3% or so of color deficient individuals with a mild defect, detected by the abridged A.O. test but not by the anomaloscope, can be considered "color safe" for all color discriminations required of air crew personnel at the present time including the identification of pyrotechnic signals. c) Both tests are, therefore, satisfactory as rapid screening tests for red-green color deficiency although neither one gives an adequate measure of the degree of defect. In order to determine whether an individual with impairment of color vision nevertheless has adequate color perception for certain tasks, an adjunct quantitative test must be used. d) The average time required to give the 2 tests is about the same. There is no possibility that Ss could be coached to pass the anomaloscope test. The possibility of coaching Ss to pass the abridged A.O. test may, however, become a problem in the future.

5584
Rowland, Louise S. A SIMPLE ANOMALOSCOPE FOR DETECTING AND CLASSIFYING RED-GREEN COLOR DEFICIENCIES. Proj. 137, Rep. 2, July 1943, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

An investigation was made of the value of an anomaloscope in detecting color deficiency and in estimating the degree of defect. Conclusions and recommendations were: a) This test detects 97% of Ss who fail the abridged American Optical Company and the Rabkin pseudo-isochromatic tests. b) About 1/4 of those who fail the test show a more marked defect than the other 3/4. c) The test is not recommended as a quantitative test of color vision in its present form.
R 2

5586
Rise, H.W. & Ripple, P.H. VISUAL PROBLEMS OF PILOT IN PRONE POSITION. Proj. 21 24 011, Rep. 1, Aug. 1951, 8pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

5586
To investigate visual problems imposed by the prone position in flight, ten Ss were required to look in the direction of the horizon for one hour while in the prone position bed with head portion adjusted to angles of 15, 20, 25, and 30 degrees of elevated gaze. Measurements were made of muscle balance and ability to maintain elevated binocular gaze. Records were taken of all subjective phenomena. Lateral limits of binocular vision were measured for 30 Ss immediately after assuming the prone position. The results are discussed in relation to effective visual performance of the pilot in flight. Recommendations are included.
T. I. R 5

5585
Rowland, Louise S. SELECTION AND VALIDATION OF TESTS FOR COLOR VISION. A TEST FOR ABILITY TO DISTINGUISH TERRAIN COLORS. Proj. 137, Rep. 1, May 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A "terrain" test was devised to simulate the color discriminations that might be involved in the choice of fields for aircraft emergency landing. A series of 20 colored discs forming a graded series varying by small steps from a yellowish-red to green to a slightly bluish-green was constructed. The S's task was to arrange the discs in the proper order between red at one end and green at the other within a 2-1/2 min. period. This test and the Threshold Color Lantern test was given to 51 Ss with normal color vision and to 62 color-deficient Ss. It was concluded that the Terrain Test could distinguish 3 degrees of ability to distinguish differences in color simulating those of nature; that ability to make these discriminations is not closely related to ability to identify signal lights (Lantern Test); and that color-deficient Ss do as well as color-normal on the task in the Terrain Test.
(HEIAS)

5597
Ripple, P.H. APPRAISAL OF THE CONSOLIDATED NIGHT VISION TESTER. Proj. 21 02 088, Feb. 1949, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The Consolidated Night Vision Tester meets some but not all of the criteria for a good night vision test. Its chief assets are: a) Ability to test 8 Ss simultaneously. b) Radium plaque illumination which keeps the machine easily standardized and makes its light source durable. c) Relative freedom from mechanical difficulties in the test itself (this is not true of its scoring mechanism). Its chief disadvantages are: a) Unevenness of illumination of the testing field because of a definite bright spot in the center of the testing field. b) Lack of specifications for tracing cloth used as a diffusion screen. c) Unavailability and high cost of the switchboard used for scoring. The fact that it does not score automatically, but requires the presence of an extra technician, is also considered a serious disadvantage. d) Lack of a prescribed "random setting" routine. The average examiner's random settings show preference for certain positions. e) Metal light baffles have no tactile identification marker, and are therefore difficult to use in the dark. f) The radium activated paint used is sensitive to exposure to light. g) Abnormal distribution of test scores with a marked tendency for piling up at the difficult end of the test.

5988

Raid, J.B., Kaplan, S.J. & Melching, V.N. A METHOD FOR ANALYSIS OF CROSS BEHAVIOR. Proj. 21 3501 0003, Rep. 10, June 1955, 18pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A method of data collection is described that permits presentation of results in a form suitable for purposes of analysis and quantitative comparisons when error scores are lacking or are insufficient for meaningful interpretation of results. The examples demonstrating its use were selected from an investigation that involved observations of infrahuman primates undergoing exposure to ionizing radiation under conditions that precluded the scoring of successes and errors in accomplishment of any discrete task. The technique is not restricted to such investigations but is equally suitable for investigations involving humans or any other type of organism and could be adapted to evaluating behavioral effects of therapy, etc. It could also be used when discrete trials are used but "extraneous" activity is of as great or greater import in interpreting results as the usual error scores. (MEIAS)

R.12

5989

Payne, R.B., Moore, E.W. & Bethrum, J.L. THE EFFECTS OF CERTAIN MOTION SICKNESS PREVENTIVES UPON PSYCHOLOGICAL EFFICIENCY. Proj. 21 32 019, Rep. 1, Aug. 1952, 23pp. USAF School of Aviation Medicine, Randolph Field, Tex.

In order to assess the psychological risks which might be incurred by aircrew personnel through their use of certain motion sickness preventives, a comprehensive battery of psychological tests was administered to a large population of volunteer airmen under 5 conditions of medication (placebo, benadryl-hyoscine, benadryl, dramamine, and hyoscine). The tests were carefully selected in terms of the degree to which they were known to measure abilities relevant to the performance of pilot and navigator duties. The drugs exerted uniformly the most pronounced effects upon those psychological functions which are highly implicit, such as visual imagery, ideation, mental set, and judgment. They exerted uniformly the least pronounced effects upon those functions which are more explicit, such as perceptual-motor and spatial decision activities. Since this distinction corresponds in a general way with the principal psychological distinction between the duties of the pilot and those of the navigator, it was suspected and demonstrated that the drugs impaired those abilities which account for navigation proficiency variance more severely than they impaired those which account for pilot proficiency variance.

R.29

5990

Payne, R.B., Osler, D.R. & Tomlinson, P.A.S. THE EFFECTS OF CERTAIN MOTION-SICKNESS PREVENTIVES UPON NAVIGATOR PROFICIENCY. Proj. 21 1601 0004, Rep. 1, May 1953, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The effects of selected anti-motion-sickness drugs upon navigation proficiency were explored in a four-hour map-reading mission (aerial) and a three-hour celestial trainer mission (ground). Aerial results were inconclusive, but trainer results exhibited drug differences which agreed with predictions based upon earlier aptitude test results and which coincided with independent experimental determinations of their palliative strengths.

R.8

5992

Ogden, F.W. EVALUATION OF EAR PLUG EFFECTIVENESS. PRELIMINARY REPORT. Proj. 257, Rep. 1, April 1944, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The results of this evaluation of ear plug effectiveness are as follows: a) cotton plugs attenuate low pure tone frequencies slightly (5 db) and the high frequencies markedly (20-35 db). The use of water soluble jelly increases the attenuation of pure tones throughout all frequencies. The Sepco and S.M.R. Ear Protectors attenuate the low pure tone frequencies (20 db) and the high (40 db). The N.D.R.C. Ear Warden attenuates the low pure tone frequencies (20 db) and peaks twice in the higher frequencies (30-35 db). Intelligibility for words accompanied by approximately 100-110 db of synthetic aircraft noise was not diminished by the use of any of the ear plugs. (MEIAS)

R.7

5993

Ogden, F.W. EFFECT OF GUNFIRE NOISE UPON AUDITORY ACUITY FOR PURE TONES. Proj. 315, Rep. 1, Sept. 1944, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The purpose of this study was to determine whether the audiometric curves of individuals who have been repeatedly exposed to the noise of gunfire differ markedly from those of a comparable group of Ss who have had little exposure to gunfire. It was concluded that: a) The noise of gunfire does produce a definite loss of hearing for high tones (2048-11584 cps) among gunnery instructors; b) Among the 7 groups of instructors examined, the Air Specialists showed the least amount of hearing loss; c) The instructors on the shotgun ranges showed the greatest amount of hearing loss; d) A major portion of the temporary high tone hearing loss which is present immediately after exposure to the noise of gunfire is recovered in the subsequent 24 to 48 hrs.

5994

Ogden, F.W. EARPLUG PROTECTION AGAINST NOISE AND CONCUSSION OF GUNFIRE. Proj. 326, Rep. 1, Nov. 1944, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The object of this report was to determine by a field test the amount of hearing protection afforded by several types of readily available ear plugs against the noise of gunfire. Significant high tone (2896-11584 cps) hearing losses (3-9 db) were produced in the average audiograms of a group of students who almost never wore ear protection during a six weeks course in flexible gunnery (Charts 1 and 2). The groups of students who wore one of 5 types of ear plugs (Sepco Ear Protectors, NDRC V 51R Ear Wardens, cotton twists, lubricated cotton twists, lubricated cotton rolls) incurred, with one minor exception, non-significant average hearing losses during the course (Charts 1 and 2). The results of questionnaires which were filled out by the subjects suggest that lubricated cotton rolls were the most comfortable ear plugs, that the NDRC V 51R Ear Wardens gave the most subjective protection against gunfire noise, and that the NDRC V 51R Ear Wardens were more durable than the Sepco Ear Protectors.

5995

Melton, A.W. FLEXIBLE GUNNERY PROFICIENCY ON THE GUN CAMERA MISSION AS EFFECTED BY PRACTICE ON THE SPERRY SPOTLIGHT TRAINER (E-8, MODIFIED) AND THE PANORAMIC GUNNERY TRAINER, MARK II. Proj. 321, Rep. 1, Oct. 1944, 25pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

5995

This is an experimental study of the effect of practice in flexible gunnery training on proficiency as tested in gun camera missions. Sixteen Sperry upper turret gunners were tested on three gun camera missions both before and after two weeks of intensive training on the Sperry Spotlight Trainer; the Panoramic Gunnery Trainer was used for 16 Martin upper turret gunners. Performance is reported in terms of tracking and framing errors for Sperry gunners, circled error and percent hits for Martin gunners, as well as reliability measures of these scores. The reliability measures are analyzed to provide a satisfactory gun camera criterion of flexible gunner proficiency.

I. G.

5996

McDonough, F.E. AIRSICKNESS IN NAVIGATION TRAINING. Proj. 165, Rep. 1, July 1943, 14pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

5996

This article presents the results of a follow-up study of airsickness and airsickness elimination in 380 navigation cadets, who were administered the swing test for motion susceptibility during their pre-flight training. The results of the study are discussed in terms of the incidence of airsickness and the elimination rate, the type and frequency of symptoms, symptom duration, the relation of motion sickness other than airsickness to swing sickness, factors related to production of airsickness, and so forth.

5997 McDonough, F.E. THE USE OF DRUGS IN THE TREATMENT OF AIRSICKNESS. Proj. 194, Rep. 1, July 1944, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

184 air cadets were given doses of motion sickness preventive, U.S. Army Development Type 2116k318049c, 22703. These cadets were chosen because they had become sick more than 3 times. The drug was administered orally 30 mins. prior to takeoff. Each S was checked before taking the drug and after the flight for visual acuity, near vision, accommodation and phorias. They were questioned after the flight concerning symptoms of airsickness. If accommodation did not drop more than 1.0 diopters it was disregarded as being within the limits of error of the test. If it dropped 1.5-2.0 diopters it was termed a mild side reaction. A drop of 2.0-3.0 was termed a moderate reaction and a drop of more than 3 was considered a severe reaction. Visual acuity remained the same after taking the drug and after the flight for all but 1 cadet. Near vision varied from normal only when accommodation was severely impaired. Phorias present prior to taking the drug were not exaggerated and sometimes lessened. The drug was effective when airsickness was the result of sensitivity to motion and ineffective when it was due to psychological reasons. It seemed to eliminate motion sickness for more than one flight and its effect often lasted through subsequent flights without medication.

R 2

5999

Matthews, J.L. AN INVESTIGATION OF CERTAIN ASPECTS OF COLOR VISION. Proj. 168, Rep. 1, Aug. 1943, 12pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

5999

To investigate the color differentiations required of various air crew personnel in the performance of their duties (1943), interviews were conducted with 19 officers experienced in various theaters of operation in World War II. Pyrotechnics, distress signals, recognition signals, smoke signals, lights for various purposes, panels, flags, and other markings, colored markings of bombs, and camouflage are analyzed in terms of colors used, day or night visibility, and the responsibility of each member of the crew—pilots, bombardiers, navigators, and observers.

6000 Baker, C.H. BIASING ATTENTION TO VISUAL DISPLAYS DURING A VIGILANCE TASK. A SUMMARY REPORT. APRU 277/56, Oct. 1956, 10pp. Applied Psychological Research Unit, Medical Research Council, Cambridge, England.

When searching a PPI type of display with a sweep-line rotating at 6 rpm subjects pay relatively little attention to the peripheral and central regions of the display. In a considerable degree, visual attention can be biased towards the periphery of the display (the result being earlier "early" warning) by use of the green-light or the box-sweep technique. When pips appear on an average of one every 2 minutes, there is no deteriorating in visual performance over a period of an hour when the box-sweep is employed, though there is with the green light. Thus the evidence from these studies is that a box-sweep is superior, considered from either the proportion of peripheral pips detected or deterioration of performance in time, to any of the other techniques investigated, including the conventional one. It is suggested that a box-sweep should be developed and compared with a conventional sweep-line in a field trial under operational conditions. The development too, of a device to inject artificial pips onto the CRT at fairly regular intervals, would, it is believed, greatly reduce the penalty paid due to reduced vigilance late in the watch period.

R 2

5001

Loucks, R.B. SUBSTITUTION OF A MICROSWITCH SCORING SYSTEM FOR THE PHOTOCELL SCORING TECHNIQUE NOW EMPLOYED IN TARGET LINK TEST. Proj. 416, Rep. 1, Sept. 1945, 2pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6001

This report describes a microswitch scoring system which may be substituted for the photoelectronic circuit employed in the Target Link Test. This is a more simple and stable system adaptable to processing large numbers of subjects with a minimum of calibration and maintenance.

6002

Lazarus, R.S. & Erikson, C.W. EFFECTS OF FAILURE STRESS UPON SKILLED PERFORMANCE. J. exp. Psychol., Feb. 1952, 43(2), 100-105. (Johns Hopkins University, Baltimore, Md.).

The effects of a failure threat upon the performance of college students on an extended version of the Wechsler-Bellevue digit-symbol subtest were studied. The main results were: a) A significant increase in inter-individual variability in test performance occurred in the stress group; b) An increase in the number of errors made under stress was compensated for to some extent by an increase in speed. Speed scores accounted for 92% of the variance in total scores; c) Students with high grade point averages showed a tendency to improve their performance under stress. Students with poor academic standing did more poorly and were much more variable.

R 17

6003

Lazarus, R.S., Deese, J. & Osler, Sonia F. THE EFFECTS OF PSYCHOLOGICAL STRESS UPON PERFORMANCE. Psychol. Bull., July 1952, 49(4), 293-317. (Johns Hopkins University, Baltimore, Md.).

A critical discussion of work in the field of psychological stress and its effect upon performance is presented. The concept of stress is defined as a secondary concept, built upon the relationship between a primary concept, motivation, and the situation in which motivated behavior appears. Stress is said to occur when a particular situation threatens the attainment of some goal and the actual responses of the individual will depend partly upon the kinds of mechanisms that have been previously established. Various experimental techniques that have been used for producing stress are discussed and evaluated under 2 main headings: stress induced through failure and stress induced by the task itself. A review of the kinds of performance which have been studied under stress includes verbal performance, perceptual-motor performance, components of performance, qualitative changes in performance, personality correlates, and performance under stress as a predictor. Some of the theoretical implications of the work on stress and skilled performance are discussed with their implications for future research. (MEIAS)

R 46

6004

Keil, F.K. APPARENT SIZE OF AIRCRAFT AT VARIOUS ALTITUDES. Proj. 56, Rep. 1, June 1942, 2pp. AAF School of Aviation Medicine, Randolph Field, Tex.

6004

To demonstrate the apparent size of a forty foot aircraft at various altitudes, a chart is offered showing increase in apparent size of the airplane descending from 30,000 to 1,000 feet in terms of visual angle subtended at the eye. The haze factor is not calculated in these figures.

6005

Jerger, J.F., Lightfoot, C. & Carhart, R. SOME EFFECTS OF SHORT-HIGH-LEVEL SOUNDS UPON AUDITORY THRESHOLD. Proj. 21 1203 0001, Rep. 9, April 1955, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The threshold shift for 3,000 and 4,000 cps. pure tones was measured at intervals of 60, 140, 500, 1,025, and 3,025 msec. following the termination of a 2-sec., 111-db blast of either a 2,000 cps pure tone or thermal noise. Results suggest that threshold shifts measured at intervals greater than 400 msec. following termination of the blast hold more promise as indices of noise susceptibility than threshold shifts measured at intervals less than 400 msec.

R 8

6006

Jerger, J.F. THE INFLUENCE OF STIMULUS DURATION ON THE PURE-TONE THRESHOLD DURING RECOVERY FROM AUDITORY FATIGUE. Rep. 55-19, June 1955, 8pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The time-intensity relationship for threshold during the course of recovery from auditory fatigue was investigated by exposing 12 normal ears to thermal noise at an overall SPL of 110 db for 2 minutes, then studying the resultant shift in the threshold for short tones of 3 durations (500, 50, and 5 msec.). 30 sec. after the termination of the noise, the pre-exposure intensity differential among these 3 short-tone durations was markedly reduced. As postexposure time increased, the decline in the degree of temporary hearing loss was accompanied by a gradual return to the pre-exposure time-intensity relationship.

R 7

6007

Hughes, H.M. DISCRIMINATORY ANALYSIS. III. DISCRIMINATORY OF ACCIDENT PRONE INDIVIDUALS. Contract AF 41(128) 8, Proj. 21 49 004, Rep. 3, Oct. 1950, 43pp. USAF School of Aviation Medicine, Randolph Field, Tex. (University of California, Berkeley, Calif.).

The mathematical statistical problem of the discrimination of accident prone individuals is presented with many illustrative examples from industrial and Air Force literature. The arguments in the literature for proneness are criticized and the need for better mathematical models of proneness is pointed out.

R 19

6008
Humes, D. THE INTELLIGIBILITY OF SPOKEN MESSAGES. Amer. J. Psychol., July 1932, 65(3), 460-465. (USAF Wright Air Development Center, Aero-Medical Lab., Ohio).

This note presents a quantitative formulation of data from a previously reported experiment on the relative intelligibility of sentences suggesting activities liked and disliked by the responding Ss. All sentences were 3 words, following a set rhythmic pattern, and were requests to execute some activity. A sentence was counted correct only if all 3 words were transcribed correctly when heard in noise; therefore, the intelligibility of the least intelligible word was presumed to be the limiting factor. A correlation was computed between the frequency of correct transcription of the sentences to the Thorndike-Lorge frequency of occurrence of the least frequent word in each sentence and found to be +0.68 and after correction for gerunds and plurals, +0.77. A relationship of this extent allows the inference that sentence intelligibility can be predicted with considerable accuracy from the average word-probability of the least probable word in the sentence and that desirability and familiarity are not operating in this particular situation. (MEIAS)
R 10.

6009
Highland, R.W. A CONSIDERATION OF SOME PERTINENT PROBLEMS RELATIVE TO RADAR MECHANIC TRAINING RESEARCH. Res. Tech. Note 51 9, Nov. 1951, 19pp. USAF Human Resources Research Center, Lackland AFB, Tex.

This report is concerned with the problem of generalized versus specialized radar mechanic training. Some problems in conducting research in this area are considered. Current basic radar mechanic training is described and possible variations in content and organization of such training are considered. Problems in selecting criteria for evaluating training methods are also discussed.
R 1

6012
Hemingway, A. & Green, E.L. INCIDENCE OF AIRSICKNESS IN CADETS DURING THEIR FIRST TEN FLIGHTS. Proj. 170, Rep. 3, Jan. 1943, 7pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

This article reports an attempt to determine the amount of airsickness in early flight training and to develop a selection procedure suitable for eliminating individuals chronically susceptible to airsickness. The records of airsickness of 2689 aviation students was analyzed statistically. The results are presented and discussed in terms of the degree of incidence of airsickness evidenced during each of ten hours of flight and in terms of the observed differences among individual cadets as indicative of differences in motion sickness susceptibility.

6010
Hemingway, A. & Smith, P.K. EFFECT OF U.S. ARMY DEVELOPMENT TYPE MOTION SICKNESS PREVENTIVE ON SWING SICKNESS. Proj. 198, Rep. 1, Nov. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

To determine the effectiveness of a U.S. Army Motion Sickness Preventive (barbiturate, atropine, and ipecacine, hydrobromide), 19 susceptible Ss were given either drug or placebo on 2 successive trials on the swing test. Capsules were given 2 hrs. before tests. The Preventive was found to be partially successful in preventing swing sickness. (MEIAS)

6013
Hemingway, A. ADAPTATION TO FLYING MOTION BY AIRSICK AVIATION STUDENTS. Proj. 170, Rep. 4, Dec. 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

198-airsick aviation students who had completed 10 hours of dual instruction in college training detachments were given a motion sickness swing test and a survey was made of the incidence of airsickness. It was found that there was a progressive decrease in the incidence of airsickness during the training period of this group. 84% were sick on the first flight and 10.5% on the last flight. In order to separate the chronic airsick from those who become adapted to flying motion, it is recommended that information on airsickness be obtained by an airsickness record from the instructor in the College Training Detachment.

6014
Hemingway, A. & Smith, P.K. EFFECT OF BARBITAL ON SWING SICKNESS. Proj. 104, Rep. 1, Jan. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

To determine whether sodium barbitol in 5 grain doses is effective in preventing swing sickness, only Ss who became definitely ill during a 20 min. swing were studied. One group were given the drug and another a placebo, in alternating procedures on 2 further trials each separated by 3 days. It was found that sodium barbitol in the above doses was no more effective in preventing sickness than was a placebo. (MEIAS)

6005

Harvey, A. MOVING SICKNESS HISTORY AND RESULTS OF THE SING TEST OF ONE HUNDRED AND SEVEN (107) AIRSICK BLANKETS FROM FLIGHT TRAINING. Proj. 170, Rep. 2, Sept. 1953, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

107 individuals who were disqualified because of airsickness in flight training were given the S.A.M. sing test and a survey was made of the history of motion sickness. 81 of these were given a psychiatric examination. The incidence of sing sickness was 50.4% in this group with 65.4% vomiting during the sing test and 27% having mild symptoms. The incidence of other types of motion sickness as determined by questioning was as follows: 18.7% were seasick; 33.7% reported carsickness; 9.4% took sickness; 39.2% sickness on amusement park devices; and 63.4% sickness on either boat, car, train, or amusement park devices. In a control group of 348 individuals who stated that they had never been airsick and who were given the sing test and questioned concerning motion sickness history, the incidence of other types of motion sickness were significantly lower.

6006

Quilliam, V., Jr., & Wechsberg, P. PHYSIOLOGICAL EFFECTS OF MECHANICAL VIBRATION. Proj. 21-1203 6002 Jan. 1953, 16pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Small groups of rats subjected to mechanical vibration under controlled conditions of duration, intensity, and frequency showed alterations of vascular tone as expressed in terms of delayed rearming of vibrated extremities after standard chilling. Frequencies of 3.62 and 7.230 cycles per min. and an acceleration amplitude of 8 to 9 g units were used. Rearming times increased progressively with exposure time of as much as 1,000 hours, returned to normal values after a 30-day rest period, and increased again during a second period of exposure. Alterations of vascular tone appeared earlier in rats exposed to the higher frequency. Abnormal per capillaries were observed after prolonged vibration. Preliminary experiments showed that low oxygen tension approximates vibration-induced vascular disturbances.

R 25

6017

Green, E.L. SELECTION OF COLOR VISION TEST PLATES: I. CRITERIA. Proj. 362, Rep. 1, July 1955, 11pp. USAF School of Aviation Medicine, Randolph Field, Tex.

An index of the diagnostic efficiency of each plate in a color vision test may be obtained from knowledge of the rates of misclassification of normal and color deficient Ss for each plate. The index is a function of the sum and of the difference of the rates of misclassification, which may be weighted equally or unequally, depending upon policy. Tests composed of several plates separate the color deficient from the normal with an efficiency which depends upon the efficiency of the individual plates and upon the number of plates in the test. The distribution of errors among normal and color deficient Ss depends upon the manner in which the 2 rates of misclassification have been balanced in the computation of the index of efficiency. It is recommended that tests composed of plates selected in the proposed manner be used only as screening tests.

6018

Bell, B., Wells, J.G. & Clark, R.T., Jr. IN-FLIGHT STUDIES OF HYPERVENTILATION. Rep. 56-69, June 1956, 9pp. USAF School of Aviation Medicine, Air University, Randolph AFB, Tex.

6019

To investigate hyperventilation as a possible cause of unexplained jet aircraft accidents, fourteen aviation cadets (ranked in upper third of class) served as subjects for laboratory and in-flight studies, and 12 additional cadets were used for in-flight studies only. In the laboratory, psychomotor performance was tested before during and after passively induced hyperventilation. Individual patterns of reactions were established and essential respiratory data gathered. In the flight tests spot samples of mixed expired air were collected during various maneuvers and alveolar carbon dioxide tensions were estimated. The limitations of the methodology are discussed.

T. G. R 9

6019

Cronbach, L.J. SOME CURRENT STUDIES OF VISUAL PERCEPTION. Tech. Rep. ONRL-1-56, Jan. 1956, 7pp. Office of Naval Research, London, England.

6019

This report presents information on four investigations of visual phenomena (perception of three-dimensional form, Miller-Lyer illusions, visual thresholds, and brightness discrimination) conducted in various parts of Europe during 1956.

6020. Cline, P.A. THE EFFECT OF RETINAL ILLUMINATION ON VISUAL PERCEPTION OF SPACE. I. EXPERIMENTAL STUDIES RELATED TO A SPECIAL TYPE OF ANISOKONIA. Proj. 21-31 011, Rep. 1, March 1951, 28pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Analysis is made of a special type of anisokonia (unequal imagery in the 2 eyes) due to differences in the retinal illumination; the state of refraction or in the retinal threshold of brightness. The spatial distortion and angular disparity between the correlated boundaries of real and apparent patterns increase as the differences in retinal illumination, refraction, and sensitivity to light increase. The threshold amplitude of depth discrimination remains constant. It is recommended that methods be standardized to cover depth discrimination, anisokonia due to overall magnification (type 1) and anisokonia due to differences in retinal illumination of retinal sensitivity to light (type 11).

R 60

6021

Johnson, H.J. DIFFERENTIAL EFFECTS OF NOISE AND FATIGUE ON A COUNTER COUNTING TASK. Proj. 21 32 014, Rep. 5, Oct. 1956, 20pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6022

To compare performance under the combined stress of noise and fatigue, a complex counting task was performed by fourteen subjects. Three two-hour sessions were used--a training session followed, in counter-balanced order, by experimental (working in quiet--77.5 decibels--one half hour followed by 1 1/2 hours in noise--111.5 decibels) and control (working in quiet). Training and control sessions were both in presence of a 77.5 decibel masking noise. Several analyses of the data--percent correct responses for half hours of work--were performed: (1) using statistical control of individual differences; (2) of performance during experimental and control conditions; and (3) of performance in first half hour of both conditions.

6023

Chinn, H.I. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. II. COMPARISON OF HYOSCINE WITH BENADRYL-HYOSCINE MIXTURE DURING NAVIGATION TRAINING FLIGHTS. Proj. 21 32 014, Rep. 2, Dec. 1950, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The incidence of nausea and vomiting among cadets undergoing actual navigator training flights was compared after they had received the following medications: a) placebo; b) hyoscine hydrobromide, 0.65 mg.; c) hyoscine hydrobromide, 0.33 mg.; Benadryl, 25 mg. No S receiving the hyoscine-Benadryl mixture vomited or became severely nauseated, whereas 7.3% receiving hyoscine alone and 16.7% receiving placebo were affected in this fashion. Among those who had been airsick at some previous time, the incidence of severe nausea and vomiting was: Benadryl-hyoscine mixture - 0%, hyoscine alone - 9.0%, placebo - 20.6%. The incidence of drowsiness was the same for all groups. Dry mouth was high in both the hyoscine and mixture groups. The occurrence of blurred vision, nervousness, excessive fatigue and headaches was lower in the mixture group than in the hyoscine group. The mixture of 25 mg. Benadryl and 0.33 mg. hyoscine is as effective as 0.65 mg. hyoscine hydrobromide alone with a significant decrease in the side effects of the latter medication.

R 4

6023

Chinn, H.I., Noell, W.K. & Smith, P.K. PROPHYLAXIS OF MOTION SICKNESS: EVALUATION OF SOME DRUGS IN SEASICKNESS. Proj. 21 32 014, Rep. 4, Oct. 1950, 20pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The object of this study was to determine whether antihistamine efficacy of a drug is related to antihistamine action, to compare a series of antihistamines with a known preventive of motion sickness, and to effect a rapid screening of potential preventives for subsequent testing in the airplane. Hyoscine, Benadryl, Dramamine, Artane and Perazil were all markedly effective in decreasing the incidence of seasickness of normal, unselected soldiers during a transatlantic crossing aboard a U.S. Army Transport. Theophorin and Neomergan were ineffective. Among known motion sick susceptibles, Theophorin showed a slight protective action although less marked than hyoscine, Dramamine or Benadryl. Hyoscine and Dramamine were tested therapeutically and found not to be significantly effective. A lower, but nevertheless significant, incidence of relief was afforded with placebos alone.

R 23

6024

Chinn, H.I., Waitris, O.H. & Massengale, H.W. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. V. COMPARISON OF ADDITIONAL PREPARATIONS IN AIRCRAFT. Proj. 21 32 014, Rep. 5, July 1951, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A mixture of 25 mg. of diphenhydramine (Benadryl) and 0.35 mg. of scopolamine hydrobromide was compared during navigation training flights and in routine C-54 flights with the following preparations: chlorcyclizine hydrochloride (Perazil), 50.0 mg.; N-(alpha-methyl-b-dimethylaminoethyl) phenothiazine hydrochloride (Lergigan), 25.0 mg.; mixture of Scopodex, 1.0 mg., and Benadryl, 25.0 mg. All preparations reduced the incidence of nausea and vomiting below the control groups although the protection afforded by Perazil was not at a statistically significant level.

R 7

6025

Chinn, H.I., Handford, S.W., Cone, T.E. & Smith, P.K. THE EFFECTIVENESS OF VARIOUS DRUGS FOR THE PROPHYLAXIS OF SEASICKNESS. Proj. 21 32 014, Rep. 6, March 1952, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Lergigan, Trimeton, Benadryl-scopolamine mixture, and Wellcome Preparation No. 47-83 all provided approximately equal protection against seasickness. No preparation was significantly superior to that of diphenhydramine although the observed percentage of protection afforded by Lergigan was slightly greater. No protection was given by the antihistaminic Diatrin or by the antispasmodics M-290 and Prantal. Slight protection, not significant at the 1% level, was obtained with Scopodex alone or with a mixture of Benadryl and Scopodex. Side effects were minimal in all cases except among those persons receiving the Scopodex. When 2.0 mg. doses of the latter were given three times daily, hallucinations, an increased incidence of nightmares, dry mouth, blurred vision, and ringing in the ears was observed. When 1.0 mg. was given combined with 25 mg. of Benadryl, there were no hallucinations but the incidence of nightmares, dry mouth, and blurred vision was still increased. There was an inverse relation between the incidence of vomiting and the age of the S.

R 17

6026

Chinn, N.I. & Hiltch, L.J. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. VII. EVALUATION OF PHENERGAN AND TRIMETON. Proj. 21 32 014, Rep. 7, Aug. 1952, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The following preparations were tested during simulated aircraft turbulence: a) placebo; b) Lergigan, 25 mg.; c) Phenergan, 25 mg.; and d) Trimeton, 25 mg. All 3 drugs reduced significantly the incidence of vomiting below that in the placebo group. Phenergan exhibited the greatest protection. Side effects with each drug were slight, an increase in drowsiness being the most apparent effect. The possibility that the effectiveness of Lergigan is due to an admixture with Phenergan is discussed.

R 9

6027

Chinn, N.I. & Plotnikoff, N.P. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. VIII. EVALUATION OF VARIOUS TECHNIQUES FOR SCREENING ANTI-MOTION-SICKNESS DRUGS. Proj. 21 37 014, Rep. 8, Dec. 1952, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Hyoscine, Benadryl, and Lergigan did not increase the vomiting threshold of dogs to abomorphine injection, nor did any of them protect dogs against wing sickness. Hyoscine protected human subjects on the swing, but Lergigan and Benadryl were without effect. The lack of correlation between these findings and the effectiveness of these preparations in air and seasickness are discussed.

R 12

6028

Buettner, K. EFFECTS OF EXTREME HEAT ON MAN. II. ANALYSIS OF TEMPERATURE CHANGES CAUSED BY DIFFERENT KINDS OF HEAT APPLICATION TO THE SKIN. Proj. 21-26-002, Rep. 2, Nov. 1951, 10pp. USAF School of Aviation Medicine, Randolph Field, Tex.

6029

This report concerns a mathematical analysis of the temperature changes in the skin when subjected to different applications of heat. These changes are subject to the physical laws of heat conduction and heat transfer. Calculations show the temperature increase upon applications of non-penetrating constant heat, penetrating radiant heat, Newtonian and contact heat, and heating through a protective layer. Causation of burns is subject to the law of rate processes and can be predicted from temperature curves.

G. R 13

6029

Buettner, K. EFFECTS OF EXTREME HEAT ON MAN. III. SURFACE TEMPERATURE, PAIN, AND HEAT CONDUCTIVITY OF LIVING SKIN IN EXPERIMENTS WITH RADIANT HEAT. Proj. 21 26 002, Rep. 3, Nov. 1951, 9pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Irradiation of human skin with strong infrared heat produced pain within 2 to 60 secs., depending on radiation intensity and initial skin temperature. Peripheral blood flow and wetness of the skin do not influence temperature or pre-pain time for higher intensities. Pain threshold temperature is 44.8°C. and the pain receiver depth 0.1 mm. Heat conductivity of the upper skin can be derived from data given. Pre-cooling the skin seems to offer effective protection against over-heating.

R 19

6030

Berger, C., Mahneke, A. & Mortensen, O. ELECTRONIC FLICKER APPARATUS WITH AUTOMATIC-FREQUENCY VARIATION. J. opt. soc. Amer., April 1955, 45(4), 307-308. (Instituto de Ciencias Fisiologicas, Montevideo, Uruguay).

An electronic apparatus is described which delivers light flashes with intensity, light-dark ratio, and frequency as independent variables. The flash rate is varied automatically, and is proportional to the voltage on the control grid of the charging pentode. The control voltage is taken from a highly isolated condenser through a cathode follower with very low grid current. When the condenser is charged or discharged by a constant current, the control voltage, and hence the frequency, will change proportionally with time. The rate of frequency change is determined by the magnitude of the current, and can be started or reversed either manually or by a saw-tooth voltage. This automatic and variable frequency variation makes it possible to keep the conditions more constant from measurement to measurement for each rate of frequency change, and to compare the effect of varying speed of frequency variation as well as of the duration of series of exposures (prethreshold exposure time) upon FFF (flicker fusion frequency) with significant precision. These factors are important for the standardization of FFF determinations.

R 10

6031

Gibson, J.J., Olum, P. & Rosenblatt, F. PARALLAX AND PERSPECTIVE DURING AIRCRAFT LANDINGS. Amer. J. Psychol., Sept. 1955, 68, 372-385. (USAF Personnel and Training Research Center, Lackland AFB, San Antonio, Tex. & Cornell University, Ithaca, N.Y.).

The accepted formulation of monocular motion parallax as a cue to distance is shown to be insufficient, particularly when applied to the problem of locomotion relative to a surface such as the earth. A more general description of the parallax phenomenon is given under the name 'motion perspective.' The latter holds for a O's movement along any line parallel or inclined to any extended surface, which includes the case of aircraft landings. A mathematical analysis of motion perspective is presented in terms of the optical flow-pattern reflected from a surface to an eye. It is shown that the variables of this flow-pattern are specific not only to the 'depth' of the surface but also to the movement of an O. Assuming that these variables are stimuli for perception, they can determine not only the experience of a stable tridimensional world, but provide a basis for the judgments required for the control of locomotion in that world.

R 10

6032

Berger, C. SOME EXPERIMENTS ON THE WIDTH OF SYMBOLS AS DETERMINANT OF LEGIBILITY. Acta Ophthalmol., 1948, XXVI(IV), 517-550. (Instituto de Ciencias Fisiologicas, Montevideo, Uruguay).

5032

To investigate width of symbols as it affects legibility (relative visibility), two to five observers made threshold judgments of five widths each of two numerals (9 and 5) either printed black on white or reproduced photographically. Two types of measurements--visual distance thresholds and intensity thresholds--were made. The data are analyzed as a function of width and interpreted on the basis of physiological factors of the retina. Methods and terms used in various legibility studies are reviewed critically.

T.I. G. R 14

6033

Gibson, J.J.: THE OPTICAL EXPANSION PATTERN IN AERIAL LOCOMOTION. WITH AN APPENDIX. *Amer. J. Psychol.*, Sept. 1955, 68, 480-484. (USAF Personnel and Training Research Center, Lackland AFB, San Antonio, Tex. & Cornell University, Ithaca, N.Y.).

Formulae are given based on the assumption that locomotion, like other forms of motor action, is behavior with an end or purpose. These 5 formulae are offered as hypotheses to account for the choice of motor-responses from moment to moment, in the case of aerial locomotion. (MEIAS)

R 6

6034

Berger, C. A COMPARISON, UNDER DIFFERENT DEGREES OF BRIGHTNESS, OF MINIMUM VISUAL DISTANCES OF TWO LUMINOUS POINTS AND OF A BROKEN CIRCLE. *Amer. J. Psychol.*, 1942, 55, 354-370. (Cornell University)

6034

To compare, under different degrees of brightness, the minimum visible distances between two points and between the arms of a broken circle, both self-luminous on a black background, the author tested the left, right, and both eyes of three subjects. Average minimum visual angles and standard deviations in seconds of arc of the just visible distance are given for both test objects, each viewing condition, and at brightnesses from 17.5 to 1476.8 lux. The results are discussed with reference to the retinal processes involved.

6036 Berger, C. ILLUMINATION OF SURROUNDING FIELD AND FLICKER-FUSION FREQUENCY WITH FOVEAL IMAGES OF DIFFERENT SIZES. *Acta Physiologica Scand.*, 1954, 20, 161-170. (University of Copenhagen, Copenhagen, Denmark).

The influence of surround illumination upon flicker-fusion frequency (FFF) is investigated with different fields and illumination intensities, surrounding images of various sizes in the light-adapted human fovea. In addition, the effect is studied of several steady (non-flickering) illumination intensities, superimposed upon the flicker-areas on a black background. A superimposed steady illumination diminishes FFF, more with small than with large areas, proportionally to its intensity. It can be concluded, that stray light plays no significant role whatever in the surround effects reported here. The illumination of an immediately adjacent white field does not affect FFF, when very large or very small foveal areas are tested. Maximal surround effects for areas around 1° in diameter consist in a rapid increase (75%) of FFF with increasing surround illumination up to ratio 1 and a progressive decrease of FFF to its initial value and below, when surround illumination is increased beyond test-illumination. Both, facilitation as well as inhibition decrease with increase of foveal image-size, inhibition disappearing with test-areas around 10' and facilitation around 200' diameters. FFF increases with increased illumination of the white part of a mixed black and white surround for all areas between 0.9' and 25' in diameter up to surround-illuminations 38 times the test-illumination. Surround effects upon FFF are attributed to an interaction of different functional units (receptive fields), of single receptors within receptive fields of the fovea, and to an increased contrast-sensitivity. R 24

6037

Berger, C. THE INFLUENCE OF STROKEWIDTH UPON THE LEGIBILITY (THRESHOLD OF RECOGNITION) OF SOME NARROW NUMERALS OF VARYING HEIGHT. *Acta Ophthalmologica*, 1952, XXX(IV), 409-420. (University of Copenhagen, Copenhagen, Denmark).

6037

To study the influence of stroke width and height upon legibility (threshold of recognition) of narrow numerals, seven Ss made threshold judgments viewing the test-object monocularly with a light adapted eye at 58 and 28 ft. Test numerals were 0 and 5 of constant width (1.0 mm), varied heights (from 2.5 to 8.5 mm) and two stroke widths (0.25 and 0.1 mm). Distance between eye of observer and test objects was the measure of legibility. The data were analyzed as functions of height and stroke width. Discussion was in terms of limiting factors and of theoretical significance of the results. T. G. I. R 21

6038

Bates, Grace E. & Neyman, Jerzy. DISCRIMINATORY ANALYSIS. VIII. CONTRIBUTION TO THE THEORY OF ACCIDENT PRONENESS. PART 11. TRUE OR FALSE CONTAGION. *Proj. 21 49 004*, Rep. 9, Dec. 1951, 35pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The paper deals with the distribution of the numbers X_1, X_2, \dots, X_n of accidents in successive periods of observation, as implied by the Poisson contagious time-effect scheme, generalized to include the possibility of accidents being fatal. Given that the individual survives at least first periods of observation, the distribution of X_1, X_2, \dots, X_n is multivariate binomial. This distribution can coincide with the similar distribution implied by the no-contagion-no-time-effect mixture model of Greenwood-Yule-Newhall only in a most exceptional case. Thus, at least in principle, the presence of contagion and/or of time effect may be subject to statistical tests. R 5

6039 Bates, Grace E. & Neyman, Jerzy. DISCRIMINATORY ANALYSIS. IX. CONTRIBUTION TO THE THEORY OF ACCIDENT PRONENESS. PART 11. TRUE OR FALSE CONTAGION. *Proj. 21 49 004*, Rep. 9, Dec. 1951, 35pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The paper deals with the distribution of the numbers X_1, X_2, \dots, X_n of accidents in successive periods of observation, as implied by the Poisson contagious time-effect scheme, generalized to include the possibility of accidents being fatal. Given that the individual survives at least first periods of observation, the distribution of X_1, X_2, \dots, X_n is multivariate binomial. This distribution can coincide with the similar distribution implied by the no-contagion-no-time-effect mixture model of Greenwood-Yule-Newhall only in a most exceptional case. Thus, at least in principle, the presence of contagion and/or of time effect may be subject to statistical tests. R 5

6040

Adrian, E.E. FLAVOR ASSESSMENT. PHYSIOLOGICAL BACKGROUND OF FLAVOR ASSESSMENT. *Chem. & Indust.*, 1953, 1274-1276. (Trinity College, Hartford, England).

The physiological background of flavor assessment is the subject of this paper delivered at a Symposium on Flavor Assessment, London, March 11, 1953. Although the physiologist's knowledge of the gustatory and olfactory sense organs has increased a great deal, it is still not adequate to help much in improving the flavor of foods. It was noted that appreciation of foods depends on signals coming to the brain from a number of different sense organs, those organs located in the mouth and nose are discussed in detail along with the exciting stimuli, neural events, and sensations of flavor. (NEIAS)

6041

Ammons, Carol H. & Metz, J. CENTRAL AND PERIPHERAL FACTORS IN THE PHI PHENOMENON. *J. exp. Psychol.*, Nov. 1951, 52(5), 327-332. (Tulane University, New Orleans, La.).

It was the purpose of this experiment to investigate the relative role of central and peripheral factors in the perception of phi movement. 22 Ss observed phi under each of 4 conditions. These conditions were designed to allow comparison of movement using monocular and binocular stimulation of the same and different cerebral hemispheres. Phi movement was reported in all conditions of observation, but the greatest number of reports of uncomplicated phi movement occurred with monocular stimulation. Although phi was perceived with binocular stimulation, reports were more variable and there was more fluctuation and variety in kinds of motion perceived. It was also found that when stimulation was of the same cerebral hemisphere, phi tended to be judged as moving a shorter distance than when different hemispheres were stimulated, even though the time and distance between stimuli were constant. It is concluded that retinal or at least subcortical factors are important in the perception of phi and it would seem that a homogeneous brain-field theory is too general and oversimplified to account for the present findings.

R 13

6042

Ammons, R.B. EXPERIMENTAL FACTORS IN VISUAL FORM PERCEPTION: I. REVIEW AND FORMULATION OF PROBLEMS. *J. genet. Psychol.*, 1954, 84, 3-25. (University of Louisville, Louisville, Ky.).

6042

The author presents an extensive review and discussion of problems pertinent to the role of experimental factors in visual form perception. Following a brief historical treatment of the concept of perception, the various meanings of this concept are presented with an illustrative phrase. The operational definitions of visual recognition perception, the empirical generalizations on the effects of visual recognition perception on subsequent visual recognition perception, and specific predictions based on the assumption that the visual recognition response is to a considerable degree a learned response, are included.

6043

Ammons, R.B. AN ANALYSIS OF "HITS" IN CONTINUOUS ROTARY PURSUIT BEFORE AND AFTER A SINGLE REST. *J. gen. Psychol.*, 1953, 48, 3-10. (Department of Psychology, University of Louisville, Louisville, Ky.).

6043

This report presents scores obtained in rotary pursuit performance tests obtained by the usual total clock time measure and by recording of individual stylus-target contacts on a constant speed paper tape. The second method allowed the determination of mean number of contacts per trial, mean duration of hits, mean duration of times off target, and the variabilities of these measures. Data derived by the two scoring techniques from 12 Ss during a 16-min. continuous practice session broken by a five-min. rest are compared and analyzed.

G. R 11

6044

Ammons, R.B. LEARNING THEORY AND MOTOR SKILLS. ca. 1948, Spp. *University of Louisville, Louisville, Ky.*

6044

This paper reports two experiments concerned with rotary pursuit performance. The first experiment tested learning theory predictions of the parallel development of permanent and temporary work decrement. Subjects (104) were tested for 20 min. following 90 min. practice in which half the group had massed practice of 10 min. work and 10 min. rest, while half had distributed practice cycles of one min. work, two min. rest. The second experiment employed 192 Ss in tests of bilateral transfer of proficiency, warm-up decrement, and temporary work decrement in order to determine whether these phenomena involve central processes. Mean performance data are presented as percent of total possible stylus-target circuit completion time.

T. few

6045

Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: VI. PSYCHOLOGICAL ABSTRACTS, 1936, VOLUME 10. *Percent. Mot. Skills Res. Exch.*, 1952, 4, 33-40. (University of Louisville, Louisville, Ky.).

6045

This is a 194-item bibliography on motor skills of material published to the year 1936. Some of the various aspects reflected in the titles are as follows: learning and fatigue effects, time relations, individual differences, and so forth.

6046

Ammons, R.B. & Ammons, Carol H. MOTOR SKILLS BIBLIOGRAPHY: VIII. PSYCHOLOGICAL ABSTRACTS, 1938, VOLUME 12. *Percent. Mot. Skills Res. Exch.*, 1952, 4(3-4), 151-157. (University of Louisville, Louisville, Ky.).

6046

This is a bibliography of 183 articles dealing with motor skills and published in the year 1938. The titles reflect such topics as the following: the role of social facilitation in motor performance, a test of eye-hand coordination, the effect of age on manual dexterity, and so forth.

6047

Ammons, Carol H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: X. PSYCHOLOGICAL ABSTRACTS, 1940, VOLUME 14. *Percent. Mot. Skills*, 1955, 5, 93-100. (University of Louisville, Louisville, Ky.).

6047

This is a bibliography of 175 articles dealing with motor skills and published in the year 1940. The titles reflect such topics as the following: transfer of training in mirror training, performance on various motor tests, studies in high speed continuous work, and so forth.

6048

Simons, R.B. & Annett, Carol W. MOTOR SKILLS BIBLIOGRAPHY: IX. PSYCHOLOGICAL ABSTRACTS, 1959, VOLUME 13. Percept. Mot. Skills, 1955, 5, 21-28. (University of Louisville, Louisville, Ky.).

This is a bibliography of material found in the Psychological Abstracts for 1959 which relate to motor skills. In addition to the 178 citations, there are 23 annotated items concerning unpublished research. (HEIAS)

6049

Balle, S. CORRELATION OF STATIC AND PHYSICAL ENDURANCE. I. A TEST OF PHYSICAL PERFORMANCE BASED ON THE CARDIOVASCULAR AND RESPIRATORY RESPONSE TO GRADUALLY INCREASED WORK. Proj. 21 32 OG, Rep. 1, April 1952, 14pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Physical exercise on the treadmill was used to determine the reactions of pulse rate, pulse pressure, pulmonary ventilation, and gas exchange to gradually increased work. The speed of the treadmill was kept constant and the angle was raised from minute to minute. The initial work load and the additional steps were kept small enough to allow for functional adaptations. The test was carried on until a pulse frequency of 180 was reached. In general that was the point of an individual's "optimal work capacity." When work was continued beyond that point a decrease in pulse pressure indicated cardiovascular inadequacy; the oxygen uptake dropped, the respiratory exchange ratio exceeded 1.0, and the ventilation equivalent for oxygen increased out of proportion. Test criteria were duration of the test in minutes and/or the performed work in meterkilograms at the cut-off point. The test proved satisfactory in the evaluation of physical performance influenced by conditioning or deconditioning.

R 18

6050

Blotzer, P., Krumm, R.L., Krus, D.H. & Stark, D.E. ACCIDENT CAUSATION. Sept. 1954, 318pp. Pennsylvania Turnpike Joint Safety Research Group, Penn.

The present report summarizes the results of the combined efforts of 4 organizations, during an 18 month period, to analyze accident causation on the Pennsylvania Turnpike. The first chapter discusses the environmental conditions under which most accidents occurred, the factors which precipitated the accidents, how the vehicle was involved, and the severity of the injuries resulting. Chapter 2 analyzes in more detail human and vehicular factors related to turnpike accidents, while Chapter 3 does the same for environmental factors. Appendices provide details of various field surveys and a selective review of the literature.

(HEIAS)

R 363

6051

Brown, J.S., Buel, J. & Helton, A.W. DEVELOPMENT AND EVALUATION OF THE S.A.M. DISCRIMINATION REACTION TIME TEST. (CP6110), MODEL 8. Proj. 470, Rep. 1, March 1946, 19pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The S.A.M. Discrimination Reaction Time Test was designed to measure the speed with which individuals make differential manual responses to visual stimulus patterns differing from one another with respect to the spatial arrangement of their component parts. The test required that the S react by pushing 1 of 4 toggle switches in response to the lighting of a red and green signal lamp. The time taken to operate the correct switch on each trial is accumulated on an electric clock and constitutes the test score. The report includes procedures for operation and maintenance and summaries of representative distribution, reliability, and validity statistics. (HEIAS)

6052

Campbell, P.A. A MODEL PHOTOELECTRIC MACHINE GUN AND TARGET RANGE FOR INDOCRINATION IN NIGHT GUNNERY UNDER CONDITIONS OF EXTREME DARKNESS. Proj. 81, Rep. 1, Sept. 1942, 3pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6052

This report describes a simple apparatus for use in demonstrating the principles of dark adaptation and the use of the eyes at night with special reference to night gunnery. Procedures to use in the demonstration are given. Photographs of the apparatus are attached.

I.

6054

USA Board Number 3. STUDY OF INTENDED USES OF THE RUCKSACK. Proj. NR 2724, DA Proj. 7 82 01 002, July 1956, 32pp. USA Board Number 3, Fort Benning, Ga.

6054

To re-examine intended uses of the rucksack to determine whether additional guidance to the developer is necessary, Department of Army publications were reviewed to determine existing doctrine guiding the use of the rucksack. Further study was made of reports of rucksack projects, tests of individual load-carrying equipment, and of standard and experimental rucksacks in order to determine the capabilities and limitations of the equipment. The military characteristics for the rucksack were reviewed and analyzed to determine the extent of guidance furnished the developer. Recommendations were included.

T. I. R 15

6053

Carmichael, L. READING AND VISUAL WORK: A CONTRIBUTION TO THE TECHNIQUE OF EXPERIMENTATION ON HUMAN FATIGUE. Trans. N.Y. Acad. Sci., Dec. 1951, Series II, 14(2), 94-96. (Smithsonian Institution, Washington, D.C.).

This paper evaluates certain aspects of an elaborate study on reading and visual fatigue. In these experiments all eye movements made during each reading period of 6 hr. were electrically recorded. 40 Ss read for 2 such periods material presented as books and as projected micro-film pages. The 2 books were Adam Smith's "Wealth of Nations", Vol. II and Richard Blackmore's "Lorna Doone." Ss were paid for the task and were required to take comprehension tests over the material. Samples of work used for statistical analysis were chosen in an objective way only after the full records were complete. An analysis of all possible changes in the motor pattern of the eyes failed to reveal any significant decrement with any of the materials used. This finding was accounted for on the basis of continuous, high motivation; other relevant studies were cited. Practical implications in industry, education, and psychiatry are indicated. (HEIAS)

R 3

6055
Adams, J.A. AN EVALUATION OF TEST ITEMS
MEASURING MOTOR ABILITIES. Proj. 7700,
Task 77010, AFTRC-TX-58-55, May 1956,
22pp. Skill Components Research Laboratory,
AFTRC, Lackland AFB, Tex.

6055
To test the hypothesis that for certain simple per-
formance criteria, a test composed of simple motor test
items would predict as well as complex motor
ability tests and thus could replace them in a classifica-
tion battery, 46 test items were developed to span a
wide range of motor abilities. The major ability classi-
fications were represented: (1) dexterity and manipula-
tive, and (2) gross muscular strength and coordination.
The relative predictive value of three test items, as
compared with four complex psychomotor tests and the Air-
crew Classification Battery, was studied using the fol-
lowing criteria: (1) success in primary pilot training,
and (2) success in reciprocal engine mechanics, hydraulic
mechanics, and aircraft electrician technical schools
for airman. T. R. 16

6056
Crook, M.N. STUDIES IN THE LEGIBILITY OF NUMERALS. Feb. 1950; 20pp. US Armed Forces Vision
Committee Meeting. (Tufts University, Medford, Mass.).

This is a report, given at the Feb. 1950 Armed Forces Vision Committee meeting, concern-
ing a number of studies on the legibility of numerals conducted at the Tufts Institute for
Applied Experimental Psychology. Among the legibility factors investigated were type size,
brightness, and vibration. Factors of digit design were also studied. Emphasis was placed
not so much on the level of phrases and thought units, as in previous studies, but on the
level of numeral reading wherein each character must be separately identified. The data
indicate that: a) if the results of the numeral reading is compared to what is known about
the reading of verbal material, it appears that in the numeral reading task any factor can
be varied over an even wider range without affecting performance than in the verbal reading
b) there exists a kind of performance limit. In other words, for a given work situation in
which information on brightness, type size, and relative vibratory movement between the eyes
and the visual field is available, it seems safe to assume that performance relative to the
maximum will probably be no better, and may easily be worse, depending on whether other
adverse conditions are present, than indicated by the experimental results. Recommendations
are made for changes in configurational design of numerals for military use. (NEIAS)

6058
Crook, M.N., Hanson, J.A. & Mulfleck, J.W. THE LEGI-
BILITY OF TYPE AS A FUNCTION OF REFLECTANCE OF BACK-
GROUND UNDER LOW ILLUMINATION. Contract W33.038 AC
14559, RDO 694 15; WADC TR 52 85, June 1952, 16pp.
USAF Wright Air Development Center, Wright-Patterson
AFB, Ohio. (Tufts University, Medford, Mass.).

6058
To study various factors in legibility of type
such as might be used on aeronautical charts, 12 Ss
performed a letter cross-out test printed in six- and
eight-point type on three papers (reflectances of
0.87, 0.49, and 0.26). Simulated red cockpit illu-
mination was used covering the range from 0.014 to
0.129 ft.-c. Speed and accuracy scores were analyzed
as functions of illumination level, reflectance of
background, and type size. The specific application
of the data to chart design is made in subsequent
papers.
T. G. I. R 2

6059
Daniels, F. Jr. CONTACT COOLING OF THE HAND AT -20° F. Proj. 7-64-12-004, Tech. Rep. LP 22,
Jan. 1956, 21pp. Environmental Protection Div., Quartermaster Research and Development Com-
mand, Natick, Mass.

Cooling curves were obtained at 1) points on the hand and fingers of 3 men with bare hands
exposed at -20° F. Measurements were made with hand exposed to air, grasping iron and alumin-
um pipes covered with an expanded plastic material, and grasping the bare iron pipes. The
general shape of cooling curves in air and in contact with the insulated pipes was an initial
rapid drop, followed by a lower fall which was practically a straight line during the period
of measurement. Some of the points of contact with bare metal plunged in a straight line to
below the freezing point of water. The favored position of the third finger in having slower
cooling than the other fingers was apparent. The small finger was particularly vulnerable
to rapid cooling. The importance of insulating metal equipment in the cold is discussed
such insulation is in many instances more feasible than trying to maintain dexterity by in-
sulating the hand.
R 8

6060
Davis, R.C., Buchwald, A.M. & Frankmann, R.W. AUTONOMIC AND MUSCULAR RESPONSES, AND THEIR
RELATION TO SIMPLE STIMULI. Psychol. Monographs, 1955, 69(20), 1-71. (Indiana University,
Bloomington, Ind.).

This monograph reports a series of experiments on the somatic responses to external sti-
muli when there is no external movement required of the S. Recordings were made of numerous
features of cardiovascular, respiratory, dermal, and skeletal-muscle responses. Topics in-
vestigated were: a) the interrelation of various cardiovascular response measures; b) the
stimulus effect of blood-pressure measuring techniques; c) the effect of stimulus repetition
upon the various response elements and their interrelation; d) the responses as functions of
auditory stimulus intensity; e) the nature of responses to a variety of cutaneous stimuli.
The direction and temporal course of the response was ascertained for each response element
in each situation and the response magnitude was related to the stimulus condition. In gen-
eral, the results indicated that there are a number of different but overlapping response
systems whose differential action is related to the stimulus and whose characteristics can be
modified by stimulus repetition.
R 52

6061
Gibbons, T.B., Phillips, I.A., Budensiek, R.K. & Gilbertson, J.R. AGE, HEIGHT, AND WEIGHT OF 2173 MEN ENTERING RECRUIT TRAINING DURING 1952 AT THE U.S. NAVAL TRAINING CENTER, GREAT LAKES, ILL. Proj. Rep. NM 003 044.01.01, June 1953, 18pp. Naval Medical Research Unit 4, USN Training Center, Great Lakes, Ill.

Observations were made on 2173 men entering the Recruit Training Program during 1952 at the U.S. Naval Training Center, Great Lakes, Illinois. Data were collected as to age, height, and weight of these men, and it was possible to correlate the 3. The average recruit entering training was 19 years old, 5'8 1/2" tall, and weighed 152.4 pounds. Body weights represented, on the average, 105.4 percent of the standard weight for height and age as given in the Medico-Accurial Report of 1912. The recruits studied ranged in age from 17 through 25 years, in height from 5' to 6' 6", and in weight from 105 to 258 pounds. Relative body weights were from 74 to 157 percent. Comparison of these figures is made with previous information obtained on former draft registrants, Army inductees, and Army septeens. In general the 1952 Navy recruits were slightly taller and heavier, the difference being small but significant. Cf. 6053
R 7

6063
Gibbons, T.B., Phillips, I.A., Budensiek, R.K. & Gilbertson, J.R. CHANGES IN BODY WEIGHT DURING RECRUIT TRAINING AT THE U.S. NAVAL TRAINING CENTER, GREAT LAKES, ILL. Proj. Rep. NM 003 044.01.01, June 1953, 18pp. Naval Medical Research Unit 4, USN Training Center, Great Lakes, Ill.

A representative sample of young men entering the Recruit Training Program during 1952 at the U.S. Naval Training Center, Great Lakes, Illinois, was studied in terms of age, height, and weight at the beginning and again at the end of their training. The purpose of the study was to evaluate the nutritional effects of the training program. Data describing the men entering training program were presented in another report. The present report deals with the changes in these measurements which occurred during recruit training. Data was complete on 2173 men entering training, and of these 2116 completed training with their original company in the prescribed time. During training, more recruits gained weight than lost, and about 1/3 maintained a constant weight throughout the period. Closer scrutiny of weight behavior revealed that weight gain was most likely to occur in younger men and in underweight men. Weight losses usually occurred in overweight recruits especially if over 20 years of age. A seasonal variation in weight behavior existed, with a tendency towards losing weight in the spring and summer and gaining weight in the fall and winter. The nutritional status of the great majority of men appeared to be improved during recruit training. Cf. 6061
R 7

6062
Dubrovner, R. & Searle, L.V. THE PIN-POINTER TECHNIQUE AND ITS USE IN THE STUDY OF TARGET IDENTIFICATION. Proj. 506 006 0006, Tech. Rep. 53 19, June 1953, 11pp. USAF Aircraft Observer Training Research Lab., Mather AFB, Calif.

6062
This is a report on the construction, administration, scoring, and interpretation of results of the pinpointer device, an instrument developed to yield precise measures of accuracy and speed in the recognition of a briefed radar aiming point. Sources of measurement and motor errors are discussed as well as the results of an application of the device to an aiming point recognition problem with 22 aircraft radar observer students serving as Ss. Suggestions for future research in utilization of this technique are presented.
T. G. I. R 7

6064
Elbel, E.R. EFFECT OF VARIOUS PHYSICAL TRAINING PROGRAMS UPON THE PHYSICAL FITNESS OF AAF PERSONNEL: INFLUENCE OF SELECTION OF PHYSICAL TRAINING ACTIVITIES UPON PHYSICAL FITNESS OF PERSONNEL IN THE CENTRAL FLYING TRAINING COMMAND. Proj. 307, Rep. 1, Oct. 1945, 4pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6064
To determine the effect of various physical training programs upon the physical fitness of the participants, 431 aviation cadets were given the AAF Physical Fitness Test previous to and following eight weeks participation in one of three types of programs (the conventional AAF physical training program, a selective sports program, and a required sports program). Three installations were used for research and the results are discussed in terms of differences in physical fitness following the various programs at each installation, and for the population as a whole.
T. R 2

6065
Erickson, C.C. EXTENDED BIBLIOGRAPHY ON METHODS OF MEASURING PILOT PROFICIENCY. ca 1951, 9pp. (Vanderbilt University, Nashville, Tenn.)

This is an unannotated 143 item bibliography on methods of measuring pilot proficiency. The period covered ranges from 1917 - 1942. The items are arranged in alphabetical order.
R 143 (HEIAS)

6066
Fairbanks, G., House, A.S. & Stevens, E.L. AN EXPERIMENTAL STUDY OF VOWEL INTENSITIES. J. Acoust. Soc. Amer., July 1950, 22(4), 457-459. (University of Illinois, Urbana, Ill.)

110 monosyllabic words, 10 for each of the 11 common American vowels, were spoken in isolation by each of 10 Ss. Most of the differences between the mean relative intensities of the vowels were found to be statistically significant. Among the words for a given vowel the intensity of that vowel was found to differ significantly in most instances, a variation tentatively attributed to consonantal environment.
R 2

6067

Frick, B.C., Green, E.L. & Fry, J.H. THE AAF SAM COLOR CODE TEST (COLCODE). A PERFORMANCE TEST OF COLOR DISCRIMINATION ABILITY. Proj. 415, Rep. 1, Sept. 1945, 17pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A performance test known as the AAF SAM Color Code Test (COLCODE) has been devised to score the ability of the color deficient individual to use colors as required in AAF aircraft maintenance. The reliability coefficient of the AAF SAM Color Code Test is 0.94. It is sufficiently accurate to score the subject's position within the group. The test will score the ability to name colors and to use a mimeographed identification card in aircraft maintenance. The test will score the ability to use the master color identification chart in aircraft maintenance. The test will score the overall ability of a subject to perform color identifications as required in aircraft maintenance. The ability to identify colors and to use the master identification chart is decreased by lower levels of illumination. The ability to identify colors is decreased by lowered clarity of the colors. The AAF SAM Color Code Test (COLCODE) does not correlate well with the AAF SAM Color Threshold Test. "Safe" or "unsafe" subjects selected for work with colors in aircraft maintenance should not be judged on the basis of their AAF SAM Color Threshold Test scores.

6068

Gottsdanker, R.M. PREDICTION-MOTION WITH AND WITHOUT VISION. Amer. J. Psychol., Oct. 1952, 65(4), 533-543. (University of California, Santa Barbara, Calif.)

15 Ss were each given the task of continuing to track a target after it had disappeared from view. Under one condition of continuation S kept his eyes open, and under another condition his eyes were closed. From the results it was concluded that: a) Basically the same mechanisms of prediction operate in visual and non-visual continuation motion, as shown by the same relative rates of continuation under the 2 conditions and by the correlations between conditions; b) Non-visual continuation tended to be less accurate and consistent than that with vision; c) Individual differences were highly consistent; d) A positive bias of non-visual continuation found was attributed to an error of central tendency; e) Ss reported the use of kinesthetic, visual, and cutaneous cues, usually in combination. Vision seemed to have been utilized even by those Ss who denied its influence; f) About half of the Ss did not perceive the acceleration of the target. Only one-fourth showed complete appreciation of acceleration. No effect on performance was found to result from awareness of acceleration. (HEIAS)

R 3

6069

Gottsdanker, R.M. THE ACCURACY OF PREDICTION MOTION. J. exp. Psychol., Jan. 1952, 43(1), 26-36. (University of California, Santa Barbara, Calif.)

Ss tracked targets with an apparatus which moved sheets of paper upon which curves were printed. Ss were asked to continue tracking after the target disappeared in the manner in which he would predict the motion of an airplane which has flown behind a cloud. The following results and conclusions were reached: a) mean rate of continuation of a constant rate deviated only about 1% from the required rate; b) mean average error of prediction motion was 11% of the required rate; c) prediction of a positively accelerated motion is at a lower rate than the terminal guided rate; prediction of negatively accelerated motion is at a rate higher than the terminal guided rate; d) individual differences in measures of prediction motion were reliable; e) repeated exposure to the same segment of an accelerated pattern did not cause Ss to learn to extend the acceleration; f) differences in prediction motion could not be predicted from differences in the previous guided motion; g) correlation between measure of prediction motion and tracking proficiency was negligible; h) the tendency of gunners to lag on approaching targets and to lead on receding ones is in accord with the present findings on accelerated targets. (HEIAS)

R 8

6070

Gottsdanker, R.M. THE CONTINUATION OF TAPPING SEQUENCES. J. Psychol., 1954, 32, 123-132. (University of California, Santa Barbara, Calif.)

Ss were instructed to synchronize key tapping movements with regular sequences of discrete sounds and to continue their tapping after each series ended. The continuation responses were analyzed and results were compared with those of earlier studies in which Ss were required to maintain continuous unidirectional lateral motion. It was concluded that: a) Repeated discrete movements may be maintained at a constant rate much more accurately and consistently than may continuous motion. b) Acceleration is incorporated into continuation behavior more often in the tapping situation than in the lateral motion situation, but not necessarily in an exact and consistent manner. c) There was no evidence that the smoothing found for continuous movement occurs when Ss attempt to maintain the final tapping rate of an accelerated pattern. d) Individual differences in the rate at which a tapping sequence is continued are consistent as indicated by a reliability estimate of .84 for 6 6-sec. trials.

R 6

6071

Gottsdanker, R.M. A FURTHER STUDY OF PREDICTION MOTION. Amer. J. Psychol., Sept. 1955, 68(3), 432-437. (University of California, Santa Barbara, Calif.)

Adult human Ss were given the task of predictively continuing the tracking of a target which had been made to disappear from view. A pattern of constant rate and a positively accelerated pattern were included within each of 3 ranges of target movement. In addition, an ordinary tracking task was given to provide a criterion of skill. The following results were obtained: a) Previous results, showing the smoothing of accelerated patterns, relatively high accuracy on patterns of constant rate, and consistent individual differences, were corroborated. b) For targets with similar patterns of acceleration, the ratio of continuative rate to terminal rate was fairly constant. c) Relative accuracy increased slightly as the rate of the movement of the target increased. d) No measure of prediction motion provided a satisfactory forecast of skill in tracking. The facts argue for a new approach to the problem.

R 4

6072
Graham, W.R. IDENTIFICATION AND PREDICTION OF THE
TRAINING CRITERION FACTORS. *J. appl. Psychol.*
1924, 20(2), 56-99.

6072
To identify and predict the variables involved in
the successful completion of the Naval Gun-Flight
training program, the Thurstone centroid factor method
was employed to evaluate the training criterion with
subsequent application of a series of criterion and
predictor variables to three hundred and ninety-nine
students. A factor analysis results in three signifi-
cant factors which are discussed in terms of the rela-
tive variables involved in prediction of successful
completion of this training program.
T. R 4

6073
Haire, M. & Smith, M.H. THE RELATIONSHIP BETWEEN B-29 GUNNERY PROFICIENCY AND CERTAIN PRO-
POSED SELECTION TESTS. Proj. 476, Rep. 1, June 1946, 14pp. USAF School of Aviation Medicine,
Randolph Field, Tex.

In order to investigate the validity of the AAF Classification Battery for the selection
of B-29 Gunners, carefully controlled gun camera missions were given to a group of candidate
gunners who had previously taken the classification tests as cadets. The reliability of
the criterion missions in this experiment was somewhat higher than that reported in previous
projects. The average intermission r runs from .16 to .32 while the average intra-mission
 r runs from .40 to .60. The validities of the psychomotor tests are encouragingly high.
The optimal weighting of psychomotor tests on this sample yields an r of .34. Addition
of the paper and pencil tests raises this figure to .38. The Pedestal Sight Manipulation
Test (CM8248) was given its first long run try-out in this experiment. Unfortunately,
techniques for maintaining the calibration were inadequate at the time, and the resulting
unreliability seriously attenuated the test's validity. However, it is thought that the
test still has considerable promise for gunnery selection.

6074
Peterson, G.E. & Barney, H.L. CONTROL METHODS USED IN A STUDY OF THE VOWELS. Monograph
1982, ca. 1953. Bell Telephone System, New York, N.Y.

Relationships between a listener's identification of a spoken vowel and its properties
as revealed from acoustic measurement of its sound wave have been a subject of study by
many investigators. Both the utterance and the identification of a vowel depend upon the
language and dialectal backgrounds and the vocal and auditory characteristics of the in-
dividuals concerned. The purpose of this paper is to discuss some of the control methods
that have been used in the evaluation of these effects in a vowel study program. The plan
of the study, calibration of recording and measuring equipment, and methods for checking
the performance of both speakers and listeners are described. The methods are illustrated
from results of tests involving some 76 speakers and 70 listeners. (AEIAS)
R 19

6075
Hemingway, A. MOTION SICKNESS AMONG AIR CREW PERSONNEL. Proj. 126, Rep. 1, March 1943, 6pp.
USAF School of Aviation Medicine, Randolph Field, Tex.

The purpose of the study was to establish the incidence of air-sickness and determine
whether there was any relation between it and sea, car, and train sickness. Sickness
on 1 or more occasions was reported by 14.1% of the men questioned. Vomiting on 1 or more
occasions from airsickness was reported by 9.1% of the men. A lower percentage of pilots
reported airsickness than did other aircrew members, 9.0% of the pilots reporting airsickness,
half of whom said they had vomited. A history of sea, car, or train sickness was reported
by 53 men, 8.6% of the men questioned. 30.2% of the 53 men reporting sea, car, or train
sickness said they had been airsick. There is a definite correlation between a history of
airsickness and a history of sea, car, and train sickness. It is recommended that a new
questionnaire with a more precise definition of airsickness be given to a large group of
aircrew personnel.

6076
Holland, J.G., & Henson, Jean B. TRANSFER
OF TRAINING BETWEEN QUICKENED AND UNQUICKENED
TRACKING SYSTEMS. Proj. NR 592-010, Rep. 4703,
Feb. 1956, 7pp. NRL, Engineering Psychology
Branch, Washington, D.C.

6076
To determine the direction and extent of transfer of
training for subjects trained on either a quickened or
unquickened tracking system with subsequent shift to the
other system, four groups of six subjects were used.
Two groups were trained on each system; one group prac-
ticed for 140 40-second trials, the other for 260 40-
second trials. After training each group was switched to
the system with which it was naive. Transfer of
training was evaluated by comparing the performance
during this initial test period with the first training
session of the two groups originally trained on the sys-
tem in question. The findings are discussed in relation
to learning theory and to practical operational pro-
cedures.
T. G. R 3

6077
Ammons, R.B., Alprin, S.L., Ammons, Carol H. ROTARY
PURSUIT PERFORMANCE AS RELATED TO SEX AND AGE OF PRE-
ADULT SUBJECTS. *J. exp. Psychol.*, 1955, 42, 127-133.
(University of Louisville, Louisville, Ky.).

6077
In order to investigate rotary pursuit performance
as related to sex and age of pre-adult Ss, 150 Ss,
from each of five grade levels and with an equal num-
ber of boys and girls at each level, were selected to
perform on the Koerth-type pursuit rotors. The Ss
ranged in age from approximately 9 to 18 years. Re-
sults are discussed in terms of performance as a func-
tion of age and sex with some discussion of the possible
interplay of such factors as motivation, "spontaneous
recovery", etc.
G. R 19

6078

Lobron, C.H. ESTIMATE OF EYE LEVEL TO FLOOR DISTANCE FOR TANKERS; HUMAN ENGINEERING REPORT 4. Proj. TBI 1000, Rep. S 4030, May 1954, 5pp. USA Frankford Arsenal, Philadelphia, Penn.

Information and recommendations were requested regarding the distance from the floor to the eye level of an average tanker (standing with shoes) for use in the design of tank optics. Since no anthropometric data on a direct measure of eye level to floor were available, the distance was computed from data on stature, eye height, eye level from seat, etc. 4 different sets of data from different populations were used. The desired measurement was computed for each set of data in order to check and substantiate the solutions. The various solutions were a) for 1000 air cadets, eye level to floor (no heels) $M = 64.2"$, $S.D. = 1.9$; b) for 4000 enlisted men (with heels) $M = 64.7"$, $S.D. = 2.4$; c) for 84,000 inductees (no heels) $M = 64.1"$, $S.D. = 2.4$; d) for 17,000 Army separablees (with heels) $M = 64.5"$, $S.D. = 2.5$. On the basis of various considerations of group size and similarity of group to Army personnel the last figures were recommended. (HEIAS)

R 4

6079

Lobron, C.H. & Hedberg, R.D. THE MAXIMUM TORQUE A MAN CAN APPLY TO A 1-1/8" KNOB. HUMAN ENGINEERING REPORT 5. Proj. TBI 1000, Rep. S 4065, June 1954, 7pp. USA Frankford Arsenal, Philadelphia, Penn.

Measurements of the amount of turning force a man could apply to a knob with a diameter of 1-1/8 in. were made on 33 male Ss. The Ss were selected to conform to a normal distribution. The average maximal force that could be exerted in turning the knob clockwise with thumb and forefinger and while in a standing position was 19.4 lb., $S.D. = 4.5$ lb. From a practical standpoint then, 84% of a comparable male population can be expected to exert a turning force of 14.7 lb. or more; 98% can exert 10.4 lb. or more on this knob. (HEIAS)

6080

Loucks, R.B. AN EVALUATION OF VARIOUS PSYCHOLOGICAL PERFORMANCE TESTS FOR ALTITUDE CHAMBER RESEARCH. Proj. 202, Rep. 1, Aug. 1944, 26pp. USAF School of Aviation Medicine, Randolph Field, Tex.

An experimental technique has been developed by means of which decrements in psychological performance due to a simulated altitude of 15,000 feet can be detected within a single experimental session. The technique eliminates the extensive preliminary training which has commonly been employed in previous studies. A comparison was made of 4 psychomotor pursuit tests, differing in complexity, at 18,000 feet simulated altitude. One test registered a deterioration in performance in 90% of the group. The next best test showed a decrement in only 56% of the Ss. Test-retest measurements on a battery of tests indicate that the ground level performance is consistent but that the amount of impairment an individual exhibits as the result of anoxia at one test session cannot be used to predict the amount of impairment at the next session. Therefore individual decremental scores cannot be used for classification. The decrement in group performance, however, is highly significant and predictable.

R 7

6081

Matthews, J.L. PHYSICAL STANDARDS FOR SELECTION OF RADAR OPERATORS. Proj. 167, Rep. 1, July 1943, 5pp. USAF School of Aviation Medicine, Randolph Field, Tex.

An investigation of the operation of the various types of air-borne and ground control Radar installations was made. An analysis of the operational requirements of operators of the equipment is presented. Ocular fatigue following Radar operation is attributable to accommodative asthenopia, convergence insufficiency, and flicker, of which accommodative asthenopia is considered the most important. Recommendations for the revision of physical standards for Radio Observers "I," "C," and "V" and ground control operators are made.

6082

McDonald, P.R. THE RELIABILITY OF THE AAF NIGHT VISION TESTER. Proj. 199, Rep. 1, Nov. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

In the course of various studies on night vision, it was found that candidates tested on the AAF Night Vision Tester showed considerable improvement in performance on retests. In order to investigate this improvement of performance, 85 Ss were given 4 tests on the AAF Night Vision Tester. The correlation between the scores obtained on the second and fourth tests is 0.797 which shows the high reliability of the second test. The practice effect is greatest between the first and second tests, there being little improvement on subsequent tests.

6083

Moeller, G., Fooks, G., Sperling, H.G. & Farnsworth, D., et al. EVALUATION OF OPTICAL FILTERS FOR SPECIAL MILITARY PURPOSES. I. DARK ADAPTATION AND THE NEAR ULTRAVIOLET. II. EVALUATION OF AN EXPERIMENTAL AIR-SEA RESCUE GOGGLE. FINAL TECHNICAL REPORT. Contract Monr 1276 (00), Proj. NR 142 082, Feb. 1956, 23pp. Office of Naval Research, Washington, D.C. (Connecticut College, New London, Conn.).

This report describes 2 series of studies conducted as cooperative enterprises of the Psychology Department, Connecticut College and the Medical Research Laboratory, U.S. Naval Submarine Base, New London, Connecticut. The 2 studies reported first were concerned with the effects of exposure to the near ultraviolet upon subsequent dark adaptation. Those studies failed to confirm reports by others that exposure to the near ultraviolet affects dark adaptation deleteriously. The third experiment reported here was designed to evaluate an experimental air-sea rescue goggle. The evidence indicates that the goggles will not improve visual performance in detection of small targets against a water background relative to such performance without any visual aid.

6084

Hemingway, A. EFFECT OF VASANO ON SWING SICKNESS. Rep. 153, March 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

To study the effect of Vasano, a mixture of hyoscine and hyoscyamine, on swing sickness, 20 susceptible Ss were given 2 trials on the swing test. Those who received Vasano on the first trial received a placebo on the second and vice versa; the drug was given 2 hrs. before swinging. The assessment of sickness incidence showed that Vasano was not significantly more effective than a placebo in preventing swing sickness. (HEIAS)

6085

Hemingway, A. INCIDENCE OF SWING SICKNESS IN FIGHT CATEGORIES OF ARMY PERSONNEL. Rep. 180, July 1943, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The incidence of swing sickness in 1625 individuals concerned with various phases of aviation is given. The individuals tested have been divided into groups according to history of airsickness, flying interest, and experience. Group I includes those who have had airsickness; Group II, those who have had flying experience or who intend to fly; and Group III, enlisted men on ground duty only. These groups have been divided into 8 sub-groups. The incidence of swing sickness is significantly higher in those groups having a history of airsickness.

6086

McDonough, F.E. AIRSICKNESS DURING AN AIRBORNE INFANTRY MANEUVER. Rep. 102, Nov. 1942, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Airsickness was studied among the personnel of an infantry division (10,070 Ss) during its participation in air landing training, October, 1942. Distance of flights varied from 130 to 150 mi. at altitudes of under 2000 ft. 97 men, as simulated casualties, were prone throughout the flights. The officer in charge of the flights submitted a report of the degree of severity of airsickness from mild to severe (unable to carry on duties at termination). An analysis of the data showed the incidence of sickness to be 3.4% for seated men and none at all for the prone men. A further study was carried out on another group of men by means of direct questionnaire to the men. Of these, 9.8% out of 688 total, reported airsickness symptoms. The difference between these 2 figures is explained by the data gathering procedure. Only 3% of the individuals with airsickness were unable to carry on their duties. Conditions of flight related to airsickness were found to be "roughness" of flight, long flights, cool or warm cabin rather than a comfortable one, and presence of odors; the first condition was the most important. (HEIAS)

6087

Newcomb, T.M. AN APPROACH TO THE STUDY OF COMMUNICATIVE ACTS. Psychol. Rev., Nov. 1953, 60(6), 393-404. (University of Michigan, Ann Arbor, Mich.).

Communicative acts, like other molar behaviors, may be viewed as outcomes of changes in organism-environment relationships, actual and/or anticipated. Communicative acts are distinctive in that they may be aroused by and may result in changes anywhere within the system of relations between 2 or more communicators and the objects of their communication. It seems likely that the dynamics of such a system are such that from an adequate understanding of its properties at a given moment there can be predicted both the likelihood of occurrence of a given act of communication and the nature of changes in those properties which will result from that act. Some of the most significant of group properties are those which, hypothetically, vary with intragroup communicative acts. It should therefore be rewarding to discover whether support for the present hypotheses, as apparently provided by the scattered evidence now available, can be confirmed in more systematic ways. If so, there are promising possibilities of investigating the phenomena of social interaction by viewing them as events within communication systems.

R 14

6088

North, W.J. EFFECT OF CLIMB TECHNIQUE ON JET-TRANSPORT NOISE. Tech. Note 3582, Jan. 1956, 19pp. Lewis Flight Propulsion Lab., National Advisory Committee for Aeronautics, Cleveland, Ohio.

A theoretical investigation of jet-transport climb technique was made to determine the effect of variations in engine thrust and airspeed on sound pressure levels heard by a ground observer. Reduced noise levels will be obtained when climbing on the steepest flight path consistent with minimum safe airspeed. Additional noise reduction may be obtained by throttling the engine; however, the additional benefit accompanying permissible thrust reduction is small.

R 5

6089

Peterson, G.E. DESIGN OF VISIBLE SPEECH DEVICES. J. acoust. soc. Amer., May 1954, 26(3), 406-413. (Speech Research Lab., University of Michigan, Ann Arbor, Mich.).

This paper describes a number of the parameter relationships which must be considered in the design of certain types of visible speech devices. Possible designs have been outlined for an instantaneous cathode-ray speech translator; and for continuous linear and logarithmic sound spectrographs. System parameter values have been selected which should afford good quality pattern portrayals. In all of the systems described there exist major mechanical or circuit design problems. In this manner the present writing illustrates the nature of the difficulties which are to be encountered in the design of speech display equipment. It also explains perhaps why such an instrument as a practical logarithmic spectrograph has not as yet been constructed.

R 11

6090

Peterson, G.E. APPLICATIONS OF INFORMATION THEORY TO RESEARCH IN EXPERIMENTAL PHONETICS. J. Speech Dis., June 1952, 17, 175-188, Bell Telephone System Mono. 2135. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

This discussion describes the major steps required in the design of voice operated devices and shows in a general way how information theory applies to these problems. The general nature and purpose of the work that has been done in experimental phonetics is described and new objectives in extracting the phonetic content from speech by automatic means are discussed. The mathematical concept of information is then considered along with the fundamental research problems in the automatic control of devices by means of speech.

T. I. R 32

6090
 Peterson, G.E. SYSTEMATIC RESEARCH IN EXPERIMENTAL PHONETICS: 2. THE EVALUATION OF SPEECH SOUNDS. In Speech Hearing Disorders, June 1954, 1972, 152-168. University of Michigan, Ann Arbor, Mich.).

The author's comments very briefly upon the general nature of the speech communication processes, and emphasizes some of the major problems which yet obtain in their description—a description which the speech scientist seeks to make quantitative. The task is the operational description of the speech processes in the various speech situations, conversation, and the arts. At the present time attention is directed primarily at the elementary communication situations with emphasis on normal speech. The motor-architectural and the acoustico-ventrory transformations of speech processes are discussed in light of what is known; speech communication theory is outlined; and statistics of the acoustical signal are summarized.

(HEIAS)
 R 73

6091
 Peterson, G.E. AN ORAL COMMUNICATION MODEL. Language, July - Sept. 1955, 31(3), 434-447. (University of Michigan).

6092
 This paper discusses the basic processes involved in oral communication—the nervous system, motor production, acoustical structure, and speech reception. The relationships among these processes are considered and some of the resulting implications for theory in structural linguistics are noted.

1.

6093
 Rahn, H.W. LOOKING UP THE HORIZON AND DARK ADAPTATION DURING METEOROLOGICAL VISIBILITY OBSERVATIONS. Proj. 21 24 008, Rep. 1, July 1950, 7pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6097
 To determine conditions under which meteorological observations are made at airports, luminance measurements were made at 14 airports of 1) luminances to which the meteorologist is exposed during work time in office (adaptation luminance), and 2) background luminance near the horizon (0 to 5 degrees above horizon) at the place where meteorologist makes his determinations during dusk, night, and dawn. These measurements are interpreted in terms of dark adaptation requirements for visibility determinations. Recommendations for changing procedures are made.

G.

6099
 Peterson, G.E. THE PHONETIC VALUE OF VOWELS. Monograph 1987, ca. 1953. Bell Telephone System, New York, N.Y.

The aural evaluation of vowel sounds is a basic problem in both experimental and applied phonetics. This paper deals with the judgment of phonetic equivalence in the elementary case of sustained vowels. The definition of the phonetic value of vowels in terms of physiological and acoustical dimensions is considered, and the conventional vowel diagram is discussed as a means of representing vowel sounds in a multidimensional phonetic space.

(HEIAS)
 R 32

6094
 Peterson, G.E. & Naisbeck, G. THE MEASUREMENT OF NOISE WITH THE SOUND SPECTROGRAPH. Monograph 2135, 1953, 20pp. Bell Telephone System, Murray Hill, N.J.

The sound spectrograph principle may be employed in the quantitative measurement of noise. Measurements may be made with the conventional amplitude section circuit in which, in the customary use of the sound spectrograph, each section provides observation during a few millisecond intervals of the signal time. A long integrating time circuit for the amplitude sectioner has been developed which provides integration over a period of as much as one or two seconds of signal time. The amplitude sectioning circuit of the sound spectrograph may be employed to determine the relationship between the level of a pure tone and the power-per-cycle of noise. Measurements were made for various types of amplitude analysis with the sound spectrograph. A study was made of the degree to which the section displays conform to the computed values of noise level.

6095
 Peterson, M.V. & Birdsall, T.G. THE THEORY OF SIGNAL DETECTABILITY. PART I. THE GENERAL THEORY. PART II. APPLICATIONS WITH GAUSSIAN NOISE. Contract DA 36-039-sc-15358, Proj. M970, Tech. Rep. 13, June 1953, 89pp. Signal Corps, Department of the Army, Washington, D.C. (University of Michigan, Ann Arbor, Mich.).

The several statistical approaches to the problem of signal detectability which have appeared in the literature are shown to be essentially equivalent. A general theory based on likelihood ratio embraces the criterion approach, for either restricted false alarm probability or minimum weighted error type optimum, and the a posteriori probability approach. Receiver reliability is shown to be a function of the distribution functions of likelihood ratio. The existence and uniqueness of solutions for the various approaches is proved under general hypothesis. The full power of the theory of signal detectability can be applied to detection in Gaussian noise, and several general results are given. 6 special cases are considered, and the expressions for likelihood ratio are derived. The resulting optimum receivers are evaluated by the distribution functions of the likelihood ratio. In 2 of the special cases studied, the uncertainty of the signal ensemble can be varied, throwing some light on the effect of uncertainty on probability of detection.

R 21

6096
 Ripple, P.H. & Sells, S.B. THE USAF SAM OPHTHALMIC ERGOGRAPH. EFFECTS OF ACCOMMODATION-CONVERGENCE EXERCISE. Proj. 21 24 005, Rep. 2, July 1950, 11pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

A group of 19 healthy males (aged 17 to 27, median age 19) was given a series of accommodation-convergence exercises (primarily accommodative) on an ophthalmic ergograph. Each S received from 4 to 6 1/2 hr. exercises consisting of accommodating and converging intermittently at a target moving toward the S. Measurements for the 92 observations were performed prior, during and after the exercise with reference to the effects in accommodation and muscle balance. 3 phenomena were noted: a) increase in amplitude of accommodation in the individual eyes, but not necessarily in both eyes, b) a shift to esophoria, c) an increase in the amplitude of convergence, d) a slight loss in divergence. The authors recommend that muscle balance be taken at the near point and a minimum amount of exophoria (around 2 diopters) and an adequate amount of prism divergence (about 15 diopters) should be required to eliminate asthenopic individuals. (HEIAS)

R 12

6098

Rowland, W.H. & Montgomery, A. GERMAN NIGHT VISION TESTER. Proj. 368, Rep. 1, April 1945, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A German Night Vision Tester is described and procedures for use of the instrument devised. On the basis of careful examination it was concluded that the instrument was used to test night vision at levels suitable only for the cone threshold. (MEIAS)

6099 Rowland, W.H. & Mandelbaum, J. A COMPARISON OF NIGHT VISION TESTER. Proj. 213, Rep. 1, Jan. 1944, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

A study was made of the relationship of the scores given by the various night vision testers in use in the AAF and a scoring system proposed by means of which candidates can be classified as "superior," "satisfactory," and "unsatisfactory" with regard to night vision. Conclusions and recommendations were: a) The AAF-Eastman Night Vision Tester should be modified so that the test object subtends a visual angle at the standard testing distance of 20 ft. and the brightest intensity level should be reduced from 0.25 to 5.7 log micromicrometers. b) When this modification is carried out, 70 to 80% of Ss will be classified into the same groups in respect to night vision efficiency regardless of the instrument used, whether it is the AAF-Eastman Night Vision Tester, the SAM Portable Night Vision Tester, or the Hecht-Schlier-Adaptometer. All night blind Ss will be clearly designated as unsatisfactory on all instruments.

6103

Rowland, Louise S. & Rowland, W.H. INDIVIDUAL DIFFERENCES IN THE REGION OF MAXIMAL ACUITY IN SCOTOPIC VISION: APPLICATIONS TO NIGHT VISION TESTING AND TRAINING. Proj. 229, Rep. 2, Feb. 1945, 4pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6103

In a report of individual differences in the region of maximal acuity in scotopic vision as applied to night vision testing and training, the design and results of several studies are presented. The studies are specifically concerned with the exact location of the region of maximal acuity at levels of illumination below the cone threshold, the relation of levels of illumination in the scotopic range to night vision training, the utilization of roving fixation in night vision training, and the use of a fixation light in testing night vision.

T. G.

6104

Schmidt, I. NEW TEST FOR EXAMINATION AND TRAINING OF COLOR VISION. PSEUDO-ISO-CHROMATIC PLATES. Proj. 21 02 042, Rep. 2, April 1949, 7pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6100

Rowland, W.H. A MODEL PHOTO-ELECTRIC MACHINE GUN FOR TARGET RANGES AND INDOCTRINATION IN NIGHT GUNNERY UNDER CONDITIONS OF EXTREME DARKNESS. Proj. 81, Rep. 2, Sept. 1943, 3pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6100

This is a report of the modification with an infra-red filter of a photoelectric machine gun, which may be used as a training device for indoctrination in night gunnery. Its particular advantages over previous models are discussed and detailed plans for its construction are presented.

I.

6104

To assess the diagnostic value of four different sets of American Optical Company pseudo-isochromatic plates, large groups of Ss whose color vision was determined by the Nagel anomaloscope, the Boström and Kugelberg color plates, and the SAM color threshold tester, were presented with the plates. The results are treated in terms of the comparative number of errors obtained in the use of the particular sets of plates.

T. G. R 11

6101

Peterson, G.E. BASIC PHYSICAL SYSTEMS FOR COMMUNICATION BETWEEN TWO INDIVIDUALS. J. Speech Dis., June 1952, 18, 116-120, Bell Telephone System Mono. 2135. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

Fundamental systems in communication technology are considered in this paper. The historical development of physical means for transmission of speech - the telegraph, telephone, recording machine, camera, television, wave analysis - are discussed. Both the problems and the progress in the development of speech-orthography transformations are discussed.

6105

Schmidt, Ingeborg. COMPARATIVE EVALUATION OF THE NEW LONDON NAVY LANTERN FOR TESTING COLOR PERCEPTION. Proj. 21-29 009, Aug. 1951, 10pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Of 500 S's (435 normals and 65 color defectives) investigated, some, established as "normal" by other testing methods, failed the Navy Lantern Test and others, established as color defective by other testing methods, were able to pass. The test was compared to several others and the results were not very significant. The test-retest reliability of the Navy Lantern, in relation to color defectives, proved satisfactory. The following observations were made: The two samples of the Navy Lantern did not show marked differences. The test result was affected by the subject's adaptation to the light. Repeating the test revealed a learning effect in normals and those moderately defective. Two general types of errors could be distinguished: a) misinterpretation of white and calling green "white"; b) misinterpretation of red and calling green "red", "yellow" or "orange". (HEIAS)

R 3

6106

Scobee, R.G. & Rowland, W.M. DEMON DAZZLE IN NIGHT VISION. Proj. 377, Rep. 1, April 1945, 7pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6106

This report contains a refresher lecture on night vision for Army Air Force personnel. It is written to be used with a film strip entitled "Presenting: Demon Dazzle in Night Vision." Demon Dazzle is identified by the many ways in which the dark adaptation of the eye can be disrupted, followed by instructions on how to use eyes at night.

6107

Lorge, I., Tuckman, J., Aikman, L., Spiegel, J. et al. THE ADEQUACY OF WRITTEN REPORTS IN PROBLEM SOLVING BY TEAMS AND BY INDIVIDUALS. J. soc. Psychol., 1956, 43, 65-74. AFPTC TN 56-100, July 1956, AFPTC, Lackland AFB, San Antonio, Tex. (Teachers College, Columbia University, New York, N.Y.).

6107

To estimate the bias in written reports of problem solving, 31 five-man teams and ten individuals (ROTC cadets) were asked to solve a problem which required formulating a plan to get a five-man group across a mined road, using materials such as beams, ropes, etc., without discharging a mine. Two trained observers recorded the behavior and statements. Each team prepared a written report, as did each individual. The observer's records and the solvers' reports were content analyzed and assigned a Quality Point Score, based on the aggregate scoring weights for various components. The observers' records were used as a criterion of problem-solving effectiveness and compared with the written reports. Implications of the findings are discussed.

T. R 3

6108

Smith, G.M. THE EFFECT OF PROLONGED MILD ANOXIA ON SLEEPINESS, IRRITABILITY, BOREDOM, AND OTHER SUBJECTIVE CONDITIONS. J. gen. Psychol., 1946, 25, 239-250. (Psychology Dept., College of the City of New York, N.Y.).

16 male college students, with a median age of 18 yrs., 4 mos., were asked to rate themselves with respect to 10 different subjective conditions at 5 different periods during a continuous 8 hour session in a nitrogen dilution chamber in which an altitude of approximately 10,000 ft. was simulated. The same procedure was followed during an 8 hour control run. The conditions rated were sleepiness, fatigue, boredom, attention, irritability, headache, elation-depression, motivation, coordination, and general feeling of well-being. Although the results for the altitude and control runs varied from one condition to another, there was on the average a pronounced trend on the altitude run in the direction of poorer adjustment from the first period, 1 1/4 hrs. after admission to the chamber, through the 4th period which occurred after an exposure of 6 1/4 hrs. The differences between the mean ratings for the control and altitude runs were in every case reliable at the points of maximum divergence which occurred most frequently at the 4th rating period. There was in general a marked end-spurt between the 4th and 5th period when the Ss were aware that their ordeal was nearly over.

R 7

6109

Smith, G.M. THE EFFECT OF PROLONGED MILD ANOXIA ON SPEECH INTELLIGIBILITY. J. appl. Psychol., June 1946, 30(3), 255-264. (College of the City of New York, New York, N.Y.).

Using the method and materials employed in an earlier study in collaboration with C.P. Seltz, 12 Ss were tested for their ability to perceive standard speech sounds at 4 periods during an 8-hour exposure to the mild anoxia encountered at an altitude of approximately 10,000 ft., simulated in a nitrogen dilution chamber. The decrement in speech intelligibility at altitude was very slight and unreliable at the 3/4 hr. period; it was nearly reliable at the 2 1/4 hr. and 4 3/4 hr. periods; but there was a marked lessening of the altitude effect at the last period, 6 3/4 hrs. after entering the chamber. The Ss' ability to overcome the mild deterioration in performance exhibited in the middle of the run in an "end-spurt" suggests that the apparent loss of efficiency at the altitude and sound level employed is primarily due to subjective factors such as wandering attention and boredom.

R 3

6110. Smith, G.M. THE DIFFERENTIAL EFFECT OF PROLONGED MILD ANOXIA ON SENSORY AND SENSORY-MOTOR REACTIONS AND ON SUCH SUBJECTIVE STATES AS SLEEPINESS, IRRITABILITY AND BOREDOM. J. gen. Psychol., 1948, 28, 3-14. (Psychology Dept., City College of New York, New York, N.Y.).

At intervals during an 8-hour exposure to an altitude of 10,000 ft. (simulated in a nitrogen dilution chamber), and also during a control run, 16 male college students were given tests of visual, auditory, and sensory-motor efficiency and were asked to rate themselves on 10 subjective conditions, including sleepiness, irritability, and boredom. The detailed results for 3 of these measures, previously reported in separate journals, are here summarized together with some new material, and the differential reactions to prolonged mild anoxia are discussed. Taken as a whole, the results indicate a moderate but progressive loss of efficiency and a generally poorer emotional adjustment as the exposure to the relatively low altitude is prolonged.

R 12

6111

Smith, G.M. & Seitz, C.P. SPEECH INTELLIGIBILITY UNDER VARIOUS DEGREES OF ANOXIA. J. appl. Psychol., April 1946, 30(2), 182-191. (College of the City of New York, N.Y.).

Under standard conditions speech intelligibility is shown to decrease with increasing altitude. If the original sound level is low the decrement in articulation is large, discrete word intelligibility falls precipitately and speech rapidly becomes unintelligible. The effects of anoxia are minimal if sea level articulation is high. (As was pointed out in our earlier paper, this will be the case when the sound level is high; a superior communication system is employed; personnel are trained in speech production and in listening under noisy and distracting conditions; and when "filling in" is made easy by familiarity with the type of message transmitted.) The fact that 67% of the subjects (8 of 12) showed a decrement in performance at 13,600 ft. suggests the importance of using oxygen equipment on long flights even at low altitude.

R 3

6112

Smith, G.M., Seitz, C.P. & Clark, K.B. VARIATIONS IN THE ANGIOSCOTOMA IN RESPONSE TO PROLONGED MILD ANOXIA. J. Aviat. Med., Dec. 1946, 17(5), 590-595. (College of the City of New York, N.Y.).

The peripheral blind area (angioscotoma) of 15 subjects was tested 5 times during a 7.5 hour exposure to an altitude of 10,000 feet, simulated in a nitrogen dilution chamber. A progressive and statistically significant increase in the size of the scotoma was observed, which became most marked at the end of 7.5 hours. The results are in contrast with the negative data obtained when psychomotor performance is measured. It is pointed out that when extraneous motivational factors are eliminated or minimized (and this is probably true of a visual task), an anoxic effect may become progressively evident with prolonged exposure to even a moderate altitude.

R 10

6113

Spragg, S.D.S., & Devoe, D.B. THE ACCURACY OF CONTROL KNOB SETTINGS AS A FUNCTION OF SIZE OF ANGLE TO BE BISECTED, AND TYPE OF END-POINT CUE. Percept. Mot. Skills, 1956, 6, 25-28. Contract N6onr-241, T.O. 6, Tech. Rep. SDC 241-6-4. SDC, ONR, University of Rochester.

6113

To investigate knob setting performance as a function of size of angle to be bisected and the type of end-point cue provided, twelve subjects attempted to bisect angular extents of 20, 40, 80, and 160 degrees for each of three types of end-point cues (mechanical stop, visual, and auditory). Twenty judgments were made for each angular extent. The results were expressed in terms of the constant error and analyzed by analysis of variance techniques with t-tests of significance applied. Applications of the findings are discussed.

T. R 2

6116

Swets, J.A., Tanner, W.P., Jr., & Birdsall, T. THE EVIDENCE FOR A DECISION-MAKING THEORY OF VISUAL DETECTION. Contract DA 36 039 SC 63203, Proj. 2262, Tech. Rep. 40, Feb. 1955, 61pp. University of Michigan.

6116

This is one of a series of papers concerned with the psychological application of the mathematical theory of signal detectability. This paper brings together all of the data on visual detection collected to date which bear directly on the case of the signal-known-exactly as treated by the theory of signal detectability. The data, visual detection behavior of the human observer, are analyzed in terms of the model provided by the theory of signal detectability, or more generally, by the theory of statistical decision. General implications for sensory theory and psychophysical methods are discussed.

R 29

6118

Vanderbie, J.H. SIMULATED SLED PULLING ON THE TREADMILL. Proj. 7-64-12-004D, Tech. Rep. EP-21, Jan. 1956, 10pp. Quartermaster Research & Development Center, Natick, Mass.

6118

To study the feasibility of simulating sled-pulling by applying posterior drag through a harness to men walking on a treadmill, a laboratory study was conducted. After a one-week training period, twelve men performed the activity at two rates (2 1/2 and 3 1/2 miles per hour) with a drag of 17.5 pounds while wearing cotton fatigue suits; five men also performed wearing arctic clothing. Metabolic costs and pulse rates were measured during latter part of exercise. The data were analyzed and compared with similar data obtained from walking the treadmill, and walking carrying a load (44 pounds) and for actual sled-pulling in the field. The use of this method for establishing baseline values for sled pulling studies in the field is discussed.

T. R 7

6120 White, C.E. REPORT ON EFFECT OF INCREASED ATMOSPHERIC PRESSURE UPON HEARING. Proj. NM 002 014.06.03, Memo Rep. 55 7, Dec. 1955, 6pp. USN Medical Research Lab., New London, Conn.

Under conditions simulating increased atmospheric pressures encountered by a diver submerged to a depth of 200 feet, with a signal-to-noise ratio between 15 and 20 decibels, the decrease in listening sensitivity as measured by articulation scoring methods is 25.8 per cent. This loss is obtained when using monosyllabic, phonetically-balanced word lists.

R 3

6121 White, C.E. REPORT ON EFFECT OF INCREASED ATMOSPHERIC PRESSURES UPON INTELLIGIBILITY OF SPOKEN WORDS. Proj. NM 002 014.06.04, Memo Rep. 55 8, Dec. 1955, 8pp. USN Medical Research Lab., New London, Conn.

For male Ss exposed to a change in pressure from atmospheric to 103 psi, absolute, the decrease in articulation scoring is determined to be 24.7 per cent. This decreased scoring is obtained under signal-to-noise ratios of 30 db. and while using phonetically-balanced monosyllabic word lists.

R 6

6123

Martin, E.F., & Henry, J.P. EVALUATION OF THE ANTI-G SUIT. Memo Rep. MCREXD-689-2C, Rep. 8, July 1948, 18pp. WADC, Aero-Medical Laboratory, Dayton, Ohio.

ATI 38691.

Returned.

6123

This memo report compares the effectiveness of three anti-G suits (Type G-3A standard, Type G-4A experimental, and Type G-5, the Capstan modification of the Lamport Pneumatic principle) in maintaining cerebral blood pressure. Three trained subjects with and without each anti-g suit were run on the human centrifuge at accelerations of 1, 2.5, 3.5, and 5g both "normally" and using the M-1 maneuver (forced expiration against a partially closed glottis). G-tolerance under the three suit conditions, in terms of visual symptoms, direct radial artery pressures, and arterio-venous oxygen are presented and discussed.

T.G. ATI 38691.

Returned.

6124

Proctor, H., & Weiner, H. THE CHARACTERISTICS OF PERFORMANCE ON A COMPENSATORY FOOT CONTROLLED TRACKING DEVICE. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 27, Aug. 1954, 23pp. Medical Research and Development Division, University of Maryland.

6124

To investigate factors affecting performance on a foot-controlled compensatory tracking device (Balaflex) a series of experiments were performed. The learning process was examined (25 subjects for ten-minute period; four subjects for nine additional periods of six minutes). A correlational analysis was made of the relationship between Balaflex performance (24 subjects) and standing, tapping, coordination, age, weight, and height. The effect of different visual conditions (normal, central binocular, central monocular, and "quarter" (25 percent) binocular) upon Balaflex performance (20 subjects) was examined. The findings are discussed in terms of motor and perceptual skills necessary for efficient performance on the Balaflex and are related to studies investigating factors in motor performance. T. G. R 34

6125

Katchmar, L.T. A STUDY OF DIRECTION OF RESPONSE ERRORS IN A HORIZONTAL DISPLAY-CONTROL PATTERN. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 26, Aug. 1954, 17pp. University of Maryland, College Park, Md.

6125

To investigate the effects of certain display-control variables on response accuracy in a perceptual motor task, 36 subjects were tested. The task was to identify (verbally or by pressing a corresponding key) the position of light flashes occurring on a horizontal display of lights (five, nine, or eleven). Distances between the lights were varied (three, five, and seven inches); lights were presented in random order every 0.6 seconds. Error data (total number, direction, and magnitude) were analyzed for differences due to number of stimuli, distance between stimuli and type of response. The results are discussed in terms of desirable display-control relationships.

T. I. R 12

6126

Bowen, J.H. EFFECTIVENESS OF DISPLAY AND CONTROL RELATIONSHIPS AS A FUNCTION OF THE CHARACTERISTICS OF DIFFERENTIAL PRELIMINARY TRAINING. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 25, Aug. 1954, 24pp. USA Medical Research & Development Div., Office of the Surgeon-General, Washington, D.C. (University of Maryland, College Park, Md.).

6126

To discover the most efficient techniques for training display-control operators, the effects of three factors are investigated: 1) stimulus predifferentiation, 2) warm-up, and 3) general apparatus knowledge. Trainee groups (28) given preliminary training at various proficiency levels in the application of verbal labels to display stimuli are evaluated along with six trainee groups required to seek relationships among the stimuli at different exposure levels and with and without apparatus understanding instructions. The results are discussed in terms of the effects of these various conditions upon display-control learning.

T. G. R 33

6127

Whittenburg, J.A. THE INTERFERENCE EFFECTS OF DISPLAY-CONTROL CHARACTERISTICS ON THE ACQUISITION AND RETENTION OF A PERCEPTUO-MOTOR SKILL. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 24, Aug. 1954, 36pp. Medical Research and Development Division, University of Maryland.

6127

To determine the interference and facilitative effects on performance of altering certain display-control variables during early and late learning stages of a perceptual-motor task, 188 Ss were given a task of compensatory tracking of a target. Torque, rate, and direction of control were varied both early and late in the learning process. The results are discussed in terms of the effect upon performance of alteration of control variables during different stages in the learning process and in terms of the influence of such factors as: the effects of prior practice, intertask similarity, transitoriness of effects, and so forth.

T. G. R 61

6128
Whittenburg, J.A. A STUDY OF THREE MEASURES OF PERCEPTUAL EFFICIENCY DURING SUSTAINED VIGILANCE. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 14, Feb. 1953, 38pp. USA Medical Research and Development Board, University of Maryland, College Park, Maryland.

12 female and 15 male Ss were each given the "Hickworth Clock Test" for a 2 hour period. Mean scores for both male and female subjects showed a significant decrease in perceptual efficiency after the first half hour as measured by errors of omission. During the last hour, the female subjects made significantly fewer errors of omission than the male subjects. Errors of omission proved to be a relatively reliable measure for the male subjects but not for the female subjects. The measure involving errors of commission was of little value since contributions to this measure were made by very few subjects. The majority of subjects either did not exhibit any error of commission over the 2 hour period or only a very few. It was concluded that perceptual efficiency, as measured by errors of omission and response time, may serve as useful measures of behavior decrement under conditions of sustained vigilance.

R 8

6129

Bowen, J.H. THE RELATIONSHIP BETWEEN STRENUOUS WORK AND SLEEP PRIVATION AND PURSUIT TRACKING LATENCY. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 13, ca. 1952, 20pp. USA Medical Research & Development Board, University of Maryland, College Park, Md.

6129

To determine the effects of strenuous work and sleep deprivation upon pursuit tracking latency, 48 subjects were assigned at random to one of six experimental conditions. Three groups were deprived of a night's sleep and then had a normal night's rest. Further subdivision was based on bicycle riding (20 miles per hour) as follows: no riding, riding for five minutes, or riding for ten minutes. The task was to follow a line which deviated at right angles to its previous course and returned at intervals of 3/8, 5/8, 1 1/4, and 1 1/2 seconds. Tracings were analyzed for two reaction times (deviation and return). The data were studied by analysis of variance techniques for changes due to sleep deprivation, to exercise, and to size of deviation.

T. G. R 11

6130

Whittenburg, J.A. THE EFFECTS OF GENERAL ACTIVITY AND EXTENDED DIURNAL VARIATION ON OLFACTORY SENSITIVITY. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 11, Aug. 1952, 16pp. Army Medical Research and Development Board, University of Maryland.

6130

To determine whether or not olfactory sensitivity would provide a sensitive and reliable indicator of general systemic fatigue, two investigations were performed. (1) The effects of general activity (stair climbing) were measured on five untrained subjects. Threshold measures were taken twice on two days (morning and afternoon) with and without exercise by means of the "stream" technique. Food intake, diurnal variation and smoking were controlled. (2) The effect of diurnal variation on threshold measures was determined on five untrained subjects. Measurements by the "blast" technique were taken early in the morning and late in the evening of same day. Food intake and smoking were controlled. The data were analyzed for differences due to the experimental variables and for consistency of results. T.I.R 14

6131

Lybrand, W.A. AN EXPLORATORY INVESTIGATION OF TASKS OF PERCEPTUAL ORGANIZATION AS POTENTIAL INDICATORS OF BEHAVIOR DECREMENT. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 10, July 1952, 26pp. Army Medical Research and Development Board, University of Maryland.

6131

To explore the relationship of perceptual organization to bodily conditions assumed to induce general systemic fatigue, measures were taken on three tasks of perceptual organization: Kohs Block Design, Perception of Hidden Figures, and the Muller-Lyer Illusion. Twelve subjects were assigned to each of four conditions: at rest, after a five-mile march carrying a back-pack, after missing a night's sleep, and after missing a night's sleep and a five-mile march carrying a back-pack. The effects of the experimental conditions were studied by analysis of covariance techniques (Kohs Block Design and Perception of Hidden Figures) and by analysis of variance techniques (Muller-Lyer Illusion). Discussion is related to the usefulness of these tasks as indicators of behavior decrement.
T. I. R 24

6132

Ross, S. REPORT ON "SYMPOSIUM OF FATIGUE" OF THE ERGONOMICS RESEARCH SOCIETY, HELD 24-27 MARCH 1952 AT THE COLLEGE OF AERONAUTICS, CRAWFORD, ENGLAND. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 9, April 1952, 21pp. Army Medical Research and Development Board, University of Maryland.

6132

This paper reports brief summaries of individual papers given at a symposium on fatigue of the Ergonomics Research Society in England. The various studies represent physiological and psychological frames of reference. Both laboratory and field investigations in industrial situations are reported. In addition, several papers on methodology and apparatus are included.

6133

Katchmar, L.T., Whittenburg, J.A., & Weiss, E.C. REVIEW OF THE LITERATURE ON MENTAL WORK AND SUSTAINED VIGILANCE. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 8, March 1952, 12pp. Army Medical Research and Development Board, University of Maryland.

6133

This report presents a critical review of the literature on mental work and sustained vigilance (attention). The main emphasis is placed on the methodology employed and studies related to behavior decrement. The problem of definitions is treated followed by review of mental work and factors of sleep deprivation, blocks and errors, and muscular tension. Experimental studies on attention are grouped under three headings: adequacy of attention, secondary changes, and breaking strain.
R 55

6134

Bowen, J.H., Hussman, T.A. & Lybrand, W.A. A REVIEW OF THE LITERATURE ON INDUCED SYSTEMIC FATIGUE. Proj. DA 49 007-MD 222, (O.I. 19 52), Tech. Rep. 7, March 1952, 13pp. USA Medical Research & Development Board, University of Maryland, College Park, Md.

6134

A review of the literature on general systemic fatigue is presented in this report. Problems of definition are discussed and methods of inducing fatigue reviewed. These latter include sleep deprivation, work periods, ergographic work, psychomotor tasks. On the basis of the review recommendations are made regarding the use of operationally defined decrement-producing variables for a research problem.
R 94

6135

Whittenburg, J.A., & Weiss, E. REVIEW OF THE LITERATURE ON OLFACTORY SENSITIVITY AS AN INDICATOR OF SYSTEMATIC FATIGUE. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 6, April 1952, 12pp. Army Medical Research and Development Board, University of Maryland.

6135

This report reviews the literature on olfaction with particular emphasis on methodology. Primary problems encountered in research are dealt with first, followed by a consideration of conditions that alter sensitivity and an evaluation of some techniques and apparatus commonly used: Zwaardemaker olfactometer, the Elzberg "blast" technique, the Wenzel "stream" technique, Foster's Olfactorium and dirhinc stimulator. The problem of a desirable technique for investigating the effects of systemic fatigue on olfactory sensitivity is discussed.
T. R 24

6136

Bowen, J.H. REVIEW OF THE LITERATURE CONCERNED WITH PURSUIT AND TRACKING BEHAVIOR. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 4, March 1952, 21pp. Army Medical Research and Development Board, University of Maryland

6136

This report presents a review of the literature concerned with pursuit and tracking studies with special reference to the ways in which such performance has been used as an indicator of behavior decrement. The major sections deal with (1) description of apparatus, (2) survey of appropriate theoretical models of learning and servo-mechanism models, (3) reliability studies, and (4) methodological recommendations concerning necessary controls and apparatus for experimental use of pursuit performance as a potential indicator of decrement due to systemic fatigue.
T. R 79

6137

Whittenburg, J.A. REVIEW OF THE LITERATURE ON MEASURES OF TONUS AND TENSION AS RELATED TO FATIGUE. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 2, Feb. 1952, 21pp. Army Medical Research and Development Board, University of Maryland.

6137

This report presents a critical review of the literature on tension and tonus with a viewpoint of determining the feasibility of using some measure of muscular tension in a study of behavior decrement. Methods of measuring tonus and tension are discussed under seven headings: tension changes as a result of application of external force, slight movements of different parts of the body, changes in reflex responses, task performance and concurrent tension changes, electrical properties of the skin as indicators of muscular tension changes, correlation methods, and electrical properties of the muscles as indicators of tension changes. The validity, reliability, sensitivity, probable cost and time necessary for construction and operation of each apparatus are discussed.
R 77

6138

Hussman, T.A. A CRITICAL EVALUATION OF FOUR INDICATORS OF BEHAVIOR DECREMENT. Proj. DA-49-007-MD-222 (O.I. 19-52), Tech. Rep. 12, Aug. 1952, 23pp. Army Medical Research and Development Board, University of Maryland.

6138

To determine the usefulness of four variables (steadiness, blind steadiness, critical flicker frequency thresholds, and tapping) as indicators of behavior decrement, an experiment was designed utilizing a collegiate boxing situation to produce fatigue and anxiety. Twelve experienced and twelve novice boxers were tested at rest, after heavy exercise, before fighting, and after fighting. Each subject was tested on all four variables three times for each condition. Analysis of variance techniques were used to test the changes in each variable as a function of fatigue and of anxiety. Each variable was evaluated for its reliability and potential as a predictor.
T. I. R 25

6139.

Rusman, T.A. REVIEW OF THE LITERATURE ON MEASURES OF STEADINESS AND BODY-SWAY AS RELATED TO FATIGUE. Proj. DA-9-007-MD-222 (O.Y. 19-52), Tech. Rep. 1, Feb. 1952, 15pp. Army Medical Research and Development Board, University of Maryland.

6139.

This report presents a critical review of the literature on steadiness and body sway. The various types of apparatus which have been designed to measure these characteristics are described and available reliability figures given. Those studies indicating the general nature of steadiness and body sway and relations between them are discussed. The possibility of using measures of these variables in behavior decrement investigations is suggested.

T. R 58

6140

Forbes, T.W. NEW DEVELOPMENTS IN HIGHWAY SAFETY. Univ. Tennessee Record, July 1952, 55(4):1-7. (Committee on Highway Safety Research, Washington, D.C.).

6140

This article reports the contemporary developments in highway safety research and the effects of efforts to reduce the traffic accident fatality rate. Also described are the functions of the Academy-Council Committee on Highway Safety Research (Highway Research Board). The need for human factor research is briefly outlined.

R 2

6142

Davenport, T.C. A DIRECT-READING PHOTO-ELECTRIC SPECTROPHOTOMETER. J. Soc. Dyers & Colourists, 1950, 66, 191-199. (Imperial Chemical Industries, Ltd., Manchester, England).

A non-recording photoelectric spectrophotometer suitable for reflectance measurements over the spectral range 4000-6500 A. is described. The instrument is compact and accurate, operates from A.C. mains, and is simple to use.

6143

Andrew, G.M. THE FREQUENCY RESPONSE AND THE TRANSFER FUNCTIONS OF THE HUMAN PILOT. AFTRC TR 52-28, March 1953, 36pp. USAF Flight Test Center, Edwards AFB, Calif.

6143

This report presents a detailed description of a proposed flying technique and data reduction method designed to yield the frequency response and transfer functions of the human pilot. The frequency response defines the pilot's reaction to disturbance by a mathematical representation. Its use as an alertness and flying skill indicator is discussed in detail.

6144

Attneave, F. SYMMETRY, INFORMATION AND MEMORY FOR PATTERNS. Proj. 7706, Task 77117, AFTRC TR 55 29, 14pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (Reprinted from Amer. J. Psychol., June 1955, 68(2), 209-222).

6144

Utilizing symmetrical, asymmetrical, and random patterns of data, the effect of symmetry on memory was investigated in three experiments: 1) reproduction of patterns immediately following a brief exposure; 2) patterns used as response-members of paired associates with an increase over the first experiment of duration of exposure and interval between exposure and reproduction; and 3) mere identification without reproduction of patterns. Results are discussed in terms of the relation between type of pattern and memory as indicative of certain Gestalt theoretical concepts.

G. I. R 9

6146
Dunkelman, L. HORIZONTAL ATTENUATION OF ULTRAVIOLET AND VISIBLE LIGHT BY THE LOWER ATMOSPHERE
Proj. NR-473 140 & NE 120 713 T 2, Rep. 4031, Sept. 1952, 21pp. Optics Div., USN Research Lab., Washington, D.C.

The horizontal attenuation of ultraviolet and visible light by the lower atmosphere has been measured at night in city, desert, and sea atmospheres under conditions ranging from fog to exceptionally clear air. The researches are summarized and the data are presented in the form of representative spectral attenuation curves for all the locations investigated and in tables of spectral attenuation coefficients for the locations where sufficient data were obtained to warrant their preparation.

R 13

6147
Eldred, K.M., Gannon, W.J., & Von Gierke, H. CRITERIA FOR SHORT TIME EXPOSURE OF PERSONNEL TO HIGH INTENSITY JET AIRCRAFT NOISE. Proj. 7213, Tech. Note 55 355, Sept. 1955, 25pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

Criteria are presented which specify the maximum noise levels to which maintenance personnel servicing turbo-jet aircraft may be routinely exposed for durations ranging from several seconds to 8 hours in any 24 hour period. Duration vs. noise levels are given for cases of both the unprotected and protected ear. Examples are given which illustrate use of these criteria to define zones around aircraft in which personnel must wear ear-plugs, ear muffs, or both protective devices in combination.

R 11

6149:

Hauty, G.T. & Mendt, G.R. STUDIES OF VESTIBULAR FUNCTION: I. THE DURATION OF PRIMARY NYSTAGMUS AS A FUNCTION OF SPEED OF ROTATION AND OF ACCELERATION. J. Psychol., 1953, 26, 143-151. (University of Rochester, Rochester, N.Y.).

In the first part of the experiment each of 3 Ss was stimulated 6 times by acceleration to or from each of 5 speeds of rotation (11, 22, 45, 90, and 180°/sec.), with duration of acceleration constant at about 1/2 sec. In the second part of the experiment the same Ss were stimulated 6 times by each of 5 rates of acceleration to or from a speed in each case of 180°/sec. The rates were such that the speed of 180°/sec. was reached in 0.5, 5, 30, 85, and 165 secs. Duration of the primary nystagmus was determined by the method of ocular movement of a fixation object. In the first part of the experiment it was found that the duration of nystagmus was probably constant, unaffected by the amount of work done on the ear. Speeds of 11, 22, 45, 90, and 180°/sec. produced primary nystagmus with mean durations of 28, 25, 27, 28, and 27 secs. respectively. On the other hand, in the second part of the experiment when the period of acceleration was lengthened, the primary nystagmus was also lengthened. With a fixed speed of 180°/sec. reached or stopped in various times, the duration of primary nystagmus was: accel. 0.5 secs., 27 sec. of nystagmus; accel. 5 secs., 29 sec. of nystagmus; accel. 30 secs., 48 sec. of nystagmus; accel. 85 secs., 87 sec. of nystagmus; accel. 165 secs., 164 sec. of nystagmus. With the 2 longest accelerations the data indicated that the primary nystagmus sometimes ended and was replaced by the secondary inverse nystagmus while S was still being accelerated. Arguments are presented to show that the results are incompatible with attributing the duration of nystagmus to the duration of deviation of the cupula.

R 9

6150

Gee, A.H., Stevens, M.R. & DeAngelis, F. ODOR CONTROL FOR AIR EVACUATION AIRCRAFT. Contract AF 18(600) 146, S.E.O. 698 29, Tech. Rep. 6565, Part 4, Sept. 1952, 78pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

This is the 4th formal report on work intended to find ways to suppress malodors from wounds of patients on air evacuation aircraft, without interfering with detection of alarm odors indicative of mechanical trouble or overheating. In this phase of the investigation, malodor, odor-control agent, and alarm odor were commingled in a dynamic air flow system equipped with sniff ports for appraising the resulting mixtures. Ozone was found to have a definite cancelling effect, selective for malodor, and not interfering appreciably with the alarm odors. The amounts needed, however, present a problem in practical application from the standpoint of tolerable levels of ozone. One aldehyde, 3,5,5 trimethyl hexaldehyde, was investigated extensively, as an example of a volatile organic compound of the masking type. It was found to suppress malodor, but only when used in large amounts. These amounts, from toxicological studies, may have an unfavorable effect on personnel.

R 5

6151

Gee, A.H., Ellner, P.D. & Stevens, M.R. CONTROL OF ODOR IN EVACUATION AIRCRAFT. Contract AF 18(600) 146, S.E.O. 698 29, Tech. Rep. 6565, Part 3, May 1952, 40pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

This is a continuation and extension of work intended to find methods or materials for suppressing malodors on evacuation aircraft, without interfering with the detection of alarm odors indicative of mechanical trouble or overheating. 2 kinds of agents have been found more promising than any hitherto investigated for the purpose: Ozone from small generators has been found capable of reducing high level of malodor, which can be virtually eliminated under laboratory conditions. The action of the ozone is selective so that alarm odors can still be detected, save under extreme conditions. The results are considered sufficiently promising to warrant investigation of the problem of practical application. 2 aldehydes also have been found useful for odor control, both of them superior to heptaldehyde. Heptaldehyde was one of the more promising of a series of essential oils, aldehydes and related materials previously investigated. One of the aldehydes, 3, 5, 5 tri methyl hexanal, is believed worth further investigation.

R 12

6153

Olsenski, K.W., Pohoski, A. & Olastula, K.W. LIMITING DIMENSIONS OF COCKPIT FRAMING BASED ON THE GEOMETRY OF BINOCULAR VIEW. Class 629.13.012.3, Rep. 2095, Nov. 1945, 52pp. Royal Aircraft Establishment, Farnborough, England.

This investigation originated from an old query by H.A.P. connected with the effect of the widths of windscreen frames on visibility. Only provisional and unproved quantities were given in the answer. After a few years' interval, the subject has been developed further and the results are issued in this report. Its importance is chiefly confined to operational aircraft, but it may also be useful for civil aircraft. A blind "spot", (the space entirely lost to view behind a given non-transparent object) is smaller when looking with both eyes than when looking with one only. If the obstruction is small or narrow--such as the various components of the windscreen framing--blind spots may disappear altogether when both eyes are used, although an appreciable interfering effect remains, since parts of the distant background are visible to one eye only. This report gives general outlines and a number of limiting dimensions for designing cockpit frames so that blind spots are avoided as far as reasonably possible when looking out of an aircraft with both eyes. An approximate photographic method is suggested for measuring the overall forward field of binocular view from a given aircraft and for locating blind spots.

6154

Packer, D.H. & Lock, C. THE BRIGHTNESS AND POLARIZATION OF THE DAYLIGHT SKY AT ALTITUDES OF 18,000 TO 38,000 FEET ABOVE SEA LEVEL--AND APPENDIX. Rep. 3713, July 1950, 59pp. USN Research Lab., Washington, D.C.

The brightness and polarization of the daylight sky over Arizona and southern California were measured from B-29 aircraft while flying at altitudes of 18,000, 27,500, 34,000, and 38,000 feet above sea level. Comparison of the results with the Tousey-Hulburt theory of sky brightness showed that the theory agreed fairly well with the experimental data for all altitudes of observation, for all points in the sky more than 30° from the horizon and for scattering angles greater than about 40° from the sun, when an atmospheric attenuation coefficient of 0.017/km was assumed. The values of sky brightness observed at scattering angles within 30° of the sun indicated that large scattering particles were present in the atmosphere overhead at all altitudes of observation, including 38,000 feet. The measured values of sky brightness and polarization are presented graphically, plotted as functions of the angle between the sun and the observed point in the sky.

R 5

6158
Chapman, A. A DEVICE FOR DEMONSTRATING THE EFFECTS OF ANOXIA ON VISION. *J. aviat. Med.*, Aug. 1946, 17, 348-356. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

6158
This article presents a description of the development and evaluation of the Lucklesh-Moss-Army Air Forces Anoxia Demonstration Charts, Types AAA-1 and AAF-2. The results of utilization of the charts with subjects at high simulated altitudes are discussed in terms of the relative effectiveness of demonstration of the charts as a part of routine high altitude indoctrination flights.

6159
Cookley, J.D., Werner, D.S., Fucigna, J.T. & Barnack, J.E. CLASSIFYING AND QUANTIFYING COMMUNICATIONS BETWEEN CONTROLLERS AND PILOTS OBTAINED DURING SIMULATED INTERCEPT MISSIONS. Contract 33(038) 18403, RDO 694 43, Tech. Rep. 6524, Dec. 1951, 53pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dunlap & Associates, Inc., Stamford, Conn.).

6159
To develop a rationale and methodology for quantifying and organizing communications (radio-voice) between ground controllers and interceptor pilots in the air defense system; 115 intercept missions were recorded. A methodology based on the use of two classes of units of intelligence was developed. One class is the "stated or paraphrased message", a standard expression of some intelligence, the second is the "derivative message" (message in context). The classification scheme was used to group messages into more homogeneous categories than was previously possible. Illustrations of the types of analyses that may be made by this technique are presented.
T. R 1

6160
Hemphill, J.K., Rush, C.H., Jr., Bakan, D. & Perloff, Evelyn. STUDIES IN AIRCREW COMPOSITION. I. MEASUREMENT OF CROSS-TRAINING IN B-29 AIRCREWS. Contracts AF 33(038) 16105 & AF 18(600) 67, Memo. Rep. 23, May 1952, 30pp. USAF Human Resources Research Lab., Bolling AFB, Washington, D.C. (Ohio State University, Columbus, Ohio).

6160
To investigate the extent to which the performance of an effective aircrew is dependent upon the knowledge which crew members possess concerning the duties of other crew positions, a Cross-Training Examination was developed and applied to three hundred and sixty-four aircrew members. A refined form of this examination was then applied to B-29 crews along with personality, leadership, and efficiency tests. The results are discussed in terms of the relation of overlap and amount of knowledge to functional efficiency.
T. R 3

6161
Henneman, R.H., Reid, L.S. & Long, E.R. THE INFLUENCE OF CATEGORICAL CUEING ON THE IDENTIFICATION OF VISUALLY DISTORTED WORDS SELECTED FROM A LOGICALLY ORGANIZED POPULATION. THE SEVENTH OF A SERIES OF REPORTS ON "SET" AS A DETERMINER OF PERCEPTUAL RESPONSES. Contract W33(038)-ac-21269, Proj. 7192, Tech. Rep. 54-362, April 1955, 16pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

6161
To investigate the role of perceptual set in aiding recognition of visually distorted words drawn from a logically organized population when subjects were familiar with word categories and the specific words, 90 subjects were required to identify distorted (two per cent identification level) words. Cueing was provided by presenting subjects with the names of the categories containing the word before, after, or both before and after stimulus presentation; degree of setting was varied by progressively reducing the size of category, hence number of stimulus words; familiarization was varied by two types of training prior to identification. The number of correct identifications was studied by analysis of variance for effects of categorical restriction, temporal position of cueing, and familiarity. T. I. R 9 111 - 668

6163
Lee, W.A., & Preitag, M. THE CONCEPT OF RESPONSE RESTRICTION APPLIED TO DIAL READING. THE EIGHTH OF A SERIES OF REPORTS ON "SET" AS A DETERMINER OF PERCEPTUAL RESPONSES. Contract W33(038)-ac-21269, Proj. 7192, Tech. Rep. 54-364, April 1955, 13pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6163
To investigate the effectiveness of setting cues as an aid to accuracy of dial-reading performed simultaneously with a competing visual-motor task, forty subjects were required to respond to randomly flashing lights (two per second) by pressing the appropriate key with the right hand; the left hand operated keys to indicate a dial pointer (in any one of four dials) in a "critical" zone. Differential cueing for the dial-monitoring was varied by using seven combinations of sense channel (vision, audition) and degree of cuing. Percentages of correct detections were studied due to degree of cuing and sense channel used. The quality of performance on the secondary task was also assessed.
T. R 9

6164
Long, E.R., & Garvey, W.D. THE ROLE OF SETTING CUES IN REDUCING THE SIMULTANEOUS LOCATION AND IDENTIFICATION AMBIGUITY OF LETTER PATTERNS. THE FIFTH OF A SERIES OF REPORTS ON "SET" AS A DETERMINER OF PERCEPTUAL RESPONSES. Contract W33(038)-ac-21269, Proj. 7192, Tech. Rep. 54-289, April 1955, 19pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6164
To investigate some aspects of the action of perceptual set as an aid to identification of ambiguous visual stimuli, multiple (four) letter patterns were employed to provide such a condition. Subjects (72) were required to select and identify a single critical letter under different degrees of location restriction (red mark for visual denotation of four, three, two or one of the letters) and three difficulty levels of figural contour distortion. Temporal position of figure cuing was varied by having one-half the subjects view undistorted letters both before and after stimulus presentation and the other half only after presentation. The data (frequencies of correct identifications) were studied by analysis of variance for effects of the experimental variables. T. I. R 6

6165
Long, E.R. & Garvey, W.D. THE INFLUENCE OF SENSORY CHANNEL OF CUEING ON THE IDENTIFICATION OF AURALLY PRESENTED DISTORTED WORDS. SIXTH OF A SERIES OF REPORTS ON "SET" AS A DETERMINER OF PERCEPTUAL RESPONSES. Contract W33(038) AC 21269, Proj. 7192, Tech. Rep. 54 361, April 1955, 22pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

6165
To study the nature and operation of perceptual set as an aid in identifying distorted auditory stimuli, subjects (90) were required to identify distorted spondaic words as heard through earphones. Cueing consisted of presenting the subjects with four non-distorted words, one of which was the same as the distorted stimulus. Auditory cues or visual cues or a combination of both were presented before or after or both before and after (nine combinations) stimulus presentation. Frequencies of correct word identification (recall) for all combinations of conditions were studied by analysis of variance for differences due to cuing, to sense channel used for cuing and to temporal position of cuing. The findings are related to those from visual studies.
T. R 7

6166
Air Transport Association of America. RECOMMENDATIONS FOR SAFE CONTROL OF EXPANDING AIR TRAFFIC. PART 1. Feb. 1947, 84pp. Air Transport Association of America, Air Navigation Traffic Control Group, Washington 6, D.C.

ATI 44622.

6166

In anticipation of increasing different aircraft traffic control problems, the present report presents analysis and recommendations intended to guide appropriate individuals and agencies in establishing priorities and evaluation procedures designed to achieve maximum improvement in air traffic control operations. Some of the topics discussed involve operational requirements pertaining to pilot and air control displays, operational flight patterns, proposals for electronic system integration, etc.

G.I.

ATI No. 44622

returned

6167

Ayer, R.W., & White, P.C. DEVELOPMENT OF AN AIRBORNE RADAR METHOD OF AVOIDING COLLISIONS WITH TERRAIN, AIRCRAFT AND OTHER OBSTACLES. BuAer Contract No(a)-9006, Final Rep., Sept. 1949, 13pp. American Airlines System, Operational Development Branch, New York, N.Y.

ATI 65393.

6167

To assess the usefulness of X-band airborne radar in providing anti-collision information, appropriate installations and test flights were undertaken. The obtained findings are reviewed and conclusions drawn on the adequacy of such radar in avoiding collisions with terrain, other aircraft, and weather disturbances and the degree of pilot's attention required to use the developed equipment. Engineering design recommendations are also included.

T,I,R31

ATI No. 65393

returned

6170
Wagner, H.G. REPORT ON STUDY OF RED LIGHTING REQUIREMENTS FOR THE COCKPITS OF NAVAL AIRCRAFT. Rep. TED NMA 31410, March 1947, 6pp. Naval Air Experimental Station, USN Air Material Center, Philadelphia, Penn.

A series of scan and pick up times of targets was made on a number of dark adapted observers exposed to different levels of indirect red panel illumination. At levels of illumination required to read instruments, the time required to pick up targets outside an aircraft under night sky conditions is lengthened steadily with increasing levels of indirect red illumination inside the cockpit. There was no evidence in this study of a beneficial effect to dark adaptation at useful levels of red illumination to the instruments.

R 1

6175

Noble, Rosalie. HUMAN ENGINEERING INVESTIGATION OF AIRCRAFT COCKPIT VISUAL DISPLAY: DIAL DESIGN FOR MACH-AIR-SPEED INDICATOR. Rep. NMA AE 7047.5, Top. Rep. XG T-237, Dec. 1954, 4pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

This report includes drawings and proposed specification requirements for the dials and pointers for 2 Mach-air-speed indicators. Various proposals of dial presentations of air speed and Mach number were considered for possible exploitation in the design of an indicator which fulfills the service need (850 knot airspeed and Mach number) and meets the requirements demanded with respect to readability, accuracy, and acceptability. In addition to a review of diagrammed and photographed proposals, interviews and discussions with pilots and personnel familiar with the use and design of aircraft instruments were held. The proposals and recommendations presented are believed to be in line with the present state of engineering design developments. (HETAD)

R 3

6173

Noble, Rosalie & Mandelson, E.S. AFTER-BURNER NOISE MEASUREMENTS IN GROUND ENGINE RUN-UPS. Rep. TED NMA AE 6513.1, WH 001062.05.08, Feb. 1954, 27pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

4 sets of measurements of F-94B aircraft afterburner noise were made with determinations of overall SPL's and frequency distributions. The following generalizations of the sonic spectra can be drawn from the observed data: a) The variability of the calculated overall sound pressure level was greater from test to test than within a single day. From data accumulated at 12 locations, standard deviation of the calculated overall sound pressure levels obtained during all the tests ranged from 1.4 to 6.48 db, whereas in a single day the range of the standard deviation was from .68 to 4.08 db. b) The variation of the frequency pattern at a particular location on any single day was sufficiently small for generalizations on the characteristics of the various spectra to be made. Comparisons among the tests showed variation to the extent that individual descriptions of the spectra obtained during each test had to be given. c) The higher sound intensities of the noise emanating from jet engine powered aircraft with afterburners is concentrated toward the rear and exhaust regions of the aircraft. On a semi-circle about the center of the tailpipe opening with the engine at rest, the overall sound level gradually becomes higher from the forward area about the aircraft to the rear regions. The most intense noises are measurable along bearings of slightly over 135°.

R 3

6176
 Noble, Rosalie. HUMAN ENGINEERING INVESTIGATION OF AIRCRAFT COCKPIT VISUAL DISPLAY: FUEL QUANTITY PRESENTATION. Rep. TED NAM AE-7047.7; Rep. XG-T-243, Feb. 1955, Spp. Naval Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

6175
 To present an optimum-type display for fuel quantity information on multi- and single-tank aircraft, several dial presentations were considered. Particular attention was given to the need for both qualitative and quantitative information with minimal use of panel space. Two presentations of a single-tank indicator and four of multi-tank indicators are shown. These designs are discussed and specific recommendations are made.
 R. 3 1

6177
 Mendelson, E.S., Noble, Rosalie, & Tiller, P.R. COMPARISON OF STANDARD AND EXPERIMENTAL EAR PLUGS. Proj. NM 001 062.05, Rep. 3 & Rep. TED NAM AE 6513.1, Nov. 1955, Spp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

Comparative measurements have been carried out of the shifts in auditory threshold for each ear of 11 laboratory subjects using standard ear plugs (V-51R, Ear Wardens) and experimental ear plugs (Dunbar-Knight Hearing Guards). The results are consonant with previous theoretical and empirical analyses on similar devices. The V-51R plugs provide more effective sound attenuation, particularly in the low frequency range where afterburner powered jet engines generate their most intense noise. As compared with other commercial ear plugs of similar acoustic design, the experimental plugs are likely to be more effective for noise exclusion. They appear worthy of consideration in principle for use by personnel who must maintain headset communications in extremely noisy environments, i.e. in instances where maximum sound attenuation may be undesirable.
 R. 3

6178
 Lowery, E.A. & Brown, F.R. INSTRUMENT LIGHTING--INVESTIGATIONS OF ULTRAVIOLET REFLECTIONS. PART III. A STUDY OF DARK ADAPTATION DURING OBSERVATION OF AN ULTRAVIOLET ACTIVATED AIRCRAFT INSTRUMENT PANEL. Rep. TED NAM 31334, Part 3, April 1950, 8pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

Measurements of dark adaptation thresholds while viewing an aircraft cockpit instrument panel illuminated with ultraviolet flood lights were obtained on 2 trained subjects. These data are compared to thresholds attained by the same subjects during a similar period in darkness. It is concluded that dark adaptation is impaired while viewing the test panel and for each subject the mean impairment is constant during observations of the panel. For one subject the mean impairment of dark adaptation while viewing the test panel was approximately 0.40 log units (micro-micro-lamberts). The mean impairment of dark adaptation for the other subject was approximately 0.20 log units (micro-micro-lamberts).
 R. 8

6179
 Lowery, E.A. SHIELDING DEVICE FOR PROTECTION OF LANDING SIGNAL OFFICER'S EYES AGAINST ULTRAVIOLET LIGHT. Rep. TED NAM AE 25790, Sept. 1949, 8pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

The eyes of Landing Signal Officers must be protected from the radiation coming from the ultra-violet lamps used for activating the fluorescent strips of his garment during night carrier operations. A shield meeting the stated requirements, designated the MAES LSO eye shield, has been designed, fabricated, and evaluated. It is constructed of rubber laminated on an aluminum ribbing and is provided with elastic straps for positioning against the face. Satisfactory evaluations have been conducted under conditions of operational use.

6180
 Lazo, J. & Brown, F.R. INSTRUMENT LIGHTING INVESTIGATIONS OF ULTRA-VIOLET REFLECTIONS. PART II. MEASUREMENTS OF ULTRA-VIOLET ENERGY IN AIRCRAFT COCKPITS EQUIPPED WITH FLUORESCENT INSTRUMENT LIGHTING. Rep. TED NAM 31334, Part 2, Feb. 1950, 30pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

An Ultra-Violet Radiometer Assembly has been designed and constructed to measure average radiant flux densities over the spectral range of 312 to 399 millimicrons. This instrument has been used to measure the energy at the pilot's eye position in cockpits of naval aircraft equipped with ultra-violet floodlighting of fluorescent instrument markings. The energy so measured is largely attributable to reflections on the instrument panel, adjoining consoles and windscreens, and, in some cases, to direct radiation from the lamps. 10 naval aircraft (JH, SHB, K40, SHJ, BTD, PB4, P61-W, JD, PBY, PBH) equipped with ultra-violet instrument floodlighting fixtures (360 BL lamps), were investigated. One commercial aircraft, a Martin 2-0-2, equipped with a cold cathode ultra-violet floodlighting installation was also studied. In addition to the measurements of radiant flux density, the related brightnesses of the fluorescent instrument markings on the aircraft panel were determined. These measurements supplement data previously reported on the amount of visible light reaching the pilot's eye position in similar aircraft. An analysis of the measurements and observations indicate that ultra-violet radiations and reflections can be minimized by improved positioning of the ultra-violet sources, by better shielding over the instrument panel and by uniform use of a standard fluorescent paint on the instrument markings.

6181

Lazo, J. & Brown, F.R. COLOR, SIZE AND SHAPES OF AIRCRAFT INSTRUMENT DIAL MARKINGS. PART II. DESIGN FOR THE TURN AND BANK INDICATOR ADAPTED TO RED INSTRUMENT LIGHTING SHIELDS. Rep. TED NAM EL 618, Top. Rep. XG T 145, Oct. 1950, 5pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

A modification of the standard aircraft turn and bank indicator dial face for use with indirect red lighting is the subject of this report. The lighting system was designed for individual illumination of the aircraft instruments to be accomplished by shields placed on the front of the instrument and containing lamps in red plastic housings which are located to top left and top right. This lighting method proved to be inadequate for the directional balance indications in the turn and bank indicator. The modifications to the dial face were a) reversal of brightness relationships of directional balance indicator elements; and b) forward inclination of dial face portion above the inclinometer to allow light to fall over the inclinometer ball. (HEIAS)

6182

Lazo, J. THE DEVELOPMENT OF INSPECTION METHODS AND CRITERIA FOR OPTICAL DISTORTION IN COCKPIT ENCLOSURES. PART III. DETAILS OF A PROPOSED METHOD FOR INSPECTING AIRCRAFT TRANSPARENCIES FOR VISUALLY OBJECTIONABLE DISTORTION. Rep. TED NAM AE 4405, Top. Rep. XG T 225, Sept. 1954, 7pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

A study was made of methods for the inspection of aircraft transparencies for visually objectionable distortion. The details of such an inspection method are presented in this report. Laboratory and analytical studies, with their results and conclusions, form the basis for the method; however, since previous reports have been published on these studies no data are given here. The inspection method includes criteria related to the severity of localized distortion as well as the extent of the area over which distortion is exhibited. A listing is made of considerations which should be included in individual determinations of acceptability standards. (HEIAS)

R 25

6183

Lazo, J. HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT. PART III. RECOMMENDATIONS FOR STANDARD ELECTRICAL AND ELECTRONIC CONTROL KNOB FOR AIRCRAFT. Rep. TED NAM EL 52004, Rep. XG T 258, July 1955, 5pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

This report discusses and recommends a series of knobs for adoption as standard electrical and electronic control knobs in aircraft cockpits. Previous reports had designated 3 classes of control knob shapes relating to control function on the basis of their manipulative and position-monitoring characteristics: a) round for spinning or twirling where orientation is not major source of information; b) bar for both spinning and twirling and step-function controls for which tactual and visual monitoring is desired; and c) pointer for those step function controls requiring considerable force for manipulation and where tactual monitoring is major source of information. 2 sizes of knob series (3 large and 3 small) incorporating features found desirable in previous study are proposed herein with detailed drawings presented in appendix. (HEIAS)

R 4

6184

Lazo, J. HUMAN ENGINEERING INVESTIGATION OF INTERIOR LIGHTING OF NAVAL AIRCRAFT. PART II. LIGHT-CONDUCTED HANDLES FOR TOGGLE SWITCHES. Rep. TED NAM EL 52004, Top. Rep. XG T 219, May, 1954, 3pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

An investigation was conducted of the possible utility of light-conducting toggle switch handles to be used in conjunction with aircraft control panel plastic lighting plates. An installation of 3 toggle switches: (a) standard, with metal, non-light-conducting handle; b) plastic encased handle presenting 4 bright circular lines around switch handle with another at top; and c) same plastic encasement sanded to provide a "glowing" effect) was observed under both day and night illumination. The frosted-finish plastic encased switch handle was most visible under both illumination conditions. (HEIAS)

6185

Lazo, J. LIGHTING REQUIREMENTS FOR COCKPITS AND COMPARTMENTS OF NAVAL AIRCRAFT. PART II. INVESTIGATION OF SUPPLEMENTARY FLOODLIGHTING FOR PANELS EMPLOYING INDIVIDUAL INSTRUMENT LIGHTING FIXTURES. Rep. TED NAM EL 619, Rep. XG T 178, June 1952, 5pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

2 alternative systems for aircraft instrument panel lighting were investigated by means of laboratory tests and pilot preference study. The 2 systems were red individual instrument fixture lighting only and red floodlighting in combination with the individual lighting. 7 Ss made comparative observations following 15 min. dark adaptation as illumination from individual lighting fixtures varied from .02 ft-L to 1.15 ft-L. At each setting various intensities of red floodlighting were added for additional observations (range upward from .020 ft-c). The addition of red floodlighting did not appear to improve the lighting display. In order to affect noticeably the brightness contrast between instrument dial faces and panel areas, rather high intensities of floodlighting (0.10 ft-c) had to be used; this was found to be deleterious to dark adaptation. It was the unanimous opinion of the pilots that the individual instrument fixture lighting method was excellent; there was no desire expressed for additional lighting. (HEIAS)

6185

Lewis, J. EXTERIOR COLOR SCHEMES FOR AIRCRAFT TO PROVIDE MAXIMUM VISIBILITY. INVESTIGATION OF COLOR SCHEMES TO IMPROVE PROPELLER NOTICEABILITY. Rep. TED NAM 42-296, Rep. NO T-213, May 1954, 4pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

Studies were conducted of propeller warning schemes incorporating contrasting colors. The conclusions and recommendations are as follows: a) Propeller noticeability can be significantly improved by properly selected paint schemes. b) The color scheme offering the best possible noticeability improvement is one in which maximum brightness and color contrast with the background are separately provided by 2 colors, one providing the brightness contrast with the background and the other providing color contrast with the background. c) Brightness contrast is of greater significance in propeller noticeability than color contrast. d) The employment of high brightness color bands on the rear surface of propellers is undesirable. However, on such surfaces the use of low brightness, high chroma color bands such as bright red, AN color 319, will afford noticeability qualities without producing objectionable glare to the pilot in flight. e) The color scheme for the front surface of the propeller found to be most effective in this study and recommended for naval aircraft application is one employing a 6" band of specular white paint, AN 511, at the propeller tip followed by a 6" band of bright red, AN 319, then another 6" band of specular white, followed by a band of black paint, AN 534, to within 6" of the propeller hub and the remaining 6" bright red.

6187

Crumley, L.W. A STUDY OF THE REQUIREMENTS FOR LETTERS, SYMBOLS, AND MARKINGS TO BE USED ON TRANSLUMINATED AIRCRAFT CONTROL PANELS. PART VI. A SURVEY OF PILOT PREFERENCES FOR SPECIAL ATTENTION PLATE MARKINGS. Rep. TED NAM 41 602, Part 6, Sept. 1951, 15pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

An opinion survey has been conducted among a group of naval pilots and other flying personnel familiar with flight problems to determine their preference among 12 alternative designs for surrounds suitable for use with transluminated special attention plates in aircraft cockpits. The results of the survey indicate that a satisfactory special attention plate design employs a minimal light flux and configuration of lines in such a manner that the area surrounding the panel attracts the pilot's attention when it falls in his field of vision, isolates the legend from the immediate surround and from the balance of the control panel, and directs the pilot's attention from the attracting surround to the legend. It was indicated that the elements of an unsatisfactory panel were mainly excessive light flux, configurations, and devices that tend to direct the pilot's attention away from the legend, and surrounding material that encroaches on and renders the legend less legible. Since no satisfactory simple method of surround markings was found suitable for both day floodlighting and night translumination use, a panel design is recommended which gives a somewhat different appearance by day than by night.

6188

Crumley, L.W. HUMAN ENGINEERING INVESTIGATION OF AIRCRAFT COCKPIT VISUAL DISPLAYS: ROTATING DIAL FOR FIVE INCH COMPASS INDICATOR, PART II. EXPERIMENTAL DIAL TYPE SPECIFICATION FOR FIVE INCH COMPASS INDICATORS. Rep. TED NAM 42-7047.1, Topical Rep. XG-T-203, Dec. 1953, 5pp. Naval Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

6189

This article presents four drawings and the recommended dimensions for moving card, fixed task types and for moving card, moving pointer types of 5 inch case compass displays. These drawings represent displays which are considered suitable for aircraft compasses housed in 5 inch cases.

1.

6189

Deese, J. THE ABILITY OF UNTRAINED OBSERVERS TO MATCH VISUAL FORMS THAT ARE SLIGHTLY DISPARATE IN CONTOUR. Contract AP 33(Q38)-22642, WADC Tech. Rep. 56-570, Oct. 1956, 13pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (The Johns Hopkins University).

6189

This is a study of the ability of observers to match slightly disparate imaginary contours defined by three points each. Utilizing a method of overlay, 22 subjects were required to match 100 pairs of contours. The discrepancy of location of the centers of mass was determined for each subject on each trial. The results are presented and discussed in terms of the mean error (i.e., discrepancy) for all subjects and the degree of individual differences. An examination of forms conducive to high circular error suggests an hypothesis concerning the relation between shape discrepancy and magnitude of circular error.

T. G. I. R 2

6190 Smith, O.W., & Sherlock, Louise I. MEMORY FOR TRANSLATORY MOTION. II. A NEW EXPLANATION OF THE VELOCITY TRANSDUCTION PHENOMENON. Contract NMR 401(14), Sept. 1956, 12pp. DHB, Cornell University.

To study various aspects of transitory motion (perceived velocity), a series of investigations were conducted. The aspect of memory for transitory motion is studied by comparing the matches made by Ss (20) when viewing successively standard and variable motion fields (Halpern pattern of one centimeter squares) with matches made to the immediate memory of the constant velocity of the standard. Tests of the differences between means and variances of the two conditions were made. The velocity transduction phenomenon (that enlargement of the moving field must be accompanied by proportional increase in stimulus velocity for phenomenal velocity to be judged identical) is investigated in relation to the frequency at which moving objects leave the field by comparing judgments of apparent velocity with judgments of frequency.

T. R 12

6191

Brown, F.R. & Lowery, E.A. A STUDY OF THE REQUIREMENTS FOR LETTERS, NUMBERS AND MARKINGS TO BE USED ON TRANS-ILLUMINATED AIRCRAFT CONTROL PANELS. PART II. A SURVEY OF PILOT PREFERENCES FOR MARKINGS FOR RHEOSTAT CONTROLS. Rep. TED NAM EL 609, Part 2, Feb. 1950, 13pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

An opinion survey has been conducted among a group of experienced Naval pilots to determine their preference among 12 alternative methods of marking the rheostat intensity controls found on transilluminated control panels in aircraft cockpits. The results of the survey indicate a strong preference for a marking of simple design utilizing lines of uniform stroke width. The other elements of a satisfactory marking are: verbal references to function and limits; conformity with standard directions, i.e., clockwise movement to increase intensity; interpretability of marking from any viewing angle or partial view; and combination of direction indicator with purpose designation, i.e., "Brighter" instead of "high." An unsatisfactory marking would have elements with these features: wide or non-uniform stroke widths; complex or subtle designations; too great dependence on non-verbal references; non-standard direction of rotation; and poor interpretability from a partial view.

R 3

6192

Brown, F.R. & Lowery, E.A. A STUDY OF REQUIREMENTS FOR COLOR, SIZE AND SHAPES OF AIRCRAFT INSTRUMENT DIAL MARKINGS. PART I. TYPE AND FORMAT FOR SIGHT REDUCTION TABLES. Rep. TED NAM EL 619, Topical Rep. XG T 139, July 1950, 11pp. USN Air Material Center, Philadelphia, Penn.

6192

To study the problems of legibility of sight reduction tables under low-level red illumination (as used in aircraft cockpits), a critical review of the current literature (1949) was made and information from other agencies solicited. Opinions and conclusions were drawn regarding type (form and size of numerals) and format (spacing, grouping, headings) with specific attention to effects of low-level red illumination. Recommendations are included.

T. I. R 13

6193

Brown, F.R. & Lazo, J. STUDY OF REQUIREMENTS FOR CARRIER AIRCRAFT APPROACH LIGHT SYSTEM. II. A COMPARATIVE EVALUATION OF THE TRI-COLOR SECTOR, THE AIRSPEED CONTROLLED, ATTITUDE GYRO-CONTROLLED AND THE ANGLE OF ATTACK CONTROLLED APPROACH LIGHT SYSTEMS. Rep. TED NAM EL 614, Part 2, Dec. 1951, 25pp. USN Aeronautical Medical Equipment Lab., Naval Air Material Center, Philadelphia, Penn.

6193

To make a comparative field and carrier evaluation of four approach light systems (Tri-Color Sector, Airspeed Controlled, Attitude Gyro-Controlled, and Angle of Attack Controlled), flight trials were conducted using both reciprocating and jet engine type aircraft. The adequacy and utility of the information provided by each system were evaluated by the participating Landing Signal Officers. Recommendations are included.

R 6

6194
Brown, F.R., Grumley, L.H. & Aisher, D. THE DEVELOPMENT OF INSPECTION METHODS AND CRITERIA FOR OPTICAL DISTORTION IN COCKPIT ENCLOSURES. PART I. A STUDY OF INSPECTION METHODS FOR OPTICAL DISTORTION IN AIRCRAFT TRANSPARENCIES. Rep. TED NAM AE 4405, Part 1, May 1954, 18pp. USN Air Material Center, Philadelphia, Penn.

A study has been made to determine the most practicable method which will reliably reveal the visually significant variations in optical distortion in aircraft transparencies. The study has included a determination of the characteristics of the variations of deviation in transparencies which are most influential in rendering the transparencies objectionable to pilots. Double aperture photography of a grid screen (11 x 11 squares) is proposed as the simplest and most reliable test to detect such variations of deviation. The proposed method requires that the picture be taken from a position closely approximating the position of the pilot's eyes in the cockpit in order to maintain geometric equivalence of the optical factors. A tentative specification for the method of evaluating the photographs is proposed for validation of the basic technique. The method, the results of which correlate highly with pilot preference of tested windshields, considers as most significant the area of extent of distortion. It is recommended that the proposed method be validated and evaluated in a production situation.

R 7

6195

Brown, F.R. A STUDY OF THE LEGIBILITY OF TRANS-ILLUMINATED MARKINGS IN AIRCRAFT COCKPITS. Rep. TED NAM EL 600, Part 2, Feb. 1949, 33pp. USN Air Material Center, Philadelphia, Penn.

6195

To determine principles governing legibility of red trans-illuminated Grow Chart letters (block-type capitals) under conditions simulating those encountered in reading such markings on cockpit consoles, 75-Ss performed an oral reading task in the dark at a distance of 28 inches. The variables were: 1) letter size (5 to 15 min. of visual angle), brightness of trans-illumination (24 to 80 microlamberts), and level of background floodlighting (11 by 10⁻² to 110 by 10⁻² ft.-c). Differences in error scores for conditions varied are analyzed for their significance in aircraft console lighting.

T. G. I. R 11

6196

Brower, J.A. & Orlansky, J. PRELIMINARY REPORT ON INVESTIGATION OF EXTERIOR LIGHTING EQUIPMENT. PART I. Rep. TED NAM 31333, Aug. 1945, 5pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

Recommendations for what is considered to be the most effective system of aircraft lighting for night rendezvous and join-up, which can be effected with slight modifications of conventional exterior lights are presented. 5 lights are required: a) 2 running lights on the wing tips (port wing red, starboard green); b) one white tail light; c) 2 section lights (top light a frosted white, bottom one a red, green, amber, blue, or white according to task force). Both steady and flashing lights are to be used at 3 brightness settings. Directions for rendezvous and formation flight are given. This represents a preliminary report. (MEIAS)

6197

Blasdel, Irene C. & Lazo, J. STUDY OF EXTERIOR LIGHTING FOR NAVY AIRPLANES. REPORT VI. NIGHT FLIGHT TESTS OF EXPERIMENTAL EXTERIOR LIGHTING SYSTEMS ON MILITARY AIRCRAFT. Rep. TED NAM 31333, Rep. 6, June 1949, 39pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

Extensive flight tests have been conducted using experienced pilots observing SNJ aircraft equipped with standard and experimental methods of exterior lighting. The installations used on these aircraft and some of the flight tests have been previously reported, however this report summarizes all work accomplished to the present time. As a result of all considerations of the problems encountered in night flying, it is now possible to formulate some definite conclusions concerning illumination for night operation of aircraft. Inasmuch as flashing of lights eliminates most of the confusion of aircraft lights with stars and ground lights, this method is suitable for taxi and solo cross-country flying. When planes are in formation, however, flashing causes confusion and disorientation to pilots of the formation, so that dim steady lights are required. The formation is distinctive against backgrounds of stars and ground lights when viewed from other aircraft because of the quantity of lights apparent during approach. When section lights are coded for signalling purposes, it is essential that all other lights on the aircraft be steady so that no confusion arises in the code. Recommended patterns are included.

Roll

6198

Blasdel, Irene C. & Lazo, J. STUDY OF EXTERIOR LIGHTING FOR NAVY AIRPLANES. REPORT V. THE INSTALLATION OF LIGHTS ON THE TRAILING EDGE OF WINGS FOR LOW LEVEL ILLUMINATION OF AIRCRAFT. Rep. TED NAM 31333 & Rep. 5, May 1949, 10pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

The report deals with the method in which 4 linear lights have been mounted on the trailing edges of the wings of an SNJ aircraft to produce low level illumination for night formation flying. This method of installation was effected by mounting fixture AN3091-3, within a surface covered by sanded acrylic plastic to produce linear illumination at the trailing edge wing tip and directly inboard from the wing tip on the fuselage. This type of installation interferes in no way with the flight characteristics of the SNJ aircraft used in this evaluation because it is integral with the contour of the aircraft. This is aerodynamically satisfactory for high speed aircraft and has the added distinct advantage of producing linear light rather than the illumination by point sources found in the present formation lights. Although the glowing lines of light produced are small in area, they furnish a comfortable visual reference and aid the pilot in maintaining position during night formation flying. The strip of light on the wing tip indicates any change in attitude of the wings, while the inboard strip, parallel to the line of normal flight of the aircraft, produces an immediate reference for climb and dive, and is useful for cross-under procedures. These linear formation lights are color coded to conform with international practice for navigation lights. The port wing strip is red, starboard wing green and both inboard lights are amber. All lights are equated in brightness and are operated at a sufficiently low level to be visible only within 700 feet. The results of night flight evaluations on SNJ aircraft equipped with these and other experimental methods of exterior lighting will be the subject of subsequent reports.

R 5

6199

Blasdel, Irene C. STUDY OF EXTERIOR LIGHTING FOR NAVY AIRPLANES. PART VII. FIELD OBSERVATION BY COMPOSITE SQUADRON FOUR. Rep. TED NAM 31333, Rep. 7, Topical Rep. FG T 119, July 1949, 7pp. USN Air Material Center, Naval Air Experimental Station, Philadelphia, Penn.

35 pilots attached to Composite Squadron Four (VC-4), observed experimental lighting installations on the SNJ-6 aircraft. Opinions obtained by use of a rating-scale questionnaire showed that the pilots strongly favored the flashing system of lights recommended for solo cross country flights, but preferred the wing tip running lights to remain steady for taxi. The use of coded section lights for rendezvous and join-up was also endorsed with consideration on invited to the use of amber filters on these lights in place of the clear glass presently used. Primary attention of the observers was directed toward methods of lighting for formation flying and the pilots strongly favored linear wing trailing edge light to replace the present standard formation lights. In conjunction with these lights, the linear tail light was preferred by 28 of the pilots over the use of floodlights on the vertical tail surface preferred by the other 7.

6200

Atisher, D., & Lazo, J. A STUDY OF THE REQUIREMENTS FOR BACKGROUND LIGHTING OF AIRCRAFT INSTRUMENTS AND LUCITE ILLUMINATED CONSOLES. PART III. INVESTIGATIONS IN THE FLOODLIGHTING OF TRANSLUMINATED COCKPIT DISPLAYS. Rep. TED-NAM EL-600, Part 3, Oct. 1951, 14pp. USN, Air Materiel Center, Naval Air Experimental Station, Philadelphia, Penn.

A study was made of the desirability of floodlighting in conjunction with translumination of cockpit-type dial instruments and of control panels. In one phase of the present study a series of tests was conducted utilizing a special dial reader. Error scores were obtained of 4 selected subjects reading red transluminated dial markings in a series of several brightnesses, with no floodlighting and with several levels of floodlighting. Opinions of subjects on the desirability of the various illuminating conditions were noted. Reading performance in these test situations did not improve significantly above 0.04 foot lamberts of translumination on the markings. The addition of floodlighting with translumination at this level resulted in a subjectively more comfortable reading situation even though errors in reading did not show significant differences. In a second phase of this study, 15 experienced pilots, while seated in a cockpit mock-up selected the combination of red translumination and red floodlighting which they would prefer for night flying. From the data obtained, it is concluded that a fixed level of supplementary floodlighting should be used with any selected level of indirect lighting in the cockpit lighting installation. This floodlighting level would serve to provide the pilot with better cockpit orientation and visual comfort. In addition, 2 other floodlighting levels are proposed to satisfy the pilot lighting needs when translumination has failed and when the pilot is not dark adapted. These 3 levels are recommended for the "dim," "medium," and "bright" positions of the 3-position selector switch.

R 11

6203

Alkon, E.G. COMBINED-ENVIRONMENTAL STRESSES AND MANUAL DEXTERITY. Proj. 6 95 20 001, Rep. 225, March 1956, 18pp. AHRL, Research and Development Division, Fort Knox, Kentucky.

Much of the field maintenance work performed by Army personnel is done under conditions of environmental stress. The sources of these stresses are varied and the precise tasks numerous. The purpose of this research was to develop a task representative of the field maintenance problem and then investigate the effects of 3 stress sources on efficiency at this task. A test-retest reliability measure indicated that the task used was a highly reliable measure of mechanical dexterity. Technical dexterity was significantly depressed by stresses of low temperature, intense sound and low illumination. The effects of temperature and noise stresses on kinesthetic judgment (muscular control) were significant and appeared to be cumulative; while low illumination had no apparent influence on kinesthetic judgment and the detrimental effects remained constant. A reliable measure of motor skills can be obtained with a task which closely simulates line maintenance conditions. A number of representative environmental stresses act to decrease both speed and accuracy. Length of exposure, as well as intensity, is an important determinant of behavior changes under stress.

R 10

6201

Adams, J.A. PSYCHOMOTOR PERFORMANCE AS A FUNCTION OF INTERTRIAL REST INTERVAL. Proj. 509 020 0009, AFPTC TR 54 60, Nov. 1954, 3pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (Reprinted from: J. exp. Psychol., Aug. 1954, 43(2), 131-133).

6201

To evaluate psychomotor performance as a function of intertrial rest interval, 446 basic airmen trainees were given 150 30-sec. trials on the Potary Pursuit Test. Divided into five groups, each group had one of the following intertrial intervals: 0, 3, 10, 20, or 30 sec. The results are discussed in terms of the relation between time on target and intertrial interval as reflected in performance curves for all groups, the rate of approach to asymptote, and the nature of the asymptote level.

G. R 4

6202

Adams, J.A. THE EFFECT OF PACING ON THE LEARNING OF A PSYCHOMOTOR RESPONSE. Proj. 509 020 0009, AFPTC TR 54 32, Aug. 1954, 5pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (Reprinted from: J. exp. Psychol., Feb. 1954, 47(2), 101-105).

6202

To evaluate the effect of degrees of pacing on the learning of a motor response, 295 basic airmen trainees were presented with the four-unit Complex Coordination Test. While four groups of Ss practiced the tasks under different pacing intervals, one group was permitted to pace itself. The results are discussed in terms of differences among the groups in mean performance level and performance trends. The implications of pacing as a learning variable are evaluated.

T. G. R 2

6205

Attneave, F. PERCEPTION OF PLACE IN A CIRCULAR FIELD. Amer. J. Psychol., March 1955, 68(1), 69-82. (Lackland AFB, Texas). (AFPTC TR 55 44).

64 Os (airman basic trainees) were required to reproduce, from immediate memory, the positions of single points presented on a homogeneous circular screen in the frontal plane. Half the Os were given points on the left side of the screen, the other half points on the right; all were presented with points on the vertical midline. A total of 9) different positions within the circle were thus explored. It is clear that 0 utilized center-in landmarks which were entirely subjective; namely, the vertical and horizontal diameters of the screen. This conclusion is based upon the fact that both VE and CF were related to distance from the implicit "cross-hairs" much as they were related to distance from the physically present border of the circle. The effects which both objective and subjective landmarks had on error were these: a) Variable errors (i.e., the interquartile range of responses), taken along an axis oriented toward a given landmark, tended to decrease in the vicinity of the landmark. This effect was to be expected on the basis of Weber's law. b) Constant errors were consistently directed away from nearby landmarks. Accordingly, points were displaced toward the middle of the quadrant within which they were presented. Possible generalizations of the results are suggested.

R 3

6206
Bahrlick, H.P., Bennett, W.F., & Fitts, P.M. ACCURACY OF POSITIONING RESPONSES AS A FUNCTION OF SPRING LOADING IN A CONTROL. J. exp. Psychol., June 1955, 49(6), 437-444. (Ohio Wesleyan University, Delaware, Ohio). (AFTRC TR 55-317).

This study investigated accuracy of positioning a horizontal arm control as a function of changes in the torque-displacement relation of the control. It was found that positioning errors were smallest when the ratio of relative torque change to displacement is largest, particularly if the absolute change of torque with displacement is also large. It is concluded that control forces opposing a movement can provide useful cues in learning to execute different amplitudes of movement, and that their usefulness depends upon the relative and absolute torque change per unit of control motion.
R 5

6207
Borch, A.M. & Lewis, D. THE EFFECT OF TASK DIFFICULTY AND AMOUNT OF PRACTICE ON PROACTIVE TRANSFER. Contract AF 33(038)-13212; Proj. S09 020 0006, AFTRC TR 54 57, Nov. 1954, 5pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (State University of Iowa, Iowa City, Iowa). (Reprinted from: J. exp. Psychol., Aug. 1954, 48(2), 134-142).

6207
To evaluate the effect of task difficulty, amount of practice, and reversal of controls following errors on one control, 213 Ss were given four variations of a following pursuit task. Differences between the tasks depended upon changes in relations between control movements and movements of the object to be kept on target. Following varying amounts of practice on an initial task one of the variations was presented. Results are discussed in terms of the role of task difficulty in transfer of learning, the kind and amount of transfer obtained, the effect of shifting from one control to another, and the proactive effects of practice.
T. G. R 14

6208
Birmingham, H.P. A DEVICE FOR USE IN STUDYING THE PATTERN OF HAND MOVEMENTS. Rep. R 3298, June 1948, 7pp. NRL, Psychology Section, Washington, D.C.

The device described is used in the study of rapid hand movements. As the hand movement is made, plots against time of position, rate, acceleration, and rate of change of acceleration are provided on cathode-ray tubes. A detailed description of the apparatus is given, and the block diagram and wiring diagram are included.

6209
Maltzer, H.S. STUDIES OF THE EFFECTIVENESS OF GRAPHIC MATERIALS. J. educ. Res., Dec. 1952, 46(4), 263-273. (Michigan State College, East Lansing, Mich.).

This article attempts to abstract general conclusions from ten studies (conducted during the last 25 years) concerned with the relative effectiveness of various types of graphic materials upon learning. A table presents author, date of experiment, number of Ss, grade level, materials employed (e.g., pictograph, bar, line, circle graphs, etc.), and method of presenting the materials. A summary statement of the results of each experiment, a discussion of the methods employed, and an interpretation of the conclusions reached in the studies are presented along with a discussion of the implications of these studies for teachers, editors, and research workers.
T. R 10

6210
Briggs, L.J. DEVELOPMENT AND APPRAISAL OF A MEASURE OF STUDENT MOTIVATION. Proj. 7709, Task 77153, AFTRC TR 54 21, Aug. 1954, 21pp. USAF Personnel Systems Personnel Research Lab., Lowry AFB, Colo.

6210
This is a report of the development and evaluation of an experimental measure of student motivation. With motivation defined as the intensity of the Air Force student's efforts to attain set goals in technical training, an observer check list of classroom behavior was developed on the basis of instructors' observations of students with high and low motivation. Correlation of the ultimate measure with grades and aptitude scores as well as suggestions for possible applications of this check list are discussed.
T. R 11

6212
Clausen, J. VISUAL SENSATIONS (PHOSPHENES) PRODUCED BY AC-SINE WAVE STIMULATION. Elmsl. Munksgaard, Copenhagen, Denmark, 1955, 101pp. (New York State Psychiatric Institute, N.Y.).

This study reports a series of experiments bearing on the characteristics and determinants of AC sine wave electrically induced phosphenes, both as unique investigations and as they relate to previous findings of other investigators. A low frequency sine wave generator was used as the electrical source of stimulation throughout a frequency range of 5 to 70 cps. Electrodes were placed as near to the eye as possible, one on the skin of the forehead and the other on the skin of the lower right temple area of the S. The method of limits was used for determining thresholds in both peripheral and central visual fields. Under standard test conditions, the S looked at a white wall which reflected light of a surface luminance of 3.2 ml and a standard stimulus duration of 1 sec. 10 trained Ss were included in the series. Some of the findings from 14 main experiments are as follows: a) Thresholds for peripheral phosphenes were found to require a regular increase in intensity (measured in microamperes) as the frequency of alternation was increased between 20 and 70 cps. Only one break was found in this relationship around 35 cps; b) Central or foveal phosphene frequency-intensity relationship for colored test patches also gave straight functions without additional breaks; c) Qualitative differences between peripheral and central phosphenes were found and described. Other findings related to adaptation, difference limits for flicker rate, flicker fusion, and effects of hyperventilation are given.
R 102

6213

Coleman, P.D., & Krauskopf, J. THE INFLUENCE OF HIGH INTENSITY NOISE ON VISUAL THRESHOLDS. Proj. 6 95 20 001, Rep. 222, Feb. 1956, 26pp. APRL, Research and Development Division, Fort Knox, Kentucky.

Using the psychophysical method of limits, thresholds for 3 visual stimuli were determined during noise and quiet conditions. Noise intensities were varied between 110 decibels (db) (re. .0002 dynes/cm²) and 140 db. The suggestions of other investigators that noise may affect visual function by "rattling" the eyeballs, causing nystagmic eye movements or "overflow" in the central nervous system, were investigated by choosing the visual stimuli to be such that if one of these mechanisms were operating noise might be expected to have a differential effect on the thresholds for the stimuli. It was found that noise had no general effect on visual thresholds at any of the intensities used in the present experiment. No differential effect of noise on the thresholds for the 3 visual stimuli used was demonstrated. There were consistent individual differences in visual threshold changes during noise. Absence of any demonstrable general effect of noise was due to cancellation of opposite effects in individuals. A possible factor contributing to these individual differences was investigated by showing the subjects spurious curves, purported to represent their performance during previous sessions. Subject's performance did seem to be influenced by the fake curves, although statistical significance was not demonstrated.

R 37

6214

Elliott, D.M., & Singer, E.G. THE PAINTAL INDEX AS AN INDICATOR OF SKIN-RESISTANCE CHANGES TO EMOTIONAL STIMULI. J. exp. Psychol., 1953, 45(6), 429-430. (Wayne University, Detroit, Mich. & University of Detroit, Detroit, Mich.).

The supposed independence of the Paintal Index and basic skin resistance was confirmed in a study involving GSR's to emotionally toned words as compared with maximum GSR's to a loud noise.

R 3

6215

Renshaw, S. & Roach, D.E. STUDIES ON VISUAL FORM PERCEPTION TRAINING BY TACHISTOSCOPIC METHODS. Engng. Expt. Station News, Dec. 1952, 24, 37-39. (Ohio State University, Columbus, Ohio).

The applications of tachistoscopic training in industry are discussed. Examples are cited of gain in reading speed and in speed and accuracy of checking numbers shown by the personnel of an insurance office who underwent 36 tachistoscopic training sessions.

6216

Fleishman, E.A. PERCEPTION OF BODY POSITION IN THE ABSENCE OF VISUAL CUES. J. exp. Psychol., 1953, 45(4), 261-270. (Human Resources Research Center, Lackland AFB, Texas).

2 experiments investigated the influence of certain factors on accuracy of adjustment to an upright position in the absence of a visual frame of reference. The Ss were subjected to displacement magnitudes of 15°, 20° and 25° in a lateral plane, and displacement speeds of 4°, 5° and 6° per second in a tilting-chair arrangement. Direction of tilt varied from trial to trial in a randomly determined sequence. In Exp. I S's head position was not held fixed, while in Exp. II S's head position was fixed so that its medial plane approximated the gravitational vertical. The results indicate: a) Greater precision of adjustment to the upright position results when the head position is fixed than when the head position is not fixed; b) Similarly, smaller constant error of adjustment results when the head position is held fixed, although constant error is in the direction of initial displacement under both conditions; c) When head position is fixed as well as when head position is not fixed, greater precision of adjustment results as speed of displacement increases, and as magnitude of displacement decreases; d) Under both conditions, greater precision of adjustment results when direction of displacement is to the left than when direction of displacement is to the right; e) Sequence of trials with respect to direction of initial displacement seems to be an important variable in over-all error; f) Magnitude and speed of displacement are important determiners of precision of adjustment at various stages of practice; g) Individual Ss show a high degree of consistency in precision of adjustment at various stages of practice. The findings are related to previous work and questions raised by the present study are discussed

R 6

6217

Fleishman, E.A., & Hempel, W.E. A FACTOR ANALYSIS OF DEXTERITY TESTS. Personnel Psychol., 1954, 7(1), 15-32. (Human Resources Research Center, Lackland AFB, Texas).

This study represents an exploratory investigation into the nature of factors contributing to manipulative performance. A battery of 15 widely used printed and apparatus dexterity tests was administered and subjected to a factor analysis. The results present evidence against the concept of "manual dexterity" as a unitary ability. 5 factors were identified to account for performance in the range of tasks investigated. These were named Finger Dexterity, Manual Dexterity, Wrist-finger Speed, Aiming, and Positioning. The results are discussed with respect to the factor composition of the individual tests, the utility of certain printed tests in measuring the factors identified, and possible test improvements.

R 22

6223
Goldstein, M. & Rittenhouse, C.H. KNOWLEDGE OF RESULTS
IN THE ACQUISITION AND TRANSFER OF A GUNNERY SKILL.
Proc. 7708, Task 77141, AFTRC IN 55 45, Nov. 1955,
10pp. USAF Personnel & Training Research Center,
Lackland AFB, Tex. (Reprinted from: J. exp. Psychol.,
1954, 48(3), 187-196).

6218

623

6223 To ascertain the effects of knowledge of results on performance in a gunnery training situation, five groups of airmen were required to perform on the SAM Pedestal Sight Manipulation Test or on the Flexible Gunnery Research Device for 36 to 60 trials. Subjects were informed after each trial of time on target ("verbal" treatment) or of time on target and of error tendencies ("tutitional" treatment) or they heard a continuous buzzer whenever they were on target ("buzzer" treatment). Learning curves are compared for "verbal", "tutitional", and "buzzer" subgroups to whose knowledge of results was presented 100 or 50 percent of the time either randomly or systematically. Transfer to a new task is also measured.

L. G. R 10

6219

6224
E.E. & Fleishman, E.A. A: FACTOR ANALYSIS OF PHYSICAL PROFICIENCY AND MANIPULATIVE
Hempel, Prof. 7703, Task 77084, Rep. AFPTRC TR 54 34, Aug. 1954, 15pp. USAF Personnel &

6219

This is a factorial study concerned with the organization of abilities in certain areas of motor skills. Primary attention was given to areas of gross muscular proficiency and fine manipulative performance. The analysis is based on the intercorrelations among 46 tests of 3 general types: a) manipulative apparatus tests, b) printed tests, and c) gross physical performance tests. 15 factors were identified to account for performance on the tests with the results indicating that abilities in the 2 areas are quite independent. General categories of abilities in gross motor performance were strength, flexibility, balance, gross body coordination, and energy mobilization; for manipulative abilities were found manual dexterity, finger dexterity, arm-hand steadiness, and aiming. In addition, an independent non-verbal reasoning factor was identified in the printed tests. (HEIAS)

T. I. E-19

6220

6225

Imus, H.A. COMPARISON OF ORTHO-RATER WITH CLINICAL OPHTHALMIC EXAMINATIONS. Proj. X-499(Av-268-p), Rep. 2 March 1946, 3pp. U. S. Naval School of Aviation Medicine Pensacola, Fla.

6220

6225

This report supplements a previous paper which gave the complete statistical analysis of the data collected in a comparison of the Orthorater with clinical ophthalmic examinations by presenting appropriate diagrams and figures.

6221

6221

This study was designed to analyze compensatory tracking behavior in terms of lead-lag errors. Six Ss were required to perform a compensatory tracking task under six experimental conditions varying velocity and acceleration of course input and amount of practice. Performance by Ss was compared with that of a mechanism defined mathematically as the simplest mechanism that may be substituted for a human operator. The results are presented in terms of a comparison between operator and mechanism performance. The analogy between operator and mechanism is discussed in detail.

6231 Krauskopf, J. & Coleman, P.D. THE EFFECT OF NOISE ON EYE MOVEMENTS. Proj. 6 95 20 001, Rep. 218, Feb. 1956, 8pp. USA Medical Research Lab., Research and Development Div., Fort Knox, Ky.

Integrated records of horizontal eye movements indicated that there were larger eye movements when the S was stimulated bilaterally with 137 db (re. threshold) random noise than in the absence of noise. Monocular stimulation with noise of the same intensity failed to produce a significant change in the records. Analysis of recordings of horizontal eye movements failed to reveal an increase in either the low frequency movements or the slow drifts of fixation. It would seem that the increase in total movement in the binocular situation is due to an increase in the small amplitude high frequency movements. No direct check on these movements was made. This increase in movement probably was not visually effective. It was suggested that immersion of the S in a noise field or a more intense noise might produce an effective increase in eye movements.

R 11

6234 McClelland, W.A., Abbott, P.S. & Stobie, W.H. TEACHING RADAR SCOPE INTERPRETATION WITH MOTION PICTURES. I. RADAR NAVIGATION, THE ELLINGTON STUDY. Proj. 506 006 0002, AFTRC TR 54 25, July 1954, 22pp. USAF Aircraft Observer Research Lab., Mather AFB, Calif.

6234

This study was concerned with evaluating the effectiveness of a motion picture training device in teaching elementary radar scope interpretation. The device simulated a radar scope by presenting motion pictures of scope returns for radar navigation. Twenty four students given all their instruction on the device, were compared with a similar group who had half their instruction on the device and half in the air and with a group given the usual course in elementary radar navigation. The relative effectiveness of motion picture and air training was evaluated in terms of ground and air grades and radar scope interpretation tests.

T. I. R 9

6235

McFann, H.H. EFFECTS OF RESPONSE ALTERATION AND DIFFERENT INSTRUCTIONS ON PROACTIVE AND RETROACTIVE FACILITATION AND INTERFERENCE. Contract AF 33(038) 13214, Proj. 509 020 0006, AFTRC TR 54 61, Nov. 1954, 6pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (Reprinted from: J. exp. Psychol., Dec. 1953, 46(6), 405-410).

6232

Mastropaulo, S., C. R. P. A. & Erdmann, R.L. A STUDY OF THE RELATIVE EFFECTS OF SIX-WEEK AND TWELVE-WEEK EXPERIMENTAL BASIC TRAINING PROGRAMS ON A SAMPLE OF LIMITED-APTITUDE AIRMEN: PART III. EIGHT-MONTH FOLLOW-UP COMPARISONS. Proj. 7705, Task 77111, AFTRC TR 54 37, Sept. 1954, 21pp. USAF Personnel Research Lab., Lackland AFB, Tex.

6232

This report, one of a series, presents a follow-up after eight months of a study of the relative effectiveness of two programs (6 and 12 weeks long respectively) used in the basic training of low-aptitude airmen (see 6233). Tests of achievement, adjustment, job knowledge and performance, aptitude, and attitude were administered to 941 airmen each of whom had participated in one of the training programs. Performances of the groups on these tests, as well as supervisor ratings, are compared with each other and with those of a control group of normal aptitude.

T. R 4

6235

To evaluate the relation between transfer and retroaction and two experimental variables--intertask similarity and relevance of verbal instructions--eight groups of ten college students were given 50 learning trials on a star discriminator, 50 interpolated trials with one of four degrees of response alteration, and 50 relearning trials on the original task. Half the groups were instructed on the nature of the difference between original and interpolated tasks. Transfer to the interpolated task and retroactive inhibition on the original task are analyzed for the various groups.

T. G. R 6

6233

Mastropaulo, S., Carp, A., Erdmann, R.L. & Schmid, J., Jr. A STUDY OF THE RELATIVE EFFECTS OF SIX-WEEK AND TWELVE-WEEK EXPERIMENTAL BASIC TRAINING PROGRAMS ON A SAMPLE OF LIMITED-APTITUDE AIRMEN: PART I. BASIC TRAINING ANALYSES. PART II. SIX-WEEK FOLLOW-UP ANALYSES. Proj. 7705, Task 77111, AFTRC TR 54 36, Sept. 1954, 41pp. USAF Personnel Research Lab., Lackland AFB, Tex.

6233

The relative effectiveness of 2 basic training programs for marginal (low-aptitude) airmen was assessed. The subjects, 941 basic trainees, were divided into two groups, one of which underwent the usual 6-week training program. The other underwent a 12-week program that included 90 hours of training in language arts and in mathematics. The performances of the 2 groups on various tests of achievement, attitude, and adjustment immediately after training and six weeks later are compared with each other and with those of a control group of normal-aptitude airmen.

T. G. R 31

6238

This paper describes 29 complex tasks used in research on problem-solving by human Ss--e.g., the pendulum problem; multiple-choice apparatus. The tasks are evaluated in terms of two general criteria--provision of a continuum for scoring (versus a pass-fail scoring system) and provision of maximum information about the S's behavior. More specific criteria for the design and selection of tasks--e.g., reliability, unidimensionality--are also discussed, as are 17 methods of scoring behavior on problem-solving tasks.

R 39

6241 Scher, S.H. ESTIMATED DECELERATION OF AIRPLANE NOSE SECTION JETTISONED AT VARIOUS ALTITUDES AND AIRSPEEDS. Rep. RM 150K09, Jan. 1951, 39pp. National Advisory Committee for Aeronautics, Langley Aeronautical Lab., Langley AFB, Va.

Calculations have been made to determine the deceleration at any time after jettisoning of an airplane nose-section design typical of those which have been proposed as escape devices for high-speed airplanes. The decelerations were determined by two methods, one utilizing successive approximations requiring graphical integration and the other giving reasonable close approximations by direct computation. Decelerations were obtained for the nose section for Mach numbers ranging up to 3.0 and altitudes ranging up to 120,000 feet, and for assumed nose weights of 750 pounds, 1000 pounds, and 1500 pounds. Drag coefficients of the nose at both 0° angle of attack (with stabilizing fins) and 90° angle of attack (without fins) at the various Mach numbers were estimated with the aid of available experimental drag data for spheres and circular cylinders and for bodies of revolution generally similar in configuration to the nose section. For the 1000-pound nose, estimations based on comparison of the calculated deceleration with such data as are available concerning man's ability to withstand decelerations indicates that, when the nose is stabilized with fins, the deceleration to which a pilot would be subjected would be tolerable for practically all the conditions investigated. For the unstabilized nose, which turns to an angle of attack of approximately 90° when jettisoned, it is indicated that the pilot would be subjected to cumulative deceleration-time effects which the available data indicate may be intolerable after the nose is jettisoned at Mach numbers greater than 0.95 at 30,000 feet, 1.6 at 60,000 feet, or 3.0 at 85,000 feet.

R 22

6239 Reveson, S.L., & Schultz, F.W. MEASUREMENT OF TEMPERATURES IN VARIOUS ORDNANCE EQUIPMENT UNDER THE DESERT ENVIRONMENT. TR 1000 13, Tech. Memo 14, Feb. 1956, 24pp. Human Engineering Laboratory, Aberdeen Proving Ground, Md.

The data contained in this report were collected during summer desert tests at Yuma Test Station, Yuma, Arizona. They were collected to give some idea of the temperatures encountered by the operator of Ordnance equipment under desert conditions. It should be noted that the ambient temperatures encountered did not appear to be extreme. In most cases they ranged between 90°F. and 105°F. and only in 3 or 4 cases did the ambient exceed 105°F. These temperatures are considered low for desert testing. The general conclusions that can be drawn from these data, from the human engineering viewpoint, are: a) Critically high temperatures appear to be predominantly caused by solar radiation; b) The problem of high temperatures on Ordnance equipment under desert conditions appears to be quite crucial. With most equipment, operators are working in temperatures within the pain range for the bare skin; c) The addition of both engine and transmission heat to the solar radiation effects in vehicles produce high temperatures at the man-machine links; d) In the artillery and ammunition area, firing obviously produces high barrel temperatures. However, this was not the concern of this survey, since the barrels are not normally handled directly by the operators; e) Further study should be performed in order to determine the effect of these temperatures on the efficiency of the man-machine system. Attention should also be given to the problem from the design point of view.

R 1

6242 Stanley, D.C. & Smith, R.G., Jr. AN EVALUATION OF THE LANGUAGE ARTS ASPECT OF THE BASIC TRAINING PROGRAM. Proj. 7705, AFPTC TR 55 36, Nov. 1955, 13pp. USAF Personnel & Training Research Lab., Lackland AFB, Tex.

6242 This study attempted to evaluate the effectiveness of the language arts aspect of the basic training program for low-ability airmen. Six groups of about 70 low-ability men each underwent one of the following training programs: 1) 45 hours of training in language arts (reading, writing, spelling) with military subject matter as the vehicle; 2) training in military subject matter covered in (1) with no training in language arts; 3) regular training program. Scores obtained by the groups on tests of reading comprehension and of military subject matter at the end of training were compared.

T. R. 2

6243 Sutter, E.L., Tomson, J.C. & Ornstein, G.N. THE LIGHT PLANE AS A PRE-PRIMARY SELECTION AND TRAINING DEVICE: II. ANALYSIS OF TRAINING DATA. Proj. 7710, Task 77170, AFPTC TR 54 35, Aug. 1954, 22pp. USAF Basic Pilot Research Lab., Goodfellow AFB, Tex.

6243 To evaluate the effectiveness of the light plane as a training device, a study was conducted in which a group of 120 students (pilot), matched with a control group on the basis of Stanine scores, received 25 hours of light plane training during six weeks of Pre-Flight training. Flight checks were administered to the two groups at five subsequent stages of training, and differences in performance were evaluated statistically. Outlines of the courses of instruction administered to the experimental group are presented.

T. I. R 3

6244 Tolman, E.C. & Postman, L. LEARNING. Annu. Rev. Psychol. 1954, 5, 27-56. (University of California, Berkeley, Calif.).

6244 This is a review of the psychological literature on learning from 1952 to 1953. The material reviewed is subsumed under the following headings: theory, discrimination learning, acquisition in classical and instrumental conditioning, performance in conditioning, verbal learning, motor learning. Subheadings include such topics as latent learning, drive intensity, generalization, distribution of practice, and transfer.

R 184

6245

Williams, J.A.C. HEAT STRESS REST ALLOWANCES IN TIME STUDY: FURTHER CONSIDERATIONS. Rep. CA/PE/5, ca. 1955, 6pp. College of Aeronautics, Cranfield, England.

This note compares 2 physiological indices of heat stress for use in allocating rest periods when men work in hot conditions: a) the predicted sweat flow (P4SR); and b) the Belding and Hatch Index (BHI), which is based on heat gained by the body from various sources and the evaporative cooling capacity of the body. Values of P4SR and BHI were calculated for various arbitrary working conditions on body data providing comparable Ss. Discrepancies occurring between the 2 indices did occur, however values of both for the various arbitrary conditions bear a very close correspondence. In all practical cases of hot working conditions, it is recommended that a first approach should be to reduce the stress-raising conditions and that the use of either index should be useful for this. The evidence suggests that values of BHI of 30-40 and P4SR of .7 be taken as the upper limit for young acclimatised men working continuously on tasks requiring vigilance; with older men these values might have to be reduced. With hot work not requiring vigilance these values could be raised. The values are relevant to continued immersion in a constant hot environment.

(HEIAS)

R 9

6247

Otis, A.B. & McKerrow, C.B. THE OXYGEN COST OF HYPER-VENTILATION. Rep. 56 28, May 1956, 10pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

6247

To measure the oxygen costs of breathing at ventilations ranging from the maximal possible down to 100 liters per minute, measurements were made on five normal male subjects and two patients with tuberculosis and obstructive emphysema. The method used is described and its validity and accuracy of measurement estimated. The obtained measurements are compared with predictions from theoretical considerations and previous more limited measurements. The construction of a low resistance valve for hyperventilation is described in the appendix.

T. G. I. R 4

6248

Wolfe, F.J. PHASE V (ALL WEATHER) TESTING OF F-94B AIRCRAFT. Proj. S 207 16, Tech. Rep. 6556, Sept. 1951, 17pp. Flight Test Div., Wright-Patterson AFB, Ohio.

Flight tests were conducted on an F-94B aircraft at Wright-Patterson Air Force Base, to evaluate the aircraft for all-weather flying conditions. All flying was accomplished by personnel of the All-Weather section, Flight Test Division. Data were gathered on operation of the aircraft from take-off to landing, under simulated and actual weather conditions, to determine the feasibility of instrument flight and to recommend instrument flight techniques to be incorporated in the Handbook of Flight Operating Instructions. The aircraft was found to be satisfactory for all-weather operations with restrictions imposed by heavy precipitation or severe icing.

6249

Melton, A.W. APPARATUS TESTS. REPORT 4. (RESTRICTED SUPPLEMENT). ca. 1947, 44pp. USA Aviation Psychology Program, Fort Rucker, Ala. (Ohio State University, Columbus, Ohio).

A number of different tests involving the timing of hand and foot control movements in order to control the movements of a steel ball in one or two dimensions were developed and experimentally employed at Psychological Research Unit No. 2. For the most part these tests were employed in Experimental Psychomotor Batteries which were administered to preflight students, many of whom never reached pilot training. As a consequence, the data on a number of the tests are scanty. Furthermore, the low validity of the pilot standing among samples of those preflight students who were sent to pilot training suggests that the graduation-elimination criterion was not equivalent to that which had been employed earlier in the Aviation Psychology Program. Nevertheless, the available data may be taken to indicate that simple timing reaction tests which involve the control of the movement of a steel ball in only one dimension lack validity for the selection of successful pilot trainees, and that the complication of the task, in its motor aspect, does not lead to greater validity of the test unless additional tasks, involving division of attention, are incorporated. Thus the Complex Timing Reaction Test (CM508A) seems to have no greater validity than the Timing Reaction Test (CM504A2, B1, B2) and the Rudder Timing Reaction Test (CM504D); whereas, the Complex Timing Reaction Test With Throttle Control (CM509A) and the Complex Timing Reaction Test With Memory for Procedures (CM511A) appear to have sufficiently high validity in small samples to warrant further intensive investigation.

6250

Guedry, F.E. AGE AS A VARIABLE IN POST ROTATIONAL PHENOMENA. Contract N7onr 434, Proj. NM 001 065.01.19, Joint Proj. Rep. 19, Nov. 1950, 4pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

The present experiment indicates that age may be a variable which should be controlled in experiments dealing with vestibular stimulation. The use of t tests to evaluate the data may be questionable on the basis of the large age-range of Group II. This large age range, however, would only increase variability and hence decrease the 'significance' of differences if age is a factor, or, on the other hand, if age is not a factor such a criticism would not be applicable. A more extensive investigation controlling age and other possible variables is contemplated.

R 4

6251

Queddy, F.E., Ray, J.T. & Niven, J.I. THE INFLUENCE OF VISUAL ORIENTATION ON APPARENT BODILY ROTATION FOLLOWING ACTUAL ROTATION. Contract N70nr 434, Proj. NM 001 063.01.23, Joint Proj. R25. 23 Jan. 1952. 5pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

Feelings of apparent bodily rotation are very similar in their general characteristics to the ecological illusion. This "postural component" can be reported independently of the visual illusion. 3 experienced observers were required to report it under two conditions of rotary acceleration and deceleration, identical except that in one there was interpolated a 5 sec. period of general room illumination following deceleration. All observers reported the first effect and the beginning of the second effect in the totally dark condition, but feelings of apparent bodily rotation were inhibited by the visual orientation afforded during illumination of the room. Duration of the first effect was significantly reduced for all observers; time to the beginning of the second effect was reduced for two observers, while the second effect was completely abolished for the third.

R 10

6252

Miller, J.G. INTEGRATION OF BIOLOGICAL AND SOCIAL DETERMINANTS OF STRESS REACTIONS. FINAL REPORT. Contract DA 49 007 MD 575, Aug. 1955. 4pp. University of Chicago, Chicago, Ill.

A theoretical formulation of various classes and categories of homeostatic behavior has previously been completed. Following this formulation, 6 classes of behavior were distinguished, and an experimental design developed to measure performance in each class. Work to date has consisted of the construction and standardization of the various items of apparatus, films, and paper and pencil tests necessary for this design to be carried out. The construction phase is essentially complete, with the exception of one piece of apparatus. Standardization is in progress. Results obtained with the one item on which sufficient work has been carried out are summarized, and are presented more fully in an attached paper. Further work will consist primarily of standardization prior to detailed study of performance in each of these 6 classes of behavior under both stress and non-stress conditions.

6254

Farrell, K.T., Wagner, J.R. & Peterson, M.S. COLOR IN FOODS: A SYMPOSIUM. Nov. 1954, 185pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

A complete record of a symposium on color in foods is presented here. The primary concern is with the current status of research and its application to the problem of writing specifications for the purchase of items of subsistence used by the Armed Forces. The major topics dealt with are as follows: color and its relationship to food investigations, color measurement in relation to commodities and consumer interest, instruments for the study of color, and measurement of color and color differences in relation to quality. (HEIAS)

R 16

6255

Perryan, D.R., Pilgrim, F.J. & Peterson, M.S. FOOD ACCEPTANCE TESTING METHODOLOGY--A SYMPOSIUM. Oct. 1954, 115pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

This symposium contains 13 papers with the following discussions on methods of food acceptance testing. Panel techniques presented were difference testing, dilution methods, descriptive analysis, and ranking versus scoring. The selection and training of panels as well as some practical applications of trained panel methodology to food evaluation problems were included. Consumer preference techniques -- food acceptance method, preference ratings, and some new psychophysical methods. Both experimental and practical applications were presented and discussed. (HEIAS)

6256

USAF Headquarters. FINAL REPORT OF RESEARCH CONDUCTED ON AF PROJECT 504 036 0010, CONTRACT AF 33(038) 26646. June 1953, 39pp. USAF Headquarters, Washington, D.C.

6256

This report presents a series of experiments dealing with the effects of group variables on attitudes and behavior, the instrumental function of attitudes in the attainment of individual goals, and means of achieving attitudinal change. The experimental results encompass such factors as the efficacy of group discussion versus lecture presentation in producing change, the effects of group and individual values upon change, the relation between type of value structure and the process of attitude change, etc.

6259

Gagge, A.P. MAN'S RESPONSE TO TEMPERATURE EXTREMES. AG 20/P10, June 1955, 82-91. Report from: "Proceedings of the Fifth Agard General Assembly. The Canadian Agard Conference 10-17 June 1955." Advisory Group for Aeronautical Research and Development, NATO, Paris, France (USAF Air Research & Development Command, Andrews AFB, Washington, D.C.).

Man maintains a constant internal temperature of 37°C (98.6°F) for comfort and health. Responses to hot and cold environments are discussed in terms of physical units: MET (heat production unit), CLO (unit of thermal insulation), EVAP (unit of cooling). Man's time tolerance to excessive heat is inversely proportional to the rate of rise of mean body temperature as measured by rectal temperature. An All Weather immersion waterproof flying suit with a thermal insulating value of about 3 CLO has been developed. By means of this suit cockpit tolerance time becomes greatly extended. The use of air ventilation on the flying suit insures the full cooling effectiveness of the sweating mechanism of the skin. (HEIAS)

6260 Cohen, J. EYE-DOMINANCE. *Amer. J. Psychol.*, Oct. 1952, 65(4), 634-636. (Antioch College, Yellow Springs, Ohio).

43 Ss with normal visual acuity were tested for eye-dominance by the method of retinal rivalry. The stimulus-materials were oblique lines of opposite slope and pairs of three and four letter words. With the oblique lines, 44% of the Ss showed 'no' dominance, 32% right eye dominant, and 24% left eye dominant. With the words, 26% showed 'no' dominance, 37% right eye dominant, and 37% left eye dominant. Sensory dominance varies with the stimulus-pattern. It is more pronounced for words than for lines, since there were more Ss in the 'no dominance' category for lines and the range of dominance was three times greater for words than for lines. The correlation between measures of dominance for the verbal materials and oblique lines ($r=0.47$) is not high but is significant at the 1-% level of confidence. It may be that the greater dominance for verbal materials is a result of reading practice. Eye-fixations during reading are so rapid and fleeting that both eyes may not always be able to fixate at the same place. The resultant double images may be resolved by characteristically relying on one eye for constant information while reading.

6261 Schipper, L.M., Versace, J., Kraft, C.L., & McGuire, J.C. HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL: IV. A COMPARISON OF SECTOR AND IN-LINE CONTROL PROCEDURES. Contract AF 33(616)-3612, Proj. 7192, Tech. Rep. 56-69, Sept. 1956, 27pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Ohio State University).

6262 To investigate the relative efficiency of two types of two-man control procedures (In-Line and Sector Control), two novice controllers varied alternately with a highly-skilled controller under two conditions of heavy traffic flow (one aircraft per sixty or one per ninety seconds). A return-to-base mission of 25 jet aircraft of bomber and fighter types was simulated using the OBU Air Traffic Control Simulator. Efficiency measures (control time, delay building fuel consumption, deviation from runway extension at OCA gate) and safety measures (absence of conflicts between two aircraft) were analyzed for differences due to systems, Controllers, Rates of Entry and their interactions. Implications of the findings for aircraft control systems are discussed.

T. I. R 5

6266 Birmingham, H.P. & Sackett, R.S. AN AUTOMATIC SCORING DEVICE FOR GUN FIRE CONTROL SYSTEMS MARK 57 AND MARK 63. Rep. R 3098, June 1947, 6pp. USN Research Lab., Washington, D.C.

6266 A device is described which is designed to provide an evaluation of the performance of pointers in tracking by radar with the Gun Fire Control Systems Mark 57 and Mark 63. The device is intended as an aid in developing "blind" tracking skill as well as an evaluative instrument. A detailed description of the design, features, and operation of the scorer is presented.

I.

6267 Birmingham, H.P. AN ELECTRONIC ERROR INTEGRATOR. Rep. R 3297, June 1948, 6pp. USN Research Lab., Washington, D.C.

6267 A device is described which is designed to provide accurate measures of average tracking error. It may be used to integrate electronically a varying error. A detailed description of the instrument and its operation is presented.

I.

6268 Buskirk, E.R., Kreider, H., Brabbie, R., Morone, N., et al. CALORIC INTAKE AND ENERGY EXPENDITURE IN A SUB-ARCTIC ENVIRONMENT. Tech. Rep. EP 33, March 1956, 34pp. Environmental Protection Div., USA Quartermaster Research and Development Center, Mettich, Miss.

Caloric intake and caloric expenditure were studied in 8 men during 10 days of pre-bivouac, 12 days of bivouac, and 8 days of post-bivouac. Fort Churchill, Manitoba, Canada, was the test site. Mean ambient temperatures for the 3 periods were -25°C (-13°F), -31°C (-23°F), and -26°C (-15°F) respectively. Caloric intake averaged approximately 3600 Cal/man/day for the entire study. The men consumed 3,613, 3,644, and 3,472 Calories respectively during the pre-bivouac, bivouac and post-bivouac periods. Since a weight loss of 1.9 kg occurred during the bivouac period, an estimated correction of caloric requirement for this weight loss would increase it to 4,260 Cal/man/day. Dietary composition did not change during the 3 periods of the experiment. The percentage of the total energy of the average food consumed during all periods was 13.8% from protein, 38.5% from fat, and 47.7% from carbohydrate. Energy expended during outdoor activities involving progression across the snow cover at 2.27 mph was found to average approximately 7 Cal/min or 221 Cal/m/hr. Thus the men averaged 1,500 Cal/man/day for outdoor activity. Variations were noted in energy expenditure between skiing, snowshoeing and walking over the same snow cover. Snowshoeing was the most economical in this group of men. A comparison was made between studies of caloric intake in northern latitude areas. It appears that food consumption calculated by the inventory method, using standard food tables, has led to exceptionally high estimates of caloric consumption. Furthermore, it is impossible to interpret the findings of most previous studies because the daily activity level was never clearly established.

R 27

6269 Williams, J.A.C. WORK DECREMENT WITH INCREASE OF HEAT STRESS FACTORS. Rep. CA/PE/7, ca 1956, 2pp. College of Aeronautics, Cranfield, England.

6269 This paper presents mathematical expressions for calculating work decrement (metabolism) caused by certain environmental heat stress factors: (1) increase of mean radiant temperature, (2) increase of dry bulb temperature (3) increase of relative humidity, and (4) decrease of relative wind speed. The formulae need validation by laboratory testing.

R. 3

6270

Smith, H.A. INTELLIGENCE AS A FACTOR IN THE LEARNING WHICH RESULTS FROM THE USE OF EDUCATIONAL SOUND MOTION PICTURES. *J. educ. Res.*, Dec. 1952, 45(5), 243-251. (University of Nebraska, Lincoln, Neb.).

To evaluate the role of individual intelligence in the learning which results from the use of such audio-visual aids as educational sound motion pictures, two types of achievement tests and an intelligence test administered to a large high school population (exposed to a program utilizing motion pictures) served as a basis for comparison between levels of intelligence and achievement. The results are discussed in terms of the correlation between gain in knowledge of a particular area and the level of intelligence of the student.

T. R 10

6271

Smith, J.G. INFLUENCE OF FATHER, EXPRESSED HOSTILITY, AND STIMULUS CHARACTERISTICS ON VERBAL LEARNING AND RECOGNITION. *J. Educ. Res.*, June 1954, 47(4), 475-493. (State University of Iowa, Iowa City, Iowa).

6272

The influence of expressed hostility, experimentally induced failure, and certain characteristics of verbal stimuli on verbal learning and on visual recognition was assessed. The subjects, 112 students previously selected as hostile or non-hostile, were required to learn two lists of paired adjectives and to recognize 30 words presented tachistoscopically. The verbal stimuli had been judged to have neutral or hostile connotations. Half the subjects were given "failure" instructions designed to elicit hostility. The dependence of number of correct responses in the learning trials and of recognition times for "hostile" and "neutral" stimuli on the experimental variables is evaluated statistically.

T. G. R 22

6273

Reis, Lucile L. KINESTHESIS IN RELATION TO THE LEARNING OF SELECTED MOTOR SKILLS. *Res. Quart. Amer. Ass. Phys. Educ.*, May 1953, 24(2), 210-217. (Western Washington College of Education, Bellingham, Wash.).

6274

To investigate the relationship between kinesthesia and learning of such motor skills as arm-raising, leg-raising, etc., 200 college women were given a series of eight tests of kinesthesia. Four of these tests (Balance Stick, Arm Raising, Leg Raising, and Balance Leap) were found to be reliable and were then applied to a group of 55 (skills clinic classes) taught with special methods stressing kinesthesia and another group taught with the usual methods. Pre- and post-training results are discussed in terms of comparative gain between the groups in the various skills.

T. R 5

6275

Irion, A.L. RETENTION AND WARM-UP EFFECTS IN PAIRED-ASSOCIATE LEARNING. *J. exp. Psychol.*, Oct. 1949, 32(5), 669-675. (University of Illinois, Urbana, Ill.).

6276

To determine the relation between duration of the retention interval and warm-up effect in verbal learning, and to determine whether this relation is affected by warm-up activity prior to relearning, ten groups of Ss were required to learn a list of paired associates (adjectives) for ten trials and to relearn the material after intervals of 0 to 24 hours. One group was required to name colors prior to the relearning task (warm-up). Degree of retention, as measured by number of correct anticipations on ten relearning trials, is compared for the various groups.

T. R 8

6274

Horton, R.E. BASIC TRAINING FOR 'SLOW LEARNING' AIRMEN. *IAED Informational Bull.*, ca. 1951, 29-32.

6274

In order to deal with the problem of training airmen with low ability scores (Category IV) on the Armed Forces Qualification Test (scores ranging from 10 to 30) two changes in the basic training course were introduced: 1) deletion of difficult material from the curriculum, and 2) extension of the length of the course. This article presents the results of the two modifications in terms of a comparison between pre- and post-training scores on the Reading Grade Placement, Total Grade Placement, and the Armed Forces Qualification Tests.

G.

6275 HENRY, F.M. INCREASE IN SPEED OF RESPONSE BY MOTIVATION AND BY TRANSFER OF MOTIVATED IMPROVEMENT. *Psych. Bull.*, 1951, 47(2), 219-228. (University of California, Berkeley, Calif.).

6275

An apparatus was designed for the purpose of measuring simple reaction time (finger press), speed of a coordinated movement (snatching a ball), and speed of a less complicated movement (treadle-press). An adjustable electronic delay circuit provided for administering a mild electric shock for slow responses. Visual stimuli were used. The simple reaction time of 10 Ss shocked in their slow responses improved 9.4%, while a control group of 10 remained constant. The treadle-press speed of 10 Ss improved 11.5% when motivated by shock, compared with no change in a control group. In the ball-snatch coordination, the speed of 5 Ss improved 17.1% when shocked, compared with a 3.1% improvement in the controls. In another series of experiments, a control group practiced a coordinated movement, shifted to practice with a simpler movement, and was then retested on the original coordination. A comparable experimental group did the same, except that electric shock was administered for slow responses during the practice on the simpler intermediate movement. This experimental design permitted the measurement of transfer effects. The first experiment of this series, using the ball-snatch for the coordinated movement and the finger press for the simple movement, showed a 6% gain due to transfer in the motivated group of 5 Ss compared with a 2% gain in the controls. Using the treadle-press as the simpler movement, the 10 Ss of a new motivated group exhibited a transfer effect of 12%, compared with no significant effect in the controls. In a similar experiment in which the intermediate treadle-press practice utilized an auditory stimulus, involving an interstimulus transfer of the motivated improvement, 10 Ss showed a transfer of 7.4% while the controls failed to exhibit any significant transfer.

R 5

6276

Henry, F.M. & Berg, W.E. PHYSIOLOGICAL AND PERFORMANCE CHANGES IN ATHLETIC CONDITIONING. *J. appl. Physiol.*, Aug. 1950, 3(2), 103-111. (University of California, Berkeley, Calif.).

6276

To determine the effects of a regime of athletic conditioning in changing certain physiological measures and measures of performance, pre- and post-test scores obtained from 23 college students were compared. The tests included time to run a given distance, time to exhaustion in stool stepping, oxygen debt and carbon dioxide production after four minutes of stool stepping. Intercorrelations among these measures were also evaluated.

T. G. R 13

6278

Glickman, A.S. & Vallance, T.R. AN EXPLORATORY STUDY OF THE APPLICABILITY OF INCIDENT TECHNIQUES TO THE ASSESSMENT OF CURRICULA FOR OFFICER CANDIDATE TRAINING. Contract NORA 890(01), Tech. Bull. 54 23, Dec. 1954, 57pp. American Institute for Research, Pittsburgh, Penn.

6278

To identify those aspects of the Naval Officers Candidate School (OCS) curriculum that are most and least relevant to the duties of an ensign on a destroyer, 1000 "critical incidents" of effective and ineffective performance were sorted by instructors according to the areas of the curriculum to which each was most relevant. To determine the relative importance of these areas, in terms of early usefulness of the relevant skill, 300 commanding and executive officers of destroyers estimated for each incident how soon the new officer should be expected to perform satisfactorily. General recommendations for improvement of the OCS curriculum are made.

T. R 8

6279
McFann, H.M., Hanner, J.A. & Taylor, J.F. TRAINING IN A NEW COURSE IN BASIC RIFLE MARKSMANSHIP. Tech. Rep. 22, Oct. 1953, 104pp. Human Resources Research Office, George Washington University, Washington, D.C.

6279

This study was designed to develop a practical basic course of rifle marksmanship which would result in the effective use of the rifle in combat and to develop proficiency test which would measure the adequacy of the training. By analyzing the elements involved in combat marksmanship and considering such general training principles as transfer, motivation, knowledge of results, fatigue, etc., an experimental training program and two proficiency tests (marksmanship and target detection) were developed. The results of comparing the experimental with the conventional training program are presented in terms of the relative proficiency exhibited by trainees of each training program.

T. G. I. R 81

6280
Domaneki, T.J. STRESS CONTRAST IN B-47 AND B-29 TRAINING OPERATIONS. Rep. 35 80, Oct. 1953, 4pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

6280

In a study of the relative stress imposed on the organism by B-29 and B-47 training flights, eosinophilia (post-flight drop in blood eosinophil response) was measured in 191 student pilots and instructors after transition missions in B-29 or B-47 aircraft. Differences in eosinophilia between instructors and students and between Ss who had flown different aircraft are evaluated statistically and are compared with reported subjective difficulty of the two tasks.

T. R 2

6283
Hays, D.G. SITUATIONAL INSTRUCTIONS AND TASK ORDER IN RECALL FOR COMPLETED AND INTERRUPTED TASKS. J. exp. Psychol., Dec. 1952, 46(6), 434-437. (Harvard University, Cambridge, Mass.).

6283

In an experiment on recall for complete and interrupted tasks 27 Ss received varied instructions and interpolated tasks. In one situation the Ss were informed that the tasks reflected intelligence whereas in another situation the task was presumably one of standardization. Each S performed two complete and two incomplete tasks with each task being followed by one of two types of interpolated tasks (dull vs. interesting). The results are discussed in terms of the effect on task recall of such factors as interruption, the nature of the task following interruption, and the type of instructions presented to the Ss.

T. R 9

6284
Coakley, J.D., Thomas, L.L., Horwath, J.F., Kernan, J.F., et al. TRAINING EQUIPMENT, INSTRUMENT FLYING UNDER SIMULATED INSTRUMENT CONDITIONS. Contract AF 33(600) 9391, AF TR 6431, Oct. 1953, 58pp. USAF Equipment Lab., Wright-Patterson AFB, Ohio. (Dunlap and Associates, Inc., Stamford, Conn.).

6284

To determine the best system or systems for instrument flight training, research on the determination of the requirements and equipment for instrument flying under simulated instrument conditions is reported in the following manner. After presenting a rationale of instrument flight, an analysis of the learning problem based upon interviews and actual flight experience with instructors and students is discussed in terms of the implications for proficiency evaluation, the definition of a training program and the role and requirements of a training aid. In addition, an evaluation of existing and proposed devices (visors, louvers, hoods, etc.) is offered.

T. G. R 4

6285
Jones, F.E. & Odom, W.F. MOONLIGHT II: TRAINING THE INFANTRY SOLDIER TO FIRE THE M1 RIFLE AT NIGHT. Tech. Rep. 15, Dec. 1954, 73pp. Human Resources Research Office, George Washington University, Washington, D.C.

6285

To determine an effective method for training infantry men to shoot more effectively at night with the M1 rifle, a criterion course (night firing range) was established on the basis of performance of 200 soldiers who had been trained in weapon alignment in daylight only. Training in special night techniques was administered to 5 experimental groups of 20 infantrymen. Indices of proficiency, scores of hits of dark targets and of blasting targets, are compared for the groups as they depend on level of illumination, changes in range, and the use of flash bulbs and of white strings between front and rear sights.

T. R 21.

6286
Kanner, J.H., Runyon, R.P. & Desiderato, O. TELEVISION IN ARMY TRAINING: EVALUATION OF TELEVISION IN ARMY BASIC TRAINING. Tech. Rep. 14, Nov. 1954, 61pp. Human Resources Research Office, George Washington University, Washington, D.C.

6286

To obtain basic information on the comparative teaching effectiveness of television instruction as compared to the Army's regular basic training instruction, two matched companies of basic trainees (200 Ss) and a standby company comprised three experimental groups: 1) TV instruction, 2) regular instruction, and 3) kinoscope instruction. Utilizing a wide variety of subject matter (map reading, squad tactics, etc.), the Ss were pretested, tested immediately following training, and following a month's duration after training. Results are discussed in terms of the relative effectiveness of each program for various levels of initial aptitude.

T. I. R 4

6287
Moser, H.M. & Dreher, J.J. RESEARCH ON THE LANGUAGE OF VOICE PROCEDURES - AIR DEFENSE TRAINING AIDS. Contract AF 18(600) 316, Proj. 519, Rep. 2, June 1953, 30pp. Ohio State University Research Foundation, Columbus, Ohio.

6287

Concerned with intelligibility in communication of aircraft surveillance telling operations, the development of a voice procedure training kit and plotter's training device is described. The voice procedure training kit consists of scope-to-plotter and forward and cross-telling cards in color and a reminder card. The plotter's training device consists of a tape recorder, microphone, and plotter unit. Included are instructions and examples of the operation of these devices.

I. R 1

6289
Rulon, P.J., Langmuir, C.R., Schweiker, R.F., Denaree, R.G., et al. PROFICIENCY OF Q-24 RADAR MECHANICS: II. THE PERFORMANCE TROUBLE-SHOOTING TEST. Contracts AF 33(038) 14562 & AF 33(038) 13236, Proj. 7709, Task 77151, Res. Bull. AFTRC TR 54-51, Nov. 1954, 32pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

6289

This article describes the development and application of the Performance Trouble-Shooting Test, a test designed to assess the proficiency of Q-24 radar mechanics. An additional aspect of the study was to examine the processes involved in trouble shooting complex electronic equipment. Malfunctions were inserted in a Q-24 set and the proficiency of 150 Q-24 mechanics was evaluated. The results of the utilization of the Performance Trouble-Shooting Test are discussed in terms of its adequacy in providing descriptions of the mechanics' problem-solving behavior. Instructions, recording forms, and scoring techniques are presented.

T. I. R 3

6290
Dornier, Dora E. & Soupe, J.L. PROFICIENCY OF Q-24 RADAR MECHANICS: IV. AN ANALYSIS OF CHECKING RESPONSES IN TROUBLE SHOOTING ON TAB TEST PROBLEMS. Contract AF 33(038) 13236, Proj. 7709, Task 77151, AFPC TR 34 53, Nov. 1954, 15pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo. (Educational Testing Service, Princeton, N.J. & University of Illinois, Urbana, Ill.).

6290
By using the Tab Test (a means of evaluating the proficiency of locating radar equipment malfunction) with 77 Q-24 radar mechanics of four known proficiency levels, an analysis is made of the number and kind of responses used by mechanics in trouble-shooting radar equipment. The results are discussed in terms of the manner in which more proficient trouble-shooters differ from less proficient trouble-shooters in their attempts to isolate malfunctions.
T. R 2

6291
Ellis, D.S. & Lesiw, W. MEASUREMENT OF SKILLS ON THE TI-A TRAINER. Proj. 7708, Task 77142, ASPRL TM 55 10, March 1955, 9pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo.

6291
This article presents an analysis and evaluation of the skills involved in the TI-A trainer, an electronic device simulating the task of the A-5 fire control system operator (B-36 and B-47 tail defense). It is used both as a trainer and a performance measurement device. The primary tasks discussed are target selection, lock-on, and firing, with an analysis of the skills required by each task used to evaluate the trainer. In addition a comparison of the skills involved under training and performance evaluation conditions is presented with some comment on the generalizability of this article's analysis to other radar gunnery tasks.
T. R 3

6292
Farber, I.E. & Spence, K.W. RELATION OF STIMULUS INTENSITY, PRACTICE, ANXIETY, AND SEX TO SIMPLE RT AND TEMPORAL GENERALIZATION. Contract N90NR 93802, Proj. NR 154 107, Tech. Rep. 4, June 1955, 42pp. State University of Iowa, Iowa City, Iowa.

6292
To investigate the effects of stimulus intensity, practice, sex, and manifest anxiety upon simple reaction time, 40 male and 40 female Ss representing five levels of anxiety (as defined by Taylor Anxiety Scale) were given a training series in which stimuli (electric shock and vibrating sponge) were presented at regular 12 sec. intervals. Following this they were given a temporal generalization series (irregular intervals varying between three and 24 sec.). The results are discussed in terms of the effect of stimulus intensity, practice, sex, and manifest anxiety upon reaction time in both the training and temporal generalization series.
T. G. R 30

6293
Hahan, T. HUMAN JUDGMENT: CAN THE CLASSROOM IMPROVE IT? J. educ. Res., Nov. 1955, XLIX(3), 161-169.

This article presents a discussion of the literature and the author's philosophical and methodological conclusions concerning the problem of the permissive group classroom as a technique to help an individual group classroom as a technique to help an individual gain insight into a problem and into his attitude toward the problem and consequently share in a more objective solution to the problem. Suggestions are offered with regard to possible techniques to be utilized in the evaluation of the change in attitude towards self and others which is implied in this orientation toward the classroom learning situation.
R 36

6294
Tinker, M.A. & Paterson, D.G. THE EFFECT OF TYPOGRAPHICAL VARIATIONS UPON EYE MOVEMENT IN READING. J. educ. Res., 1955, 49, 171-184. (University of Minnesota, Minneapolis, Minn.).

In a series of nine experiments designed to study the effect of typographical variations upon eye movements in reading, eye movements were photographed while reading under conditions of optimal and nonoptimal typographical arrangements. The variations investigated included such factors as line width, size of type, type faces, type form, white vs. black print, etc. The results are discussed in terms of the oculomotor patterns (as measured by fixation frequency, words per fixation, regression frequency, etc.) which occurred under the various conditions of typographical arrangement.
R 17

6295
USA Southwestern Signal Corps Training Center. TRAINING EVALUATION AND RESEARCH PROGRAMS. PART IV. TRAINING RESEARCH PROGRAMS: INSTRUCTOR-STUDENT CONTACT IN TEACHING BY TELEVISION. July 1953, 12p. USA Southwestern Signal Corps Training Center, Camp San Luis Obispo, Calif.

6295
This study was concerned with student-instructor intercommunication during television lectures. Three experiments are described in which there was 1) no intercommunication between three classes and an instructor who lectured to a studio class; 2) intercommunication by means of ultra-short wave transmitters and receivers between instructor and outlying classes; and 3) same as (2), but with no studio class. Recommendations are made on the basis of scores obtained by outlying and studio classes on posttests and of comments by office observers and students.
I.

6296
USA Southwestern Signal Corps Training Center. TRAINING EVALUATION AND RESEARCH PROGRAMS. PART I. PROFICIENCY MEASUREMENT PROGRAMS. PROGRAM 4. TELEVISION TYPE PROFICIENCY TESTING. July 1953, 20pp. USA Southwestern Signal Corps Training Center, Camp San Luis Obispo, Calif.

6296
This report deals with the use of television as a medium for evaluating student proficiency. The advantages and disadvantages of television tests are enumerated, and four general classes of television tests (matching, completion, true-false, and multiple-choice) are discussed.
T. I.

6297
Dornier, J.J. AN ANALYSIS OF NON-COMMISSIONED OFFICER SUPERVISORY TRAINING IN THE USAF AS COMPARED TO SUPERVISORY TRAINING IN INDUSTRY. M.A. Thesis, 1955, 140pp. Ohio State University, Columbus, Ohio.

6297
This study presents a comparison between the supervisory training of noncommissioned officers in the Air Force and that of foremen in industry. The respective personnel, technical, and management functions of foremen and noncommissioned officers are discussed. Supervisory training programs in eight industrial organizations and at two Air Force bases are described and analyzed. Recommendations for Air Force training programs are made on the basis of comparisons drawn.
R 79

6298

Hick, W.E. PRE-FLYING PERCEPTUO-MOTOR TRAINING OF PUPIL PILOTS. *EPSC 832(A)*, May 1953, 4pp. *Applied Psychology Research Unit*, MRC, Cambridge, England.

6298

Recommendations are made for pre-flight synthetic training of student pilots. The training would include perceptual judgments--of height, drift, etc.--with stimuli presented on films and still photographs, and motor skills--tracking, manipulation of flight controls, etc. The advantages of training on task components in terms of knowledge of results provided and of the minimizing of negative transfer are discussed.

6299

George Washington University. TRAINING METHODS RESEARCH. ANNUAL PROGRESS REPORT. Contract DA 44 109 Q4 650, Proj. 095 30 000, Dec. 1954, 40pp. Human Resources Research Office, George Washington University, Washington, D.C.

6299:

This report summarizes various studies on methods of training. Among the studies on methods of training for individuals the following topics are treated: map reading, training in rifle firing by the "whole" method, the relation of manifest anxiety to rifle marksmanship, night firing, retention of skills. Among the studies on training for military groups, the following topics are treated: tactical training of rifle squads, reconnaissance patrol training (information reporting and land navigation), training in electronic and fire control maintenance, the effectiveness of television as a training medium.

6301

Ritchie, M.L. & Muckler, F.A. RETROACTION AS A FUNCTION OF DISCRIMINATION AND MOTOR VARIABLES. Contract AF 33 (038) 23726, Proj. 7706, Task 77122, AFPMR TN 55 80, Dec. 1955, 7pp. *USAF Personnel Training & Research Center*, Lackland AFB, Tex. (University of Illinois, Urbana, Ill.). (Reprinted from: *J. exp. Psychol.*, Dec. 1954, 48(6), 409-415).

6301

Retraction effects in a psychomotor task are studied as a function of the nature of the interpolated task, amount of original learning, and amount of interpolated learning. A two-stage analysis in which psychomotor performance is analyzed into discrimination and motor stages is discussed and utilized in the interpretation of results. Apparatus was developed which allowed separate analysis of these stages. Results are presented in the form of statistical evaluation of error and time scores for discrimination and motor stages of the task for each experimental variable. The implications for retraction theory and verbal learning are considered.

T, G, R 8

6302

Saupe, J.L. AN ANALYSIS OF TROUBLE-SHOOTING BEHAVIOR OF RADIO MECHANIC TRAINEES. Contract AF 33(038) 13236, Proj. 7709, Task 77151, AFPMR TN 55 47, Nov. 1955, 32pp. *USAF Armament Systems Personnel Research Lab.*, Lackland AFB, Tex. (University of Illinois, Urbana, Ill.).

6302

This investigation analyzes the nature and proficiency of trouble-shooting. A written test of basic electronic knowledge and a performance test consisting of determining the malfunction in a superheterodyne radio receiver were administered to forty radio mechanic trainees. Specified overt aspects of trouble-shooting behavior were scored on an observation record for each subject. Nine hypotheses concerning successful trouble-shooting behavior were statistically evaluated; such as: relationship between knowledge and performance, errors in equipment use and general checks, etc. Implications for maintenance training programs are given.

T, I, R 9

6300
Eppler, R.G.E. THE HUMAN PILOT: FUNDAMENTALS OF DESIGN OF PILOTED AIRCRAFT FLIGHT CONTROL SYSTEMS. VOL. III. Contract No. 51 514(c), BuAer Rep. AE 61 4, Aug. 1954, 200pp. (approx.) US Bureau of Aeronautics, Washington, D.C.

This volume is intended to serve two purposes. The first of these is to provide engineers who are responsible for the synthesis of flight control systems for piloted aircraft with a quantitative description of the characteristics of a human pilot viewed as a sensor and as an actuator. Chapter II contains experimental data concerning (1) the accuracy of the pilot's senses, (2) the maximum forces which a pilot can exert as well as the accuracy with which he can exert these forces, and (3) the pilot's reaction-time delays between stimulus and response. The second aim is twofold: (1) to present the approximate transfer functions which have been recently developed to describe human pilots engaged in simple tasks, and (2) to present the methods for simulating on an analog computer a pilot in a routine flying situation. This material is contained in Chapter III.

R 31

6305
Groth, Hilde & Lyman, J. RATIONALE FOR THE EVALUATION OF FUNCTIONAL REGAIN IN PROSTHETIC SYSTEMS. Memo. Rep. 30, March 1956, 8pp. *Engineering Dept.*, University of California, Los Angeles, Calif.

In the engineering of prosthetic devices, additional criteria of user performance must be added to the usual specifications made in terms of structural and functional criteria such as strength of materials and dynamic characteristics. This report sets up the requirements for making such specifications. 2 general levels of user performance must be included: a) speeds and ranges of motion and force, and b) factors contributing to coordination, skill, motion control, and naturalness of motion. Measurements in the first category can be accomplished by the methods of physical anthropology and motion and time engineering using population data for normal individuals currently available. For the second category there is no systematic population data available in the upper extremity field for comparison of performance with different types of terminal devices to normal performance. An approach is suggested through which a group of everyday living activities are standardized as a battery of tests and would yield an index of amputee proficiency. The steps and procedures for obtaining a concise quantitative expression for the relationship between an individual amputee's performance and that of the normal population are considered. With such specific information the control problems most in need of design consideration can be located. (HEIAS)

R 12

6308

Gaito, J. ELAPSED TIME CLOCKS, OPTIMUM PRESENTATION FOR: THE EFFECTS OF DIFFERENT METHODS OF PRESENTATION OF TIME INFORMATION ON LEGIBILITY. TED MAN AE 7047.6, Rep. NANC ACCL 271, May 1956, 32pp. Naval Air Experimental Station, USM Air Material Center, Philadelphia, Penn.

The present experiment is concerned with the effects on legibility of 8 types of aircraft clock designs presenting both time of day and elapsed time by means of direct reading counters and/or pointers on one or 2 instruments. Using average number of errors, variability of errors, average time to read, and variability in time to read as the major criteria of legibility, a paper and pencil test administered to experienced pilots revealed that the types presenting both kinds of time information by means of counters on one instrument were superior to the others for quantitative readings. A questionnaire and group interview indicated that the main uses of both time of day and elapsed time information were quantitative and that the pilots preferred the types that had been shown to be superior in the test.

R 18

6310

Advisory Group for Aeronautical Research and Development, NATO. COLLECTED PAPERS ON AVIATION MEDICINE. 1955, 209pp. Advisory Group for Aeronautical Research and Development, NATO, Paris, France.

This is a collection of papers on aviation medicine, covering such topics as Arctic survival problems, layout of aircraft cockpits, physiological requirements of pressure cabins, instrumentation, noise problems, tolerance to abrupt deceleration, testing of color vision, and heterophoria. (HEIAS)

R (many scattered)

6311

Flitts, P.M. LEARNING AND FORGETTING CHANGES AS RELATED TO THE DIMENSIONAL CHARACTERISTICS OF BASIC SKILLS. QUARTERLY REPORT. Contract AF 33(638) 10528, Proj. 412, Rep. 15, Feb. 1954, 7pp. Ohio State University Research Foundation, Columbus, Ohio.

6311

This is a progress report on a series of investigations on learning and forgetting changes in different classes of perceptual-motor skills. The studies emphasize identification of dimensions of motor skills, analysis of the characteristics of skilled movement, and development of instruments and techniques for such an analysis. Sixteen investigations are listed with brief summaries of each.

6313

Lockheed Aircraft Corporation. DETAIL SPECIFICATION T-33A MOBILE TRAINING UNIT. (REVISION II). Rep. SP/312151, Oct. 1952, 39pp. Lockheed Aircraft Corporation, Burbank, Calif.

6313

This report describes a Mobile Training Unit for use in demonstrating the theory, function, and methods of operation and maintenance of the systems and installations of the T-33A airplane. Detail specifications of the following are included: instrument trainer, electrical system trainer, fuel system trainer, hydraulic system trainer, main landing gear trainer, nose gear trainer, air conditioning and pressure trainer, auxiliary power supply, ejection seat and canopy trainer, radio trainer, armament trainer, and J-2 compass trainer. Also included are general requirements, technical training charts, and equipment lists.

T

6314

Defence Research Board. SELECTION AND TRAINING OF OPERATORS, FIXED WIRELESS STATION. OR Rep. 4, June 1952, 22pp. Defence Research Board, Department of National Defence, Canada.

6314

The first part of this investigation concerns the selection process of fixed wireless station operators. Correlations were determined among a general aptitude test and the test battery used in selecting wireless operators. Also, the effects of previous experience in touch-typing, code typing, and code training on passing the course were determined. The second part studies the stage of training at which code typing should be introduced to obtain optimal learning speed. Stage of training was defined by rate of code reception achieved. The results compare the effectiveness of the different starting times in terms of speed and accuracy. Recommendations for selection criteria and training procedures are given.

T, R 1

6315

Allport, F.H., Reimer, E.W. & Valentine, J.A. THE STRUCTURAL ENERGICS OF LEARNING: A STUDY OF THE EFFECT OF PERSONALITY-TREND AND COLLECTIVE STRUCTURES ON READING RATE IMPROVEMENT. Contract N6 onr 248 C7, July 1954, 69pp. Office of Naval Research, Washington Research Office, Washington, D.C. (Maxwell School of Syracuse University, Syracuse, N.Y.).

6315

This study tests several hypotheses, each with reading rate as the dependent variable, with respect to learning, based on F.H. Allport's Structural Energies Formula. The procedure involved selection of 47 subjects enrolled in a reading improvement course, securing measures necessary for the correlation techniques, and computation of the rank-difference and product-moment correlation coefficients. All hypotheses were tested by determination of correlations between reading rate improvement and the independent variables consisting of aspects of personality trend and collective structures as defined in Event-Structure Theory. This theory is described and its application in further research discussed.

T, G. R 8

6316

Goldman, M., Horwitz, M., & Lee, P.J. ALTERNATIVE CLASSROOM STANDARDS CONCERNING MANAGEMENT OF HOSTILITY AND EFFECTS ON STUDENT LEARNING. Contract N6 ori-07144, 1955, 23pp. ONR, Group Psychology Branch, (University of Illinois, College of Education, Bureau of Educational Research).

6316

Student hostility toward the teacher as a function of the social environment of the classroom was studied in terms of tension systems. Freshman ROTC students were organized into classroom groups. The procedure consisted of inducing hostility toward the teacher; then varying forces opposing hostile action, communication, and thinking. Assuming that performance regresses with the number of hostile behaviours blocked, measures were taken of attention span, retention of learned material, and overcoming an inefficient set in problem solving. The data was statistically analyzed and interpreted in relation to the theoretical framework. The implications for the practice of teaching are discussed.

T, R 8

6317

Cook, T.W. SIMILARITY AND TRANSFER. May 1954, 61pp. Defence Research Board, Department of National Defence, Canada.

6317

This paper presents and analyzes principles of similarity and transfer in relation to military training problems. The discussion is organized around the work of Osgood, Gagne, and Bartlett. The first section is an estimate of their theoretical views. Points of agreement and disagreement are presented in the second section. The topic of motor transfer and interference is considered in section three. The last two sections cover implications and suggestions for further research. T, R 53

6318
Rosenberg, N. & Nelson, W.H. TIME TO COMPLETE NAVAL AIR TRAINING: IMPLICATIONS FOR TRAINING. Contract NR 154 098 Spec. Rep. 54 14, June 1954, 15pp. Office of Naval Research, Tulane University & USN School of Aviation Medicine, Pensacola, Fla.

6318
The relationship between time-to-complete Naval Air Training and cadet success in the training program was studied. Records were selected for 47 fast, 50 slow, and 100 average cadets in terms of time-to-complete training. Data was classified into flight performance, ground performance, and leadership potentiality. The groups were compared statistically on the following: frequency and severity of accidents, frequency of board actions, unsatisfactory flight ratings during training, number of flights to complete training, flight performance ratings, and overall training score. Training cost estimates of each group were determined. Implications for flight training are considered.
T.

6319
Poe, A.C., Maag, C.H. & Johnson, W. A STUDY OF THE EFFECT OF OMISSION OF RADIO FLIGHT TRAINING DURING STAGE D UPON LATER BASIC INSTRUMENT FLIGHT PROFICIENCY. Proj. NM 001 056.23.01, Oct. 1952, 12pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

6319
This study determined the effect of omission of radio range flights during basic instrument flight training upon later basic instrument flight proficiency. The matched group technique was used, the only training difference being omission of five radio range flights. Both groups were sub-classified for instrument proficiency. Student performance was objectively scored on a repeat basic instrument flight check, and the groups compared on the following: difference in basic instrument flight proficiency, differential effect on students of high, middle, and low proficiency, duration of differences, and effect on progress in advanced radio range instruction.
T, G, R 5

6320
Shaycroft, Marion E. & Altman, J.W. PROCEDURES FOR EVALUATION OF JOB PERFORMANCE IN SCIENTIFIC RESEARCH, SIXTH IN A SERIES OF REPORTS DEALING WITH THE EVALUATION AND MEASUREMENT OF RESEARCH PERFORMANCE. Proj. NR 153 146, Oct. 1955, 66pp. American Institute for Research, Pittsburgh, Penn.

This report deals with the following performance evaluating procedures: a) critical incident report form, b) performance evaluation by ratings, and c) performance samples. The first 2 procedures were tried out on a large group of junior research personnel. The performance sample procedure was given a small-scale tryout. Findings were: a) the critical incident report form seems the most promising method; b) objective scores based on number of incidents reported do not seem very useful; c) in the tryout (15 cases only) the performance sample procedure did not seem to provide useful criterion measures; d) major difficulties in accurate evaluation are the variations among supervisors and among jobs, and the lack of interest on the part of the supervisors. (HEIAS)
R 16

6321
USAF Ballistic Systems Div. HUMAN ENGINEERING DESIGN STANDARDS FOR MISSILE SYSTEM EQUIPMENT. AFBN Exhibit 57 8A, Nov. 1958, 71pp. USAF Ballistic Systems Div., ARDC, Los Angeles, Calif.

Design principles and practices are set forth to be used in designing equipment for maximum utilization by missile operator and maintenance personnel. The standards are listed under the following main headings: general requirements, visual displays, controls, physical characteristics, ambient environment, work place characteristics, hazards, and safety.
(HEIAS)

6322
Peters, R.W. THE EFFECT OF ACOUSTIC ENVIRONMENT UPON SPEAKER INTELLIGIBILITY. Prepared under Contract N6onr-22525, Proj. NM 001 064. 01.26, Joint Proj. Rep. 26, Aug. 1954, 7pp. Ohio State University and USN School of Aviation Medicine, Pensacola, Fla.

6322
This study was designed to evaluate the effect of acoustic environment upon speaker intelligibility. Thirty-six speakers read 12 lists from multiple-choice intelligibility tests while simultaneously hearing one of six types of acoustic signals (nonsense syllables, similar words, etc). 481 listeners in 36 panels were utilized to assess intelligibility. Double-clerification analysis of variance of the mean intelligibility value for each speaker was employed to determine the relative effects of signal conditions and speakers. The results are discussed in terms of the amount of distraction which each of the various types of acoustic environment contributes to the speaker's performance.
G. R 9

6323
Weisslogel, Mary H. (Proj. Dir.). PROCEDURES FOR EVALUATING RESEARCH PERSONNEL WITH A PERFORMANCE RECORD OF CRITICAL INCIDENTS. American Institute for Research, Pittsburgh, Penn.

The purpose of the study was to study a number of methods for an observational record form listing instances of outstanding and unsatisfactory performance. A field study was carried out during which a group of supervisors at 3 laboratories used different procedures to record the behavior of their immediate subordinates. Findings were: a) observational records of critical behaviors are useful in evaluating scientific personnel; b) the classification framework is convenient, and is applicable to a wide variety of positions; c) preliminary training of 2 to 2 1/2 hrs. is desirable for learning to use the procedure; d) both long and short forms proved suitable for recording observed behaviors; and e) immediate recording is most effective when the procedure is first learned, but less frequent recording is satisfactory after supervisors have become familiar with the form. (HEIAS)

6324

Carterette, E.C. PERSTIMULATORY AUDITORY FATIGUE FOR CONTINUOUS AND INTERRUPTED NOISE. *J. acoust. Soc. Amer.*, Jan. 1955, 27(1), 103-111. (Hearing & Communication Lab., Psychology Dept., Indiana University, Bloomington, Ind.).

Perstimulatory fatigue, or adaptation, is measured by a simultaneous loudness balance or median plane localization of a dichotically presented acoustic stimulus. After one ear has been stimulated for a period of time, it is usually found that the variable or comparison stimulus must be reduced below the prefatiguing intensity in order to maintain the loudness match or localization balance. 5 Gs. made median plane localizations of a continuous 100-5000 cps band-pass noise before, during and after a 7 min. fatiguing period. The fatiguing stimuli were continuous noises at 30, 60, 87, and 100 db SPL, and noises interrupted at 1, 2, 5, 9, and 12.5 ips with both burst level and noise-time fractions held constant at 90 db SPL and 0.5, respectively. It was found that: a) the time required for fatigue to reach an apparent asymptote is at least 7 mins., about twice that required for pure tones; b) the maximum fatigue increases with the intensity of the fatiguing stimulus and the function is positively accelerated; c) for a fixed intensity of fatiguing noise, the maximum fatigue for the highest rate of interruption used (12.5 ips) is less than that obtained with a continuous noise having the same over-all level (87 db).

R 14

6325

Egan, J.P. & Thwing, E.J. FURTHER STUDIES ON PERSTIMULATORY FATIGUE. *J. acoust. Soc. Amer.*, Nov. 1955, 27(6), 1225-1226. (Hearing & Communication Lab., Psychology Dept., Indiana University, Bloomington, Ind.).

One of the puzzling characteristics of auditory adaptation is its small magnitude when measured by the alternate binaural loudness balance. The magnitude of adaptation was compared under 3 conditions of measurement using 12 Ss. The presentation of the tone, first to one ear and then the other, in repeated alternation, resulted in little measured adaptation. In a second experiment, the degree of adaptation to white noise was measured by simultaneous dichotic loudness balance using 3 conditions of phase relationships. Adaptation occurred in all 3 conditions (17 Ss). In a third experiment, 3 methods of measuring adaptation were compared using 1 experienced S. The simultaneous dichotic loudness balance, which involves judgment of both loudness and localization factors, resulted in the greatest amount of adaptation. (HEIAS)

R 5

6326

Price, H.E. & Older, H.J. AUDITORY SIGNALS IN AIR FORCE WEAPONS SYSTEMS AND EQUIPMENT. FINAL REPORT. Contract AF 19(604) 1576, FRA Rep. 55 11, June 1956, 154pp. *Psychological Research Associates*, Washington, D.C.

This report contains the results of a survey conducted to determine: a) the present status of the use of auditory signals in Air Force weapons systems and equipment; b) the contemplated use of auditory signals in Air Force weapons systems and equipment; c) operational opinions of present and proposed auditory displays in Air Force weapons systems and equipment; d) recommendations for immediate application to auditory systems and recommendations for further research in the field of auditory displays. Information was collected using questionnaire techniques, interviews, examination of literature, and conferences. The information has been presented in such a manner that cross referencing may be done between types of auditory signals, purposes for which they are used, and weapons systems or equipment in which they are contained. Operational considerations relating to auditory signals are synthesized in a separate chapter. The final chapter contains recommendations suitable for immediate application and recommendations for further research.

6328

Scott, D.N., Machen, G.S. & Baker, C.H. PERCEPTUAL PROBLEMS IN ESTIMATING RANGE AND BEARING FROM PPI OVERLAYS. DRML Proj. 163 134 55, DRML Rep. 163 1, Jan. 1955, 23pp. *Defense Research Medical Laboratories*, Defense Research Board, Toronto, Canada.

6328

To determine in what ways errors in telling from PPI (plan position indicator) overlays are affected by the pattern of range rings and bearing lines, a series of experiments was performed. Subjects (52) estimated the ranges of the target (pip) under conditions of: 1) varying numbers of range rings (one to 16); 2) varying degrees of visual angle subtended by whole display (from approximately five to 139 degrees); and 3) target bearing (zero to 270 degrees). Error scores were analyzed with respect to the variables used. The nature of errors in bearing estimations was explored in a final experiment.

T. G. I. R 16

6329

Schaefer, K.E. & Carey, C.R. INFLUENCE OF EXPOSURE TO VARIOUS CARBON DIOXIDE CONCENTRATIONS ON FLICKER FUSION FREQUENCY AND ALPHA BLOCKING. Proj. NM 002 015.11.04, Rep. 251, Aug. 1954, 12pp. *USN Medical Research Lab.*, New London, Conn.

24 subjects were exposed to 1.5 per cent, 3.3 per cent, 5.4 per cent and 7.5 per cent CO₂ in air over periods of 15 minutes, with pre- and post-exposure periods on air of equal length. Flicker fusion frequency was measured with a Krasno-Ivy flicker photometer between the 10th and 15th minutes of the experimental periods (CO₂ and air). It was found that the flicker fusion frequency decreased with increasing CO₂ concentrations above 3.3 per cent, and the alpha blocking time increased correspondingly. Control experiments, in which the ventilation was increased to the level usually measured during inhalation of 5 per cent CO₂, while the alveolar CO₂ level was kept constant by adding small CO₂ concentrations to the inspired CO₂, showed no change in alpha blocking time. This indicates that the increase in CO₂ tension, rather than the ventilation increase, is the decisive factor in producing observed changes.

R 14

6330

Gelinas, R.W. & Genoud, R.H. A BROAD LOOK AT THE PERFORMANCE OF INFRARED DETECTORS. P 1697, May 1959, 41pp. The Rand Corporation, Santa Monica, Calif. (The Rand Corporation, Santa Monica, Calif. & Hughes Aircraft Company, Culver City, Calif.).

The capabilities of present day infrared detectors are discussed from the viewpoint of radiant power and time. The performance limits for ideal detectors are derived, establishing a basis of comparison for real detectors. It includes the limits set by background fluctuations and by signal fluctuations. The fundamental fact is stressed that the minimum detectable power is directly related to the time taken for the detection process. The 2 methods of rating detectors, and their limitations, are discussed. The background fluctuation limits are extended through the long wave infrared region of the spectrum to the microwave region. The material presented makes it possible to arrive at a performance rating for any infrared detector, regardless of the principle of operation. (HEIAS)
R 12

6331

Moser, H.M. & Dreher, J.J. A COMPARISON OF THREE N-WORD ALTERNATES IN THE MODIFIED ICAO ALPHABET. Contract AF 18(600) 316, RF Proj. 519, Rep. 17, AFRC TR 54 88, Nov. 1954, 4pp. USAF Cambridge Research Center, Cambridge, Mass. (Ohio State University, Columbus, Ohio).

26 Ss representing 17 nationalities listened to speakers of 8 nationalities pronouncing random groups of words from the 4-word ICAO alphabet modification, including the alternate words MUGGET and NOVEMBER. NOVEMBER proved superior to MUGGET or NECTAR.

6332

Small, A.M., Jr. & Gross, N.B. INTEGRATED MUSCLE ACTION POTENTIALS IN A WEIGHT-LIFTING TASK AS A FUNCTION OF WEIGHT AND RATE OF LIFTING. J. comp. physiol. Psychol., April 1958, 51(2), 227-229. (Lehigh University, Bethlehem, Penn.).

The relation between muscle action potential (MAP) and muscle tension was investigated in a task in which the muscle lengthened and shortened. MAPs were obtained from the biceps muscles of 16 Ss while they were lifting weights of 0, 1, 2, or 4 kg. The IMAP was shown to increase as a function of both weight and rate of lifting. The IMAPs of the passive arms also tended to increase with rate and weight. It was found that the greater the strength of S, the smaller was his IMAP. The curves for the conditions of 0 and 50, though not 25, lifts per min. were nearly parallel. It is concluded that an orderly relation exists between IMAP and dynamic work. (HEIAS)
R 5

6333

Shackel, B. DIAL DESIGN BASIC FUNCTIONAL REQUIREMENTS. Design, Feb. 1958, 5pp. (E.M.I. Electronics Ltd., Hayes, Middlesex, England).

Functionally, a good dial or visual indicator is one which allows the best combination of speed, accuracy and sensitivity when transferring the necessary information from machine to man. General principles are set out for the design of dials to be used at normal reading distances. A number of common errors in design are illustrated. (HEIAS)

6334

Taggart, R. USE OF THE DETECTION DIFFERENTIAL IN UNDERWATER NOISE MEASUREMENT. Rep. 371 N. 15, May 1953, 22pp. Department of the Navy, USN Bureau of Ships, Washington, D.C.

This report discusses the possible usefulness of a single-number representation of the relative detectability of ship noise in the presence of sea noise. This number, termed "Detection Differential," shows the relationship of any foreign noise to the ambient sea noise associated with sea state zero. Methods for calculating this factor are described.

6335

Hall, A.L. SOME EFFECTS OF RAPID DECOMPRESSION TO 43,000 FEET ON HUMAN SUBJECTS: INCIDENCE AND SEVERITY OF AEREBULLOSIS (AEROEMBOLISM) IN A SUBJECT REPEATEDLY EXPOSED TO TERMINAL ALTITUDES BETWEEN 35,000 and 43,000 FEET. Res. Proj. NM 001 101 103, Rep. 1, Dec. 1955, 12pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

A human subject was exposed to simulated altitudes of 35,000 to 43,000 feet by rapid decompression for a total of 142 exposures. The man exhibited an increase both in severity and incidence of symptoms of aerobullosis (aerobolism) with repeated exposure. As the number of exposures increased, the man had to be returned to increasingly lower altitudes before symptoms disappeared. Increase in number of exposures did not decrease the time at altitude for first appearance of symptoms.
R 1

6336

Webb, W.B. AN EXPERIMENTAL ANALYSIS OF ANTECEDENTS OF SLEEP. Proj. NM 001 109 113, Rep. 1, Feb. 1956, 12pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

3 experiments were conducted in the study of the relationship between the sleep response and systematic manipulation of past sleep experience in a given environment, time of sleep deprivation, and an irrelevant hunger drive. 2 major conclusions were drawn. In experimental conditions of these experiments the major determinants of sleep latency were within subject consistent differences in contrast to the conditions imposed on these subjects. Further observations suggested that the time to sleep may be jointly determined by the development of wakefulness tendencies as well as sleep tendencies.

6337

Webb, W.B. THE PREDICTION OF AIRCRAFT ACCIDENTS FROM PILOT CENTERED MEASURES. Proj. NM 001 106 100, Rep. 1, Jan. 1956, 9pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

6337

This paper reviews studies which attempted to predict aircraft accidents from pilot measures. The predictors include aptitude tests, classification tests, previous personal accidents, training accidents, and training proficiency. The findings are discussed and the implications considered. Also included is the role of transient individual states such as moods and inattentiveness.
R 8

6338

Albritton, E.C. (Ed.). STANDARD VALUES IN NUTRITION AND METABOLISM. Contract AF 33(038)-2174, WADC Tech. Rep. 52-301, Dec. 1953, 380pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (George Washington University, Washington, D.C.).

The report presents tables and certain charts of data in the field of nutrition and metabolism, together with introduction, bibliography and index. Both plant and animal organisms are included. The guiding principle in selecting the material has been that it be of basic importance in its general field. The tables are arranged under the following sections: a) The Nutrients; b) Requirement of Minerals, Amino Acids or Protein, Carbohydrate, Lipids, Vitamins by Selected Animal Forms; c) the same, Selected Plant Forms; d) Daily Nutrient Allowances, Man, Laboratory and Farm Animals, other Animal Forms; e) Diets Supplying Nutrient Requirements for Animal Forms; f) Composition of Nutrient Solutions, Culture Media and Fertilizers (i.e., "diets") for Plant Forms; g) Nutrient Composition and Energy Content of Foodstuffs and Feedstuffs; h) Biological Action of each of the Nutrients in Animal and Plant Forms; i) Pathways of Metabolism of the Nutrients, Animal and Plant Forms; j) Metabolic End Products, Animal and Plant Forms; k) Tissue Oxygen Consumption and Carbon Dioxide Production, Animal and Plant Tissues; l) Energy Metabolism, Man and Laboratory and Farm Animals.

R Many

6339

Pressesky, A.J. AUTOMATIC RECORDING HAPLOSCOPE. Contract AF33(600)8434, WADC Tech. Rep. 53-512, May 1954, 16pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (American Optical Company).

The design and construction of an automatic recording haploscope are described. The range of positions of the stimulus targets is from +10 to -2 diopters and the range of response positions is from +12.5 to -4.5 diopters. The angle of convergence has a range from +60° to -40°. Interchangeable response optometers are used. The response position may be recorded as a function of stimulus position or convergence angle.

R 1

6340

Jarison, H.J. EFFECT OF A COMBINATION OF NOISE AND FATIGUE ON A COMPLEX COUNTING TASK. Proj. 7193, Task. 71610, WADC TN 55-360, Dec. 1955, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

6340

This investigation concerns the effect of noise and fatigue on a complex counting task. Fifteen male undergraduates kept a mental count of the number of times each of three lights flashed and responded periodically in terms of the count. There were two noise levels; each present for one hour. Three two-hour sessions were given. Error frequency was analyzed in terms of the following variables: count required before a response could be made, differential flash rates, and time over the session. The performance dimensions in the counting task, and the effectiveness of this task as a stress test are discussed.

T. I. G. R 4

6341

Sanders, J.W., Christensen, J.M. & Sabeh, R. COMPARISONS OF A SINGLE OPERATOR'S PERFORMANCE WITH TEAM PERFORMANCE ON A TRACKING TASK. Proj. 7182, WADC TN 55-362, July 1955, 5pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

6341

Performance of two-man teams on a two dimensional compensatory pursuit tracking task, each member responsible for one dimension, was compared to one man performing the task. Also the effect of knowledge of the partner's performance was investigated for the team situation. Twenty-nine male undergraduates performed on a modified Dual Compensatory Pursuit Apparatus in one of the following conditions: tracking both dimensions, two-man teams, two-man teams with knowledge of the partner's performance. The results include comparison of the performance curves of each group and statistical evaluation of differences.

T. G. R 3

6342

Rookway, M.R. THE EFFECT OF VARIATIONS IN CONTROL-DISPLAY DURING TRAINING ON TRANSFER TO A "HIGH" RATIO. Contract AF 18(600)-78, Tech. Rep. 55-366, Oct. 1955, 13pp. WADC, Wright-Patterson AFB, Ohio.

6342

To investigate the relationship between amount of transfer of a two-dimensional tracking skill and degree of physical similarity between training and tracking test ratios, each of three groups of subjects received training using one of three different control-display ratios. The ratios were such that one degree of control deflection produced either 3-, 9-, or 27-sixteenths inch display movement. Following training (25 trials), all groups performed with the 1:3 ratio for 25 further trials. Time-on-target scores were analyzed as a function of training on each control-display ratio, for amount of transfer on first transfer trials, and for persistence of transfer effects. Implications for design of training devices are discussed.

T. G. R 4

6343

Christensen, J.M. THE IMPORTANCE OF CERTAIN DIAL DESIGN VARIABLES IN QUANTITATIVE INSTRUMENT READING. Proj. 7186, Tech. Rep. 55-376, Oct. 1955, 61pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

6343

The design and use of instrument dials is investigated as a function of the following variables: subjects, exposure time, practice, moving pointer-moving scale, clockwise-counterclockwise scale, and point of fixation. Four dial types under two conditions of fixation were presented in a sliding mirror tachistoscope. The eight Ss knew beforehand the type of dial face to be presented in the next trial. Each variable is statistically evaluated in terms of reading error, and the relationships interpreted in relation to dial design problems. The experiment is compared to a previous experiment similar to this one with the exception that no information regarding type of dial face was presented.

T. G. I. R 5

6344

Kurke, H. I. PERSONNEL VARIABLES IN THE ANALYSIS OF MAN-MACHINE SYSTEMS. Ergonomics, Aug. 1959, 2(4), 349-353. (Dunlap & Associates, Inc. Washington, D.C.).

In an experiment comparing the detectability engendered by 4 optical systems, additional data concerning certain characteristics of the Ss were collected. Analysis of the data led to the conclusion that although variations of equipment design produced significant differences in the performance of a simple psychomotor task, the personnel variables of mental ability and attitude also had significant effects. It is suggested that the design of a man-machine system should take into account both personnel and design considerations if the best human contribution to the system's effectiveness is to be achieved.

R 12

6345
Maltzman, I., Smith, W.M. & Brooks, L.C. SOME EFFECTS OF DIFFERENT TRAINING CONDITIONS AND MANIFEST ANXIETY UPON TARGET TRACKING. *Percept. Mot. Skills*, 1955, 2, 185-191. (University of California, Los Angeles, Calif.).

6346
Single target tracking and proficiency in shifting to a second target were studied as functions of the following variables: amount of practice on one target, manifest anxiety level, and target speed during practice. Scores on the Taylor Manifest Anxiety Scale were available for the forty male and forty female undergraduates. The task consisted of following the target spot on a movie screen with a light beam emitted from a projector which the subject manipulated. After the practice trials, the second target was presented. The effect of each variable was evaluated statistically.
T, R 5

6346
Ammons, R.B. & Ammons, Carol H. SOME "KNOWLEDGE OF PERFORMANCE" CONCEPTS. *Psychol. Rep.*, 1956, 2, 65-66.

6346
Twenty-four statements concerning the effects of knowledge of performance on learning and performance are proposed with the purpose of organizing this area. The following is an example: the more information that is given, the more directed will be the motivation which appears.

6347
Ammons, R.B. EFFECTS OF KNOWLEDGE OF PERFORMANCE: A SURVEY AND TENTATIVE THEORETICAL FORMULATION. *J. Gen. Psychol.*, 1956, 54, 279-299. (Department of Psychology, University of Louisville, Louisville, Ky.).

6347
The effects of knowledge of performance are surveyed and summarized in the form of eleven empirical generalizations. Each generalization is followed by available supporting research studies. Also included are nine statements which theoretically formulate the effects of knowledge of performance upon learning and performance. Illustrations of the statements are given; no factual evidence is presented.
R 56

6348
Stone, G.R. THE EFFECT OF THE DIFFERENTIAL SELECTION OF TARGET STUDY CUES UPON AIMING POINT IDENTIFICATION TEST PERFORMANCE. Proj. 7711, Rep. AFPTRC-TN-56-40, Feb. 1956, 8pp. AFPTRC, Air Research and Development Command, Mather AFB, Calif.

6348
To examine one source of human error in bomb drops, five classes of experienced aircraft observers were given an abbreviated target study correlating specific aspects of an Urban Area Analysis chart with radar scope photographs. Following the study, a test was given which required identification of the aiming point during a motion picture of the bomb run on which they had been given target study. Subjects were divided into two groups on the basis of the primary guiding cue which they used in locating the aiming point. Total performance scores and error scores were compared for group differences due to choice of cue. Hypotheses are offered to guide future research leading to reducing observer performance error.
T. I. R 1

6349
Volters, W.D. BOMBING ACCURACY AS A FUNCTION OF THE GROUND SCHOOL PROFICIENCY STRUCTURE OF THE B-29 BOMB TEAM. Proj. 7713, Task 77219, Rep. AFPTRC-TN 56-4, Jan. 1956, 24pp. USAF Personnel & Training Research Center, Randolph AFB, Tex.

Relationships between 3 simulated radar bombing criteria (circular error, range, and deflection) and ground school grades of the 4 bomb-crew members were studied for a sample of 176 B-29 crews in combat crew training. The design permitted examination of the relationship between the proficiency (ground school grade) of each member and the bombing criteria under all possible combinations of proficiency in the remaining members. The results were consistent with the hypothesis that the aircraft commander and radar observer are directly dependent upon one another for effective expression of their respective proficiencies. The proficiency of each member correlated most highly with the bombing criteria under conditions of higher-than-average proficiency in the other member. High proficiency in the navigator appeared to compensate in some degree for lack of proficiency in the aircraft commander and radar observer, in that the navigator's proficiency appeared most highly correlated with the criteria under conditions of low proficiency in these members. The results obtained with bombardier proficiency were not sufficiently pronounced to warrant conclusive interpretation although they were generally consistent with hypotheses advanced concerning bombardier performance as a factor in the variability of bombing results.
R 6

6350
Wolff, H.S. MODERN TECHNIQUES FOR TIME AND MOTION STUDY IN PHYSIOLOGICAL RESEARCH. *Ergonomics*, Aug. 1959, 2(4), 354-362. (Human Physiology Div., National Institute for Medical Research, Hampstead, London, England).

Conventional methods for time and motion study recording by the use of stop-watch, pencil and paper were found inadequate when army recruits were studied for a week to determine calorie balance. Methods are described for use in the field by a small and relatively untrained staff. By means of Walkie-Talkie radio sets observers can report every change of activity of Ss to a central laboratory. For group study a machine known as the multichannel integrating clock has been designed. The time spent on any activity can be calculated by reading the counters before and after the period under study. The clock can also be used for the evaluation of diary cards. Activity sampling is a method which enables one observer to study up to 12 Ss simultaneously by means of punch cards recording 11 different activities. (HEIAS)
R 8

6351

Aracult, M.D. A COMPARISON OF TRAINING METHODS IN THE RECOGNITION OF SPATIAL PATTERNS. Proj. 7706, Task 77119, Rep. AFTRC-TN-54-27, Feb. 1956, 13pp. AFTRC, Air Research and Development Command, Lackland AFB, Texas.

6351

To compare the effectiveness of different training methods in pattern (spatial arrangement of two or more objects in a field) recognition, eleven groups of 50 subjects each were trained to recognize patterns of 16 objects arranged randomly in a circular field. For half the subjects the pattern elements were pictures of real objects and for the other half, nonsense shapes. Training (five sessions) methods were: (1) reproduction with or without a matrix, (2) answering questions about spatial elements either oral or written, (3) observation (criterion method). The criterion test consisted of selecting the learned pattern from a set of five similar ones. The percentages of correct choices on test were analyzed for differences due to meaningfulness and to training method. T. G. I. R 1

6352

West, L.J. REVIEW OF RESEARCH ON MORSE CODE LEARNING. Proj. 7714, Task 77257, Rep. AFTRC-TN-55-52, Dec. 1955, 69pp. AFTRC, Air Research and Development Command, Chanute AFB, Ill.

6352

This nontechnical review of research in Morse Code learning was designed for the use of those who train radio operators in the Air Force and in other military services. The research findings are summarized and recommendations for training procedures are given. Topics covered include: nature of code-learning process, transmission speeds for code-reception practice, tone speed, order of presentation of signals, rate of introduction and grouping of signals, amount of practice per signal, types of practice materials, code-voice method, training aid and techniques, arrangement of practice time, typical progress, code-reception errors, accuracy standards, anti-monotony devices, prediction of success, code sending, and code typing.

R. 66

6353

Goldstein, M. A PROFICIENCY MEASURE FOR TEMPORAL INTEGRATION OF COMPONENTS IN A PERCEPTUAL-MOTOR TASK. Proj. 7708, Task 77141, Rep. AFTRC-TN-55-35, Nov. 1955, 14pp. AFTRC, Air Research and Development Command, Lowry AFB, Colo.

6353

To evaluate a proposed proficiency measure for temporal integration of components in a perceptual-motor task, 64 subjects performed on a pedestal sight gunnery task. Three clock scores were obtained: AER (azimuth, elevation, ranging), T (triggering), and AERT; unit of practice was nine target attack flights (scores were summed); trial length was 1.170 minutes. From these figures a new score, D, was derived comparing triggering performance of subjects with expected results for a random automatic triggering device. The results were analyzed to show effects of learning and to determine reliability of the D score. It is noted that the score may be applied to other tasks than pedestal sight gunnery.

T. G. R 9

6354

Jackson, K.F. BEHAVIOUR IN CONTROLLING A COMBINATION OF SYSTEMS. II. EFFECTS OF CHANGES IN THE VELOCITY OF DISTURBANCES. *Ergonomics*, Aug. 1959, 2(4), 363-366. (Institute of Aviation Medicine, Royal Air Force, Farnborough, Hampshire, England).

The object of the study was to determine the effect upon the pattern of operator behavior of uniform variation in the velocity of disturbances affecting a set of 4 dials. 12 Ss carried out a multiple tracking task, disturbance was provided by a set of cams rotating at 0.6, 1.0, or 2.0 cpm. An analysis of variance performed on duration and number of control movements showed that velocity affected neither the rate of working as a whole nor the components of this overall rate, namely, duration of control movements and duration of change-over movements. The duration of interruptions was similarly unaffected. In conclusion it appears that when faced with changes in the difficulty of his task due either to increased load or increased velocity of disturbance, the operator adapts his responses considerably.

(HEIAS)

R 4

6355

MacKworth, J.F. & MacKworth, N.H. THE OVERLAPPING OF SIGNALS FOR DECISIONS. 23pp. *Applied Psychology Research Unit*, MCC, Cambridge, England.

6355

To investigate human limitations in the perception and reaction to a continuous series of visual objects, 18 subjects were presented with a multi-channel display and required to make 100 comparisons between pairs of cards under conditions of varied speed and number of channels. In a second experiment, 24 subjects performed the same task but with speed held constant. Utilizing signal overlap as the physical measure, the results were analyzed and discussed in terms of the effects of variation of number of sources of visual information upon performance.

T. G. I. R 24

6356 Colquhoun, W.P. THE EFFECT OF A SHORT REST-PAUSE ON INSPECTION EFFICIENCY. *Ergonomics*, Aug. 1959, 2(4), 367-372. (Medical Research Council, Applied Psychology Research Unit, Cambridge, England).

Little is known about the efficiency of inspectors engaged on simple checking work, or whether short rest-pauses are beneficial to performance at such tasks. An experiment was carried out to investigate these questions in the case of machine-paced work. 32 Ss inspected sets of 6 objects and had to press a key under any disc which carried a spot. The number of response failures was recorded. The results showed that, when the work was interrupted for a period of one hour, efficiency, although high on average, declined markedly after about 30 min. When a rest-pause of 5 min. was inserted at this point, performance was maintained at its initial level throughout the hour. The theoretical and practical significance of these findings is discussed.

R 8

6357

Leslie, W. & Goldstein, M. RELATIONSHIPS BETWEEN SIZE-MATCHING TEST AND PEDESTAL SIGHT GUNNERY PERFORMANCE. Proj. 7708, AFPTRC-TN-56-29, Feb. 1956, 16pp. AFPTRC, Lackland AFB, Tex.

6357

To determine the extent to which framing the target in a pedestal gunnery task may be considered a task of perceptual recognition, 96 target diagrams similar to the pedestal sight visual display were prepared in printed test format. Subjects judged whether these diagrams represented correct or incorrect framing under power conditions (about ten minutes) and speed conditions (three minutes). After five days of test performance, practice was given in pedestal sight manipulation on a gunnery simulator followed by a final printed test. Descriptive statistics for the printed test are reported. Test scores were correlated with performance scores to establish the relationship with a detailed examination of both tasks to explain the results.

T. I. R 9

6358

Killie, D.S. GUN-CAMERA RECORDS AS MEASURES OF PEDESTAL SIGHT GUNNERY PROFICIENCY. Proj. 7708, AFPTRC-TN-56-30, Feb. 1956, 25pp. AFPTRC, Lackland AFB, Tex.

6358

To investigate the effectiveness of ground gunnery devices in developing skill which would transfer to the aerial situation, proficiency in the air was measured from gun-camera records, filmed on aerial training missions. Prior to these missions, students were trained on one of several ground devices or on a combination of devices. A control group received no training. Film records for 139 students in a flexible gunnery course were scored for extent of error for azimuth, elevation, and range. The data were analyzed for group differences which could be attributed to ground training. The reliability of scoring methods for detecting performance differences was studied through correlational procedures. An interpretation of the findings is offered.

T. R 16

6359

French, Elizabeth G. SOME CHARACTERISTICS OF ACHIEVEMENT MOTIVATION. *J. exp. Psychol.*, Oct. 1955, 20(4), 232-236. (Personnel Research Lab., USAF Personnel and Training Research Center, Lackland AFB, San Antonio, Tex.).

An independent measure of motivation and a performance test were given under 3 different verbally created conditions of achievement motivation; relaxed, task motivated, and extrinsically motivated. The results, consistent with hypotheses proposed, may be summarized as follows: a) Increase in achievement motivation score was a function of both previous motivational level and the experimental conditions. b) Performance scores were more closely related to motivation scores than to the experimental conditions. c) Performance scores in one situation tended to be most closely related to motivation scores in another when the situations presented similar motivational cues. d) In addition, when affiliation cues were more prominent in the situation than achievement cues, performance was related to affiliation motivation scores rather than achievement motivation scores.

R 3

6360

Adams, J.A. EFFECT OF EXPERIMENTALLY INDUCED MUSCULAR TENSION ON PSYCHOMOTOR PERFORMANCE. Proj. 509 020 0009, AFPTRC TR 54 59, Nov. 1954, 4pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (Reprinted from *J. exp. Psychol.*, Aug. 1954, 48(2), 127-130).

6360

To investigate the effect of experimentally induced muscular tension on psychomotor performance, 120 Ss kept either 10, 20, or 30 lbs. suspended by pressing stirrups to the floor during an initial practice session on the Two-Hand Matching Test. Following rest, additional practice was given without induced muscular tension. Performance was compared with a group of 40 Ss who practiced without weights throughout. The results are presented and discussed in terms of the relative effect of various degrees of tension and a condition of no tension on psychomotor performance.

6361
Wilkinson, R.T. REST PAUSES IN A TASK AFFECTED BY LACK OF SLEEP. *Ergonomics*, Aug. 1959, 2(4), 374-380. (Medical Research Council, Applied Psychology Research Unit, Cambridge, England).

12 Ss worked at the Five Choice Test for 25 min. either continuously, or with a 30-sec. rest pause at the end of each 5 min. interval. The Ss were given each version twice, once with sleep and once with no sleep the previous night. It has been confirmed that 30 hrs. loss of sleep can seriously impair performance towards the end of a 25-min. test of aerial reaction. In particular, the occurrence of gaps, or abnormally long response delays, is greatly increased. This is what happens when the test is a continuous one; when 30-sec. rest pauses were allowed every 5 min this effect of lack of sleep was found to remain unaltered, an equal though small and insignificant improvement in performance occurring under both normal and sleep-deprived conditions.

R 15

6362

Wegner, R.C., Fitts, P.M. & Noble, M.E. PRELIMINARY INVESTIGATIONS OF SPEED AND LOAD AS DIMENSIONS OF PSYCHOMOTOR TASKS. Contract 33(038) 10528, Proj. 7707, AFPTRC TR 54 45, Oct. 1954, 19pp. USAF Skill Components Research Lab., Lackland AFB, Tex.

6362

Three experiments were conducted to assess the effects of speed and load upon motor performance. Utilizing an apparatus consisting of a rotating drum (to present the signals), response keys, automatic counters (to record data), and a knowledge of result light, a total of 100 right-handed subjects were given track signals under varied conditions of speed, load, practice, and anticipation. Analysis of variance of the hit data, transfer, etc., leads to specific conclusions concerning the relative influence of each of the variables, but particularly speed and load, upon motor performance of this sort.

T. G. I. R 6

6353

Lowless, N.E. THE EFFECT OF THE RELATIVE POSITION OF CONTROL AND DISPLAY UPON THEIR DIRECTION-OF-MOTION RELATIONSHIP. *Ergonomics*, Aug. 1959, 2(4), 382-385. (Puffels Department of Industrial Health, University of Durham, King's College, Newcastle upon Tyne, England).

The effect upon performance of the direction-of-motion relationship between a control and a display is shown to depend upon certain other features of the layout. 72 is performed a compensatory tracking task. Each group of 18 Ss used a different pointer arrangement. An analysis of variance was performed on the measures of tracking errors. When a rotary control knob is used in conjunction with a linear indicator, a clockwise movement of the control is expected to move the pointer upwards or to the right. This expectation is, however, weaker when the centre of rotation of the control is situated on the line of movement of the display than when the control is situated to the side of the line, so that the pointer moves in the same direction as the nearest part of the knob. The orientation of the display and the position of the control have no effect apart from this relationship between them.

R 5

6354

Squires, P.E. THE SHAPE OF THE NORMAL WORK AREA. *Annals of the New York Academy of Sciences*, July 1955, 59, 854-856. (USN Medical Research Laboratory, Naval Submarine Base, Groton, Conn.).

6355

To contribute some analytical notes on the shape of the "normal" work area (region over which the hands can move comfortably when a man is seated before a small operating space), a prolate cycloid curve is proposed as the correct and desirable contour. The parametric equations of the curve are given, based on anthropometric data with the elbow regarded as a moving rather than a fixed pivot. The contour suggested is recommended for situations where instruments and visual displays must be arranged compactly and operator movement is relatively restricted.

1. 4 3

6356

Stiller, R.A. SPEED OF ACQUISITION OF A SIMPLE MOTOR RESPONSE AS A FUNCTION OF SYSTEMATIC TRAINING: MEASURES OF KNOWLEDGE OF RESULTS. *Psychological Monographs*, 1954, 67, 23-25, Nov. 1954, 23pp. (USN Medical Research Laboratory, Naval Submarine Base, Groton, Conn.).

6357

This is a study of the speed of acquisition of a simple motor response as a function of systematic transformations of knowledge of results. Two hundred Ss were given a series of trials on a microtome knob-turning task under one of five different conditions of knowledge of results as defined by linear transformation equations (i.e., the transformation of true scores to reported scores). The results are treated in terms of the relative effect of each condition of knowledge of results on speed of acquisition of the motor skill.

6358

Black, J.W. & Morrill, S.N. THE PITCH OF SIDE-TONE. *Contract N6onr 22523, Projs. NR 145 993* & NR 001 024.01.31, Rep. 31, Oct. 1954, 2pp. (USN School of Aviation Medicine, Pensacola Air Station, Fla.).

An investigation relating to the question of whether a listener and a talker hear the same pitch when both are listening to the talker's voice was conducted. 32 male experimental Ss, including 29 trained musicians, attempted to adjust the pitch of electroacoustically reproduced vowels to agree with the pitch of the same vowel currently sustained by the same S. Adjustment of pitch was achieved through altering the frequency of the voltage to the motor of the playback tape unit. Adjustments occurred at each of 4 sound pressure levels. Typically the matchings indicated that the Ss heard their own voices during vowel production as being higher in pitch than an externally generated sound of like sound pressure level and quality.

R 2

6359

Heinonen, A.O., Karvonen, M.J. & Ruosteenoja, R. THE ENERGY EXPENDITURE OF WALKING ON SNOW AT VARIOUS DEPTHS. *Ergonomics*, Aug. 1959, 2(4), 389-394. (Institute of Occupational Health, Helsinki, Finland).

The energy expenditure of walking at natural pace on snow was determined. 7 male Ss walked 45-180 m at their natural walking pace. The energy expenditure was calculated directly from the O_2 content of the expired air. The mean depression of the feet into the snow was calculated from 20-50 measurements in each test. The results are expressed as a function of the depth of the depression of the feet into the snow. Depressions of 0, 10, 20, 30 and 40 cm gave an energy expenditure of 0.63, 1.42, 2.65, 5.72 and 8.30 cal/kg body weight per horizontal meter, respectively. The energy expenditure could be expressed as a linear function of the depression, using 2 equations, one for depressions less than and the other for those greater than 15 cm. The results are discussed.

R 11

6360 Bond, O.D. A PSYCHIATRIC ANALYSIS OF FORTY (40) SUBJECTS WHO WERE SICK BY A SWING. *Prej. 149*, Rep. 1, July 1953, 3pp. (USN School of Aviation Medicine, Randolph Field, Tex.).

To determine the incidence of psychologic factors that might predispose to swingsickness, 43 susceptible Ss were studied. 29 out of the 43 Ss gave evidence of considerable emotional maladjustment on the data collected in a very brief psychiatric examination. All but 1 of the 21 Ss who had a previous history of susceptibility to motion sickness had a history of considerable evidence of emotional maladjustment. The histories of susceptibility to motion sickness are difficult to evaluate solely on the basis of the psychologic effort of motion and in many instances point toward an emotional component in the illness. 3 Ss who had evidence of neurosis or of emotional difficulty and 1 of whom had a history of emotional difficulty did not become sick on the swing. There is evidence that an increased susceptibility to motion sickness may be a neurotic symptom, but it is clear that all those with emotional difficulty will not necessarily become sick on the swing. Because of the demonstrated evidence of emotional maladjustment in over half of those Ss, it will be well not to neglect this factor in the evaluation of future work on the etiology or treatment of motion sickness.

6369
 Miles, W.J. THE EFFECTS OF SLEEP DEPRIVATION ON PERFORMANCE OF A COMPLEX MENTAL TASK. Proj 7153, Task 7112, Tech. Note 55 173, Sept. 1955, 13pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

Data were recorded on the performance of 6 subjects each of whom was deprived of 30 hours sleep. The task on which these subjects performed required the making of a total of 200 discrete comparisons over a period of approximately 25 minutes. 3 such performance periods were used: one at the beginning of the normal working day, a second approximately 24 hours later (no sleep having been permitted in the meantime), and a third approximately 6 hours after the second session. The performance of these subjects was compared with that of a control group of 5 subjects who performed the test 3 times but did so on 3 separate days, each session having been preceded by a presumably normal night's sleep. The statistical analysis revealed a significant difference between the 2 groups, i.e., the control group showed significantly more improvement from the second to the third sessions than did the group deprived of sleep. The general conclusion was that subjects who are suffering from loss of sleep do not show the improvement which would be expected on the basis of the performance of normal subjects when the fatigued subjects are confronted with a complex mental task which they have not as yet mastered.

R 5

6370
 Ruffy, T.B. & Lavetta, J.T. WORK GROUP STRUCTURE, COMMUNICATION, AND GROUP PERFORMANCE. *ERGONOMICS*, 1956, 29, 105-113. (USAF Personnel & Training Research Center, Rockland AFB, San Antonio, Tex.). (AFPRC DN 55 95).

To introduce several constructs which appear to be of general utility in the measurement and analysis of communication in groups, a theoretical framework of the overall problem of group task performance is outlined. A conceptualization of: 1) the task as an observation-response matrix, and 2) personnel deployment in terms of a personnel-observation matrix and a personnel-response matrix is presented. Laboratory studies of the personnel-response matrix are summarized as illustrations. The application of the constructs and of the results to date are discussed in reference to further research.

1.

6371
 Sonjer, F.M. THE EFFECTS OF ATTITUDE, FITNESS, PHYSICAL WORKING CAPACITY, SKILL AND MOTIVATION ON THE QUALITY OF WORK. *Ergonomics*, May 1955, 2(3), 254-261. (Occupational Health Dept., Netherlands Institute for Preventive Medicine, Leiden, Holland).

2 experiments are discussed. They were designed for the determination of the best work method from the point of view of ergonomics. Methods for the detection of long term effects on the state of health are indicated. The economy of the work has been judged by comparison of the efforts expended and the resulting performance. The results of these measurements are also largely influenced by the personal capabilities for the performance of the particular task by each of the Ss. An analysis of this capability is given. Attention is also given to the difficulties of comparing work methods when the composition or the use made of the teams of Ss varies. If different groups of Ss are compared, each using their own work method, the groups may differ too much in general working capacity; if the same group applies different work methods, experience in using one method will be greater than with another. Adjustment of the energy expenditure to compensate for differences in pace or quality were not considered feasible.

R 8

6372
 Evans, J.R., Crowder, G.P. & Taylor, P.F. CIRCULATORY RESPONSES TO CHANGE FROM RECLINANT TO ERECT POSTURE AS AN INDEX OF HEAT STRESS. *Ergonomics*, May 1955, 2(3), 262-273. (Applied Physiology Dept., London School of Hygiene and Tropical Medicine, London, England).

Experiments are described in which Crampton Index values, derived from measurements of blood pressure and pulse rate following on change in posture, have been related to conditions of environmental heat and to the thermal sensations of resting and working Ss. Experimental evidence is given which indicates that changes in the Crampton Index may be of value in defining individual reactions to increasing environmental heat.

R 14

6373
 Henderson, J.G. THE ESTIMATION OF THE TRANSFER FUNCTION OF A HUMAN OPERATOR BY A CORRELATION METHOD OF ANALYSIS. *Ergonomics*, May 1955, 2(3), 274-286. (Electrical Engineering Dept., University of Birmingham, Birmingham, England).

This paper records an experiment to determine the transfer-function of a human operator, when he is acting as an element in a closed-loop control-system, by a method of analysis which is based on correlation functions. The theoretical analysis shows that under certain conditions the transfer-function of the operator can be defined by an integral equation that relates a cross-correlation function of his response to an observed 'error', to the auto-correlation function of that 'error'. It is shown how this integral equation can be solved approximately by a technique which uses an electronic analogue-computer. In this instance such a computer has been used to determine the parameters that will 'best fit' an assumed form of transfer-function to the recorded data.

R 5

6374
 Moore, J. SIGNAL SIZE AND DETECTABILITY ON
 A PPI DISPLAY. Contract AF 33(638)-22642,
 Proj. 7142, Tech. Rep. 54-146, Aug. 1954,
 13pp. Aero Medical Laboratory, WADC, Wright-Patterson
 Air Force Base, Ohio.

6375
 To investigate the relationship of signal size to
 detectability on an intensity-modulated CRT (cathode-ray
 tube) display, thresholds were obtained (two observers)
 for five signal sizes (from 26 minutes, 15 seconds to
 10712 minutes, 15 seconds visual angle) at two CRT
 voltage biases (background luminance approximately 0.01
 and 2.0 millilamberts at ten degrees behind screen). De-
 tectability thresholds were measured in decibels attenua-
 tion from a fixed signal of eight volts. The data were
 studied by analysis of variance techniques for primary
 sources of variance. Graphic comparisons of the size-
 detectability function were made with data from previous
 studies. Practical implications of design engineers are
 discussed. A technique for measuring the approximate
 luminance on each display is described. T. G. R 8

6376
 Erickson, C.W., & Make, H.W. ANCHOR EFFECTS
 IN ABSOLUTE JUDGMENTS. Contract AF 33(638)-
 22642, Tech. Rep. 54-146, Jan. 1954, 12pp.
 Aero Medical Laboratory, WADC, Wright-Patterson
 Air Force Base, Ohio. (The Johns Hopkins University).

6377
 To account for anchor effects (accuracy with which
 one stimuli are judged) of identification data obtained
 under the method of absolute judgment, a subjective stan-
 dard hypothesis is proposed and evaluated. Two experi-
 ments were performed. (1) Two groups of subjects (five
 each) were required to judge a series of lines forming
 a circular continuum by assigning to each line a number
 (one to twenty). Groups differed in what response num-
 bers were assigned to specific lines. (2) The stimulus
 series consisted of twenty squares varying in size from
 two to forty millimeters square; methods and procedures
 were otherwise same as before. Percent correct responses
 were analyzed for anchor effects predicted by the
 hypothesis. T. G. R 9

6378
 Garbar, D.J. THE JUDGMENT OF VELOCITY AND PRECISION OF MOTION. *Ergonomics*, May 1955, 2(3),
 287-304. (Department of Scientific & Industrial Research, London, England).

Experiments are described using an interception situation and varying the amount the S is
 able to view of the progress of the object being intercepted. The results indicate that the
 Ss were able to deal with this type of situation by using a comparatively simple response
 technique. The main question which remains is the way in which the S predicts the region of
 an object once it has disappeared. Further experiments were carried out using a prediction
 situation in which the S has to press a button when he judges when a moving light which has
 disappeared has reached a specified point. The results show a systematic relationship be-
 tween the variability of the S's performance and the time the light has been invisible. The
 relationship closely approximates $V^2 = Kt^2$ where V is the variability of the S, t the time
 the light was obscured and K a constant. Divergence from this precise relationship appeared
 to be due to the use by the S of a well-established response technique. R 13

6379
 Dusek, E.R., & Teichner, W.H. THE RELIABILITY AND INTERCORRELATIONS OF EIGHT TESTS OF BODY
 FLEXION. Proj. 7 95 20 002C, Tech. Rep. EP 31, May 1956, 13pp. USA Quartermaster Research
 and Development Center, Natick, Mass.

29 subjects performed on 8 tests of gross motor performance. 5 measures per subject were
 obtained on each test on 2 successive days. Analysis of the data suggested the following
 conclusions: a) 6 of the 8 tests are sufficiently reliable and mutually independent to be of
 use in a test battery designed to evaluate the effects of clothing on gross motor performance.
 b) The results suggest that all 8 tests show negligible practice effects. R 2

6380
 European Productivity Agency. E.P.A. PROJECT NO. 335. "FITTING THE JOB TO THE WORKER".
Ergonomics, May 1955, 2(3), 305-329. (European Productivity Agency, Paris, France).

An international conference on ergonomics was held in March 1955 in Zurich under the
 above title. The project started in 1955 with a visit to the USA; the second phase was a
 technical seminar in Leiden in 1957. The Zurich conference discussed muscular work, work-
 place layout, display and controls, lighting, noise, climatic conditions and working rhythms.
 The papers and discussions of the Zurich conference are briefly summarized in the following
 account. At the end of the conference the employers' and trades unions' representatives pre-
 sented their conclusions about the application of ergonomics in industry. The wholehearted
 support for ergonomics expressed in the resolutions they presented clearly justifies the Euro-
 pean Productivity Agency in having undertaken this project. This report was prepared by Dr.
 W.F. Floyd and Miss I.M. Slade. R 120 approx.

6381
 Engen, T., & Levy, N. THE INFLUENCE OF STANDARDS ON PSYCHOPHYSICAL JUDGMENTS. *Percept. mot. Skills*, 1955, 2, 193-197. (Brown University, Providence, R.I.).

Experimental applications of the method of direct magnitude estimations to brightness and
 weight stimuli provided evidence that: a) a standard selected from the middle of the stimulus
 series will yield more sensitive judgments than a higher and lower standard; and b) if no
 standard is used, more sensitive discriminations will be obtained when the adaptation level
 (or geometric mean) is in the middle of the stimulus series. The interaction of central
 tendency with adaptation level may prove to have important implications for a general theory
 of psychophysical judgment.

6380

Floyd, V.F. & Roberts, B.F. ANATOMICAL AND PHYSIOLOGICAL PRINCIPLES IN CHAIR AND TABLE DESIGN. *Ergonomics*, Nov. 1955, 2(1), 1-15. (Physiology Dept., Middlesex Hospital Medical School, London, England & Human Anatomy Dept., Oxford, England).

The paper is concerned with general principles derived from anatomical, physiological and clinical considerations in relation to dimensions of chairs and tables, from a study of the literature and the authors' own investigations the following conclusions emerge: a) The height of a chair seat should be no more than the length of the lower leg of the shortest person who will use the chair to allow the ischial tuberosities to bear the full weight of the trunk. The minimum seat depth for comfort is determined by the length of the thighs of the shorter persons using the seat. Seat width is adequately measured by trochanteric width. A substantially plane seat is preferable to one moulded to fit the backside. No horizontal struts of other obstruction should be placed between the front legs of the chair. Back rest should not restrict the movement of the spine or of the arms. A saddle-shaped backrest gives satisfactory support. Elbows should be about the level of the working plane of a table. The space between the under-surface of the table and the chair seat should be slightly greater than thigh thickness.

R 28

6381

Mahn, H.W., & Eriksen, C.W. RECOGNITION AND IDENTIFICATION OF COMPLEX VISUAL FORMS AS A FUNCTION OF THE LABELING SYSTEM EMPLOYED. Contract AF 33(050)-22642, Proj. 7192, Task 71500, Tech. Rep. 55-367, Sept. 1955, 23pp. WADC, Aero Medical Laboratory, Dayton, Ohio.

6383

Nelson, R. COLOR AND SEEING. *Illus. Exper.*, June 1955, 59, 271-278. (University of Texas, Austin, Tex.).

6321

To explore variables affecting the ability of human observers to learn to recognize and identify previously unfamiliar complex visual forms, two experiments were performed. In both experiments the effect upon subsequent recognition skill of giving subjects practice in the use of irrelevant labels (letters of the alphabet) as discriminating responses before learning to associate them with a set of unfamiliar stimulus forms was systematically studied. Stimulus materials were varied on the basis of familiarity (geometric forms, portions of aerial photographs, abstract figures); responses varied in number used (from one to twelve). The data are analyzed in terms of practice effects, familiarity of material, and number of labels. The functions of verbal labeling practice are discussed. T. G. I. R 10

6322

The author presents a discussion of the relation between illumination and visual performance with specific emphasis upon the variables which may account for the prevalent variation in experimental investigations of this relationship. Suggestions are offered concerning conceptual and methodological problems reflected in the treatment of such pertinent aspects as the following: individual differences in color vision, the background effect of color, the effect of the spectral energy of light sources upon object colors, the effect of color of source on acuity (and other visual functions), and the attempt to define an optimal color for all sources of illumination. Pertinent references are included in this discussion. T. G. R 15

6382 Nelson, R. & Himelstein, P. A SHORT METHOD FOR CALCULATING THE ADAPTATION-LEVEL FOR ABSOLUTE AND COMPARATIVE RATING JUDGMENTS. *Amst. J. Psychol.*, Dec. 1955, 52(4), 631-637. (University of Texas, Austin, Tex.).

Extension of the theory of adaptation-level (AL) to include comparative as well as absolute types of judgments has enlarged the sphere of use of equations previously published for quantitatively evaluating factors that influence psychophysical and other types of judgment. Calculation of the best value of AL and of the weighting constant, k , which measures the relative contributions of the stimulus-series and of the AL in determining responses to stimuli, can be shortened considerably when using the method of least squares through the use of tabulated values of the function $Y = (0.5K + J) / (1.5K - J)$ which enters into the equation. In this article 2 examples are presented illustrating use of tabulated values of Y as a function of the judgments and of coded stimulus-values (X) to minimize the computations in solving the normal equations for the desired constants. Data obtained by the method of absolute judgment and by the method of comparative ratings were chosen for examples. (METS)

R 11

6384

Griew, S. A STUDY OF ACCIDENTS IN RELATION TO OCCUPATION AND AGE. *Ergonomics*, Nov. 1955, 2(1), 17-23. (University of Bristol, Bristol, England).

A study is reported in which accident rate is related to age and occupation. Age distribution of observed accidents occurring during a 4-yr. period to manual workers in each of 9 jobs are compared with distributions expected on the assumption that job differences do not result in differences in fluctuations with age of accident rates. 3 significant differences between observed and expected distributions are obtained. These relate to the jobs of Electrician, Miller and Grinder, all of which are jobs in which mainly younger workers are normally employed. The median ages of those employed in 9 jobs are correlated with the extents to which accidents in the upper age groups are more or less numerous than expected. This correlation is significant, and indicates that older workers in jobs normally occupying younger workers tend to have more accidents than expected. Fluctuations in accident rates with age are concluded as being a function of the type of work studied. The results of the study are thought to reflect the difficulties of older workers in meeting the demands of certain types of work.

R 7

6385

Cavis, D.R. HUMAN ERRORS AND TRANSPORT ACCIDENTS. *Ergonomics*, Nov. 1958, 2(1), 24-33. (Department of Medicine, University of Cambridge, Cambridge, England).

The paper discusses the part played by 3 psychological processes, here called 'the false hypothesis', 'pre-occupation' and 'emergency mechanisms', in the causation of transport accidents. The false hypothesis results from people responding to situations as they conceive them to be, and this may be very different from what they really are. Emergency mechanisms may come into play when a person is caught unawares, and may lead to excessive and inappropriate responses. Some of the experiments in which these processes have been studied in the laboratory are described. Explanations of the errors responsible for certain train collisions when the driver had passed one or more signals at danger, and for certain aircraft accidents are suggested by reference to one or other of these processes.

R 3

6386

Grimaldi, J.T. SENSORI-MOTOR PERFORMANCE UNDER VARYING NOISE CONDITIONS. *Ergonomics*, Nov. 1958, 2(1), 31-43. (General Electric Co., New York, N.Y.).

A group of 52 Ss performed a tracking task in quiet and noisy environments. The noise was intermittent, within the frequency range of 75 to 5600 cycles and at sound levels of 70, 80, 90, and 100 db. The study was experimental, but simulated an occupational situation. Errors, response times and production (the number of turns of the stylus) were recorded. There was a tendency for more errors and less precision when working in the noisy environment. Response times were slower and the number of errors greater than when noise levels and frequencies were highest. The frequency range of 2400-4800 cycles was associated with the slowest response time and largest number of errors, both at 90 and 100 db. It appears that intermittent noise may have a reducing effect on the individual's capacity for quick and precise execution of coordinated movements. The implications for safety and certain production tasks seem obvious.

R 15

6387

Jackson, R.F. BEHAVIOUR IN CONTROLLING A COMBINATION OF SYSTEMS. *Ergonomics*, Nov. 1958, 2(1), 52-62. (Institute of Aviation Medicine, RAF, Farnborough, Hampshire, England).

The state of a manually controlled system or combination of systems depends upon a balance between the skill of the operator and the difficulty of his task. When the difficulty of the task is varied by increasing the number of systems which have to be controlled, some change in the pattern of performance can be expected. It is possible to identify the parameters of performance which can be adjusted to meet the increasing demands of such a situation and to describe how they are related to each other and to overall performance. This analysis has been applied to a task in which the pointers of several dials which tend spontaneously to deviate have to be kept as nearly in alignment as possible, and an experiment with this task has shown ways in which Ss adapt to changes in the number of dials (and controls) involved.

R 5

6388

Provins, K.A. ENVIRONMENTAL CONDITIONS AND DRIVING EFFICIENCY: A REVIEW. *Ergonomics*, Nov. 1958, 2(1), 97-107. (Human Anatomy Dept., University of Oxford, Oxford, England).

The paper is a review of work in the field of environmental effects on human performance with special reference to problems of driving efficiency. It is concerned principally with the effects of low and high environmental temperatures, and of air pollution by carbon monoxide, on sensori-motor performance at tasks related to driving. There are many papers and reviews dealing with the general problem of environment and occupational efficiency but relatively few concerned directly with motor vehicle driving. This is probably due to difficulties and dangers of experiments on the roads which might lead to reduction of driving efficiency and to the intrinsic difficulty of measuring driver performance. This review must be regarded therefore as a guide to the possible effects which environmental conditions may have on motor vehicle driver performance and a pointer to the need for further research more pertinent to the driving problem itself.

R 47

6389

Loucks, R.B. MEASUREMENT OF SMOOTHNESS OF COORDINATION IN THE PERFORMANCE OF A PSYCHOMOTOR TEST. Proj. 45, Rep. 1, June 1942, 4pp. *USAF School of Aviation Medicine*, Randolph Field, Tex.

To determine whether smoothness of coordination in the performance of a psychomotor task can be measured, a simple pick-up unit was designed to be attached to a large variety of test apparatuses. An initial investigation of its usefulness was made during the performance of 2 groups of Ss (95 and 166) on the SAM Two-Hand Coordination Test. In one group, the Test was merely placed on the table; in the other it was clamped firmly to the table. Sums of jerkiness scores for 4 even-numbered trials were correlated to those for the 4 odd-numbered trials producing reliability coefficients of +.94 and +.91. Correlations between total scores for smoothness of coordination and total scores for performance on the Two-Hand Coordination Test were -.25 and -.32. The significance of these data for increasing the accuracy of pilot selection are discussed. (HEIAS)

6390

Usher, J.R., Johnson, K.O., Hoople, G., Hirsh, I.J., et al. PROBLEMS IN MILITARY AUDIO-METRY: A CHABA SYMPOSIUM. *J. Speech Hear. Disord.*, Dec. 1957, 22(5), 729-756. (Reports from: 1955 Annual meeting of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics (CHABA)).

The symposium discussed the problem facing the Armed Forces of accurately testing the hearing of all candidates for military service. The following topics were discussed: veteran's compensation for hearing loss, diagnostic audiometry, classification of hearing tests, automatic audiometry, military audiometry. Recommendations are made on how to proceed when new audiometric methods or instruments are needed.

6391

Leuchs, R.B. ASSESSMENT OF INSTRUMENT FLYING PERFORMANCE: FURTHER METHODS FOR AUTOMATIC RECORDING OF AN AIRCRAFT'S FLIGHT PATH. Proj. 383, Sep. 2, Dec. 1945, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

2 types of apparatus have been constructed which will plot an aircraft's flight path automatically. A technique is also described for recording the flight path at a ground station as well as in the aircraft itself. One of the 2 recording systems plots the aircraft's position independently of any special data regarding wind direction, wind velocity, and air speed. In contrast with photographic techniques, the present systems provide records which can be evaluated immediately upon termination of any particular flight maneuver. The records readily lend themselves to direct interpretation inasmuch as each tracing constitutes a scaled plotting of the aircraft's flight path on a conventional map. When desired, an elevation profile can be traced synchronously with the azimuth patterns provided by the 2 systems described in this paper.

R 8

6392

Seymour, W.D. TRAINING OPERATIVES IN INDUSTRY. Ergonomics, Feb. 1959, 2(2), 143-147.

(Presented at a symposium on training.) Recent researches have shown the importance of the perceptual component in skilled performance on industrial tasks, and have indicated the ways in which the operator adapts his capacities to improving his level of skill. The methods by which this new knowledge is used in systematic training schemes based on skills analysis are described, and some current problems in industry reviewed.

R 6

6393

Baumberger, J.P. MANUAL OF FIELD PHYSIOLOGY. ANNUAL PROGRESS REPORT FOR PERIOD JULY 1952 TO JAN. 1954. Contract No. 225(14). Proj. NR 101 007, Jan. 1954, 61pp. Office of Naval Research, Washington, D.C. (Stanford University, Stanford, Calif.).

This report presents a survey and sampling of methods of physiological problems as a preliminary step to writing a manual of field physiology. Some ways and means of producing such a manual, its probable usefulness, and the audience it might serve are treated. A sampling of subject matter for such a manual is presented and an extensive source bibliography is included. (HEIAS)

R many

6394

Crossman, E.R.F.M. A THEORY OF THE ACQUISITION OF SPEED-SKILL. Ergonomics, Feb. 1959, 2(2), 153-156. (Psychology Dept., Reading University, England).

(Presented at a symposium on training.) Recent researches are cited which suggest that the acquisition of manual speed-skill proceeds by a certain type of selective action. A formal theoretical model is developed, and its predictions compared with the experimental results. Certain complications of the theory, and conclusions from it are outlined, and the nature of the selective mechanism is discussed. Some implications for training are indicated.

R 10

6395

Singleton, V.T. THE TRAINING OF SEWING-MACHINISTS. Ergonomics, Feb. 1959, 2(2), 146-152. (The British Boot, Shoe & Allied Trades Research Association, Kettering, England).

(Presented at a symposium on training.) A training scheme for sewing-machinists based on the 'progressive-part' method is described. It was tested in preliminary training courses run by the Research Association to which the author belongs, and was then spread throughout the industry by organizing a series of training courses for instructresses. These instructresses are selected by the parent firm or technical college, they are trained in the procedures of the scheme and then return to their factories or colleges to set up their own training schools. The main difficulties of this work have not been connected with the finding of successful training procedures, but with the initiation and maintenance of training schools in the industry. The problems which arise and some measures which have been devised for dealing with them are outlined.

6396

Blair, Isabel. PRACTICE AND KNOW: SOME COMMENTS ON LEARNING AND TRAINING IN INDUSTRY. Ergonomics, Feb. 1959, 2(2), 167-170. (National Institute of Industrial Psychology, London, England).

(Presented at a symposium on training.) Learning a task differs psychologically from doing it once skill is acquired. Industrial training should focus on actual learning processes and on fostering the desire to learn. Learning may be helped by directing attention to kinaesthetic experience, which in turn can convey more meaning if irrelevant differences in machine adjustments and work-place layouts are minimized. Learning depends on identification of good responses. Knowledge of success achieved tends to create a desire for more success. The skill of instructors in using these principles, with learners who vary in rate of progress, is likely to be an important influence in the effectiveness of industrial training.

R 1

6397

Davis, J.A. DEVELOPMENT OF THE C14N4 INDIVIDUAL PROTECTIVE COVER. INTERIM REPORT. Proj. 4 80 04 006, CALR 1/14, Nov. 1954, 17pp. USA Chemical Center, Chemical & Radiological Labs., Md.

This is an interim report on the development of an improved individual protective cover against toxic liquid spray. The experimental work reported was in redesign and improved construction of the package and of instructions for donning the cover. Secondary effort was made to improve materials of construction of the cover itself. (HEIAS)

R 5

6398
Brindley, G.S. INTRINSIC 24-HOUR RHYTHMS IN HUMAN PHYSIOLOGY, AND THEIR RESISTANCE TO THE PLANNING OF WORKING PROGRAMMES. PPRC 871, April, 1954, 5pp. Flying Personnel Research Committee, RAF Institute of Aviation Medicine, Farnborough, Hants, England.

6399
This article reports the results of several experimental investigations of some human physiological diurnal rhythms. Conducted by the Cambridge University Spitbergen Expedition (1953), the study utilized eight subjects who during eight weeks of living with a 22-hour periodicity were tested for normal and experimental diurnal rhythms. Each subject possessed a wrist watch designed to run 24 times as fast as a normal watch. The results of intrinsic and external measures are presented and discussed in terms of the relative variations in these physiological components: sleep, fatigue, excretory rhythms, and the diurnal cycle of eosinophil counts. The results of an experimental investigation of the effects of prolonged severe exercise upon eosinophil counts are briefly discussed. C. R. 11

6400
Saut, E.V. NOTE ON CURRENT TRENDS IN LITERATURE ON TRAINING. Ergonomics, Feb. 1959, 2(2), 180-182. (Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.).
(Presented at a symposium on training.) This note outlines the experience of the Human Engineering Information and Analysis Service project at Tufts University. Sources of training research, some of the topics receiving emphasis and possible reasons for the dearth of published research on training in industry are discussed. A fuller article on the project will be published in a subsequent number of the Journal. R 6

6401
Adamson, G.T. CIRCUIT TRAINING. Ergonomics, Feb. 1959, 2(2), 183-186. (Physical Education Dept., University of Leeds, Leeds, England).

(Presented at a symposium on training.) The paper describes a form of training in which there is progressive loading of the individual. The 'circuit' includes a number of exercises, usually 9 to 12, selected so as to improve general muscular condition, and circulatory and respiratory responses. The main assumption underlying this approach is that general fitness is determined by: muscular strength, the capacity to exert force against resistance; muscular endurance, the capacity for continuous performance of heavy activity making small demand on circulatory and respiratory functions; general endurance, the capacity to continue sub-maximal contractions of sufficient intensity to make demands on circulatory and respiratory functions; muscular power, the capacity to develop horsepower. Circuit training consists of the following phases: teaching, timing, training and relating in accordance with a target time. Some figures are given showing improvement in performance attained by a group of 20 university students attending training for 8 weeks on a circuit consisting of 12 exercises. R 1

6402
Chalupsky, A.B. ASM PROCEDURAL ANALYSIS. Proj. P3-52, Rep. FR-9, First Partial Report, Section 1, Jan. 1953, 10pp. USN Electronics Lab., Naval Personnel Research Unit, San Diego, Calif.

6403
This report consists of a series of Task Breakdown sheets for operational and preventive maintenance of the Tactical Range Recorder (CAN-55-1344).
1.

6402
Cotes, J.E. & Hinde, R. PHYSICAL TRAINING IN RELATION TO THE ENERGY EXPENDITURE OF WALKING AND TO FACTORS CONTROLLING RESPIRATION DURING EXERCISE. Ergonomics, Feb. 1959, 2(2), 195-206. (Medical Research Council, Pneumoconiosis Research Unit, Llandough Hospital, Penarth, Glamorgan, Wales).

(Presented at a symposium on training.) In 11 National Service men during their preliminary training course there was a decrease in energy expenditure and 'vertical work' done in walking at 3 1/2 mph. This is attributed to increased economy of movement since the rate of energy expended to 'work' done remained constant. The reduction in exercise ventilation on switching the inspired gas from air to oxygen also occurred over the training period, suggesting improved oxygenation of the blood in the lungs. There was no concurrent change in pulmonary diffusing capacity or ventilation equivalent. No experimental evidence was obtained to support the hypothesis that as a result of this training the body temperature rises less on exercise and that this contributes to the changes in exercise ventilation. R 24

6403
Davenport, E.W. & Woodson, W.E. THE DESIGN OF A NAVY AIR TRAFFIC CONTROL TOWER. Rep. 490, ca. 1953, 33pp. USN Electronics Lab., San Diego, Calif.

6403
This report describes the interior design of the air traffic control tower, Naval Air Station, San Diego, California, which incorporates a number of new equipment and layout features designed to improve the efficiency of the working crew. The report includes a section on design planning, external problem factors influencing the design, and an evaluation and discussion of the control tower based on operator opinions, as well as detailed observations. Recommendations for further improvements are included.
T. G. I. R 8

6409

Hendford, S.W., Cone, T.E., Jr., Chinn, H.I., & Smith, P.E. DRUGS PREVENTING MOTION SICKNESS AT SEA. Proj. XI GCS 052.32.01, Jan. 1954, 10pp. USM Medical Field Research Lab. Camp Lejeune, N.C.

6409

This report is the fourth in a series of studies designed to evaluate the effects of certain drugs in preventing motion sickness. Conducted during an actual sea voyage, the study employed approximately 500 subjects who received systematic dosage of one of the following: benzadrin, pontofen, loranin, thiamine, Eli Lilly Preparation No. 01730, and placebo. The results are reported in terms of the relative incidence of seasickness as a function of type of drug, previous history of motion sickness, and age of subjects. Side effects are described and one drug emerges with positive potential as a motion sickness preventative.

T. G. R 23

6410

Muller, E.A. TRAINING MUSCLE STRENGTH. Ergonomics, Feb. 1959, 2(2), 216-222. (Max-Planck-Institut fur Arbeitsphysiologie, Dortmund, Germany).

(Presented at a symposium on training.) The stimulus for increase in muscle strength is not fatigue but the force exerted during the job. When this force exceeds one-third of maximum strength, the maximum speed of increase in strength is reached with one single, short duration static contraction per day. The slower increase by weekly training leads to a more permanent acquisition of strength. To avoid fatigue in static work the muscles should be trained against a force about double the highest static force which occurs during the job. Inactivity lowers strength about 30% in a week, with an equally quick return to normal strength by new activity. Atrophy can be prevented by one contraction per day with a force one-fifth of maximal strength. Normal strength is maintained by contractions lying between one-fifth and one-third of maximum strength. The ability of muscles to increase maximum strength varies from muscle to muscle and from person to person. For men it is maximal at 25 years of age and half-maximal at ages 10 to 60 years. The rate of increase in men is double that of women at age 25 years and 25% higher at ages 19 and 60 years.

R 10

6411

Harker, G.S. & Henderson, A.C. EFFECTS OF INDUCED VERTICAL IMBALANCE ON DEPTH PERCEPTION. Proj. 6 95 20 001, Rep. 201, Aug. 1955, 13pp. Research and Development Div., USA Medical Research Lab., Fort Knox, Ky.

A binocular depth judgment task was used to evaluate the effect of induced vertical imbalance on binocular vision. Zero, 1/2, and 1 prism-diopters were used in conjunction with two alternation rates, 30 and 15 alternations per half hour experimental period. The data were analyzed to show the effect of two exposure times, 15 and 30 minutes. The data of this study in conjunction with that of Ogle and Prangen indicate that the use of binocular instruments which require vertical fusional effort on the part of the observer will be most fatiguing when the observer seeks to change frequently from viewing with the instrument to viewing with the unaided eye.

R 5

6412

Harrell, T.W. RESEARCH PLANNING CONFERENCE IN PROFICIENCY ANALYSIS AND JOB ANALYSIS OF AIR FORCE TECHNICAL SPECIALTIES. Conf. Rep. 49 4, Nov. 1949, 47pp. USAF Human Resources Research Center, Chanute AFB, Ill.

The conference dealt with the operational needs of the Air Force. The development of criteria of job success emerged as the most prominent issue. Sections are devoted to the following items: sponsors and participants; purpose of the conference; review of agenda; brief review of presentations; job analysis and proficiency analysis. (HEIAS)

6413

Hausman, H.J. THE B-29 AVIATION MECHANIC TESTING PROGRAM IN AIR WEATHER SERVICE (MILITARY AIR TRANSPORT SERVICE). Memo. Rep. 4, March 1951, 6pp. USAF Human Resources Research Labs., Bolling AFB, Washington, D.C.

As a group, B-29 mechanics in 3 stations of the Air Weather Service seemed to be proficient, according to test results of the B-29 Oral Proficiency Examination during the period October to December, 1950. 1/2 of them scored in Groups I and II, where competent mechanics should score. Many of the remaining half need only further experience to achieve this score. Some undoubtedly should be closely examined for fitness as mechanics. Differences between stations are minor and can easily be explained by differences in the number of experienced men tested at each location. The test results should prove highly useful to squadron maintenance officers in planning assignments and training of their mechanics. Mechanics currently being schooled in the OJT program can be examined after a suitable time and their proficiency in maintaining B-29 aircraft can be determined. Mechanics who fail the examination at this time may be able to pass after more training. A continuous testing program should include retesting of mechanics who fell in Groups IV and V, or even those who are "Satisfactory" in Group III.

6414

Head, C.V., Jr. RESEARCH PLANNING CONFERENCE ON TRAINING AND PROFICIENCY MEASUREMENT OF NAVIGATOR-BOMBARDIERS. Conf. Rep. 49 3, Sept. 1949, 24pp. USAF Human Resources Research Center, Mather AFB, Calif.

This report contains a summary of a research planning conference on training methods and proficiency measurement of navigators, bombardiers, and radar observers. A review of research results of the AAF Aviation Psychology Program was presented, existing problems were considered, and a research program was formulated. The major recommendations of the conference briefly stated are as follows: a) study the Navigator-Bombardier's job to provide an accurate definition of job behavior; b) develop criteria of performance for research use; c) investigate problems in radar scope interpretation and target identification; d) evaluate the use of training devices; e) formulate plans for instructor selection and training; f) analyze and evaluate curriculum organization and content; and g) develop measurements of proficiency maintenance. (HEIAS)

6415

Hudson, G. AN INVESTIGATION INTO THE PROBLEM OF FOOT CASUALTIES IN THE ARMY. Rep. 9/54, Aug. 1954, 11pp. USA Operational Research Group, Department of the Scientific Adviser to the Army Council, Washington, D.C.

An assessment of the magnitude of the manpower wastage caused by foot ailments in the Army and the influence of certain variables (training, climate, Arm of Service, etc.) was made. A survey was made of all foot ailments seen on unit sick parades over a period of 4 wks. of a planned sample of some 8000 other ranks involving recruits and trained men from all Arms of Service. A smaller survey covering about 850 Malayan other ranks was also made. Overall, approximately 22% of unit strengths reported sick with foot ailments each week or about 1/4 of all sick-parade attendance. The manpower wastage was equivalent to the permanent incapacitation of some 120 men/division. No differences between Infantry and other Arms were found. Among recruits the incidence and associated manpower loss was 2 to 3 times as great as among trained men with major contributing ailments of orthopedic condition and blisters. Among trained men the most prevalent complaints involved skin conditions other than blisters. Findings on the Malaysian troops were similar. Recommendations are included. (HEIAS)

6416

Imus, H.A. MANUAL FOR THE INSTALLATION AND ADJUSTMENT OF THE MULTIPLE PROJECTION EIKONOMETER. Contract OHSR 1171, Proj. N 11A, Memo. 9, Rep. 4231, Oct. 1944, 42pp. Applied Psychology Panel, Office of Scientific Research and Development, Washington, D.C. (University of Wisconsin, Madison, Wisc.).

This Manual includes the complete description of the Multiple Projection Eikonometer, directions for its installation and adjustment and suggestions concerning its maintenance. The main body of the report is concerned with the description, installation and operational test of the instrument, followed by suggestions for the general care of the Multiple Projection Eikonometer. In the Appendix, detailed instructions for the insertion of new rolls of electric paper, the insertion of replacement stylus, a wiring diagram, inspection specifications, and complete parts list for the Multiple Projection Eikonometer are included. A description of the test furnished by the instrument and a manual for its use are contained in OSRD Report No. 4050. Data on the validity of the test for Army height finder observers are included in OSRD Reports Nos. 1789 and 1790. Similar data for Navy rangefinder operators will be available shortly.

6418

Henry, F.H. THE PREVENTION OF ALTITUDE PAIN BY PRESELECTION. J. Aviat. Med., June 1947, 18(3), 259-265a. (Medical Physics Div. & Physical Education Dept., University of California, Berkeley, Calif.).

The relation between individual differences in altitude pain susceptibility, measured by a standard test, and occurrence or absence of pain in validating exposures with altitude exercise, and denitrogenation differing from the standard test conditions was investigated in 2 experiments. a) 53 men were classified in a 38,000 ft. test with isotonic type arm exercise; 34 of these were given a validating exposure with half as much exercise and 33 were given about 2% as much work in ft. lbs. (isometric work). Correlations between test and validation averaged .59 with isotonic work and .48 with isometric work. Pre-selection by discarding the most susceptible men (75%) reduced moderate and severe pain from 65% to 25%. b) 151 men were classified by a standard preoxygenated test at 33,750 ft. With exercise 98 were then given validating exposure under the standard test conditions and 53 were given 2 preoxygenated exposures at 35,000 ft. with twice as much work. Average correlation between test scores and altitude pain occurrence was .45. It was concluded that preselection by non-preoxygenated tests using a standard exercise and altitude are effective in reducing the occurrence of altitude pain in further exposures. (HEIAS)

R 3

6417

Mock, R.O., & Pippitt, R.G. FIELD TEST OF FOOD TABLETS. Proj. 7156, Tech. Note 56-370, Aug. 1956, 5pp. Aero Medical Laboratory, NADC, Wright-Patterson AFB, Ohio.

6417

To investigate the feasibility of using food tablets for feeding aircrews in high performance aircraft, a field test was conducted. Prototype food tablets and tablet dispensers were evaluated on the ground and in the air. A food preference questionnaire for four tablets (chocolate butter cream, cheese, honey-almond, and milk) was completed on the ground by 43 test pilots and students. Dispensers, with a selection of food tablets, were installed in two jet aircraft and evaluated for ease of use in flight. Discussion centers on acceptability and utility of using the food tablets. T. I.

6414

Head, C.W., Jr. RESEARCH PLANNING CONFERENCE ON TRAINING AND PROFICIENCY MEASUREMENT OF NAVIGATOR-BOMBARDIERS. Conf. Rep. 49 3, Sept. 1949, 24pp. USAF Human Resources Research Center, Mather AFB, Calif.

This report contains a summary of a research planning conference on training methods and proficiency measurement of navigators, bombardiers, and radar observers. A review of research results of the AAF Aviation Psychology Program was presented, existing problems were considered, and a research program was formulated. The major recommendations of the conference briefly stated are as follows: a) study the Navigator-Bombardier's job to provide an accurate definition of job behavior; b) develop criteria of performance for research use; c) investigate problems in radar scope interpretation and target identification; d) evaluate the use of training devices; e) formulate plans for instructor selection and training; f) analyze and evaluate curriculum organization and content; and g) develop measurements of proficiency maintenance. (HEIAS)

6415

Hudson, G. AN INVESTIGATION INTO THE PROBLEM OF FOOT CASUALTIES IN THE ARMY. Rep. 9/54, Aug. 1954, 11pp. USA Operational Research Group, Department of the Scientific Adviser to the Army Council, Washington, D.C.

An assessment of the magnitude of the manpower wastage caused by foot ailments in the Army and the influence of certain variables (training, climate, Arm of Service, etc.) was made. A survey was made of all foot ailments seen on unit sick parades over a period of 4 wks. of a planned sample of some 8000 other ranks involving recruits and trained men from all Arms of Service. A smaller survey covering about 850 Malayan other ranks was also made. Overall, approximately 22% of unit strengths reported sick with foot ailments each week or about 1/4 of all sick-parade attendance. The manpower wastage was equivalent to the permanent incapacitation of some 120 men/division. No differences between Infantry and other Arms were found. Among recruits the incidence and associated manpower loss was 2 to 3 times as great as among trained men with major contributing ailments of orthopedic condition and blisters. Among trained men the most prevalent complaints involved skin conditions other than blisters. Findings on the Malaysian troops were similar. Recommendations are included. (HEIAS)

6416 Imus, H.A. MANUAL FOR THE INSTALLATION AND ADJUSTMENT OF THE MULTIPLE PROJECTION EIKONOMETER. Contract Ochr 1171, Proj. N 114, Memo. 9, Rep. 4233, Oct. 1944, 42pp. Applied Psychology Panel, Office of Scientific Research and Development, Washington, D.C. (University of Wisconsin, Madison, Wisc.).

This Manual includes the complete description of the Multiple Projection Eikonometer, directions for its installation and adjustment and suggestions concerning its maintenance. The main body of the report is concerned with the description, installation and operational test of the instrument, followed by suggestions for the general care of the Multiple Projection Eikonometer. In the Appendix, detailed instructions for the insertion of new rolls of electric paper, the insertion of replacement stylus, a wiring diagram, inspection specifications, and complete parts list for the Multiple Projection Eikonometer are included. A description of the test furnished by the instrument and a manual for its use are contained in OSRD Report No. 4050. Data on the validity of the test for Army night finder observers are included in OSRD Reports Nos. 1789 and 1790. Similar data for Navy rangefinder operators will be available shortly.

6418 Henry, F.M. THE PREVENTION OF ALTITUDE PAIN BY PRESELECTION. J. Aviat. Med., June 1947, 18(3), 259-265a. (Medical Physics Div. & Physical Education Dept., University of California, Berkeley, Calif.).

The relation between individual differences in altitude pain susceptibility, measured by a standard test, and occurrence or absence of pain in validating exposures with altitude exercise, and denitrogenation differing from the standard test conditions was investigated in 2 experiments. a) 53 men were classified in a 38,000 ft. test with isotonic type arm exercise; 34 of these were given a validating exposure with half as much exercise and 33 were given about 2% as much work in ft. lbs. (isometric work). Correlations between test and validation averaged .59 with isotonic work and .48 with isometric work. Pre-selection by discarding the most susceptible men (75%) reduced moderate and severe pain from 65% to 25%. b) 151 men were classified by a standard preoxygenated test at 33,750 ft. With exercise 98 were then given validating exposure under the standard test conditions and 53 were given 2 preoxygenated exposures at 35,000 ft. with twice as much work. Average correlation between test scores and altitude pain occurrence was .45. It was concluded that preselection by non-preoxygenated tests using a standard exercise and altitude are effective in reducing the occurrence of altitude pain in further exposures. (HEIAS)

R 3

6417

Mock, R.O., & Pippitt, R.G. FIELD TEST OF FOOD TABLETS. Proj. 7156, Tech. Note 56-370, Aug. 1956, 5pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6417

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6424

Moser, H.M., & Dreher, J.J. STANDARD PRO-
NUNCIATION OF THE MODIFIED ICAO ALPHABET.
Contract AP 10(600)-316, RP Proj. 519, Psp.
18, AFCE-15-54-89, Dec. 1954, 7pp. Air Force
Cambridge Research Center, Cambridge, Mass.
(Ohio State University).

6424

To assess the patterns of variation in pronunciation among certain words in the modified International Civil Aviation Organization (ICAO) alphabet with regard to relative efficiency, eight males of various nationalities were used as speakers with three groups of listeners: (1) 11 American females, (2) 75 Air Force ROTC seniors, and (3) 26 foreign nationals. Each speaker recorded his list twice and these recordings were presented to the listeners under varied signal-to-noise ratios. Analyses of variance and t-tests of error scores were computed. The results are discussed in terms of designating the specific words which warrant concern with regard to variation in pronunciation and the general role of such variation on the efficiency of all other ICAO words.

T. I.

6425
Hoss, H.L. & McDonald, P.R. THE EFFECT OF HIGH ALTITUDE ON THE CURVATURE OF THE CORNEA.
Proj. 61, Rep. 1, Oct. 1943, 5pp. USAAF School of Aviation Medicine, Randolph Field, Tex.

A study was made to determine the effect of reduced atmospheric pressure on the curvature of the cornea. 15 Ss were examined on the ophthalmometer at ground level with and without an oxygen mask. The chamber was then taken to simulated altitude of 50,000 ft; and after 50 min. at this altitude, the ophthalmometer readings were recorded again with oxygen mask in place. The results of an analysis of changes in horizontal and vertical meridians and astigmatic errors associated with wearing the mask or with a decrease in atmospheric pressure revealed slight and insignificant changes in corneal curvature. (HEIAS)

6426

Haggard, E.A. ON THE APPLICATION OF ANALYSIS OF VARIANCE TO GSR DATA: II. SOME EFFECTS OF THE USE OF INAPPROPRIATE MEASURES. J. exp. Psychol., Dec. 1949, 39(6), 861-867. (University of Chicago, Chicago, Ill.).

The purpose of this paper is to apply 4 measures of the GSR to a given set of original data, to show that the application of the F-test to inappropriate measures results in invalid conclusions, and to attempt to account for discrepancies among the F-values in terms of the qualities of the 4 measures as they affect the F-ratio under identical experimental conditions. The GSR measures include: Resistance change, Conductance change, Log Resistance change, and Log Conductance change. Comparisons were made in terms of certain scale characteristics of the 4 measures, and in terms of the variables of Age, Sex, and PIU (words previously rated by the Ss as being 'pleasant', 'indifferent', or 'unpleasant' in emotional tone). A group of 50 boys and 50 girls were tested at 13.5 and retested at 17.5 years of age. The study is based on 2305 responses. The findings of this study justify the following conclusions: a) The 4 GSR measures examined in this study cannot be used interchangeably, since when applied independently to the same original scores, some measure yielded highly significant differences for a given comparison, whereas other did not. b) The variability among the obtained F-values arises from the scale characteristics of the 4 measures as they are applied to the original or derived scores. It may be assumed that those measures which violate the basic assumptions underlying the analysis of variance technique yield biased F-values.

R 8

6427

O'Neill, J.J. LISTENER JUDGMENTS OF SPEAKER INTELLIGIBILITY. Contract N6onr-22525, Proj. Designation NR 145-993, Proj. NM 001 064.01.28, Rep. 28, Sept. 1954, 8pp. USN School of Aviation Medicine, Pensacola, Fla.

Seven panels of listeners rated speakers on the basis of expected intelligibility score. Those ratings were compared to scores obtained on standard intelligibility tests. The test results were further analyzed to determine if speakers from particular Naval Districts were more intelligible.

R 5

6428

O'Neill, J.J. THE EFFECTS OF EXPOSURE TO WHITE NOISE ON INDIVIDUAL TEST SCORES: LOUDNESS-BALANCE AND INTELLIGIBILITY TESTS. Prepared under Contract N6onr-22525, Proj. Designation 145-993, Proj. NM 001 064.01.29, Rep. 29, Sept. 1954, 8pp. USN School of Aviation Medicine, Pensacola, Fla.

6428

In order to determine the effects of exposure to white noise on the results of loudness-balance and speech-intelligibility tests, 16 subjects were first required to make a series of loudness-balance matches and complete half of an intelligibility test and then, after a 30-minute exposure to 100 decibels of white noise, to repeat the loudness-balance matches and complete the intelligibility test. Loudness-balance findings and intelligibility scores are treated in terms of the effects of white noise on incidence of auditory fatigue and recruitment, and the relative temporal effects on intelligibility scores.

T. I. G. R 19

6430

Polegion, M.J. THE STATISTICAL CALCULATION OF SERVO SYSTEMS. Library Trans. 475, July 1954. 44pp. Royal Aircraft Establishment, Farnborough, England.

The complete book describes the application of a new statistical theory of telecommunication to the problems of servo-mechanisms. Chapter 3 is a study of relays in detail, giving the various types and uses of relays and the problems likely to be encountered in their use. A detailed study is made of the operating time constants for relays both when mounted on a stationary and a vibrating piece of apparatus. This latter has shown the necessity of using a mounting as nearly free from vibration as possible. Chapter 4 details the various mathematical properties which can be used to obtain the probability functions and various types of autocorrelators and similar machines designed to lessen the tedious mathematics which would otherwise be necessary to determine these functions.

R 16

6432

Peters, R.M. COMPETING MESSAGES: THE EFFECT OF INTERFERING MESSAGES UPON T-C RECEPTION OF PRIMARY MESSAGES. Contract Memor 22525, Proj. Designation NR 145 908 & Proj. NR 061 064.01.27, Rep. 27, Sept. 1954, 7pp. School of Aviation Medicine, Pensacola, Fla.

6432

To evaluate the effect of interfering messages upon the reception of primary messages, 144 subjects (in 36 listening parties) heard two simultaneous and non-simultaneous messages and were required to respond to only that message designated as the primary message. Six types of message were employed (e.g., same words as primary, unrelated words, nonsense words, and so forth). The data were analyzed in terms of the mean listener reception value under each of the experimental conditions. The condition leading to maximum message interference is discussed along with the positive effect of primary message delay, with relation to the interfering message, at the reception of the primary message.

T. G. R 12

6433

Peters, R.M. STUDIES IN EXTRA-MESSAGES: LISTENER IDENTIFICATION OF SPEAKERS' VOICES UNDER CONDITIONS OF CERTAIN RESTRICTIONS IMPOSED UPON THE VOICE SIGNAL. Contract Memor 22525, Proj. Design. 145 903, Proj. NR 061 064.01.30, Rep. 30, Oct. 1954, 9pp. School of Aviation Medicine, Pensacola Air Station, Fla.

The ability of listeners to identify a speaker by voice was studied relative to certain restrictions imposed upon the voice signal. These restrictions included: a) high-pass, low-pass and octave-band pass filtering of the voice signal, b) the altering of the relative sound pressure level of the voice signal, and c) the masking of the voice signal by noise. A decrease occurred in correct identifications of voice with increasing amounts of the signal rejected through progressive high-pass or low-pass frequency filtering. For the octave bands considered, maximum correct identification of voices occurred for the octave band of 1200 to 2400 cps. A decrease in listener identification occurred when the voice signal was presented at a relatively low signal level. Listener identification of voices decreased directly as the signal-to-noise-ratio of the masking noise was decreased in the range from a plus to a minus 8 signal-to-noise-ratio.

R 4

6434

Petit, S.M. SKIN REACTIONS TO OXYGEN MASK RUBBER IMPREGNATED WITH FUNGICIDES. Proj. 385, Rep. 1, June 1945, 2pp. USAAF School of Aviation Medicine, Randolph Field, Tex.

Patch tests were conducted to determine whether or not certain fungicides when impregnated into oxygen mask rubber will cause sensitization reactions of the skin. 50 healthy male Ss were tested with small patches of 6 specimens (1 untreated and 5 treated with varying amounts of the fungicides) fixed to their backs for a 48-hr. period. No reactions were found for any of the test items (1% PT, 2% PT, 1% PB, 2% PB, and 2% GA). (MEIAS)

6435

Polonis, Bernice W. ANALYSIS AND SUMMARY OF FOOD PREFERENCE SURVEY DATA. Contract DA 71 009 QM 19865, Proj. 7 64 15 007, Rep. 5, May 1953, 4pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

6436

This report presents a survey of the findings of five food preference surveys of Armed force personnel conducted during 1950 to 1951. The discussion is centered upon the following aspects of the investigations: 1) evaluation of the food preference questionnaire and sampling methods; 2) the stability of food preference data; 3) the relation of individual background characteristics to food preference; 4) the meaning of the scale; and 5) the variation in preference by installation-sampled.

6437

Paulson, E.C. THE PRECISION OF CHOICE REACTIONS. J. exp. Psychol., Feb. 1956, 51, 93-122. (Applied Psychology Research Unit, National Research Council, Cambridge, England).

6437

To determine the relative accuracy between one-choice and two-choice reactions, 16 subjects tracked the center line on a vertically moving paper tape, moving to right one inch or to left two inches upon a corresponding auditory signal. For one-choice reactions the pattern of signals was fixed, for two-choice, random; time intervals of 2.1 and 4.2 seconds were used. A correct reaction had to satisfy a combined criterion of time and precision; errors, reaction times and speed of movement were analyzed for differences between the two types of reactions. Further analysis was made of the "catch tests" in one-choice reactions (signal after 2.1 second occurred only 50 per cent of trials) and applied to tracking behavior in one dimension. T. R 5

6438

Sandel, T.L., Teas, D.C., Fenderson, W.E., & Jeffress, L.A. LOCALIZATION OF SOUND FROM SINGLE AND PAIRED SOURCES. J. acoust. Soc. Amer., Sept. 1955, 27, 842-852. (Contract N0bsr-52267. University of Texas).

6438

This investigation of localization of air-borne sound from single and paired sources employed five subjects throughout three experiments. Three six-inch speakers placed 40 degrees to left, 40 degrees to right and directly at front of subject were used with a fourth moveable speaker to indicate direction of signal source. In the first experiment a single speaker at a time was used; in the second, pairs of speakers were used in phase; and in the third, pairs in phase opposition were employed. Approximately 50 judgments were made by each subject in each experiment. Predicted locations are compared with subjects' responses. The results are discussed in terms of tone localization at various frequencies as a function of interaural time differences and

111 - 708 Intensity differences at the two ears. T. G. T. R 6

6439

Sargent, F., Sergeant, Virginia W., Johnson, R.E., & Stolpe, S.G. THE PHYSIOLOGICAL BASIS FOR TRAINING CONDITIONS IN SURVIVAL RATINGS. PART 1. THE EFFICIENCY OF YOUNG MEN UNDER TEMPERATE CONDITIONS. Contract AF 12(50C) 88, M50 656 81, Tech. Rep. 53 484, June 1954, 50pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

From December 1952 through June 1953, 12 students served in survival ration studies at McKinley Hospital, University of Illinois, Urbana. To establish physiological, biochemical, nutritional, and clinical judgments on the relative effects of water, calories, and ratio of protein, carbohydrates, and fat in all-purpose survival rations, numerous observations were made in recurring periods of adequate, restricted, and recovery diets with known amounts of vitamins at all times. Starvation and a 3000 calorie adequate ration represented the worst and best regimens. 20 nutrient combinations could be rank-ordered, by 19 different tests, with respect to effects on organ function and body efficiency. Below the 3000 calorie control ration, the highest score was obtained by a combination supplying unlimited water, 2500 calories per day, and a distribution of calories of 15% protein, 55% carbohydrate, and 30% fat.

R 170

6440

Talhurst, G.C. THE EFFECTS OF AN INSTRUCTION TO BE INTELLIGIBLE UPON A SPEAKER'S INTELLIGIBILITY, SOUND PRESSURE LEVEL, AND MESSAGE DURATION. Contract N6onr 22325, Proj. Design. NR 145 953, Proj. NR 001 104 500, Rep. 58, July 1955, 150p. USA School of Aviation Medicine, Pensacola Air Station, Fla.

3 criterion measures, namely, multiple-choice intelligibility scores, and sound pressure level and duration measurements of 5-syllable phrases, were obtained on 48 Naval Aviation flight students. 1/2 received an instruction to be as intelligible as possible before a second reading; 1/2 received no instructions. The results of the instruction were to improve intelligibility scores and to prolong the reading. No increase in sound pressure level of voice was found.

R 17

6441

Herrick, J.H. EFFECT OF EXPONENTIAL TYPE CONTROL LACS ON THE SPEED AND ACCURACY OF POSITIONING A VISUAL INDICATOR. Proj. 7182, Tech. Note 55-348, June 1955, 12pp. USAF Wright Air Development Center, Aero Medical Laboratory, Wright-Patterson AFB, Ohio.

6442

To determine the effect exponential type controller system lags have on the human operator's ability to position a visual indicator rapidly and accurately, twenty subjects repeatedly set a pointer to a fixed reference position by means of a rotatable knob. Exponential lags of 9, 40, 120, 360, and 1,000 milliseconds were introduced between control and display. Performance data (steering time, settling time, total acquisition time and excessive entries of pointer into center scoring area) were analyzed as functions of control lag. Further study was made of the extent to which the operator tended to compensate for the effect of lag. Implications for the design of such systems are discussed.

T. G. I. R 2

6444

Richards, D.L., Archbold, R.B., Coopersmith, H., & Alkaster, H.V. THE EFFECT OF LOGATON MATERIAL ON THE RESULTS OF ARTICULATION MEASUREMENTS. Res. Rep. 13710, H.9.2.55, Nov. 1954, 11pp. Post Office Engineering Dept., Post Office Research Station, Dollis Hill, London, England.

6444

This study was designed to evaluate the effects of type of logaton scoring method, and test material upon articulation measurements. Two types of logatons, the Dwyer and the Berry, a variety of test materials (words in common use, logatons with variable vowel, etc.) and several scoring methods (e.g., percent of words, sounds, etc., correctly received) were evaluated in two sets of 5 tests each. A summary of results is presented and deals primarily with the relative effect of change in each of three variables upon the accuracy of articulation rating techniques. Implications for techniques to afford more accurate assessment of telephone circuits are discussed.

T. G. I. R 6

6445

Booe, R.W. & Schmidt, I. PHYSIOLOGICAL EFFECTS OF REFLECTIVE, COLORED, AND POLARIZING OPHTHALMIC FILTERS. III. EFFECT OF OPHTHALMIC FILTERS ON COLOR VISION. Proj. 21-02-040, Rep. 2, March 1950, 29pp. USAF School of Aviation Medicine, Randolph Field, Tex.

6445

This is a study of the effects of ophthalmic filters as used in protective goggles upon color vision. Four hundred subjects screened with the pseudo-isochromatic tables to include both color normal and color deficient individuals were tested on the SN color threshold tester and the Nagel anomaloscope while wearing each of 12 filters. Readings were made with and without goggles and the filters were presented in a random order. The results are discussed in terms of the relative effect of each of the filters on accuracy of color perception. In addition, the wave length, transmission curve, and spectral sensitivity are presented for each of the filters. Recommendations are offered concerning the utilization of colored protective ophthalmic filters by pilots or for general wear.

T. G. R 26

6446
Sattzman, R.H., Jr. OPERATIONAL EVALUATION OF MODIFIED B-1A ATTITUDE INDICATOR (3-1/2 INCH SHAFT TWO-TONE). AFG-SAR/398, Sept. 1954, 2pp. USAF Air Proving Ground Command, Eglin AFB, Fla.

An operational evaluation of the Lear 3-1/2" In. Attitude Indicator was conducted by Air Proving Ground Command and the USAF Instructor School during August 1954. The indicator was installed in an airplane and evaluated by 16 different pilots during 4 night and 14 daylight flights. The presentation was found to be from a very satisfactory to superior. Compared to the J-8 indicator, there was complete agreement that this indicator was much more desirable. Although processional errors in some instances were reported to be as great as those found in the J-8, these errors were easier to compensate for accurately and quickly. The ability to make accurate pitch and bank adjustments when at steep climb and dive attitudes was particularly noted by all. (HEIAS)

6447

Schubert, E.D. RESEARCH STUDY OF THE PSYCHO-ACOUSTIC EFFECTS OF HUMAN AND ARTIFICIAL SIDETONE. FINAL REPORT. Contract DA 36-029 ac 42562, Proj. 3 92 12 822, Signal Corps Proj. 17 152B, Oct 1954, 13pp. Lab. Procurement Office, USA Signal Corps Supply Agency, Fort Monmouth, N.J. (5650 University of Iowa, Cedar Rapids, Iowa).

This is a final summary report on 2 years of investigation of effects and possible uses of sidetone. It is a brief overall view of the experiments attempted, the reasoning behind them and the implications of the results. More detailed accounts of most of these experiments have appeared in earlier reports. In addition, 3 supplementary reports dealing with phases completed since the writing of the last quarterly report (July 20, 1954) will follow immediately. The present report points out that there are definite limits beyond which sidetone will cease to affect speaking behavior. Even the untrained speaker will choose to continue speaking without listening to his sidetone if too many changes from the normal speaking situation are introduced into any experiment on sidetone. Though we have not succeeded in measuring body-conducted sidetone directly our present belief is that it consists primarily of energy at the fundamental frequency and possibly a little of the second and third partials. Intelligible signals picked up "from the ear" when the usual airborne signal has been determined do not appear to be the signal which travels directly from vocal mechanism to the inner ear. Delayed sidetone produces some dramatic and interesting changes in speaking behavior. It represents, however, too radical a change from the normal speaking situation to be highly useful as an experimental tool either for modifying speech behavior within the normal range or for investigating the characteristics of the speaking mechanism. All these assertions are discussed in some detail in the text of the report.

R 4

6448

Tschobert, V.R., Kneibick, J.L. & Bosch, E.R. STUDIES OF MANUAL DEXTERITY: I. METHODOLOGICAL STUDIES. Proj. 7 95 20 883C, Tech. Rep. EP 3, Nov. 1954, 38pp. USA Quartermaster Research & Development Command, Watrick, Mass.

A series of experiments were designed to isolate the requirements of practical testing procedures for the evaluation of manual dexterities afforded by Quartermaster handgear. The results obtained suggest that: a) There is no general test of manual dexterity; rather, individual tests evaluate specific dexterities. b) The effects of specific test-glove combinations are altered by practice. c) There is probably an optimal method of performing specific tasks with specific handgear items. Thus, the handgear item itself determines in part the specific dexterity measured by a test. d) Fatigue appears to alter the nature of specific dexterities measured by a test. In addition, the authors propose a methodology for evaluating handgear which is based upon the assumption of specific dexterities, and which takes into consideration other factors involved (fatigue, learning, etc.). Related problems for future experimentation are suggested.

6449

Weiss, E.C. & Taylor, A.L. HUMAN ENGINEERING EVALUATION OF TRUCK, 1 1/4-TON, 4 x 4, M151. Proj. TEE 1000 19, Tech. Memo. 21, June 1955, 73pp. USA Human Engineering Lab., Aberdeen Proving Ground, Md.

6449

To evaluate the Army 1 1/4 ton truck, M151, in terms of its man-machine relationships and to provide some generalizations for an optimum vehicle of this class, a human engineering study was made. Specific suggestions are presented for the vehicle and its components in light of anthropometric data supplemented by use of subjects approximating the 5th and 95th percentiles actually performing a given task. Pertinent literature was reviewed and user information from operators of the currently used 1 1/4-ton equipment was obtained. Topics covered are: workspace dimensions (fixed limits, seating), controls, displays, visibility, safety and comfort, and maintenance.

T. I., R 31

6450

Wechsler, R. & Koskoff, Y.D. EFFECT ON HUMANS OF MODERATE DOSES OF ATROPINE. Contract DA 18-108 CML 5370, MLCR 54, Jan. 1955, 7pp. USA Chemical Center, Chemical Corps Medical Labs., Md. (Montefiore Hospital Institute of Research, Pittsburgh, Penn.).

An investigation was carried out on the effects of large doses of atropine sulfate on humans and monkeys. The Ss were observed for cardiovascular, neurologic, and ELG effects in addition to changes in cerebral blood flow and cerebral metabolism. Findings from the human studies show that with the exception of increased pulse rate and occasional rise in blood pressure, there were no immediate changes observed as the result of atropine. (These Ss were at complete bed rest during the entire study.) Other changes such as pounding headaches, blurred vision, and dryness of mouth appeared 1 to 2 hours after injection of the drug and persisted for about 24 hr. This is a preliminary report on a long-term study.

(HEIAS)

R 4

6452

Crannell, C.W. & Christensen, J.M. EXPANSION OF THE VISUAL FORM FIELD BY PERIMETER TRAINING. Contract AF 18(600)-25, Proj. 7186, WADC Tech. Rep. 55 368, Oct. 1955, 32pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Miami University, Coral Gables, Fla. & Aero Medical Lab., USAF WADC, Wright-Patterson AFB, Ohio).

This is the second in a series of experiments designed to examine the possibility of increasing the size of the visual form field by specialized training. The present investigation was concerned with the effect of various amounts of perimetric training on the visual form field. 5 groups were used: a control group which received no training, and 4 groups which received, respectively, 10, 20, 30 and 40 1/2 hour sessions of training. As in a previous experiment, there was considerable improvement in ability to identify familiar stimuli presented farther and farther from the foveal area, but no evidence of transfer to other stimuli.

R 9

6453
USA Medical Research Lab., COLD INJURY MONITOR, 1951-1952.
Proj. 6 64-12 608, Subtask 8, Rep. 113, April 1953.
1954pp. USA Medical Research Lab., Fort Mon., Ky.

6453
This report on cold injury represents a summary of the activities of the Cold Injury Research Team in Korea 1951-1952. Fifteen studies are presented and they concern such topics as evaluation of winter clothing, the personality traits of frostbite casualties, cold stress studies, the treatment and epidemiology of frostbite, and so forth.
T. C. A. (mon.)

6458
Allist, E.A. MWP, ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL SYSTEMS. (Contract AF 33(616) 43, Proj. 2138, Rep. 15, Final Quarterly Report, June 1954, Rep. 2244, Wright Air Development Center, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

6458
This report is a general summary of a research program in human engineering aspects of air traffic control systems. Included are brief statements of each study completed (purpose, description of methodology, results of results) with references to publications in which complete reports can be found. Areas covered by these experiments were: display of radar information for air traffic control, visibility and lighting, man's capacity as a monitor, information-processing capacities of the human operator, systems research and evaluation, design and development of research equipment.
R 28

6454
US Advisory Panel on Personnel and Training Research. SYMPOSIUM ON ELECTRONICS MAINTENANCE. RPT 702/4, Aug. 1955, 21pp. US Research & Development Board, Department of Defense, Washington, D.C.

This symposium on electronics maintenance was chiefly concerned with the personnel and training research and development contributions to the operating and training programs sustained under trouble shooting and maintenance. The first session pertained to the analysis of job activities and contained 5 papers on field research, operator role in maintenance, evaluation of various job analysis methods and specific methods of forecasting maintenance job requirements. Session II, on selection and classification of personnel, presented 3 papers on this topic. Session III, proficiency measurement, described performance tests for various electronics specialties and the development of proficiency measures for technicians and guided missiles, 4 papers. Session IV, effectiveness of training in maintenance activities, contained 3 papers of various approaches to evaluation of training effectiveness, to training for trouble shooting, and on the relationship between operational effectiveness and maintenance minimization and training. Session V, maintenance organization (and teams), presented 2 papers--dimensions of team performance and team training problems and studies in the organization of maintenance. A final session was held to discuss next steps in research and development in this field. (HEIAS)

6456
Southwest Research Institute. DESCRIPTION OF ROTARY PURSUIT TEST MODEL C. Contract AF 18(600) 605, Proj. 7701, Task 77029, Nov. 1954, 23pp. USAF Technical & Training Research Center, Skill Components Research Lab., Lackland AFB, Tex. & Southwest Research Institute, San Antonio, Tex.

This report describes the Rotary Pursuit Test which is used to measure ability of an individual to follow accurately by the "free-hand" method the movement of an object moving rapidly in a repeated curved path. The S is required to follow the contact point of a stylus in contact with the target. The score is based on total time that the stylus has been in contact with target for 5 test trials, each of 10 sec. Test periods of 10 sec. are given between test trials with 20 sec. between groups. The sequence of events during test administration are enumerated with the test and control units described in detail. Photographs and schematic wiring diagrams are included. (HEIAS)

6459
Anderson, C.H., Baker, R.E., Crippen, D.S., McKnight, F.S., et al. EVALUATION OF A TRAFFIC CONTROL MONITOR FOR USE WITH THE PRECISION APPROACH RADAR. Proj. 11 709, Rep. 150, Feb. 1953, 26pp. US Civil Aeronautics Administration, Technical Development & Evaluation Center, Indianapolis, Ind.

This report describes the operational and technical evaluation of an air traffic control aid called the PAR-Traffic Control Monitor. The equipment was designed to monitor aircraft making precision radar approaches and to perform the coordination function between the PAR controller and the departure controller. The equipment is also designed to act as a monitor of the control instructions issued by the PAR controller and to sound an alarm if less than minimum separation develops between aircraft on approaches. The PAR-Traffic Control Monitor includes direct-reading meter indications of the distance from touchdown, the point at which the airplane touches the ground, and of the ground speed of landing aircraft. It also includes means of actuating a no-take-off warning alarm when aircraft on approach reaches a preset minimum distance from touchdown. The overtaking warning alarm is actuated when aircraft on approach have less than minimum separation from other aircraft. Misfunctioning of the equipment is indicated by a no-video alarm. In the evaluation of the monitor, use was made of both actual and simulated aircraft targets. The results of the evaluation tests indicate that the PAR-Traffic Control Monitor in its present form considerably increases the work load of the PAR controller and is not sufficiently reliable to be used in the control of air traffic.

6457
USAF Air Weather Service. THE MILITARY GRID REFERENCE SYSTEM. Tech. Rep. 105-122, Oct. 1954, 12pp. USAF Military Air Transport Service, Air Weather Service, Washington, D.C.

The Military Grid Reference System (MGR) is a method for locating a point on the earth's surface to several of many degrees of accuracy. The MGR for a point consists of a) the grid zone designation--a combination of letters and numbers; b) an identification of the 100,000 meter square in which the point is located; and c) the grid coordinates of the point expressed, in numbers, to the desired degree of accuracy. This manual gives a description of each of these 3 portions of the MGR and contains a section showing how they are combined. (HEIAS)

6461
Anonymous. THE ART OF CENTRIFUGE: RESEARCH APPARATUS AT R.A.F. INSTITUTE OF AVIATION MEDICINE. Engineering, May 27, 1955, 662-665.

The non-carrying centrifuge at the Royal Air Force Institute of Aviation Medicine, Farnborough, recently (1955) incorporated by the Air Minister, is designed to simulate the centrifugal acceleration encountered by pilots when they change direction at high speeds, and to provide means for monitoring the physiological reactions to such accelerations. Details of design and performance are given along with illustrations of layout of the centrifuge plant, a simplified diagram of the control scheme, and photographs of the equipment. (NEIAS)

6464
Atkinson, C.J. RESEARCH STUDY OF THE PSEUDO-ACOUSTIC EFFECTS OF HUMAN AND ARTIFICIAL SIDETONE. SECOND QUARTERLY REPORT. Contract DA 36 639 sc 42552, DA Proj. 3 59 12 022, SC Proj. 17 1328, Jan.-March 1953, 10pp. Department of the Army, Signal Corps Supply Agency, Fort Monmouth, N.J. (State University of Iowa, Iowa City, Iowa).

This technical report covers work done at the State University of Iowa during the period Jan. 1, 1953 to March 31, 1953, on the Sidetone Project, Signal Corps Contract DA 36 639 sc 42552. Three tasks are under active prosecution at present: a.) the procurement and construction of equipment; b.) search of the literature; and c.) determination of natural sidetone paths. These tasks are at various stages of completion, and this report indicates their present status and probable direction.

6467
Baker, P.T. THE EFFECTS OF A HOT-DRY CLIMATE ON CAGES MORPHOLOGY. Rep. 197, Jan. 1953, 21pp. US Department of the Army, Office of the Quartermaster General, Quartermaster Climatic Research Lab., Lawrence, Mass.

This study attempts to discover and assess some of the body structure adaptations that took place when 83 Army personnel were placed in the hot-dry desert near Yuma Test Station, Arizona, for a 2-1/2 month period. Measurements were made on the men just prior to their departure for the Yuma Test Station and for each week during their stay there, and finally upon their return. Analyses of the data show that some amount of circumference and fat was lost in most individuals. There were different amounts and patterns of loss according to racial group and original amount of fat. There was more loss in the extremities than in the torso. It was not conclusively proved that the heat encountered in the desert environment was responsible for the changes found, but it might be assumed that the change from a temperate to a hot-dry climate was at least a contributory factor in a multiple causation. The analysis by type of activity showed that the kind of work done was probably not an important factor in loss. (NEIAS)

6468
Baldwin Company. DEVELOPMENT OF AN OXYGEN WARNING-SIGNAL GENERATOR. FINAL REPORT. Contract AF 33(038) 23313, Rep. AFAC 4, Nov. 1953, 25pp. The Baldwin Company, Cincinnati, Ohio.

A warning-signal generator was developed for operation directly into the headset circuit of the AN/AIC 10 Intercommunication Set. Special attention was directed toward making the tone loud, attention-arresting, and unlike other sounds normally heard by flying personnel. Although intended primarily for use with an oxygen-failure indicator, it will also provide a mixing facility for other separate warning signals.

6469
Balke, B., Grillo, G.P., Konecni, E.B., & Luft, U.C. GAS EXCHANGE AND CARDIOVASCULAR FUNCTIONS AT REST AND IN EXERCISE UNDER THE EFFECTS OF EXTRINSIC AND INTRINSIC FATIGUE FACTORS. A. WORK CAPACITY AFTER BLOOD DONATION AND AFTER EXPOSURE TO PROLONGED, MILD HYPOXIA. Proj. 21-1201 0014, Rep. 1, July 1953, 14pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Work capacity was determined during exercise on the treadmill; heart rate, blood pressure and respiratory gas exchange in response to an increasing work load were used as criteria of performance. Optimal work capacity can be defined objectively in this procedure as the highest work load at which an individual is able to balance the immediate oxygen requirement by exerting circulatory and respiratory functions to capacity. Experiments on the after-effects of blood donation (500 cc.) were carried out on 14 subjects at different intervals after venesection. Within one hour after blood donation the reduction in optimal work capacity was statistically very significant as compared to repeated controls made previously. Test results obtained 48 and 72 hours after blood loss were not significantly different from the normal. Determinations on the 8th and 10th day after blood donation revealed an improvement in work capacity which was statistically significant. After an exposure of 3 1/2 hours to a simulated altitude of 16,000 feet in a low-pressure chamber the same criteria of performance indicated a decrease in work capacity on the borderline of statistical significance. Differences in the behavior of circulatory and respiratory functions under the influence of the 2 fatigue factors employed in this study are revealed and discussed.

6472
Bengoechea, J.R. FLIGHT NOISE LEVEL SURVEY OF RB-57A AIRCRAFT. Task T04P 307L, Tech. Note WCLS-55 1, Jan. 1955, 15pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

A flight and ground noise level survey of the RB-57A airplane was conducted at Wright-Patterson Air Force Base, Ohio on 23 August 1954 and 14 September 1954. The subject survey was conducted in accordance with request contained in suborder from WCLSY-5 dated 14 April 1954, subject, "Cockpit Noise Level". Results of this test indicate that the noise level in the Navigator/bombardier location may be excessive at top airspeed. It is further indicated that additional soundproofing is required to bring sound level in the frequency bands above 600 cps to the desired handbook limits.

R 0

6473
 Bilger, R.C. INTELLIGIBILITY OF FIELD TELEPHONE VOICE COMMUNICATIONS THROUGH RESPIRATORS. Contract DA 38 108 ONL 4037, Rep. 10, Nov. 1954, 14pp. Voice Communication Lab., Purdue University, Lafayette, Ind.

6473
 To investigate the relative intelligibility characteristics of three Army respirators (M-9 Standard, M-9 with Voice-mitter, M2-HM1-6 Optical) with respect to telephonic transmission of speech signals, a standardized multiple-choice intelligibility test was used. Two talkers read the word lists through a chest microphone under each of the three mask conditions and a no-mask condition. The listeners heard the voice signals through headphones with in-line noise for all conditions. The intelligibility scores (words accurately heard) were studied by analysis of variance techniques for differences due to transmitters. Findings are discussed in relation to data from previous experiments on these respirators.
 T. I.

6477
 Bogan, J.W., & Barnett, W.E. APPLICATION OF QUEUEING THEORY TO CONGESTION PROBLEMS OF FORWARD AREA COMMUNICATION SYSTEMS. Contract DA 42-025-aa-150, DA Proj. DA 3-92-71-0C1, 30 Proj. 1023, Rep. 57-E-3, Dec. 1954, 83pp.
 Keller, Raymond and Brown, T.C., State College, Penn.

6477
 Queueing theory is the application of the probability theory to problems of congestion, such as congestion of messages on a communication link. The theory is explained and discussed and the simple queueing problem having exponential call lengths, Poisson arrivals, and ordered queueing is worked out in detail for purposes of illustration. This problem, however, does not apply to the communications of a small military organization or a forward area. In the appendixes will be found further examples using various sets of assumptions which have been worked out in the course of developing more realistic models.
 G. R. 3

6474
 Bilodeau, Ima McD., & Bilodeau, E.A. SOME EFFECTS OF WORK LOADING IN A REPETITIVE MOTOR TASK. J. Exp. Psychol., Dec. 1954, 455-467. (USAF Skill Components Research Lab., Air Force Personnel & Training Research Center, Lackland AFB, Tex.).
 A studies used a simple cranking device with basic trainee assigned to investigate the question of the extent to which the inhibition accrued in a self-paced task varies with work loading. Experiments I and II, holding pre- and posttest loading constant, provided evidence that recovery in rate of responding is independent of work loading across manipulation of duration of pretest work, duration of interpolated rest, and ordinal number of the recovery. The data provided no unambiguous answer to the question of how much, if at all, work loading affects the amount of work inhibition accrued in a self-paced task. In Exp. III and IV the inhibitory effects of 2 loadings were studied by comparing SS shifted from the heavier to the lighter loading with control SS who worked against the lighter loading throughout. In Exp. III the variable was the duration of interpolated rest given after a constant period of pretest cranking, and in Exp. IV the variable was the duration of cranking preceding an instantaneous shift. In general, though not in every case, the post-shift performance of control groups was superior to the performance of groups shifted from the heavy to the light loading. The data thus suggest that a greater amount of work inhibition was accrued in work against the heavier loading, though alternative explanations may be offered to account for the postshift differences. Postshift differences, however, were slight; performance depending more upon present than past work loading; the different rates of responding for heavy and light loadings seemed, thus, to some extent to compensate for the difference in the work required per unit response.
 R. 7

6478
 Bolt, R.H. AIRCRAFT NOISE AND ITS RELATION TO MAN. Report from "Annual Flight Propulsion Meeting, Institute of the Aeronautical Sciences, March 1954, Cleveland, Ohio", March 1954, 26pp. Institute of the Aeronautical Sciences, Cleveland, Ohio. (Massachusetts Institute of Technology, Cambridge, Mass.).

The main ingredients of the aircraft noise problem are discussed in a broad way. The components of the "system", as the author sees it, are source, transmission path, receiver, and effects on receiver. These 4 components are considered in light of what is now known and then of problems that need investigation. Aircraft noise is seen as a system problem. There are possibilities of noise control on many individual parts of this system. The effectiveness of any particular control procedure should be evaluated in terms of its ultimate influence on subjective responses and the whole system designed to yield maximum acceptability at minimum total cost. (MEIAS)
 R. 3

6480
 Bostrom Manufacturing Company. BIBLIOGRAPHY ON THE EFFECTS OF ACCELERATION, VIBRATION AND NOISE ON THE HUMAN BODY. June 1956, 5pp. Bostrom Manufacturing Company, Milwaukee, Wis.
 The entries in this bibliography are subdivided into: general, acceleration, vibration, and noise categories. It was prepared from the Engineering Dept. files of Bostrom Manufacturing Co., Milwaukee, Wisconsin.
 R. 57

6475
 Black, J.W., & Utterback, W.E. VOICE COMMUNICATION. Contract N6onr 22525, Proj. 398, Rep. 11, Dec. 1954, 8pp. USN Office of Naval Research, Washington, D.C. (Speech Dept., Ohio State University Research Foundation, Columbus, Ohio).

This progress report of research on voice communication presents an annotated list of 18 technical reports that have been completed to date, a list of active personnel on the project and a summary of liaison and papers given by various members of the staff. (MEIAS)

6482

Bovles, J.W. PRELIMINARY ANALYSIS OF THE THURSTONE COLOR-FORM DOMINANCE TEST. Proj. 7704, Test 77751, Tech. Rep. AFFTC TR 55-1, Nov. 1955, 5pp. Personnel Research Lab., USAF Personnel and Training Research Center, Lackland AFB, Tex.

The Thurstone Color-Form Dominance Test was administered to 8 groups of basic airmen. A series of analyses indicated that the Form score was markedly affected by seating position. This effect was more striking for some designs than for others. Test-retest reliabilities were low. With regard to the Form score, further work with group administration of the test in its present form would seem to be of doubtful value. Any relationship that Form scores might have to other behavior variables would apparently be masked by the sources of variance noted in this report and probably by other extraneous conditions that were controlled in these studies. These findings do not, of course, preclude the possibility that an individual administration of the test under carefully controlled conditions might produce significant relationships to personality variables. A vertical movement score was found to have a relatively wider range, to be less sensitive to seating position, and to be somewhat more reliable than the Form score. It appears to be more amenable to group-administered investigation than does the Form score.

R.11

6483

Boynton, R.M. RAPID CHROMATIC ADAPTATION AND THE SENSITIVITY FUNCTIONS OF HUMAN COLOR VISION. J. Opt. Soc. Amer., March 1956, 46, 172-179. Contract Monr-668(06), ONR, University of Rochester.

6489

Bush, W.R. PUPIL LIGHT ADAPTATION AS AFFECTED BY THE SPECTRAL COMPOSITION OF THE TEST AND ADAPTING STIMULI. J. Opt. Soc. Amer., Dec. 1955, 45, 1047-1057. Contract Monr-668(05), ONR, University of Rochester.

6483

To study the sensitivity functions of human color vision, foveal, monochromatic test flashes were delivered 0.05 second after the onset of colored adapting stimuli and threshold determinations obtained by descending method of limits. Five conditions were used each on separate days: absolute threshold, red, yellow, green, and blue adaptation. Within a given session thresholds were determined at each of 29 wavelength settings from 420 to 700 millimicrons for two subjects. The data (negative log relative energy threshold values) are presented graphically. A theoretical analysis of the findings is presented and discussed in terms of color theory.

T. G. R 13

6489

To investigate foveal light adaptation as a function of wavelength, principally during the first fraction of a second, three nearly monochromatic lights (red, green, blue) equated for luminance were employed in all possible adapting stimulus-test flash combinations. The test flash was superimposed in a larger adapting field at intervals varying from -0.15 to +0.45 seconds and thresholds for three dark adapted subjects were obtained by descending method of limits. A second series of thresholds were obtained over an adaptation period of 15 minutes. Thresholds (log millilamberts) for each light were presented as functions of adapting intervals and analyzed in terms of selectivity effects of wavelength.

T. G. I. R 13

6484

Brantley, J.Q. APPLICATION OF CONTINUOUS WAVE RADAR IN A POSSIBLE SOLUTION TO THE PROBLEM OF COLLISION PREVENTION IN FLIGHT. Rep. 40, Nov. 1951, 23pp. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.

This paper develops the major requirements for a collision warning system. The necessity for detecting the presence of other objects, measuring their range, relative speed, and relative bearing is indicated and the utilization of these quantities for collision warning and avoidance is discussed. The operation of frequency modulated radar is explained and its adaptability to the fulfillment of the requirements shown. Results of an experimental program in progress at the Cornell Aeronautical Laboratory (a subsidiary corporation of Cornell University dedicated to aeronautical research and development) have also been included.

R 6

6486

Brewer, D.A. & Wurtele, D.B. SUBMERGED AIRCRAFT POSITION INDICATOR--ORIGINAL IDEA EVALUATION. Rep. 1123, July 1955, 3pp. Central Experimental and Proving Establishment, Royal Canadian Air Force, Ottawa, Ontario, Canada.

The purpose of this project was to determine the possibility and practicability of carrying Sea Markers, fluorescent blocks Ref 33C/232 in an aircraft as a visual aid for searchers should the aircraft come down in water. Water tests were carried out using the fluorescent blocks to determine the amount of marking they would give and the length of time this marking would remain in the water. Tests were carried out by allowing the markers to sink in various depths of water ranging from 3 to 20 feet. The results obtained using the fluorescent Sea Markers Ref 33C/232 indicated it would not be suitable as an aid to search for aircraft.

6488

Bullock, D.H., Braley, L.S. & Meyer, Susan R. RESEARCH ON MULTIPLE-CHANNEL MONITORING. Contract AF 30(602)-574, Prog. Rep. 2, Dec. 1953, 7pp. Psychology Dept., University of Buffalo, Buffalo, N.Y.

A progress report of work completed during the second quarter on multiple-channel monitoring is presented. Small scale parametric studies relating to the development of visual and auditory channels for use in simultaneous monitoring were conducted. In addition, techniques for producing auditory stimuli and for obtaining continuous recording of responses from both individual and group Ss have been developed. These visual and auditory channels are described briefly. (HEIAS)

6493

Chang, S.H., Essigmann, B.W., Phil, G.E., Stubbs, H.L., et al. VISUAL MESSAGE PRESENTATION. QUARTERLY PROGRESS REP. 17. (Contract AF 19(122)-7, Item 1, May-Aug. 1953, 46pp. Northeastern University, Boston, Mass.

Included herein are reports of progress made on the various topics under active study during the period from April 15, 1953 to July 1, 1953. General consideration is given to the tentative block diagram of a speech-analyzer component for use in a proposed speech-compression system. The general scheme employs existing techniques of speech analysis to perform the processes of segmentation and identification of discrete speech units, here defined as phonoids. Treated specifically in this connection are: a) pitch-period indication b) sampling of the clipped-speech waveform for segmentation, c) discriminatory analysis applied to fractional-power measurement for identification, and d) pertinent linguistic studies. Terminal results are reported on the intervalgram studies and on the construction of an electronic analog divider circuit.

R 4

6494

Chiles, V.B. EXPERIMENTAL STUDIES OF PROLONGED WAKEFULNESS. Proj. 7193, Task 71612, Tech. Rep. 55 395, Dec. 1955, 16pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

2 experiments were carried out concerning the effects of prolonged wakefulness and of fatigue on performance of psychomotor and psychological tasks. The first experiment involved 4 subjects each of whom sat individually in an aircraft cockpit for 56 hours. During this time, measures of reaction time and alertness were taken, and, at the end of the experiment, 2 of the subjects flew ILS passes in a Link trainer. The reaction time and the alertness measures reflected considerable variability in the attentiveness of the subjects. The performance in the Link trainer was judged to be within the limits of acceptability. The second experiment involved the assessment of the effects of 30 hours of wakefulness with continuous work (painting a barracks) on the performance of 15 subjects on a psychological and a psychomotor task. In addition, the effects of 2 different drugs, d-amphetamine sulphate and cortisone, were compared with those of a placebo. The psychological test involved the summing of rows of figures, and the psychomotor test involved arm-hand steadiness. Each of these tests distinguished, to some extent, the 2 drug groups from the placebo group. It was concluded that the 2 drugs improve performance on the addition test, whereas they tend to decrease arm-hand steadiness as a function of time.

R 4

6495

Chinn, H.L., Cannon, V.R., & Frantz, H.E. EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIR-SICKNESS. IX. PROTECTION OF AIRBORNE TROOPS. Proj. 21 32 014, Rep. 5, Dec. 1952, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

Airborne soldiers received placebo and medication during 2 flights of 5 to 7 hours' duration. The incidence of vomiting for the placebo group was 6.8 percent. The following drugs given immediately prior to take-off significantly lowered the incidence of vomiting: Wellcome 47-83 (50 mg), Phenergan (25 mg), Phenergan (12.5 mg), Trimeton (25 mg), Pyrrolazote (50 mg), and scopolamine (0.65 mg). Postafene (50 mg), given 24 hours prior to take-off also afforded significant protection. None of these medications was superior to the others. The incidence of drowsiness, blurred vision, dry mouth, and fatigue was increased by some of the drugs, while dizziness, sweating, and headache were reduced. Almost 19 percent of the paratroopers became sick during a 60- to 90- minute flight prior to their jump.

R 7

6496

Chinn, H.L., Handford, S.W., Smith, P.K., Cone, T.E., et al. FURTHER EVALUATION OF DRUGS FOR THE PREVENTION OF SEASICKNESS. Proj. 21 32 014, Rep. 10, Dec. 1952, 9pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The following preparations afforded significant protection against seasickness when tested aboard Navy transports: Lergigan, Phenergan, Trimeton, Benadryl, Persidol, Pyrrolazote, Wellcome 47-83, Schering preparation 1667, Multargen, Parke-Davis S-45, Trimeton-scopolamine mixture, and Postafene. Lisergan, Probanthine, Isophenergan, Bentyll, Diparcol, Buscopan, Dramamine, Mosidal, Benthine, and Dibenzylene were ineffective. The incidence of seasickness decreases progressively with increasing age between 17 and 39. Similarly, the incidence decreased with increasing weight. Seasickness was least among those quartered amidships, increasing both fore and aft. The probable chemical identity of Phenergan and Lergigan was discussed. The relationship between chemical structure and pharmacological activity was considered.

R 30

6497

Christensen, J.M. & Collins, H.R. REPORTS OF RESEARCH IN THE FIELD OF ENGINEERING PSYCHOLOGY. RDO 694 38, WADC TR 53-75, April 1953, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

6497

This bibliography lists by functional groupings the authors and titles of the reports published by the Psychology Branch, Aero-Medical Laboratory, Directorate of Research, Wright Air Development Center, since its inception in 1945. The titles reflect the efforts of the Psychology Branch to find those designs and arrangements of equipment (aviation) that best match the sensory, motor, perceptual, and intellectual capacities of the human operator.

R 198

6498

Churchill, A.V. & Allan, D.G. EXPERIMENTAL DIAL DESIGN: DRML Proj. 164, DRML Rep. 134-1, P.C.C. Proj. 077, 94-20-27, H.R. 103, March 1955, 8pp. Defence Research Medical Labs, Toronto, Ontario, Canada.

This study is concerned with the speed and accuracy with which dials can be read when various principles of scale design are applied. The design factors tested were: black markings on a white background, and white on black; numbers inside the scale, and numbers outside the pointer tip an equal distance from the major and minor scale marks, and a different distance from the major and minor scale marks; standard scale, and staircase scale. The variables were combined to produce 16 different dials. Data were collected in terms of time and error. Analysis permits the following conclusions: a) the black on white contrast dials are read in a significantly shorter time than the white on black; b) scale marks equidistant from the pointer tip show a statistically significant advantage in reading accuracy and a slight, though not statistically significant, time advantage; c) numbers outside the scale show a significantly lower reading error when considering critical pointer positions, i.e. pointer partially obscuring numerals inside scale; d) errors of 10 or less occur more frequently in the right half of the scale, and errors of greater than 10 occur more frequently in the left half of the scale.

R 7

6499

Churchill, E. & Daniels, G.S. NOMOGRAPHS OF HEAD MEASUREMENTS. Contract AF 18(600) 30, RD0 695 71, Tech. Rep. 53-14, May 1953, 26pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio)

To achieve the optimum design of equipment intended to fit the wearer's head closely, a knowledge of the interrelationships between the more important head dimensions is necessary. This report provides such information in the form of 2 nomographs for determining the most accurate estimate for each of 12 head dimensions based on known values of head length and head breadth, and head breadth and head circumference.

R 5

6501

Clements, J.A., Johnson, R.P. & Beaton, R. COMPARISON OF VENTILATION OF A HIGH RESISTANCE-LOW COMPLIANCE PNEUMATIC SYSTEM (GAS CASUALTY MODEL) BY MOUTH-TO-MASK INSUFFLATION AND BY A PORTABLE HAND BELLOWS. Res. Rep. 290, June 1954, 19pp. Chemical Corps Medical Labs., USA Chemical Center, Md.

Normal young males can, for at least a half hour, continue the muscular effort necessary for the resuscitation by M-MI or bellows of a human nerve gas casualty manifesting extreme ventilatory hindrance. Under the circumstances of this investigation, maintenance of a competent seal of the mask to the casualty face is possible but is difficult and tiring. This study does not indicate a superiority of either M-MI or hand bellows (as modified for this comparison) with respect to ease of operation or adequacy of casualty ventilation. Further trials of these methods should be undertaken on unconscious human patients, in order to compare their ventilatory effectiveness, and especially to compare their effects on management of the upper airway.

R 7

6502

Coakley, J.D., Fucigna, J.T., & Bishop, E.W. HUMAN ENGINEERING REVIEW OF THE RADAR SET AN/CPN-4. Contract AF 30(602)-215, Task Order .05, Rep. 55-64, Nov. 1954, 32pp. RADC, Griffiss AFB, Rome, N.Y., and Dunlap and Associates, Inc., Stamford, Conn.

6502

To evaluate a ground-controlled-approach (GCA) radar set (AN/CPN-4) and to determine needed or desirable design changes, a human engineering review was conducted of this equipment as functioning in a GCA system. A review of GCA procedures and techniques is presented in this report with a description of the CPN-4 equipment and procedures for use. The evaluation of the system includes discussion and recommendations for desirable changes in regard to (1) the load handling capability of the system, (2) the number and arrangement of scopes, (3) the design of search radar, (4) the design of precision radar, (5) the design of the communications system, (6) illumination, and (7) maintenance.

T. I.

6503

Coakley, J.D., Fucigna, J.T. & Bishop, E.W. A HUMAN ENGINEERING REVIEW OF THE RADAR SET AN/FPS 3A. Contract AF 30(602) 215, Task Order .05, Rep. 55 63, Aug. 1954, 25pp. USAF Rome Air Development Center, Griffiss AFB, Rome, N.Y. & Dunlap & Associates, Inc., Stamford, Conn.

6503

This report presents the findings of a human engineering review of a surveillance radar (AN/FPS 3A) intended for use by the air defense system in either Early Warning sites or Air Defense Direction Centers. The equipment and its place in a functional system are described. The general characteristics evaluated include panel illumination, meters, alarm system for malfunctioning, off-centering procedures of the PPI display, and arrangement of PPI consoles. Appendices contain summaries of specific design features of the various components that need redesign with recommendations included.

T. I.

6504

Coakley, J.D., Fucigna, J.T. & Bishop, E.W. A HUMAN ENGINEERING REVIEW OF THE DIRECTION FINDER SET AN/GRD 9. Contract AF 30(602) 215, Task Order .05, Rep. 55-105, Dec. 1954, 13pp. USAF Rome Air Development Center, Griffiss AFB, Rome, N.Y. & Dunlap & Associates, Stamford, Conn.

6504

To obtain guidance for future models of a UHF direction finder system, a prototype model (Radio Direction Finder set AN/GRD-9) was reviewed. The equipment and operating procedures are described and an evaluation made on the basis of: 1) adequacy with which it fulfills its stated function, 2) display configuration, 3) arrangement of controls on the indicator, 4) size and centering of display, and 5) communications receiver. Recommendations for improved design are included.

1.

6505

Cohan, J. & Senders, Virginia L. FACTORS AFFECTING THE FREQUENCY OF VARIOUS FINAL DIGITS. Contract AF 18(600) 50, Proj. 7185, Tech. Rep. 55 371, Nov. 1954, 13pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

A total of 50,000 numerical responses, obtained from an experiment on the effects of repeated exposures on scale reading, was analysed to determine the effects of several experimental variables on patterns of number preferences. These variables were: exposure time, exposure number, scale graduation, and the final digit of the pointer setting. The last two variables and their interaction proved to be the most influential, but long exposure times and many repetitions of the same setting tended to reduce the amount of rounding. The results are discussed in relation to other work on number preferences, and recommendations are made concerning the design of scales and the methodology of scale reading experiments. Scales designed in accordance with established good design features are less affected by number preference patterns. Scale settings should be equalized or randomized over all the experimental conditions to keep number preference patterns from biasing research data.

R 10

6506

Coles, Signal Laboratory. A BIBLIOGRAPHY OF SPEECH COMMUNICATION IN NOISE. Contract DA 36 039 sc 64469, Proj. 1328, 843D, Order 94 PH 55 91 (4307), Jan. 1955, 224pp. Radio Corporation of America, DA, Shoran & Specialties Engineering, Camden, N.J.

6506

This is a bibliography of items especially chosen for their pertinence to the subject of speech communication in noise. The approximate time period covered is from 1930 to September 1954. The items are classified as follows: general; architectural acoustics; books and bibliographies; the ear and hearing; applied acoustics, instruments and apparatus; musical instruments and music; noise; speech and singing; ultrasonics; waves and vibrations; underwater sound; personnel and training; psychology and human engineering.

R approx. 2700

6513

Day, W.E. & Beach, Barbara R. A SURVEY OF THE RESEARCH LITERATURE COMPARING THE VISUAL AND AUDITORY PRESENTATION OF INFORMATION. Contract W33 038 AC 21269, AF TR 5921, Nov. 1950, 14pp. USAF Materiel Command, Wright-Patterson AFB, Ohio. (University of Virginia, Charlottesville, Va.).

6513

This review was oriented around two questions: 1) "Is material more easily understood when presented visually or aurally?" 2) Under what conditions and to what extent is each of the methods more efficient with respect to the comprehension of material? The findings were grouped according to the type of material presented; e.g., nonsense syllables, meaningful prose. From these data, several conclusions were drawn which point out the specific conditions under which each of the systems is superior. Implications for future communications research were outlined in five general areas: type of material, characteristics of human receiver, method of presentation, measure of intelligibility, and conditions of reception.

R 34

6507

Cowland, Iris M. THE NUMBER OF CASUALTIES ATTRIBUTED TO THE CARELESS OPENING OF VEHICLE DOORS. Note RM/1905/INC, Feb. 1953, 7pp. Road Research Lab., Department of Scientific and Industrial Research, Harmondsworth, Middlesex, England.

An analysis of accidents during the first 6 months of 1951 shows that about 4 per cent of pedal cyclist casualties are attributed by the police to "driver negligently opening door of vehicle." No type of vehicle can be singled out as being particularly likely to be involved in this type of accident but there is some indication that certain makes of cars and goods vehicles are relatively more often involved. It is thought that about 2,000 casualties per year, including about 1,900 casualties to pedal cyclists, can be attributed to this factor. The number of casualties of this kind to pedal cyclists appears to be increasing.

6509

Daniels, F., Jr., Vanderbie, J.H. & Winsmann, F.R. ENERGY COST OF TREADMILL WALKING COMPARED TO ROAD WALKING. Rep. 220, Aug. 1953, 10pp. Research and Development Lab., Office of the Quartermaster General, Department of the Army, Natick, Mass.

A comparison has been made between subjects walking at 3 1/2 mph on the treadmill and walking over roads and cinder tracks at the same speed. It has been found that the road or cinder track condition involves an average energy expenditure 9 to 10 percent greater than that for the treadmill. This is believed to be caused by a difference in the body mechanics while walking under these 2 different conditions. This difference must be taken into account in extrapolating climatic chamber and other treadmill data to field conditions.

R 11

6510

Daniels, F., Jr. & Madden, R. ENERGY EXPENDITURE DURING SOME SUBARCTIC BIVOUAC ACTIVITIES. Proj. 7 64 12 004D, Tech. Rep. EP 20, April 1956, 17pp. USA Quartermaster Research and Development Center, Natick, Mass.

The energy cost for the performance of certain activities was measured at Fort Churchill, Canada. The energy costs varied from about 40 Cal/m/hr. (in sleeping bag at night) to about 325 Cal/m/hr. (simulated infantry assault), an 8 fold increase. Other activities, such as cutting snow blocks, chopping ice, pitching tents, etc., were also measured and the energy costs were in the range 200-300 Cals/m/hr. The importance of these findings to the design of Arctic clothing is discussed.

R 7

6511

Daniels, F., Jr. OBSERVATIONS ON THE KOREAN A-FRAME. Proj. 7 64 12 004D, Tech. Rep. EP 29, May 1956, 21pp. USA Quartermaster Research and Development Center, Natick, Mass.

An analysis of design features and principles applicable in the field of heavy load carrying was made from 35 mm still pictures and 16 mm movies. Several illustrations are included for purposes of clarity. It is suggested that the Korean A-Frame is a highly functional device for transport of heavy loads.

R 20

6514

Babaglis, G.C. WINTER ARCTIC CAMOUFLAGE INVESTIGATION. Proj. 8 31 OR 004, Rep. 1234, Dec. 1952, 71pp. NSA Research and Development Lab., Fort Belvoir, Mo.

This report covers the winter Arctic camouflage investigation made to determine the visual coloration and related camouflage aspects for application to personnel clothing and related equipment to be used in winter Arctic and subarctic terrain. The investigation was conducted at Fort Churchill, Manitoba, during the period from Nov. 1950 to April 1951. The investigation was broken down into studies of three major items: overwhite fabrics (a 2-piece garment worn over the environmental clothing), colored fabrics, combination dress, personal equipment, and personnel equipment. During each of these studies, observations were made in all available terrain, weather conditions, and in all critical angles of illumination. It is recommended that: a) the overwhite uniform and raincoat cover be achromatic and have a glossless and a reflectance of 95% or more when worn over an olive drab fabric; b) a reasonable whitening compound for washing and duck personal equipment and a cleaning compound for white felt boots and mittens be developed; c) the rifle be provided with a white cover; d) personal equipment, such as skis, snowshoes, wall sleds, and other low silhouette equipment, be painted a permanent achromatic white with a minimum reflectance of 85%; e) tunings should be reversible, white on 1 side and olive drab on the other, or it should have white covers, the white being achromatic and having a reflectance of 85% - 95%; f) achromatic fluorescence be further investigated for application to overwhites; g) a white face veil, mask, or shield be developed to reduce conspicuousness of the parts head opening; h) the GQ-7 pants, with a band-down for roll and less glossiness, be used for outer garments to blend with the vegetation of the winter subarctic.

R 4

6518

Bishop, F. & Peterson, J.L., Jr. REGENERATION OF ACCELERATIVE FORCES ACTING ON MAN IN FLIGHT AND IN THE UNDERGROUND. Proj. DA 001 052 04 01, July 1953, 225pp. NSA School of Aviation Medicine, Pensacola Air Station, Fla.

The present text endeavors to provide in a single volume most of the basic mathematics, physics, and elementary aerodynamics required for the investigation and understanding of the effects of acceleration on man. Although directed primarily to the aviation physiologist and flight surgeon, much of the material is pertinent also to the biologist engaged in studies of the effects of acceleration on animals and plants. In addition, the presentation should be intelligible to pilots and other aviation personnel who have had some grounding in physical sciences. The chapters are intended for study in their numerical order, but an idea of the overall approach may first be gained by reading the "Chapter Summaries" in conjunction with the Table of Contents. Physiologic responses in general correlate most readily with forces determined from the standpoint of an observer moving with the actual subject, rather than with force patterns calculated in terms of some stationary terrestrial reference frame, as is more usually done in ordinary mechanical studies. Chapter IV endeavors to bridge the gap between these "internal" and "external" viewpoints and to define precisely their relationship; in the past the distinction has not always been made with sufficient clarity by acceleration physiologists. The preceding chapters actually cover standard classical mechanical analysis, while in subsequent chapters the treatment is primarily from the special "physiological" viewpoint.

R 11

6519

Bulch, J.P. & Schubert, E.D. STUDY OF BODY-CONDUCTED SIDETONE. Contract DA 36 039 SC 42562, Suppl. Rep. 6, Oct. 1954, 64pp. NSA Signal Corps, Washington, D.C. & State University of Iowa, Cedar Rapids, Iowa.

In order to study the signal which reaches the talker's ear through paths other than air during speech it is first necessary to attenuate the usual air signal. This was attempted in the study reported here by building a special "mouth-box" into which the talker spoke and a pair of "ear-boxes" to afford additional attenuation at the ears. Special materials are required to furnish adequate seals at the mouth and at the junction of the ear-box and the skull. Additional complications arise because the entire skull is vibrating to some extent during speech, and this appears to create more unwanted sound pressure under the ear-box enclosure than was anticipated. Further investigation revealed that a similar unsuspected sound pressure was present under ordinary earphone cushions during speech. Removal of this extra pressure by "cancelling" it leads to strange subjective impressions of difficulty of production of voice and unusual changes in apparent location of the source of one's own speech. The initial aim of obtaining a measure of body-conducted sidetone was pursued somewhat further by constructing a microphone probe which presents a resistive load to the ear, but the most promising means of estimating the spectrum of this signal is a non-loading capacitive pickup, currently under construction.

R 7

6520

Drummond, R.R., & Lackey, E.E. VISIBILITY IN SOME FOREST STANDS OF THE UNITED STATES. Contract DA-44-109-ga-1019, Proj. 7-83-05-0048, Tech. Rep. XP-16, May 1955, 25pp. Quartermaster Research & Development Center, Watlik, Mass.

6520

To measure the effect of vegetation cover on continuous visibility (greatest distance to which a quiet, erect, stationary man can be kept in constant view as the observer goes away from him), 392 stands of vegetation in various parts of the United States were classified according to the nature of both primary growth and undergrowth (Kuchler's system). A standard visibility object (green cylinder simulating the dimensions of a man with military equipment) was used for making visibility determinations (in yards). Measurements were made in both summer and winter months. Data were organized and presented in tables, graphs, and maps to show limits of visibility under various conditions. Further study is recommended.

T. G. I. R 5

6523

Egan, J.P., Gerjuoy, H., Shwing, E.J. CORRELATION BETWEEN ARTICULATION SCORES FOR SPEECH MASKED BY NOISE AND FOR SPEECH MASKED BY SPEECH. Contract AF 16(600)-571, Tech. Rep. AFRC-TR-56-52, May 1956, 9pp. GRO, AFRC, Bolling AFB, Washington 25, D.C. (Indiana University).

6523

To determine the degree of relationship between the ability to receive speech in a background of similar speech and in a background of noise, three experiments were performed. In each the subjects (297 in all) were given two articulation tests in a background of each type. In the first experiment, the test consisted of individual words; in the second and third, a five-word sentence test. In the last two tests, the cue for differentiating signal message from interfering speech was either differential intensity or differential quality. The data (number of correct words received) obtained for each of the abilities were compared by calculating the product-moment correlation between them.

R 2

5524

Fisher, J.E. & Spence, K.W. MAJOR AND INTERACTIVE EFFECTS OF SEVERAL VARIABLES ON REACTION TIME. Contract AFM 5587, Proj. NR 154 117, Tech. Rep. 3, March 1955, 24pp. Office of Naval Research, Washington, D.C. (State University of Iowa, Iowa City, Iowa).

Eighty college students served as Ss in an investigation of the joint effects of manifest anxiety, experimental stress, stimulus brevity, sex, and practice on simple and complex RT. The results showed significant positive relations between speed of response and stimulus intensity, practice, and task complexity. Men were faster than women. No main effects were found for manifest anxiety or for experimentally-induced stress. There was a highly significant interaction between sex and task complexity and a marginally significant interaction involving sex, task complexity, and stress. Failure to substantiate previous findings with respect to the influence of anxiety and stress indicates the need for more information concerning the specific conditions of which their effects are a function.

R 15

5525

Felton, W.W., Fritz, E. & Coker, G.W., Jr. COMMUNICATION MEASUREMENTS AT THE WASHINGTON NATIONAL AIRPORT FEBRUARY 1953 TO JUNE 1957. Contract CCA 26386, Tech. Rep. 1 285 2, Feb. 1957, 107pp. Air Navigation Development Co., The Franklin Institute, Philadelphia, Penn.

The main purpose of this report is to describe and analyze the use of air-ground voice communications at Washington National Airport during the measurement period. The study as a whole is intended to develop techniques for analyzing voice communications and to provide quantitative information about them. The information and the techniques may be used in two ways: to promote the best use of voice communications, to the end that assigned channels may be used more efficiently, and to guide, as required, the development of proposed systems of communications. Some of the main findings are: pilots and controllers are not able to use a single air-ground channel 100% of the time; amount of communicating time per aircraft limits the estimated maximum number of aircraft under simultaneous control per channel; the average message length is small (3.5 sec.); approx. 80% of all messages occur in conversations; message overlap is infrequent; communications in landing employ a wide variety of types of information.

5526

Fitts, P.M. & DeLongor, R.L. C-R COMPATIBILITY: CORRESPONDENCE AMONG PAIRED ELEMENTS WITHIN STIMULUS AND RESPONSE SETS. Contract AF 33(688) 10528, Proj. 77X, Task 77133, AFFWC TR 55 62, 1955, 10pp. USAF Personnel Research Center, Lackland AFB, Tex. (Ohio State University, Columbus, Ohio). (Reprinted from J. exp. Psychol., Dec. 1954, 48(5) - 483-472).

5526

This is an investigation of maximum stimulus-response compatibility for maximum rate of information as a function of the degree of agreement between stimulus and response elements with a population stereotype. One hundred Ss were given a series of stimulus-response ensembles consisting of two spatial stimulus sets and two symbolic stimulus sets. Pairing of stimuli with responses occurred in such a fashion as to provide maximum mirrored, and random stimulus-response correspondence. Results are discussed in terms of the relative performance under each of the three conditions of stimulus-response pairing.

I. G. I. R 15

5527

Pitts, P.M., Weinstein, M., Rappaport, M., Anderson, Nancy, and Leonard, J.A. STIMULUS CORRELATES OF VISUAL PATTERN RECOGNITION: A PROBABILITY APPROACH. J. exp. Psychol., Jan. 1956, 51, 1-11. Contract Monr-495(02). OSU, Ohio State University.

5527

This article describes a method for constructing classes of figures (metric figures) which can be specified precisely in probability terms. The approach contributes to the methodology of the study of visual perception. To investigate the effect of three stimulus factors (1. single versus bilaterally symmetrical figures, 2. construction by randomized versus constrained sampling, 3. orientation) two experiments were conducted using a perceptual task demanding speed in recognizing a particular pattern where presented as one of a set of alternative patterns. Mean recognition times were analyzed for effects of the three stimulus variables. Differential rates of learning for the different classes of figures were examined.

I. T. R 19

French, Elizabeth G. INTERRELATION AMONG SOME MEASURES OF RIGIDITY UNDER STRESS AND NONSTRESS CONDITIONS. J. abnorm. soc. Psychol., July 1955, 51(1), 114-118. (Personnel Research Lab., USAF Personnel and Training Research Center, Lackland AFB, Tex.).

5528

Kolstoe, R.H., Czech, R.S. & Rozzan, G.B. ORDNANCE IFC ELECTRONICS MAINTENANCE PERSONNEL: ANALYSIS OF FIELD ACTIVITIES WITH IMPLICATIONS FOR TRAINING. Part II-T-38, Tech. Rep. 37, March 1957, 100pp. Human Resources Research Office, George Washington University, Washington, D.C.

5529

To be able to specify actual job requirements for electronic repair personnel, data were gathered from 182 officers and enlisted men from two training school programs to determine: 1) nature and frequency of tasks performed, 2) level of proficiency of the man, 3) nature and extent of on-the-job training and 4) relationship between job requirements and specific aspects of the training program. The men were compared in terms of pre-army background experience, type of job activity, number of months of field experience needed for new graduates to become satisfactory helpers, difficulty experienced in use of more complex equipment, preferred on-the-job training experience and so forth. Recommendations are made for modifications in training program.

6530

Frick, F.C. INFORMATION TRANSMISSION THROUGH THE HUMAN OPERATOR. ca. 1954, 11pp. USAF Human Factors Operations Research Lab., Belling AFB, Washington, D.C.

This report gives a generalized summary of work in progress on the development of a quantitative description of human performance that would be of use to the engineer. The use of communication theory is said to have made this task possible; thus the task of the human operator within a complex system is seen as data or information processing, and his function as transmission of information. Thus it is necessary to know something of the operator's bandwidth (informational capacity) and his characteristics as a communication channel. The author feels from his evidence that 50 bits/sec. is the maximum rate of transmission through a human channel with 30 bits/sec. coming closer to the actual rate; thus he sees man as a narrow band channel. The need to pre-filter information by coding to minimize delays is discussed along with ways of solving this problem. Man's discriminative capacity appears to be relatively fixed and not a function of the particular dimensions of the signal space or display but on the ratio between the physical difference of signals and total range of permissible variations. The practical implications of this finding are noted. Multi-dimensional coding possibilities are discussed briefly. (MEAS)

6531

Russell, G.W. & Boyston, T.E. DEVELOPMENT OF AN EXPERIMENTAL MODEL SPEECH ANALYZER. FINAL ENGINEERING REPORT. Contract AF30(602) 395, Sept. 1954, 105pp. USAF Rome Air Development Center, Griffiss AFB, N.Y. (Nelpar, Inc., Alexandria, Va.).

The purpose of the present program was the development of a speech analyzer to work in conjunction with the previously developed speech synthesizer in order to form a complete experimental voice channel compression system. The object of this compression system was to enable the direct transmission of a spoken message, with no loss in time, over a channel with a bandwidth of 100 cycles or less. Although the message must be reproduced audibly at the receiving end, it is necessary to transmit only the intelligence contained in the word content of the message. The developed analyzer successfully recognizes some 12 vowel-like sounds, but only 4 to 6 are recognized reliably when operated in conjunction with the synthesizer as a system. Although during the synthesizer development some 57 sounds were found adequate to create intelligible speech by the patching technique, it was found impossible to recognize these as basic sounds in the analyzer development. In addition, qualities of the basic sounds which remained invariant with time for the same voice were difficult to discover; the problem is much more severe, of course, for a range of voices. However, these results do not imply that there is fallacy in the basic assumption that speech is redundant and that by removing this redundancy the bandwidth can be compressed to a fraction of normal. In fact, the forward strides made in this field during this period indicate that future work should prove fruitful. It is recommended that further work in this field follow a continuous analysis approach as represented by the parametric method. This technique shows considerable promise as an immediate answer to the problem of a practical speech compression system.

R 66

6532

Gell, C.F. & Hunter, H.M. PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION. Proj. NM 001 060, Study NM 001 060. 01, Rep. NM 001 060.01.03, TED MACC AE 6300, June 1954, 26pp. USN Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Penn.

A supine seat, capable of back tilting at 10° increments to 85° backward tilt, was built and installed on one of the swinging platforms of the Aviation Medical Acceleration Laboratory Centrifuge. In this, as in previous studies, it was demonstrated that when fully supine, exposure to 15 transverse G can be tolerated for 5 seconds with no indication of impending blackout. It was further demonstrated that at 77° backward tilt the antiblackout protection did not exceed that protection afforded by an inflated anti-G suit with the subject in the upright seated position. This study indicates that to receive the full protection against blackout afforded by supination the subject must be back tilted beyond 77°. A close relationship was observed between the degree of backward tilt of the seat, the vertical angle of the retinal-aortic dimension, and the degree of blackout protection afforded.

R 14

6536

Gibson, J.J., Purdy, Jean & Lawrence, Lois. A METHOD OF CONTROLLING STIMULATION FOR THE STUDY OF SPACE PERCEPTION: THE OPTICAL TUNNEL. J. exp. Psychol., July 1955, 50(1), 1-14. (Cornell University, Ithaca, N.Y.).

A method is described for inducing and controlling a perception of surface and space. Conclusions are: a) There is evidence that surface quality depends on the density of transitions in the optical stimulus. When the transitions are absent, surface quality disappears. b) There is evidence that the gradient of texture density in isolation need not always determine the qualities of slant and recession. It is ambiguous, but only with respect to the members of a family of surfaces. c) There is evidence that the gradients of textural disparity and motion can determine the qualities of slant and recession. Presumably when the gradients are concomitant, ambiguity is removed.

R 5

6537

Goldstein, A.G. JUDGMENTS OF VISUAL VELOCITY AS A FUNCTION OF LENGTH OF OBSERVATION TIME. Proj. 6 95 20.001, Subtask S 2, Rep. 239, May 1956, 15pp. USA Medical Research Lab., Fort Knox, Ky.

To investigate the effect of increasing prior exposure to visual movement upon apparent (subjective) velocity judgments of this movement, 29 subjects observed moving stimuli and made velocity judgments by moving a stylus over a contact bar at same speed as stimulus. Three physical velocities (approximately 2.4, 4.8, and 14.3 centimeters per second) were viewed for six different observation periods (2, 8, 15, 22, 30, and 60 seconds). The data (time in seconds to move stylus across the bar) were subjected to a non-parametric analysis of ranked data for evidence of a systematic relation between duration of time of observation of a moving stimulus and its apparent velocity. Implications of the findings for practical situations were discussed.

T. G. R.10

6538

Gray, R.F. THE EFFECTS OF TONIC ELECTRICAL STIMULATION AS A MEANS OF COMBATING ADVERSE CIRCULATORY DISTURBANCES CAUSED BY ACCELERATION. Proj. NM 001 060, Study NM 001 060.12, Repts. NM 001 060.12.62 & NM 001 060.12.63, Jan. 1955, 14pp. Aviation Medical Acceleration Lab., USN Air Development Center, Johnsville, Penn.

Electrical stimulation which caused strong painful contractions of the muscles of the abdominal wall did not significantly increase the G-level at which the subject lost sight of peripheral lights. Nor was there a significant increase in the G-level at which peripheral light loss occurred when the muscles of the thighs were contracted by the electrical current. Because of the low protection afforded and the high degree of subject discomfort, this method of protection against G-force is considered to be impractical.

R 11

6539

Greene, S.F. THE SOLUTION TO THE AIR TRAFFIC CONTROL PHASE OF RETURN-TO-BASE. AR/OSM 3, Nov. 1953, 43pp. R.F. Comments Lab., Air Force Cambridge Research Center, Cambridge, Mass.

6539

This document describes the Volcan Air Traffic Control System, an automatic device for converting randomly arriving aircraft into an orderly flow of entry into the final approach path at the precise instant the landing system is ready. The system is reported able to handle 120 jet aircraft or 125 turbo aircraft per hour on the basis of field tests.

T. 1.

6540

Guedry, F.E., Jr. & Kalter, H. DESCRIPTION OF HUMAN ROTATION DEVICE. Proj. 6 95 20 001, Subtask AMRL 55, Rep. 242, May 1956, 17pp. USA Medical Research Lab., Fort Knox, Ky.

A turntable was constructed for rotating Ss positioned within a radius of 3 feet from the center of rotation. Recorded performance of this device indicates that control of angular velocity is excellent. Control of angular accelerations and decelerations below 30°/sec. is very good and easily obtained with a cam system for driving the speed control potentiometer. Accelerations of 60°/sec. and decelerations of 50°/sec. can be obtained with the cam control system. However, to obtain these higher magnitudes, the cam must be cut to compensate for a lack in linearity of response. The system provides sufficient range of angular velocities and angular accelerations for conducting a wide variety of experiments in vestibular research.

6542

Hall, A.L., Shrineghesh, M.H. & Johnson, M.W. THE EFFECTS OF DECOMPRESSION ON SUBJECTS REPEATEDLY EXPOSED TO 43,000 FEET WHILE USING STANDARD PRESSURE BREATHING EQUIPMENT: INCIDENCE OF AEROEMBOLISM IN AN INDIVIDUAL SUBJECTED TO 82 EXPOSURES, A CASE REPORT. Proj. NM 001 059.21.03, July 1952, 3pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

One human S was exposed to 43,000 feet for 1/2 hour a day for 82 days. From the 75th exposure he exhibited an increasing number and severity of aeroembolism symptoms. It is felt that aging played little or no part in the increasing susceptibility of the subject to aeroembolism.

R.

6543

Hall, J.F. & Polte, J.W. THERMAL INSULATION OF PROTECTIVE CLOTHING (PART 3). Tech. Note WCRD 53 37, Dec. 1953, 30pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

Thermal insulation of various types of USAF standard and experimental clothing items and assemblies has been determined with electrically heated copper manikins, and hand and foot models. Light, medium and heavy clothing types; sleeping bags; as well as hand- and footgear were included in the test measurements. The described method was developed at the Aero Medical Laboratory and results are expressed in "clo" units. Accuracy of the method ranges from ± 2.4 to $\pm 10.0\%$. Measurement of protective clothing insulation with this method serves as an effective screening procedure in the development of new and improved clothing end-items.

R 4

6547

Hartman, B.O. GRAPHIC TIME-ON-TARGET: A TRACKING SCORE WITH BOTH QUALITATIVE AND QUANTITATIVE ASPECTS. Proj. 6 95 20 001, Subtask AMRL S 1, Rep. 245, June 1956, 14pp. USA Medical Research Lab., Fort Knox, Ky.

A technique for graphically recording time-on-target is described, which permits the experimenter to record the functioning of scoring clocks and counters. The resulting record is relatively simple to score and appears to be sensitive to intra- and inter-trial changes in performance. This record evaluates the relationship between quantitative measures of performance and the temporal and spatial characteristics of the S's responses.

R 5

6548

Hecht, K.F. GROUND TESTS OF A PILOT EJECTION SEAT EJECTED THROUGH MONOLITHIC-, REINFORCED-MONOLITHIC-, AND LAMINATED-TYPE CANOPIES. Tech. Rep. 53 361, Oct. 1953, 20pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

5 tests were conducted by the Aircraft Laboratory, Wright Air Development Center, Wright-Patterson Air Force Base, during the latter half of 1951 to determine the feasibility of ejecting pilots through canopies in the event of a canopy release failure. For 3 of the tests the ejection seat and dummy were fired through a monolithic-type canopy used on the F-86A aircraft; the remaining 2 tests were through an F-84 reinforced monolithic-type canopy and a B-47 laminated-type canopy. Ejections were accomplished by duplicating the mechanisms involved in actual flight. Motion picture cameras and metering devices recorded the data. The results of the tests indicate that the trajectory of the seat and pilot after ejection through the canopy is not seriously affected and adequate tail clearance will still be attained.

R 2

6551

Horgan, F.D. SLEEP MEASUREMENTS: PSYCHOLOGICAL, PHYSIOLOGICAL AND MEDICAL. Biblio. Series 31, Nov. 1953, 33pp. USA Quartermaster Research and Development Labs., Philadelphia, Penn.

This literature search centers about measurements of sleep and conditions of sleep, that is, measurement of the depth of sleep, the recuperative value of sleep, the determination of when an individual is asleep, relative difference in quality of sleep, the restfulness of sleep and the effect of environmental and other conditions upon the depth and quality of sleep. The scope of the present survey encompasses the psychological, physiological and medical literature. Such related areas as problems of consciousness, hypnosis, narcotics (anesthetic and drug), the hypnagogic state, and the narcoleptic conditions, such as cataplexia and narcolepsy are considered in the present search. No specific limitation has been placed upon the span of coverage, the time element being slanted to cover the intent of the survey. Hence the period covered varies with the relevancy of material found in the particular abstract or periodical source from which the survey abstract was taken. Since most of the abstracts fall within the years 1937 to date, it may be said that the present compilation gives a good cross section of the literature of the past 15 years. Where abstracts on the subject have already been prepared in abstract bulletins, or in the abstract sections of technical or trade journals, such abstracts were used in the survey, and credit given them as a source in subscript symbols placed at the end of the abstract. Abstract sources used include: a) Biological Abstracts, b) Chemical Abstracts, c) Science Abstracts, d) British Abstracts, e) Psychological Abstracts, f) Journal of Mental Science, g) Science Digest, h) Journal of Clinical Psychopathology, i) Science News Letter, j) Quarterly Cumulative Index Medicus, k) Index to Periodical Literature, and l) Current List of Medical Literature. Arrangement of entries is alphabetical by author. Anonymous entries are listed alphabetically by source.

R 137

6552

Ittelson, M.H. & Ames, A., Jr. ACCOMMODATION, CONVERGENCE, AND THEIR RELATION TO APPARENT DISTANCE. J. Psychol., 1950, 30, 43-62.

The problem posed in this paper was that of determining whether a change in apparent distance alone will induce a change in accommodation and convergence. Static size change-monocular. Different sizes of a familiar object (playing card) were presented one at a time at a distance of 32 in. Measures of apparent distance, accommodation, and convergence were taken. For 4 out of 5 observers, apparent distance of the double-size card was an average of 1/4 that of the half-size card, accommodation when viewing the double-size card was an average of .25 diopters nearer than when viewing the half-size card, and convergence followed the same pattern. Continuous size change-monocular. The projected image of a playing card which continuously changed size from normal to 1/3 size was viewed from a distance of 16 in. Introspective reports of 4 observers indicated that apparent distance changed continuously with the size of the image, the card appearing to move back and forth as it grew smaller and larger. Measures of accommodation showed an average of .46 diopters nearer for the large size than for the small size. Convergence measurements indicated similar results. Continuous size change-binocular. The same stimulus configuration was used as above. Introspective reports indicated a distinct impression of movement. Some blurring of the images suggested a shift in accommodation. Severe feelings of muscular strain about the eyes were reported after a few minutes.

R 18

6553

Hershkovitz, J. EVALUATION OF GAI-PHONE DIAL TELEPHONE STATIONS FOR SPEECH COMMUNICATION IN HIGH AMBIENT NOISE LEVELS. Lab. Proj. 5467-2, Jan. 1955, 7pp. Material Lab., USN, New York Naval Shipyard, Brooklyn, N.Y. (Gai-Tronics Corporation, Reading, Penn.)

Measurements have been made of the electroacoustic properties of the Gai-Phone in combination with other telephone stations. These show that after correction of several defects the Gai-Phone could be substituted for a standard type telephone and provide an adequate level to the line. A psychoacoustic evaluation has been conducted to determine its efficiency in high noise ambients relative to standard type telephone stations. The Gai-Phone was found to be superior to the other phones at high noise levels. Results lead to the recommendation that Bureau of Ships should consider procurement of a telephone station along the lines of the Gai-Phone (i.e., noise cancelling microphone, linear transducer, electronic amplifier for receiving and transmitting, slide-tune control) but ruggedized to survive Naval usage.

6552

Inoué, H.A. EVALUATION OF EYE EXAMINATION, NUSAV FORM 1, Proj. X-395 (AV 213 k), June 1947, 29pp. USN School of Aviation Medicine and Research, Pensacola, Air Station, Fla.

In order to evaluate the visual portion of the flight physical examination, 350 Naval Aviators, recently returned from combat or operational tours of duty, were given a complete eye examination, including all of the tests required for flight status. The subjects presented very superior scores of visual acuity and near vision, low refractive errors, mild degrees of anisometropia and normal variations of heterophoria. Their stereoscopic depth perception was no better than that found in an average population having normal vision. The compensatory fusional innervation varied from extremely poor to very high, and the amplitude of accommodation varied widely as compared with that expected according to standard age tables. Only 2 subjects failed the color vision test plates, but the color deficiency was not great. About 10% of the subjects reported diplopia with the red lens test, especially in the upper field; however, no evidence of paralysis or paresis was found. In general, it can be stated that these subjects, who were selected originally for superior visual capacity, retained their superiority. Their visual acuity, however, was considerably above the passing standard of 20/20, whereas their stereoscopic depth perception was not outstanding.

R 72

6556

Jerison, M.A., et al. EFFECT OF ACOUSTIC NOISE ON TIME JUDGMENT. Contract AF 18(600) 50, Proj. 7193, Tech. Rep. 55-358, Oct. 1955. 12pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

14 volunteer male undergraduates with normal hearing were asked to press a telegraph key at 10 minute intervals while working on another job that kept them almost completely occupied. In a 2-hour control session the overall noise level was about 77.5 db. In another 2-hour experimental session the first half hour was in the 77.5 db noise field and the last one and one-half hours were in an overall noise field of about 111.5 db. The lower noise level served as a measure of performance under "normal" conditions and also to mask extraneous laboratory noises, and the higher noise level provided the experimental condition studied. It was found that under quiet conditions subjects responded about every 9 minutes on the average. Under noise conditions subjects responded about every 7 minutes. The difference between time judgments in noise and quiet was significant at the .02 level. It is concluded that noise affects time judgments as measured in this experiment. The results are discussed in terms of effects of motivation on time judgment and in terms of a neural model for the construction of subjective time involving the normal activity of the central auditory nervous system.

R 10

6557

Bondurant, S., Blanchard, W.G., Clarke, N.P., et al. EFFECT OF WATER IMMERSION ON HUMAN TOLERANCE TO FORWARD AND BACKWARD ACCELERATION. Proj. 7222, Task 71746, AFDC TR 58 290, July 1958, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

6557

Accepted physical principles suggest that immersion of Ss in water should constitute effective protection against some of the effects of acceleration. This premise was evaluated in a study of the duration of tolerance of immersed Ss to forward and backward accelerations of six through 14 g. Respiration was maintained by the use of skin divers' breathing equipment. In addition to reported tolerances, comments were made concerning the S's ability to move and on postacceleration symptoms.

T. G. I. R 8

6558 Taylor, H.L., Anderson, J.T., Buskirk, E., et al. THE EFFECT OF A LOW CALORIE CARBOHYDRATE DIET WITH HARD WORK ON THE BODY COMPOSITION AND PERFORMANCE CAPACITY OF YOUNG MEN. Contract DAM 109 on 1526, Proj. 7 84 12 011, Rep. 1, 13pp. Quartermaster Food & Con-tainer Institute for the Armed Forces, Chicago, Ill. (University of Minnesota, Minneapolis, Minn.).

A study of the effects of a daily intake of 580 calories derived from carbohydrate for 12 days on the body composition and performance capacity was carried out. 12 Ss were divided into an experimental (E) and a control (C) group of 6 men each. The E group went through a control period of 11 days, a 12-day period of caloric restriction, and a rehabilitation period of 15 days. The C group followed for 38 days the same activity and testing program as the E group but did not eat the survival rations. Physical activity included a 4.5 mile road walk, an hour's walk on a motor driven treadmill, and a run to exhaustion every other day. Among the findings were: E group lost, on the average, 7.2% of their initial body weight; the plasma and thioyanate space did not decrease; it was estimated that an average of 2.47 kg of fat and 3.15 kg of active tissue were lost; during the semistarvation period the men lost an average of 85.5 grams of Nitrogen or 534.3 g of dry protein; speed and strength measurements showed no significant deteriorations. (HEIAS)

6559

Klemmer, E.T. RATE OF FORCE APPLICATION IN A SIMPLE REACTION TIME TEST. AFRC TR 55 1, June 1955, 7pp. USAF Cambridge Research Center, Bolling AFB, Washington, D.C.

6559

This is an investigation of rate of force application as a factor in simple reaction time. Six Ss performed a series of reaction time tests in which holding force and response force were varied. The results are presented and discussed in terms of the relation of degree of holding force and degree of response force to reaction time. Also discussed is the form of rate of force application curves under varied conditions.

T. G.

6561

Klemmer, E.T. DISCRETE TRACKING IN ONE AND TWO DIMENSIONS. AFRC TR 56 2, April 1956, 9pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C.

6561

In an investigation of performance on two pursuit tracking tests, eight Ss were asked to perform a series of one-dimension and two-dimension tracking tasks. Target position was varied and all test runs were self-paced. The results are presented and discussed in terms of tracking performance as a function of target position and amount of information transmission as a function of the type of tracking task (one- versus two-dimensional tracking).

T. G.

6562

Klemmer, E.T. TIME UNCERTAINTY IN SIMPLE REACTION TIME. J. exp. Psychol., March 1956, 51(3), 179-184. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

6562

In an investigation of the role of time uncertainty in simple reaction time, six Ss were presented with two series of reaction-time tests. In the first series, a warning click was presented at 11-second intervals and changes in foreperiod variability and mean foreperiod were investigated. In the second series, spacing between stimuli was investigated (with no warning click). The results are presented and discussed in terms of reaction time as a function of foreperiod variability, mean foreperiod, and the immediate foreperiod.

T. G. R 6

6563

Krumm, R.L. & Kirchner, W.K. HUMAN FACTORS CHECKLISTS FOR TEST EQUIPMENT, VISUAL DISPLAYS AND GROUND SUPPORT EQUIPMENT. Contract AF 29(501) 175, Proj. 7800, AFSC TN 56-12, Feb. 1956, 5pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

This report consists of a series of checklists intended to aid in the human engineering analysis of general design features of certain types of equipment. The checklists can be used to identify human factors design deficiencies. Since deficiencies in design contribute in varying degrees to system degradation, the checklists are scaled to indicate design characteristics that are minor, important, and serious. In their present stage of development, the checklists are a diagnostic tool; they point out equipment shortcomings which require improvement and they suggest the relative seriousness of these shortcomings. It is possible that field experimentation will lead to refined scoring techniques so that various pieces of equipment can be compared on a more precise quantitative basis.

R 7

6564

Kryter, K.D. NOISE AND BEHAVIOR. Noise--Causes, Effects, Measurement, Costs, Control, 1952, 6pp. (NRL, Bolling AFB, Washington, D.C.).

The present paper presents selected experimental findings and summaries from a recent survey on the effects of noise on man (cf NEIAS 14397). Topics covered include the effects of noise on work performance, including communications, and emotional reactions and public health. (NEIAS)

R 24

6565

Kryter, K.D. NOISE SAFETY CRITERIA. A.M.A. Arch. Industr. Hyg. Occup. Med., 1952, 2, 117-120 (NRL, Bolling AFB, Washington, D.C.).

Noise conditions are described and their effects on people are reviewed. The discussion is restricted to more or less steady-state or regular noise at intensities such as may be found in heavy industrial factories. On the basis of present knowledge 3 rather tentative safety criteria for this type of noise are proposed: a) Criterion for voice communications: For perfect work conditions in offices or other work situations in which person-to-person voice communication at near conversational intensities is required, the noise or 'unwanted sound' spectra should not exceed about 40 db. re 0.0002 dyne/sq. cm. at 2,000 cps or for the critical band at that point and even less at higher frequencies. b) Criterion for deafness: For work situations requiring minimal amounts of voice communication the maximum safe intensity for exposure for indefinite periods is around 85 db. re 0.0002 dyne/sq. cm. for tones or critical bands in the case of noises of continuous spectra. This 85-db. criterion is an extra safe figure; further research will probably indicate the necessity for revising this value upward for the frequencies below 1,000 cps and above 3,500 cps. c) Criterion for non-auditory work output: Except for possible damage to the ear, regular or expected noise as high as 100-110 db. re 0.0002 dyne/sq. cm. per critical band can be tolerated with no detrimental psychological or physiological effects, provided the worker has had sufficient time to adapt.

6566

Shambough, G. TEMPERATURE RECEPTORS, AN ANNOTATED BIBLIOGRAPHY. Proj. Ref. 7-64-12-0049, Tech. Rep. EP-24, Apr. 1956, 55pp. Quartermaster Research and Development Center, Environmental Protection Research Division.

6566

This bibliography is divided into four sections: the temperature receptors in man (annotated and listed chronologically); the temperature receptors in other animals (annotated and listed chronologically); the effect of chemicals on temperature receptors (annotated and listed alphabetically); and an alphabetical listing of the above references cross-indexed, together with additional pertinent references.

T. R. approx. 225

6568

Kryter, K.D. ON PREDICTING THE INTELLIGIBILITY OF SPEECH FROM ACOUSTICAL MEASURES. J. Speech Hearing Disorders, 1956, 21:2, 208-217. (University of Rochester).

6568

This paper reviews briefly some procedures for predicting from physical measurements what the intelligibility of speech ought to be over any particular communication system. The Twenty Bands Methods of Bell Telephone Laboratories (BTL) and the Octave Bands Methods are described and evaluated by examining performance as applied to conditions of frequency distortion, masking due to noise, and person-to-person speech. Possible solutions to some problems encountered are proposed and need for further investigation in other areas is indicated.

G. R. 11

6567

Sanders, Virginia L., Cohen, J. & Argenteanu, Mary. THE EFFECTS OF ABSOLUTE AND CONDITIONAL PROBABILITY DISTRIBUTIONS ON INSTRUMENT READING: II. A COMPARISON OF A LINEAR AND A LOGARITHMIC SCALE. Contract AF 18(600) 50, Proj. 7186, Tech. Rep. 54 253, Part 2, July 1955, 33pp. USAF Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

The readability of a logarithmic scale was compared with that of a linear scale. Pointer settings were grouped into sequences of 9 settings each. The settings increased either linearly or logarithmically. The stimuli were presented tachistoscopically for exposures of .8 seconds and each of 16 Ss was tested under every experimental condition. Results indicated that when error is expressed in scale units, the linear scale is superior to the logarithmic, the skewed distribution to the rectangular, and the regular order to the random. The use of a regular order improves performance more on the logarithmic scale than on the linear. In terms of angular deviation of response from settings, the logarithmic scale is not significantly different from the linear scale. On the logarithmic scale, the log mean error is directly related to the logarithm of the numerical value of the pointer settings, but the slope of the line is .54, indicating that errors at the low end of the scale are proportionately higher than errors at the high end. When log median error, instead of log mean error, is plotted against the logarithm of the pointer setting, an almost direct proportionality is found.

R 9

6570

Lawrence, W. & Eades, R.J. THE DISPLAY OF SPECTRAL MAXIMA WITH A SPEECH SPECTROGRAPH. S.R.D.E. Rep. 1087, May 1955, 8pp. Signals Research and Development Establishment, London, England.

In the analysis of speech sounds by means of a speech spectrograph, described in S.R.D.E. Report 1375, methods have been devised to show the frequencies of spectral maxima (formants) with greater accuracy than with the orthodox spectrograph. This report describes the use of sharpened circuits, of phase filters and of differential spectrography. Differential spectrography was developed at S.R.D.E. and is of particular use in the analysis of speech towards the production of an analysis-synthesis method of speech transmission. Differential spectrograms are obtained by using a discriminator instead of a band-pass filter; the location of a spectral maximum is shown on Teledeltos paper as a sharp boundary between 2 fields of unequal appearance.

R 7

6571

Levine, L.M. & Hershkovitz, J. EVALUATION OF THE INTELLIGIBILITY OF SOUND POWERED TELEPHONE EQUIPMENT INSTALLED IN OXYGEN RESCUE BREATHING APPARATUS. Lab. Proj. 5619 I, NS 683 034, Final Rep., Jan. 1955, 7pp. Material Lab., New York Naval Shipyard, Brooklyn, N.Y.

An evaluation to determine the feasibility of using sound powered telephones with the Navy Oxygen Breathing Apparatus has been conducted. 2 arrangements were tested, one in which the standard speaking diaphragm in the face piece was replaced by a sound powered transmitter, and another in which a modified sound powered transmitter is fitted over the speaking diaphragm. Articulation tests showed that acceptable intelligibility may be expected from both arrangements which is far superior to intelligibility obtained by direct transmission through the speaking diaphragm alone. It is recommended that the newly developed standard models of sound powered phones (Lab. Project 5476-3,4) be adapted for use with the breathing apparatus and performance compared with those used in this evaluation.

6572

Licklider, J.C.R., Stevens, K.W. & Hayes, J.R.M. STUDIES IN SPEECH, HEARING AND COMMUNICATION. FINAL REPORT. Contract W19 122 ac 14, AFRC TR 54-159, Sept. 1954, 68pp. Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.

Memory span has been measured for 13 ensembles, the smallest of which was 2 items in size and the largest 355,000 items in size. Reliable differences in memory span among these ensembles were observed. Memory span decreases as ensemble size increases from 2 items to 16 or 32 items. As ensemble size increases beyond 32 items, memory span changes slowly or not at all. Factors other than ensemble size are important in determining memory span. The amount of information retained in immediate memory is greatest for ensembles of 17,000 to 55,000 items.

R 53

6573

Davis, S.W. & Taylor, J.C. STRESS IN INFANTRY COMBAT. Tech. Memo. ONR T-295, Sept. 1954, 103pp. Operations Research Office, Johns Hopkins University, Baltimore, Md.

There is evidence that being in blocking position behind the MLR does not alter the normal physiological function of combat infantrymen. A short period of intense combat results in a characteristic set of physiological changes for the average infantryman (a high degree of adrenal responsiveness, increased protein destruction, and a shift in the balance of body salts). A period of prolonged, less intense combat results in a different set of physiological changes in the average infantryman (a low degree of adrenal responsiveness, normal protein destruction, and a shift in the balance of body salts opposite to that observed in short, intense combat). Although the response of both groups can be considered normal stress responses, that of the short, intense group is characteristic of the initial or adaptation phase of the stress reaction, and that of the prolonged, less intense group is characteristic of the second or resistance phase of the stress reaction. Men exposed to the same combat reach the period of maximal physiological adaptation to stress at different times. Time taken to recover to normal physiological levels after intense combat of 18 hours is approximately 6 days; after less intense combat of 5 days it takes approximately 13 days. Based on physiological function alone, combat of a high level of intensity is more costly than combat of a low level of intensity in that recovery time is longer in proportion to the duration of the stress. Based on physiological function alone, the initial period of combat is more costly than continuing in combat past the initial period in that recovery time is longer in proportion to the duration of the stress.

R 45

6574

Lincoln, R.S. LEARNING AND RETAINING A RATE OF MOVEMENT WITH THE AID OF KINESTHETIC AND VERBAL CUES. J. exp. Psychol., 1956, 51, 199-204. Contract N6ori-166, Rep. 166-1-196. ONR, Johns Hopkins University.

6575

Lincoln, R.S., & Averbach, E. SPATIAL FACTORS IN CHECK READING OF DIAL GROUPS. J. appl. Psychol., 1956, 40, 105-108. Contract N6ori-166, Rep. 166-1-197. ONR, Johns Hopkins University.

6574

To study some aspects of learning and retaining skilled movements, three groups of subjects (18 each) were trained to turn a handwheel at a constant linear rate (160 feet per minute). Training variables were: 1. amount and direction of error given verbally, 2. amount of rate error given kinesthetically, directional error verbally, and 3. standard rate given kinesthetically. After training S attempted to produce the same rate without aid of external cues (either immediately, after one-hour delay, or after 24-hour delay). Rate accuracy and constant error were studied by analysis of variance to determine relative value of kinesthetic and verbal cues for such performance.

G. R 7

6575

To investigate the effects of spatial location on the accuracy with which check dials are read, three groups of subjects (14 each) were required to detect deviant pointers (null point 9 o'clock position) within a display panel of 16 circular dials. The panels (42 variations) were displayed for exposures of .35, .70, and 1.40 seconds (one duration time for each group). The data (percentage of detection) are analyzed as functions of exposure duration, number of trials (28), quadrant of panel and position of dial within the quadrant (corners, sides, middles). The pattern of detection is interpreted in terms of scanning habits which, in turn, are related to previously learned reading habits.

T. G. R 3

6575
 Lockard, R. THE EYE AS A CONTROL MECHANISM (INTERIM REPORT). Tech. Note 304-14, June 1956, 17pp. Naval Ordnance Test Station, Electronics Systems Branch, China Lake, Calif.

6576
 This "interim report" was taken from a longer manuscript entitled "The Eye as a Control Mechanism." The use of the human eye as an error-correcting device to partially fulfill the role of cinematolite cameras for obtaining trajectory data about missile and rocket tests is suggested. Types of eye movements are discussed, standard eye-movement recording techniques are reviewed and the tracking accuracy of the eye is experimentally approximated. Applications to a tracking system capable of providing immediately available trajectory data are discussed.
 G. I.

6578
 Mangelsdorf, J.E. VARIABLES AFFECTING THE ACCURACY OF COLLISION JUDGMENTS ON RADAR-TYPE DISPLAYS. Contract AF 33(616)-43, Proj. 5-1(7-7192), Tech. Rep. 55-462, Dec. 1955, 51pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Ohio State University).

6578
 To investigate man's ability to judge collision courses (point of intersection) of aircraft on radar-type displays, four practiced subjects made a total of 4400 judgments by the psychophysical method of adjustment. The subject observed a pair of converging trails projected on a screen and adjusted the position of one so as to produce a "collision" situation. Target speed, distance-to-go, and angle of convergence were varied. Constant, average, and variable error were calculated for each problem and pooled for all subjects and studied as functions of training and for the three variables, of speed, distance, and angle. A mathematical model was developed to relate variable error to the experimental variables. Both general and applied aspects of the model are discussed. T. G. I. R-14.

6579
 Morant, G.N. SURVEYS OF THE HEIGHTS AND WEIGHTS OF ROYAL AIR FORCE PERSONNEL: VII. HEIGHTS AND WEIGHTS OF 137 ROYAL AIR FORCE APPRENTICES RECORDED ON FIFTEEN OCCASIONS. FPRC 7111(7) March 1952, 17pp. Flying Personnel Research Committee, RAF Institute of Aviation Medicine, England.

This report deals with records of the heights and weights of 137 RAF apprentices who were measured on 15 occasions over a 3-yr. period. Their medical histories, assessments of their physical fitness and final examination results were examined. The following are some of the conclusions reached: a) no evidence was found of significant association between the assessments of health, physical fitness and ability, on the one hand, and age, on the other, or between any pair of the 3 criteria; b) no seasonal fluctuations in growth rate was observed; c) it was suggested that the growth rate was accelerated appreciably in the 2nd and 3rd year of observation; d) all 55 probably reached their maximum height between their 17th and 22nd years of age; e) no correlation was found between maximum height and the age at which it was attained; f) for those who had not reached their maximum height, there was no correlation between height at 17 yrs. 4 months and increase in height between 17 yrs. 4 months and 18 yrs. 4 months; g) no evidence was found of any significant association between weight levels or changes in weight during particular intervals, on the one hand, and health, physique or examination results, on the other. (HEIAS)

6581
 Finkelstein, Beatrice, Pippitt, R.G., & Taylor, A.A. EVALUATION OF IMPROVED COMPACT BOX LUNCH, NUTRITIONAL CHARACTERISTICS, STABILITY, EASE OF FLIGHT KITCHEN PREPARATION, EASE OF HANDLING IN FLIGHT, AND ACCEPTABILITY OF COMPONENTS. Proj. 7156, Tech. Rep. 56-363, July 1956, 40pp. Aero Medical Lab., USAF Wright Air Development Center, AFMCC, Wright-Patterson AFB, Ohio.

An improved Compact Box Lunch, designed to be eaten aboard jet bomber aircraft during flights of extended duration, is evaluated. In appraising this system of feeding, consideration was given to the findings of a previous field trial of the Compact Box Lunch. Results of that study were used to formulate an improved lunch. Meals in this system of feeding are nutritionally adequate. They can be satisfactorily produced by Air Force flight kitchen. Assignment of additional food service personnel and an increase in flight kitchen work and storage space may be necessary if the lunch is used at bases from which large numbers of jet bomber aircraft depart. Because of the small size of the foods and convenient packaging, jet lunch can be consumed easily under restricted flight conditions. The foods which are used retain their wholesomeness when stored without refrigeration for periods up to 20 hours. Consumer acceptance of these foods is high. However, desire was expressed for an increase in the amount of beverage in each lunch. Accordingly, menus have been modified to reflect this need. Since the Compact Box Lunch meets the requirements of nutrition, utility, stability, and acceptability, this feeding system, as revised by this study, is suitable for use aboard jet bomber aircraft.
 R 6

6580
 Morin, R.E., Grant, D.A., & Nyström, C.O. TEMPORAL PREDICTIONS OF MOTION INFERRED FROM INTERMITTENTLY VIEWED LIGHT STIMULI. Contract AF18(600) 54, Tech. Rep. 54-69, Jan. 1955, 14pp. USAF Wright Air Development Center, Aero Medical Laboratory, Wright-Patterson AFB, Dayton, Ohio. (University of Wisconsin, Madison, Wisc.).

The accuracy of predicting when a moving object will reach a target was studied in the following procedural context: No real movement occurred, but instead the subject viewed the successive illumination of two or four cue lights which were placed at even intervals in a horizontal row. Illumination of the cue lights represented momentary viewings of a moving object as it might be seen on a radar scope. After the illumination of the last cue light, the subject estimated the time it would take the imaginary object to reach a target light by pressing a button at the moment of predicted arrival. The results indicated that among the above main variables of the experiment, computed object velocity produced the greatest effect upon accuracy of estimation. Marked underestimations occurred at the slower velocity. Highly significant effects, temporal estimations for the shorter distance being more accurate than for the longer distance, were also observed. Temporal estimations for the longer distance were less important, although they introduced statistically significant results. Temporal estimations were more accurate following longer interval sweep times and were more accurate following four cues than they were following two cue lights.
 R 4

6582

Moser, H.M., Dreher, J.J., & Adler, S. EFFECT OF RATE AND PHRASING ON INTELLIGIBILITY OF AIR MESSAGES. Contract AF 19(604) 1577, Proj. 7681, AF Proj. 664, Tech. Rep. 29, AFRC TH 55 68, May 1955, 12pp. USAF Cambridge Research Center, Bolling AFB, Washington, D.C. (Ohio Research Foundation, Columbus, Ohio).

6582

To examine effects of word grouping and rate of speaking on reception of messages, a test was devised in which listeners (40, 48, 57) heard messages (six lists of 15 signals) from the typical environment of control talk. Six categories of syntactical forms were used: imperatives, interrogatives, informatives, verbless compliments, propositional phrases, and infinitive phrases. Five trained speakers contributed three messages to each list using three rates of delivery: normal, fastest rate commensurate with precise articulation, and spaced by use of signal lights. Signal to noise ratio was -3 decibels; mean signal level (speech) was set at 82 decibels. Percent of messages correctly received for each message type are analyzed in relation to rate of presentation. T.I. R 18

6583

Moser, H.M., Dreher, J.J., & Harbold, G.J. RECOGNITION OF THREE MAGNITUDES OF INTERPHONETIC TRANSITIONAL INFLUENCE. Contract AF 19(604) 1577, Tech. Note 33, RP Proj. 664, AFRC TH 55-74, Dec. 1955, 23pp. AFRC, Bolling AFB, Washington, D.C.

6583

To investigate the interphonic transitional influence (result of equal combinations of spoken speech) on recognition, monosyllabic nonsense syllables were formed by combining consonants and vowels with respect to hub location to form discrete magnitudes of transition (minimum, medium, maximum). Six male speakers recorded the syllables to which 24 trained listeners responded (syllable and speaker orders randomized) in progressively destructive signal to noise ratios (+24 to 0 decibels). Criterion measure was magnitude of recognition irrespective of transition direction. Data for the +3db S/N ratio were evaluated by triple analysis of variance. T.I. R 26

6584

Jeely, K.K. A COMPARISON OF THE ICAO I AND ICAO II PHONETIC ALPHABETS AT VARIOUS ALTITUDES. Proj. 118 43-108, Rep. 118-1, Dec. 1954, 27pp. Defence Research Medical Labs., Department of National Defence, Toronto, Ontario, Canada.

A study of the ICAO I and ICAO II Phonetic Alphabets at various altitudes (sea-level, 15,000 feet, and 30,000 feet) indicated: a) no statistically significant difference in word-intelligibility between the 2 alphabets; b) no statistically significant difference in alphabet item word-intelligibility scores among positions in a 3-word phrase; and c) a highly significant difference, statistically, in the word-intelligibility of the alphabet items among the 3 altitude conditions.

R 15

6585

Neely, K.K. ACOUSTIC PROPERTIES OF HEADGEAR WITH NOISE ATTENUATION DEVICES. Proj. 100 43 72, Rep. 100 4, Nov. 1954, 8pp. Department of National Defence, Defence Research Medical Labs., Toronto, Ontario, Canada.

Results of sound attenuation tests indicated that the NDRC V-51R Ear Warden afforded the most protection from noise in the frequency range 100 to 3,000 cps and the straightaway Sound Protector (Helmet and Headband types) was the most efficient sound-attenuating device in the frequency range 3,000 to 10,000 cps. Wet cotton was found to have more efficient sound-attenuation properties than dry cotton or the Billsholme Hoerselskyd, but was less efficient in this respect than was either the NDRC V-51R Ear Warden or the Straightaway Sound Protectors. T 4

6586

Newman, R.W. THE ASSESSMENT OF MILITARY PERSONNEL BY 1912 HEIGHT-WEIGHT STANDARDS. Rep. 194, Nov. 1952, 18pp. Climatic Research Lab., Environmental Protection Branch, USA Office of Quartermaster General, Washington, D.C.

This study was made to establish and compare relative weights in 3 Arm. Series, White male separablees measured in 1946, Negroid male separablees measured in 1946, and White male inductees measured in 1946 and 1949, with the height-weight table established by the medico-actuarial mortality investigation of 1909-1912, utilized as the standard in this assessment. The 3 Army series were uniformly higher than the 1912 medico-actuarial standards in weight. The White and Negroid separablees demonstrated an unexplained decrease in the average relative weight with age. The White inductees did not show this decrease over the limited available age range. The largest Army group, White male separablees, was compared to 2 other standards, a European standard which proved unsatisfactory because age was not taken into account, and a study of civilians in 1940 by the Equitable Life Assurance Society. The Equitable Life data showed overall average weights that more nearly approached the Army data but a curious discrepancy in tall-statured men occurred.

R 5

6587 Newman, R.W. & Winston, G. COMPARISON OF TEN ANTHROPOMETRIC AND TAILORING MEASURES ON THE SAME MEN. Rep. 210, June 1953, 11pp. Climatic Research Lab., USA Office of Quartermaster General, Lawrence, Mass.

This study was undertaken to determine the relationship between 2 types of measurements, i.e., anthropometric and tailoring. The information could then be applied to the large amount of anthropometric data available on military personnel and would facilitate a translation of anthropometric data into meaningful pattern measurements. Data on 10 bodily measurements: neck, shoulder, chest, waist, and hip (seat) circumferences, sleeve length, scye depth, inside arm length, outseam, and inseam were presented and analyzed for the relationship between the 2 types of measurements on 42 men. The relative reliability of the techniques was assessed and was found to be roughly similar and the relationship appeared sufficiently consistent to warrant translation from one technique to the other without undue loss of accuracy. Methods for conversion from one type of measurement to the other were presented in several forms if appropriate to individual situation.

6588
 Newton, P.B. PROPOSED SPECIFICATION FOR THE ILLUMINATION OF INTERIOR COMMUNICATION INSTRUMENTS AND OTHER VISUAL DISPLAY SYSTEMS. NS 681 138; EES Rep. 060025, July 1953, 19pp. USN Engineering Experiment Station, Bureau of Ships, Annapolis, Md.

Proposed performance requirements for the illumination of interior communication instruments and other visual display systems are given, together with definitions of terms pertinent to such systems and their components. Suggested materials and their suppliers are listed. A description of the Duo-Panel system of instrument illumination, is presented by means of sketches and photographs.
 R 46

6589
 USN Personnel Research Field Activity. PROFICIENCY MEASURES IN A/S SONAR MAINTENANCE. II. JOB SAMPLE TESTING FOR TROUBLE-SHOOTING. NavPers 18409, Tech. Bull. 55 1, Feb. 1955, 15pp. Bureau of Naval Personnel, USN Personnel Research Field Activity, San Diego, Calif.

This study reports the preliminary phases in the development and administration of a sonar trouble-shooting performance test. This test was to be the first in a series of performance, tab-type, and multiple-choice printed tests in the area of sonar maintenance. After preliminary try-out of a one-problem QMBa trouble-shooting job-sample test, a 6-problem SQS-11A job-sample test was developed and administered to 15 graduating students of the Advanced Sonar Maintenance Course at Fleet Sonar School, San Diego. 15 of these examinees completed an 80-item printed electronics test also. The reliability of the performance test was not significantly different from zero. The reliability of the printed test was fairly adequate (.78); its correlation with the performance test was very low (.18).
 R 3

6592
 Bureau of Aeronautics. ENGINEERING ANALYSIS AND ESTIMATE OF THE EFFECTS OF CONVERTING TO VERTICAL-READING SCALES. Contract N045 53 476 c; April 1954, 10pp. Bureau of Aeronautics, (Kollsman Instrument Corporation, Elmhurst, N.Y.)

This report deals with engineering analysis and estimate of the effects of converting to vertical reading scales. Its main concern is the problems involved in the design of vertical reading instruments of the electro-mechanical type and their relative indicator complexity, and panel space requirements. The considerations evaluated are the relative size and weight of the instruments along with the relative cost and reliability. Consideration is given to the man-machine efficiency and the estimation of the man-machine benefits to be derived from the partial or complete adoption of the vertical instrument presentation idea. A literary and historical review of the use of vertical-dial instruments was made and a list of advantages and disadvantages compiled. (HEIAS)

6593
 Korff, S.A. (Ed.) & Neuburg, H.A.C. THE WORLD'S HIGH ALTITUDE RESEARCH STATIONS. March 1954, 84pp. Joint Commission on High Altitude Research Stations. (Research Division, New York University, University Heights, N.Y.)

This report is a list of high altitude research laboratories throughout the world. Information supplied concerning each station includes: location, climatic conditions, elevation, operating season, access and transport, facilities, space, staff, accommodations, etc. (HEIAS)

6595
 Winsmann, F.R. PACK CARRYING IN THE DESERT. Proj. 7 64 12 004, Rep. EP 28, May 1956, 27pp. USA Quartermaster Research and Development Center, Natick, Mass.

The energy cost of walking, climbing, and carrying loads over 3 different types of desert terrain has been studied. The surfaces studied included level hard surface, level sandy surface, and sand dune slopes. Pulse rates and rectal temperatures were measured, along with oxygen consumption, as indicators of stress. The energy expenditure of walking, climbing, and carrying loads expressed as Calories per square meter body surface area per hour (Cal/m²/hr) shows a striking increase from hard surface to sandy areas (mean-increase 104%). The increased pulse rates and rectal temperatures over the sand and slope (dune) areas are also indicative of added stress. The 40-pound pack carried at a rate of 2.5 mph continuously for one-half hour would appear to represent the extreme upper load limit to carry in any sandy area on the desert. It is expected that the quantitative measurements of heat production contained herein will be useful in the calculation of total heat load on a man under desert conditions.
 R 7

6597
 Wulfeck, J.W., Crook, D.J. & McBride, Patricia. STUDIES ON DARK ADAPTATION. EXPERIMENTS I, II, AND III: THE PRE-EXPOSURE TOLERANCE OF THE HUMAN FOVEA ADAPTED TO DIFFERENT BRIGHTNESS LEVELS, INCLUDING DARKNESS. Contract AF30(602) 199, RADC TR 54 88; Final Report, Oct. 1954, 34pp. Rome Air Development Center, Griffiss AFB, Rome, N.Y. (Tufts College, Medford, Mass.)

The effect on foveal dark adaptation of pre-exposure of the eye for brief durations to light of relatively low brightness was investigated. Monocular measurements were made of both absolute brightness sensitivity (RL) and difference or contrast sensitivity (DL). In DL determinations background brightness and Adaptation Level were of the same value. The extent of dark adaptation as measured by the RL was found to increase as pre-exposure duration and brightness increased above critical values. The extent of dark adaptation as measured by the DL increased with increasing duration and brightness of pre-exposure above critical values. Dark adaptation was too slight to be measured following certain pre-exposures of the dark-adapted eye to quantiles of light in which the brightness x duration product was 100 ft.-lambert-sec. or less. In the case of both RL and DL experiments there were also certain pre-exposure combinations yielding a brightness x duration product of 100 ft.-lambert-sec. or less which, when superimposed on the 3 Adaptation Levels other than darkness, did not produce dark adaptation as measured by the techniques used in these investigations.
 R 14

6601
O'Hare, J.J. INTERSENSORY EFFECTS OF VISUAL STIMULI ON THE MINIMUM AUDIBLE THRESHOLD. *J. gen. Psychol.*, 1956, 54, 167-170. (U.S.N. Medical Research Laboratory, Naval Submarine Base, New London, Conn.).

6602
To investigate the effect of visual stimuli on the minimum audible threshold, measurements were made of the intensity limits of four pure tones (200, 700, 2,000, and 5,000 cycles per second) while subject fixated a patch of color or in darkness. Colors and effective brightnesses (in foot-lamberts) were: yellow, 07.4; green, 55.6; blue, 16.5; and red, 10.9. Comparisons were made between auditory threshold data in the dark or "no-color" situation and in a particular color situation and significant shifts were observed for intersensory effects.
C. R. R

6604
Platzner, H.L. THE PHASE-PLANE AS A TOOL FOR THE STUDY OF HUMAN BEHAVIOR IN TRACKING PROBLEMS. Contract AF 33(038) 70420, Proj. 7182, Tech. Rep. 55 444, Nov. 1955, 10pp. Aero-Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Franklin Institute).

The phase-plane technique has been used to study human behavior in specific tracking problems. This technique is well suited to the study of the response characteristics of the human operator when step inputs are used. For these inputs, the appearance of sharp corners in the phase trajectories is evidence of non-linear behavior by the human operator. Evidence of strong non-linear behavior has been observed experimentally when the dynamic system is stable or unstable. Phase-plane techniques are not so useful when more general inputs, and in particular when random inputs are used. The reason is that the appearance of a sharp corner in the phase trajectory may be caused by the random input as well as by non-linear response of the human operator. However, useful information can still be extracted from the phase trajectory, such as time on target, average error, error variance, etc.

6605
Pollack, I. THE ASSIMILATION OF SEQUENTIALLY-ENCODED INFORMATION, 5. BINARY-ENCODED MATERIALS. Rep. TR 54 5, Jan. 1954, 11pp. USAF Human Factors Operations Research Labs., Bolling AFB, Washington, D.C.

This report considers the immediate recall of binary-coded verbal materials--messages in which each unit could assume only one of 2 possible alternatives. Binary materials are of special interest because of the ease of recoding the materials into alternative units which, presumably, aid in their reproduction. The contribution of 4 variables, which were believed to influence the assimilation of binary messages, has been examined. Of these, 3 are significant: the length of the message--the number of binary units per message; the rate of presentation of the message--the number of binary units presented per unit time; and, the statistical restriction of the message source--the maximum length run permitted. In general, over the experimental conditions examined, the information transmitted increased as: the length of message increased, as the rate of presentation decreased, and, as the statistical restriction upon the message-source decreased. More important, however, were the interactions among the several variables. These interactions may be accounted for by a few assumptions regarding the recoding operations reported by the subjects. While these assumptions are entirely reasonable, it is concluded that a further continuation of this type of indirect analysis of encoding operations will not be fruitful. Rather, a direct examination, of encoding operations e.g., as performed by Miller and Smith, appears to offer a more promising hope for elucidation of these operations.
R 5

6606
Pollack, I. SOUND LEVEL IDENTIFICATION AND INTERNAL STIMULUS VARIATIONS, 1. *J. acoust. soc. Amer.*, Nov. 1955, 27(6), 1222-1223. (Operational Applications Lab., Bolling AFB, Washington, D.C.).

Sound level identification was examined for 2 restricted ranges of sound-levels concurrently. The principal variable was the rate of shifting between the 2 restricted ranges. In general, identification performance decreases as the rate of shifting between the 2 ranges increases. However, because of the loss of stimulus information, the arbitrary restriction of the stimulus range results in a lower-over-all information transmission than without the procedural restriction. An implication for the scaling of elementary aspects of auditory displays is discussed.
R 5

6607
Pollack, I. IDENTIFICATION OF SOUND LEVEL AND MATCHING FROM SAMPLE. *J. acoust. soc. Amer.*, May 1956, 28, 412-415. (USAF Cambridge Research Center, Bolling AFB, Washington, D.C.). (Tech. Rep. 56-3).

6607
A direct comparison between the identification and the discrimination of the loudness level of a tonal signal can be made by reference to the contiguity between the signal and the "catalog" of possible signals. Seventy different "catalogs" of sound levels were established differing in the size of the differences between the items (0.2% to 64 db) and the number of items (2 to 17). The subject: 1) identified the signal, 2) identified the signal after also hearing others in that catalog, 3) identified the signal after hearing it and others in that catalog as often as he wished. The results obtained on five listeners are expressed in terms of the matching error made in identifying, recognizing and discriminating the signal.
T. G. R 1

5608
 WSN Air Test Center. OPERATIONAL TEST OF RANGING THRUSTLE GRIP, 2040-40. FINAL REPORT. Proj
 WSN PTC 22 42384, Letter Rep. 1, June 1953, 4pp. WSN Air Test Center, Patuxent River, Md.

Tests were conducted on 2 Ranging Thrustle Grips, 2040-40, which were mounted in an
 F3F-5 and an F3F-5 airplane. Operations of 4 pilots during 32 flights led to the conclusion
 that the Thrustle grips are unsuitable for service use because of pilot discomfort which is
 a result of the poor location of the speed brake switch on the grip. It is recommended that
 an investigation be made to determine the possibility of employing one of the presently un-
 used buttons on the control stick now installed in the F3F-5 airplanes to accomplish the
 range out function.

5612
 Rappaport, M. THE ROLE OF REDUNDANCY IN THE DISCRIMINATION OF VISUAL FORMS. Presented in
 partial fulfillment of the requirements for the Ph.D. degree in the Graduate School of the
 Ohio State University, 1954, 79pp. Ohio State University, Columbus, Ohio.

Experiments were performed to test the effects of type of redundancy upon the discrimina-
 tion of visual patterns. It was also attempted to determine the degree of redundancy that
 allows discrimination to take place optimally. The series of 4 experiments constitute a new
 and quantitative approach to the problem of form perception using concepts stemming from in-
 formation theory. In general, it was shown that redundancy is more effective in a visual
 discrimination situation where visual noise is present than where visual noise is not present.
 It was also concluded that information theory provides a fruitful approach to the study of
 form perception. (NEIAS)

R 77

5614
 Robinson, S. THE PHYSIOLOGICAL EFFECTS OF ATROPINE AND POTENTIAL ATROPINE SUBSTITUTES. Con-
 tract DA M 126 DM 2597, Rep. 15, Aug. 1953, 150pp. US Army Chemical Corps Medical Laborato-
 ries, Army Chemical Center, Md. (Indiana University, Bloomington, Ind.)

The object of this study was to determine the effects of atropine and 4 atropine substi-
 tutes on the response of men to stresses of work and temperature. The effects on men of in-
 tramuscular doses of 2 mg. atropine sulfate, 0.5-2 mg. netropine, 8 mg. parpanit, 4 mg.
 lergigan and 5 mg. artane were determined in 2 series of work experiments. In the first
 series a study was made of temperature regulation of men doing prolonged walks at 3.5 mph on
 a treadmill. In the second series physiological responses of men to 3 different intensities
 of work were studied. Neither lergigan nor parpanit caused any measurable ill effects. Ar-
 tane caused interference with mental concentration and psychomotor performance. The effects
 of atropine and netropine on the physiological responses of men to work in the heat are seri-
 ous enough to limit performance. (NEIAS)

R 8

5618
 Zoonblith, I.A., Wheeler, D.Z., & Spedal, H.
 PROBLEMS OF HIGH-INTENSITY NOISE: A SURVEY
 AND RECOMMENDATIONS. Contract NSG-1-76,
 Proj. Order II, Dec. 1952, 25pp. Psycho-
 Acoustic Lab., Harvard University.

5616
 This is a survey of the relevant problems of high
 intensity noise based partly on the experimental litera-
 ture and consisting of the following general aspects:
 a brief history of the noise-man problem; a brief his-
 tory of the noise problem in Naval aviation; analysis
 of the jet noises on flight deck; an inventory assess-
 ment of research facilities and programs concerned with
 noise; problems of ear protection; and certain recommen-
 dations directed toward each of the foregoing aspects.
 T. G. I. R 7

5619
 Roush, R.G. & Hamburger, F., Jr. A LIGHT FLASH GENERATOR. Proj. 165 1 47, March 1948, 8pp.
 Special Devices Center, Office of Naval Research, (Johns Hopkins University, Baltimore, Md.)

A method of generating controllable light flashes is described in the following paper.
 The system is designed to produce either one or two variable duration flashes with provision
 for delaying the onset of either flash with respect to that of the other. The rate of pre-
 sentation of the overall light pattern may be varied over a wide range of values thereby
 providing a useful equipment for visual investigations where precise control of the light
 stimulus is required.

5626
 Rupp, J.C. & Westen, R.J. RESEARCH INTO BASIC METHODS AND TECHNIQUES OF AIR FORCE JOB AN-
 ALYSIS--II. Proj. 507 015 0302, Res. Rep. AFPTC-TN 55 51, Nov. 1955, 69pp. USAF Personnel &
 Training Research Center, Training Aids Research Lab., Chanute AFB, Ill.

This study is concerned with determining the relative merits of 5 techniques of job analy-
 sis. They are: a) questionnaire survey; b) group interview; c) individual interview; d) ob-
 servation interview; e) technical conference. 12 jobs were selected as meeting the require-
 ments for the experimental design in that they: a) represent as many career fields as possible
 b) range from simple to complex; c) represent varying degrees of manual, intellectual, mech-
 anical, and manipulative requirements; d) represent Air Force-wide performance requirements.
 This report covers 4 of those jobs. Among the conclusions reached are: for Air Force require-
 ments, the technical conference appears to be best and is the most expensive; the question-
 naire survey method is the least expensive and except for the group interview is the least
 productive; it appears that the techniques which make the most demands upon the talents of
 the job analysts (individual interview, observation interview and technical conference) pro-
 duce more information than the other 2 methods; of the 4 methods requiring the use of job
 analysts, the group interview is significantly less effective than the other 3, which do not
 differ significantly from each other in reporting work activities. (NEIAS)

R 9

6621

Rape, J.C. & Westec, R.J. RESEARCH INTO BASIC METHODS AND TECHNIQUES OF AIR FORCE JOB ANALYSIS-III. Proj. 587 015 9C52, Res. Rep. AFTRC TN 55 53, Dec. 1955, 67pp. USAF Personnel & Training Research Center, Training Aids Research Lab., Chute AFB, Ill.

This study is concerned with determining the relative merits of 5 techniques of job analysis. They are: a) questionnaire survey; b) group interview; c) individual interview; d) observation interview; e) technical conference. 12 jobs were selected as meeting the requirements for the experimental design in that they: a) represent as many career fields as possible; b) range from simple to complex; c) represent varying degrees of manual, intellectual, mechanical, and manipulative requirements; d) represent Air Force-wide performance requirements. This report covers 4 of these jobs. Among the conclusions reached are: for Air Force requirements, the individual interview appears to be best; the technical conference method is the most expensive; the questionnaire survey method is the least expensive, and except for the group interview, is the least productive; it appears that the techniques which make the most demands upon the talents of job analysts (individual interview, observation interview and technical conference) produce more information than the other two methods; there are no statistically significant differences among the four methods requiring the use of job analysts when the percentage scores of the Work Performed sections of individual schedules produced by these methods are compared. (NEIAS)

R 11

6623

Saul, E.V., Cornblisen, J.M., Jr., Devoe, D.B., Nicoll-Ebner, Mary, et al. A REVIEW OF THE LITERATURE PERTINENT TO THE DESIGN AND USE OF EFFECTIVE GRAPHIC TRAINING AIDS. Contract Monr 494(08), Proj. 23 D 3, Tech. Rep. SEC 494 08 1, Feb. 1956, 216pp. Special Devices Center, Fort Washington, N.Y. (Tufts University, Medford, Mass).

The aim of the report is to present annotated reviews of the literature in specified areas pertinent to the problem of developing standards and criteria in the design, preparation and utilization of effective graphic training aids. The reviews are also intended to serve as a preliminary basis for the formulation of principles of design and utilization of graphic training aids. It was concluded that much of the literature and information available is contradictory and inconsistent and that detailed study and evaluation of these data are necessary prior to their application as criteria in the design and use of visual training aids. In addition an interdisciplinary approach must be used to cope with the present graphic training aid problem. Material for the report was derived from a literature search in the areas of: psychophysiology of vision, visual perception, experimental aesthetics, advertising visual education, psychology of learning, visual art, engineering drawing and quantitative presentation. The time period covered is approximately from 1920 to 1954. (NEIAS)

6624

Schipper, L.M. PREDICTION OF CRITICAL EVENTS IN CONTEXTS OF DIFFERENT NUMBERS OF ALTERNATIVE EVENTS. Contract AF-33(616) 43, Proj. 7192, Tech. Note 55-744, Dec. 1955, 7pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Ohio State University, Columbus, Ohio).

In the present experiment, subjects predicted the occurrence of the critical event within contexts of 3 different numbers of alternative events. It was hypothesized that as the number of alternative events increased, the subjects would perceive the occurrences of the critical event as more frequent. The critical event was a short flash of a particular light; alternative events were flashes of similar lights. The design was an orthogonal arrangement of the relative occurrences of the critical event, 1/2, 1/4, 1/6, and 3 levels of alternative events, 1, 3, 5. Rates of omission of positive responses were significantly influenced by the proportions of occurrences of the critical event. However, the number of alternative events appeared to have no effect on subjects' performance. This lack of effect was consistent at all 3 probability levels. The results at the 1/2 and 1/4 levels with one alternative event corroborate earlier work; results at 1/6 offer an extension. It is concluded that under instructions to classify events simply into critical and non-critical categories, subjects' behavior is not significantly influenced by the number of non-critical possibilities.

R 5

6626

Ramond, C.K. & Myhill, C.R. TARGET PLACEMENT ON A DETECTION PROFICIENCY COURSE. June 1954, 20pp. Human Resources Research Office, George Washington University, Washington, D.C. (USA Human Research Unit No. 3, Fort Benning, Ga.).

6626

To design a precise and economical target detection course, the ranges of the minimum number of targets necessary to cover all discriminable ranges within any given interval were investigated. Each day for four days, 15 enlisted soldiers, aligned facing a level grassy field, made 60 estimates as to the relative closeness of two successively presented targets (human figures), one of which was either 2, 4, 6, 8, 10, 12, 14, 16, 18, or 20 yards more distant than the other. The subject's task was to record which target seemed nearer, the first or second. The near target in either kneeling or standing position was 100 or 200 yards from the subject, who was either prone or standing. The data were analyzed to determine target separations beyond which no errors would occur. T. G. R 8

111 - 731

6627

Simon, C.W., Slocum, G.K., Hopkins, C.O. & Roscoe, S.N. ALTIMETRY STUDIES: I. AN EXPERIMENTAL COMPARISON OF THREE PICTORIAL AND THREE SYMBOLIC DISPLAYS OF ALTITUDE, VERTICAL SPEED, AND ALTITUDE COMMANDS. Tech. Memo. 425, Jan. 1956, 14pp. Weapon Systems Development Labs., Hughes Aircraft Company, Culver City, Calif.

6627

This is an experimental evaluation of six displays (three pictorial and three symbolic) whose design was directed toward displaying aircraft altitude, vertical speed, and altitude commands. The displays were presented in a decision-making task requiring integration of the three types of information for successful performance. Two groups of 12 subjects each were employed and consisted of professional pilots vs. individuals with some previous pilot experience. A paper and pencil test was utilized to present two problems for each of the six displays. The results are presented in terms of the time and error scores for each of the groups with each of the displays. Pictorial displays are evaluated against symbolic displays and the specific positive features of each of the displays are discussed. T. G. I. R 17

6633

Summy, W.H. & Pollack, I. SHORT-TIME PROCESSING OF INFORMATION. Rep. TR 54 6, Jan. 1954, 12pp. USAF Human Factors Operations Research Laboratories, AFRC, Bolling AFB, Washington, D.C.

This report is concerned with the information handling capabilities of human operators. It considers the reproduction of artificial language materials which approach, to various degrees of statistical approximation, everyday English. It deals with the effect of manipulating the sequential restrictions of the materials (altering their structural approximation to English) and the effect of the manipulation of the size of the vocabulary available for reproduction (controlling the information of the units of material themselves). It was observed that when the sequential restrictions were altered, the time for processing the materials is approximately proportional to the information of the materials (the materials are processed, approximately, at a constant informational rate). When the information of the units was varied, the time for processing the materials was approximately independent of the information of the materials (the materials are processed, approximately, at an informational rate proportional to the information of the materials). In the first procedure the Ss reproduced the material orally, in writing and by typing. Each method was used by 22 to 25 Ss. In the second procedure 17 Ss used 6 lists of 50 words each. Before being given the lists, they were given the vocabulary of possible words. Each list had a different vocabulary size. (HEIAS)
R.11.

6635

Tanner, W.P., Jr. PSYCHOPHYSICAL APPLICATION OF THE THEORY OF SIGNAL DETECTABILITY. Contract DA 039 sc 15358, Task EDG-6, DA Proj. 3 99 04 042, SC Proj. 29 1948 0, EDG Rep. 18, Feb. 1954, 12pp. Armed Forces-NAC Vision Committee, Electronic Defense Group, University of Michigan, Ann Arbor, Mich.

This paper is concerned with the human observer's behavior in detecting light signals in a uniform light background. As detection of these signals depends on information transmitted to cortical centers by way of the visual pathways, an analysis was made of the form of this information and the types of decisions which can be based on information of this form. Based on the analysis, the expected form of data collected in "yes-no" and "forced-choice" psychophysical experiments is defined. Experiments demonstrating the internal consistency of this theory are presented in the paper. The conclusions reached were: a) the conventional concept of a threshold, or a threshold region, needs re-evaluating in the light of this theory; b) the guessing hypothesis is rejected on the basis of statistical tests; c) change in neural activity is a power function of change in light intensity; d) the mathematical model of signal detection is applicable to the problems of visual detection; e) the criterion of seeing depends on psychological as well as physiological factors; f) the experimental data support the logical connection between "forced-choice" and "yes-no" techniques developed by the theory. (HEIAS)
R.2

6636

Teeple, J.B., Bond, H.J. & Sleight, R.B. HOW TO DESIGN A COCKPIT: "FROM THE MAN OUT". Aviation Age, Jan. 1956, 25(1), 4pp. (Applied Psychology Corporation, Washington, D.C.).

This paper is a report on the human factor criteria which must be used in the design of a functional cockpit. It stresses the importance of the human engineer to the proper designing of a cockpit and depicts both verbally and graphically the technique of designing a cockpit "from the man out", thus taking into consideration the various factors involving man-machine interactions. (HEIAS)

6637

Thornton, G.B. DETECTION TIME OF RADAR PIPS UNDER IDEAL OPERATING CONDITIONS. Proj. 107-134-41, Rep. 10-2, Dec. 1954, 10pp. Defence Research Medical Laboratories, Toronto, Ontario, Canada.

5 experiments were performed to determine a) the time required by an alerted operator to detect clear bright pips on a noise-free CRT, b) how detection time is related to number of pips already displayed, c) work decrement over a 30-minute period at an average rate of acquisition of 6 pips per minute and at a rate of 17 per minute, and d) the effect of one to 60 seconds delay time after a ready signal. Detection time under the best conditions was found to be approximately 0.30 second. Detection time was a negatively accelerated increasing function of the number of pips displayed, increasing to more than 0.50 second with 40 pips acquired. No evidence of decrement over a 30-minute period was apparent, and no relationship was observed between detection time and a delay of one to 60 seconds after alerting. Detection times were found to be shorter when new pips were presented at an average rate of 17 per minute than when a rate of 6 per minute was employed. Thus, high traffic loads, resulting in a high saturation of marked pips on a CRT, will almost double the time taken to detect a new pip. Most of this penalty is due to the first 6 pips acquired. On the other hand, high rates of acquisition of new pips improves detection time performance.

6638

Konecni, E.B. HYPOXIA AND UNDETERMINED JET ACCIDENTS, 1 JULY 1954 THROUGH 31 DECEMBER 1955. Publ. 43-56, Oct. 1956, 20pp. Directorate of Flight Safety Research, Office of the Inspector General, USAF, Norton AFB, Calif.

6638

In order to determine the potential role of hypoxia in undetermined jet aircraft accidents, an analysis was made of 194 such accidents. The relative incidence of hypoxia as a probable cause is specified and discussed in terms of the factors responsible for the occurrence of hypoxia, e.g., improper oxygen mask fit, loose or dirty valves in masks, defective regulators, etc. The Flying TAF Non-Fatal Hypoxia Incident Report is described as an effective means of discovering the causal factors in the occurrence of hypoxia. Recommendations are offered concerning the prevention of hypoxia episodes.
T.

6640

Torrance, E.P. PSYCHOLOGICAL ASPECTS OF SURVIVAL: A STUDY OF SURVIVAL BEHAVIOR. Memo. TN 54-4, Jan. 1954, 93pp. USAF Human Factors Operations Research Laboratories, ARDC, Bolling AFB, Washington, D.C.

This composite report of several studies on the psychological aspects of survival behavior deals with the following areas: a) fear in survival; b) specific enemies of survival, i.e., pain, cold, thirst, hunger, fatigue, boredom, and loneliness; c) group behavior under survival conditions; d) personality requirements for survival; e) relationships of downed air crew members with individuals and groups in enemy territory; f) psychological "set" as a factor in survival; g) conflict as a factor in survival; h) concessions to comfort; i) how to enjoy yourself in survival. The report takes the form of a series of non-technical discussions. The information sources were: a) Air Force evadees, escapees, and survivors in World War II and in the Korean combat; b) Arctic survival and rescue reports; c) intelligence reports of the Far Eastern Air Force; d) studies of behavior under the simulated survival conditions of the SAC Advanced Survival School; e) a survey of the related psychological literature. (HEIAS)

6641

Torrance, E.P. PSYCHOLOGICAL ASPECTS OF SURVIVAL: SUPPLEMENT: TEACHING THE PSYCHOLOGICAL ASPECTS OF SURVIVAL. Memo. Rep. TN 54-4A, Jan. 1954, 25pp. USAF Human Factors Operations Research Laboratories, ARDC, Bolling AFB, Washington, D.C.

This report consists of information useful to survival instructors and trainees. Some of the aspects of survival training covered are: a) teaching to control fear and panic; b) good leadership; c) psychological reactions to pain, cold, thirst, hunger, fatigue, boredom and loneliness; d) teaching for effective group action in survival; e) personality requirements for survival; f) teaching "set" for survival; g) learning how to get along with friend and foe in hostile territory; h) teaching how to resolve conflicts in survival; i) teaching the dangers of making concessions to comfort; j) how to help trainees enjoy survival training. (HEIAS)
R-11

6642

Torrance, E.P. PSYCHOLOGICAL ASPECTS OF SURVIVAL. Rep. 35, March 1953, 28pp. Human Factors Operations Research Labs., ARDC, Bolling AFB, Washington, D.C.

Information relevant to the psychological aspects of survival have been brought together from widely-scattered sources. Although almost nothing has been written directly concerning the psychological aspects for survival, there is a considerable body of data concerning psychological reactions to stresses which make up a part of "survival" which may be expected to apply to survival. Even in this, there are many gaps in present knowledge and the investigator interested in developing "a psychology of survival" is working in almost virgin territory. Perhaps the biggest gap in our knowledge occurs in relation to the application of the psychological principles which have been outlined to the practical problems of specific survival problems and survival training problems and the communication of these principles to trainees. It would seem that much of the emphasis of future research should be directed toward filling this important gap.
R-68

6648

Warren, J.M. & Pinneau, S.R. INFLUENCE OF FORM ON JUDGMENT OF APPARENT AREA. Percept. Motor Skills, March 1955, 5, 7-10. (University of Oregon, Eugene, Ore. & University of California, Berkeley, Calif.).

The geometrical area of the circle, square, cross, and triangle judged subjectively equal to a 600 mm. standard circle was determined for 32 experimentally naive Ss by the method of constant stimuli. It was found that: a) With regard to subjective equality the 4 forms constituted 2 significantly different populations. The subjectively equal square was slightly larger than the standard circle in geometrical area; while the subjectively equal triangle and cross were approximately 20% smaller. The PSEs of the square and circle did not differ significantly, nor did the PSEs for triangle and cross. b) The data indicated that the Ss, although instructed to equate the figures in area, tended to equate the forms in the maximum vertical dimension.
R-4

6649

Webster, J.C. A RECORDED WARBLE TONE AUDIOMETER TEST SUITABLE FOR GROUP ADMINISTRATION OVER LOUDSPEAKERS. J. Speech and Hearing Disorders, June 1952, 17(2), 213-223. Title also used: DEVELOPMENT AND USE OF THE NEL RECORDED WARBLE TONE HEARING TEST: PART II. Rep. 546, Part II, Dec. 1954. USN Electronics Lab., San Diego, Calif.

A pulsed-tone group hearing test has been developed which a) uses warble tones (tones that vary in frequency at a given rate, 5 cps), and vary over a given extent as from 885 to 1125 cps; b) uses within-group attenuation (each pulse within a group of pulses is softer than the pulse preceding it); c) is recorded on a phonograph disc (or magnetic tape) and therefore requires a less skilled operator to administer it. This test was tried out on 200 college students under 2 conditions; a) It was played back over a multiple array of loudspeakers in a reverberant room to groups of as many as 80 people, listening binaurally; b) It was played back over a network of 36 pairs of headsets to as many as 36 people listening binaurally. These same students also were given the more usual type of group tests over both loudspeakers and headsets. The test-retest reliability was a function of frequency and whether or not the person changed positions or headsets between test and retest, but in general the new test was as reliable as the better of the 2 control tests whether heard over headsets or loudspeakers. The comparison of the results of this test with the results of an individual clinical audiometer test, although based on a small sample, indicate that as a screening device it is satisfactory.
R-10

6650

Webster, A.P. HIGH ALTITUDE-HIGH VELOCITY FLYING WITH SPECIAL REFERENCE TO THE HUMAN FACTORS. IV. OPENING SHOCK OF PARACHUTE DESCENTS. Proj. NM 006 014.09.01, Jan. 1953, 28pp. USM Medical Field Research Lab., Camp Lejeune, N.C.

The purpose of the paper was to discuss in detail the opening shock of parachutes and determine human tolerance to altitude and velocity for a particular type of parachute. The opening shock of standard American parachutes is shown to increase directly with the 4th power of the velocity (true air speed) of the jumper when the parachute opens; to increase directly with the weight of the jumper; and to increase directly with the mass density of the air, i.e. decrease with increase in altitude. A velocity-altitude tolerance table and chart were prepared showing a Safe Region producing 20 G. or less, a Dangerous Region producing 30 G. or more, and a Borderline Region producing between 20 and 30 G. (NEIAS).

R 13

6651

Fritz, E. INFORMATION THEORY IN AIR TRAFFIC CONTROL. Contract AF 18(600)26, ca. 1953, 5pp. Franklin Institute Laboratories, Philadelphia, Penn.

6651

This document presents a discussion of the role of information theory in air traffic control. Information and redundancy are defined and four types of context isolated and applied in an analysis of information transmission in an air traffic control situation. The results of this analysis are discussed in terms of variation in message content as a function of context, redundancy, etc.

G.

6654

Whiteside, T.C.D. VISION IN AN EMPTY VISUAL FIELD: A SUBJECTIVE TECHNIQUE FOR THE MEASUREMENT OF ACCOMMODATION. PPRC 850, Sept. 1953, 5pp. RAF Institute of Aviation Medicine, Farnborough, Hants, England.

6652 Weiss, H.S., Edelberg, R., Charland, P.V., & Rosenbaum, J.I. THE PHYSIOLOGY OF SIMPLE TUMBLING. PART II. HUMAN STUDIES. R00 695 61, Tech. Rep. 53 139, Part 2, Jan. 1954, 20pp. Aero Medical Lab., USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

In order to assess the tolerance limits to head-over-heels rotations or flat spins, as likely to be encountered in escape from aircraft, human subjects were spun on the horizontal spin-table. The experiments were guided by previous animal investigations but runs on human subjects were limited to 125 rpm because of the onset of pressure pain in the head or feet. During the spin, the physiological behavior of the human closely resembled that of dogs and, on the basis of this, curves for the responses of humans at speeds up to 110 rpm were extrapolated to the level of circulatory failure. By this procedure, it was estimated that the border line of unconsciousness would be reached after 3 to 10 seconds of rotation at 140 rpm and complete unconsciousness after 3 to 10 seconds at 160 rpm with the center of rotation at the heart. The data, together with performance tests and the observation of conjunctival petechiae, were used to determine the time-intensity areas of safe and dangerous rotations.

R 24

6653

Weiss, Sylvia E. & White, H.S. A CATALOG OF OGRD REPORTS. DIVISION 7, FIRE CONTROL. PB 104375S8, July 1952, 44pp. US Office of Technical Services, Department of Commerce, Washington, D.C.

6653

This document is one of a series of report catalogs primarily based on a single-copy collection of the former office of Scientific Research and Development reports existing in the Technical Information Division, Library of Congress. This report is the unclassified section of Division Seven (Fire Control) reports. In addition to titles, arranged by report number, the following indices are included: contractor, contract number, OGRD number, report to services, report number, author, and subject.

R 400 (approx)

6654

To further investigation of such matters as the best form for a stimulus which might be fixated while searching in an empty visual field, a test is described by means of which accommodation can be measured without requiring the subject to fixate any object. The test was calibrated against measurements obtained with the coincidence optometer. The difference between the degrees of accommodation really exerted and the degree of accommodation expected when a test object is being observed is given.

T. G. I. R. 5

6655 Wilson, H.R. EVALUATION OF THE EYE REFRACTOMETER. Proj. 21-0201-0007, Dec. 1952, 7pp. USAF School of Aviation Medicine, Randolph Field, Tex.

The Rodenstock "Eye Refractometer" is comparable in accuracy to the standard methods of retinoscopy in determining refractive errors under cycloplegia. The experienced retinoscopist requires approximately the same amount of time for determination of refractive errors using retinoscopy and the eye refractometer. The eye refractometer provides a method for accurate cycloplegic refracting at a great savings in time to the relatively inexperienced refractonist and can be accurately employed by the totally inexperienced technician after a few hours' indoctrination.

6657

Office of Naval Research. A SYMPOSIUM. PSYCHOPHYSIOLOGICAL FACTORS IN SPATIAL ORIENTATION. Report from: Meeting of the Naval Research Advisory Panel in Psychophysiology, 30-31 Oct. 1950. NAVEXOS P 966, Oct. 1950, 89pp. Office of Naval Research, Washington, D.C.

The aim of this symposium is to make available to the military an integrated report of current work on psychophysiological factors in spatial orientation and its application to the military. Topics discussed are: a) spatial disorientation in flight; b) neurophysiological factors (anatomy and physiology of the vestibular system, cortical projection of postural impulses); c) orientation to visual and postural vertical (individual differences in mode of space orientation, factors influencing the perception of the vertical); d) accelerative forces (some characteristics of vestibular eye movements, studies to define quantitatively the stimulus required to produce motion sickness, psychological effects of increased positive radial acceleration, the lag effect associated with stimulation of the semicircular canals as indicated by the oculogyral illusion, the effect of a change in direction of resultant force on sound localization, age as a variable in post-rotation phenomena); e) the operating principle of the vestibular mechanisms; f) the relation between visual and postural determinants of the phenomenal vertical; g) some studies of visual perception of motion. (NEIAS)

R 15

6658

Stevens, S.S., Loring, J.C.G., & Cohen, Dorothy. BIBLIOGRAPHY ON HEARING. Contract NSori 76, Proj. Order II, Proj. NR142 201, Rep. PKR 160, Cambridge, Mass: Harvard University Press, 1955, 600pp. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

This is a 1955 bibliography on hearing containing well over 10,000 titles. There is an alphabetical listing by author and also a classification by subject matter.

6660

Regener, V.H. ZODIACAL LIGHT. Contract AF 19(604)-181, Final Rep., Aug. 1954, 29pp. University of New Mexico.

6660

This report presents 47 automatically plotted maps of the zodiacal light from 24 nights in 1953 and 1954. The maps were obtained from equipment of high resolution, equal to about 0.1 square degree. Analysis and discussion centers upon the following properties of zodiacal light and their variations with time: (1) intensity variation along the ecliptic in terms of elongation from the sun; (2) symmetry of intensity distribution with respect to the ecliptic; and (3) extraterrestrial intensity in terms of star intensities. The methods of analysis, plotting of the isophotes, and accuracy of the maps are described.

T. G. R 6

6661

Teichner, W.H., Kobrick, J.L., & Wehrkamp, R.P. THE EFFECTS OF TERRAIN AND OBSERVATION DISTANCE ON RELATIVE DEPTH DISCRIMINATION. Amer. J. Psychol., June 1955, 68, 193-208. (Quartermaster Research & Development Center, Natick, Mass.).

6661

To investigate the effects of terrain and observation distance on the precision of relative depth discrimination, (see 6662) and experimental situation modeled after the Howard Dolman apparatus was used. Four subjects made daytime equality judgments of the relative spatial positioning of two large targets at nine observation distances (from 200 to 3000 feet) over different types of flat terrain (meadow, airstrip, desert sand, desert pavement, and silt). Both monocular and binocular observations were made. Threshold data (standard deviations of settings) were analyzed in terms of distance and terrain functions. A prediction formula for the distance function in outdoor viewing is proposed.

T. .. R 15

6662

Teichner, W.H., Kobrick, J.L., & Dusek, E.R. COMMONPLACE VIEWING AND DEPTH DISCRIMINATION. J. Opt. Soc. Amer., Nov. 1955, 45, 913-920. (Quartermaster Research & Development Center, Natick, Mass.).

6662

To determine the effects of terrain and observation distance on the precision of relative depth discrimination (see 6661), an experimental situation modeled after the Howard-Dolman apparatus was used. Four subjects made daytime equality judgments of the relative spatial positioning of two large targets at observation distances of 200, 750, and 1500 feet in an Arctic area over flat terrain. The data were compared with measurements taken over desert terrain and with similar data from other investigators. The standard deviations (precision) of depth discriminations were analyzed as functions of observation distance and type of terrain. The basis for commonplace depth discrimination is discussed.

T. G. R 13

6663

Trabold, F.W., Jr. HUMAN ENGINEERING FACTORS IN THE DESIGN OF RADIATION DETECTING UNITS: SUPPLEMENT I. Aug. 1956, 6pp. Avco Manufacturing Corporation, Crosley Division, Cincinnati, Ohio.

6663

To evaluate consumer preference for a configuration in the form of an "iron" for packaging a Geiger Counter unit, 21 subjects were asked to rate in order of their personal preference seven different models: pistol, iron, camera, floodlight, wristwatch, handle grip, and wrist unit. Subjects were individually interviewed and given a mental situational set for the operational conditions of the unit. Rank order preferences were determined and recommendations are included. (See also 6664).

T.

6664

Trabold, F.W., Jr. & Sklodowski, V.A. HUMAN ENGINEERING FACTORS IN THE DESIGN OF RADIATION DETECTING UNITS. cir. Aug. 1956, 20pp. Avco Manufacturing Corporation, Crosley Division, Cincinnati, Ohio.

6664

To present human engineering factors in the design of radiation detecting units, two opinion surveys were conducted. In the first, 26 subjects were asked to rate five clay models for use as a geiger counter in prospecting and again for use in Civil Defense. Rank order preferences were established. In a second survey, 36 men and women made subjective estimates of the weights of four objects differing in configuration but identically weighted. Based on these last three data configurations were recommended. Both general principles and specific design recommendations were included.

T. I.

6665

Van Huyck, A.P., Davidson, G.W., & Notary, A.C. HUMAN ENGINEERING SURVEY OF HONEST JOHN WEAPON SYSTEM. TBI-1000, Tech. Memd. 24, Sept. 1956, 73pp. Aberdeen Proving Ground, Md.

6665

To ascertain what significant human engineering problems were being encountered by users with the 762 mm. Rocket (Honest John), a liaison team of three men was familiarized with the system by training, conferences with design personnel and observational studies. Problems were incorporated into questionnaire form and used for interviewing five batteries experienced in the use of the system. The results were organized into natural sequence of occurrence: loading emplacement, sighting, and aiming, and checkout. Design recommendations for future equipment, modifications on present equipment, and areas where further study is necessary are given.

X.

6666

Woodcock, A.H., Powers, J.J., Jr., & Breckenridge, J.R. MAN'S THERMAL BALANCE IN WARM ENVIRONMENTS. Proj. 7-83-01-003, Tech. Rep. RP-30, July 1956, 18pp. Quartermaster Research & Development Center, Natick, Mass.

6666

This paper presents a theoretical analysis of the factors influencing stress in warm and hot environments developed by means of physical equations of heat and moisture transfer. Two different situations are considered: (1) where all sweat is evaporated and cooling limited by sweat secretion, and (2) with the skin wet where cooling is limited by the amount of sweat which can be evaporated. Unequal evaporation over body area is also considered. Graphical presentation demonstrates the separate and combined effects of various environmental factors and indicates how clothing alters these effects. The theoretical results are compared with experimental findings of previous research.
G. R 19

6667

Webb, W.D. ELEMENTS IN INDIVIDUAL-TO-INDIVIDUAL COMMUNICATION. Proj. NM 001 108 107, Rep. 4, May 1956, 6pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

6667

To investigate some aspects of oral communication of information, test materials of relatively unfamiliar material (three Greek myths) were prepared. A communicator was selected at random from groups of twenty air cadets. After a period of study, the communicator transmitted the stories to a communicatee, who then answered a 45-item true-false test (reliability of .72). Eight communicators repeated the procedure for successive subjects varying in number from three to seven. Time per session was recorded. Test scores and time scores were evaluated by analyses of variance for differences due to communicator, time required to transmit information, and communicator-communicatee interaction.
T. R 1

6668

Licklider, J.C.R. & Cherry, C. (Ed.). AUDITORY FREQUENCY ANALYSIS. Report from: "Third London Symposium on 'Information Theory'", Sept. 12-16, 1955. AFRC TM 55 63. Operational Applications Laboratory, USAF Cambridge Research Center, Bolling AFB, Washington, D.C.

6668

This paper re-examines theoretical and factual information concerning frequency analysis in hearing, how that analysis is made and of what features of subjective experience are related to what features of objective stimulation. Results of observations made in order to check conflicting reports are described and a "triplex" theory of pitch perception is outlined.
R 31

6669

Wilkinson, D.A. SOME ASPECTS OF NIGHT AND INSTRUMENT FLYING ON SINGLE ROTOR HELICOPTERS. Rep. AAE/Res/291, Jan. 1956, 26pp. Ministry of Supply, Aeroplane and Armament Experimental Establishment, Boscombe Down, England.

6669

To study some aspects relevant to the operation of helicopters under instrument-flying and night-flying conditions, a series of investigations were performed. Assessments were made of ground lighting equipment (helicopter beacon, paraffin flares, glinn lamps, and flare path sodium lamps), various lighting patterns, two approach patterns, use of parachute flares for emergency landing, and types of cockpit lighting (Thorne--a trans-illumination system). Some information on the results of instrument flying obtained during testing of prototype helicopters is included. The results of the test are discussed in terms of the facilities required by the pilot during night flying.
I. G. R 4

6670

Whiteside, T.C.D., & Gronow, D.G.C. VISION IN AN EMPTY VISUAL FIELD. THE EFFECT OF EMPTY FIELD MYOPIA UPON THE MINIMUM VISUAL ANGLE. PPRC 872, March 1954, 14pp. PPRC, RAF Institute of Aviation Medicine, England.

6670

To determine what increase in angular size is necessary to make a target visible in an empty field, measurements were made of the distance at which a test pattern of dots could be recognized with and without a superimposed collimated fixation pattern. (Both test and fixation pattern were maintained at optical infinity). Luminance of background was between 400 and 450 foot lamberts; 63 pilots and navigators were subjects. Performance data were expressed as ratios of the "with stimulus" to the "no stimulus" distances and analyzed with respect to experience factors. Physiological factors of the eye are discussed in relation to the results and suggestions are made for improving recognition of targets in the flying situation.
T. I. G. R 10

6671

Whiteside, T.C.D., & Roden, T.G.V. VISIBILITY OF AERODROME SYMBOLS OF ICAO - NEW ISSUE RAP AND MODIFIED NEW RAP MAPS. PPRC 760, May 1951, 6pp. RAF Institute of Aviation Medicine, Farnborough, Hants, England.

6671

To determine the best means for specifying aerodromes on maps, three types of symbols were tested: red, black, filled-in black. The visibility of the symbols was measured under "normal reading intensity" electric lights. Results in terms of the number of symbols found in 15 seconds under the three conditions are reported for 18 subjects.
I.

6672

Bradley, J.V. EFFECT OF KNOB ARRANGEMENT ON CONSUMPTION OF PANEL SPACE. Proj. 7182-71514, Tech. Rep. 56-202, June 1956, 9pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6672

To examine methods of crowding instrument controls, data were derived from two previously reported experiments. (Both experiments investigated inadvertent touching of knobs adjacent to the operated knob as a function of distance between knob rims: knobs were mounted on concentric shafts or side by side in a straight line). This report presents frequency of inadvertent touching as a function of panel space consumed. Application of the results to most efficient knob arrangements for limited space is made.
G. I. R 2

6674

Casperson, R.C., Lenzycki, H.P. & Orlansky, J. TAXIWAY LIGHTING, ROUTING AND DESTINATION MARKING SYSTEM FOR AIRFIELDS. Contract NOAS 51-1017 C, Tech. Rep. 32 1, March 1952, 79pp. Dunlap and Associates, Inc., Stamford, Conn.

6674

This report describes a study undertaken to develop a taxiway lighting, routing and destination marking system for airfields. The following procedures were used: survey of literature, survey of airport designs and existing equipment; pilot interviews and questionnaires; analysis of operating procedures to assess the present and future requirements for taxiing; and objective field and laboratory investigations, including tests of coding and legibility. The conclusions are presented in the form of recommendations for an optimum system: general operational requirements, marker content (terms and symbols), design of marker figures, lighting, circuiting, and placement and construction of signs.
T. G. I. R 55

6675

Orlansky, J. IMPLICATIONS OF HUMAN ENGINEERING RESEARCH FOR TRAINING. No date, 11pp. Dunlap and Associates, Inc., Stamford, Conn.

6675

This report of a speech stresses the need for human engineering design of complex equipment in order to simplify training problems. The purposes and range of human engineering are described and illustrated in some detail, and the paper concludes with a discussion of the relation of human engineering to training.

6676

Peters, G.A., Jr. PRELIMINARY ANTHROPOMETRIC ESTIMATES OF HUMAN SURFACE AREA. Tech. Memo 7, June 1956, 20pp. Samuel Peltzman Assumption Laboratories, Picatinny Arsenal, Dover, N.J.

6676

To derive estimates of the amount of projected human surface area, a sample of anthropometric photographs in the Atlas of Man (Dr. W. H. Sheldon) were chosen. An integrating planimeter was used for obtaining area measurements of both front and side views. Descriptive statistics, correlations with other human physical attributes and predictive charts were obtained for both front and side projected surface areas. The relation of projected area to the total radiating surface was determined. Comparisons were made with data currently in use, particularly in the design of Ordnance items. Selective factors which tend to influence the anthropometric characteristics of a group are discussed. Recommendations for future study are made.

T. G. I. R 9

6679

Müller, F.A. COMMUNICATION IN THE PRESENCE OF ADDITIVE GAUSSIAN NOISE. Contract DA36-039 sc 100, Proj. 8 102B 0, DA Proj. 3 99 10 022, Tech. Rep. 244, May 1953, 17pp. USA Signal Corps, Office of Naval Research, AFPC, Washington, D.C. (Research Lab. of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.).

This report presents an analysis of the properties of finite segments of noise taken from correlated gaussian noise. This analysis is applied to the problem of optimal detection of signals when a communication channel adds gaussian noise and introduces a linear distortion. Some specific examples are discussed briefly.

T. 12

6680

Moser, H.M., Dreher, J.J., & Adler, S. NUMBER TELLING OF REPEATED DIGITS, EXACT HUNDREDS AND THOUSANDS. Contract AF 19(604)-1577, Proj. 664, Tech. Rep. 32, AFPCRC TN 55-73, June 1956, 8pp. Operational Applications Laboratory, AFPCRC, Bolling AFB, Washington, D.C. (Ohio State University Research Foundation).

6682

Moser, H.M., Dreher, J.J., O'Neill, J., & Adler, S. EFFECTS OF REPEATING THE INITIAL SOUNDS OF WORDS ON THE INTELLIGIBILITY OF AIR MESSAGES. Contract AF 19(604)-1577, Proj. 664, Tech. Rep. 30, AFPCRC TN 55-69, June 1956, 33pp. Operational Applications Laboratory, AFPCRC, Bolling AFB, Washington, D.C. (Ohio State University Research Foundation).

6682

To examine the effects of repeating initial sounds of words (a so-called "bounce" pattern) on the intelligibility of air messages, ten trained listeners indicated in writing their response to words spoken with "single-bounce" and with "double-bounce" technique (speech-to-noise ratio, -17 decibels). Percent correct responses was compared with data from a previous study using normal and "single-bounce" techniques. Messages patterned on current traffic control style were tested for intelligibility on 75 listeners using both normal and "single-bounce" telling techniques (speech-to-noise ratio, -5 decibels). The data were analyzed for effect of telling techniques and practice. Recommendations for further assignment of technique are made.

T. G. R 6

6683

Moser, H.M., & Dreher, J.J. PRELIMINARY TEST OF AIR DEFENSE COMMAND PROCEDURE WORDS. Contract AF 19(604)-1577, Proj. 664, Tech. Rep. 34, AFPCRC TN 56-54, July 1956, 14pp. Operational Applications Laboratory, AFPCRC, Bolling AFB, Washington, D.C. (Ohio State University Research Foundation).

6683

The purpose of this study was to determine the relative intelligibilities of certain procedural words used in Air Defense operations when spoken by American, French, and Spanish speakers to American listeners. Six key words of the telling procedure (Track, At, Range, Course, Objects, Speed) were combined into word lists with 36 other words and recorded by foreign and American speakers. They were played back to three groups of listeners (32, 45, and 50) in quiet, with white noise (+5 signal-to-noise ratio) and with voice babble (+5 signal-to-noise ratio). Articulation scores were analyzed for effect of speaker nationality under all conditions. Recommendations for further research are made.

T.

6684

Muller, P.F., Jr., Sidorosky, R.C., Slivinske, A.J., Alluisi, E.A., & Pitts, P.M. THE SYMBOLIC CODING OF INFORMATION ON CATHODE RAY TUBES AND SIMILAR DISPLAYS. Contract AF 33(616)-43, Proj. 7192, Tech. Rep. 55-375, Oct. 1955, 123pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation).

6684

This report summarizes the results of a series of eleven studies of the feasibility of several different types of symbols for the coding of information on cathode ray tubes (CRT) and similar displays for use in future air traffic control and related systems. Section I contains specifications and recommendations for engineering applications to CRT displays. Section II contains detailed results of the laboratory investigations. Four basic code symbols (inclination, ellipse ratio, blip diameter, and color) are dealt with, and then multi-dimensional alphabets combining two or more symbols. Psychophysical data on absolute discrimination and on information-handling ability with the various symbols are given.

III - 737, O. I. R 22

6681

To measure relative intensities of sustained vowel sounds at various locations from the larynx to the top of the head, three subjects (representing three distinct body types) practiced until they could maintain each of twelve vowel sounds at 76 decibels for five seconds. A bone oscillator was placed in each of 16 positions on head and neck; the signals, fed into an Ampex recorder, were recorded at constant gain setting. The resultant 576 readings were analyzed for relative intensities by power level tracings and evaluated by analysis of variance. Anatomical locations were ranked on basis of intensity of transduced vowel sounds. Subjective judgments were made of the position yielding the most faithful reproduction. Implications for recording speech signals are discussed.

6685

Muller, P.F., Jr. EFFICIENCY OF VERBAL VERSUS MOTOR RESPONSES IN HANDLING INFORMATION ENCODED BY MEANS OF COLORS AND LIGHT PATTERNS. Contract AF 33(616) 43, Proj. 5 (7 7192), WADC TR 55 472, Dec. 1955, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University, Columbus, Ohio).

6685

To compare the relative compatibility of verbal and motor responses to different types of visual stimuli and to determine the effect of verbalization as a factor in transfer from one type of response to the other, four experimental and four control groups made verbal (number-naming) and motor (key-pressing) responses to spatial and to color symbols. Control groups made the same response during training and transfer trials; experimental groups trained on one type of response and used the other in transfer trials. Data (reaction times and information-handling rates) were analyzed for most compatible stimulus-response conditions and for transfer effects. The results are discussed in relation to general concept of stimulus-response compatibility.

T.G. I. R 13

6686

Maag, C.H., & Hall, A.L. CHARACTERISTICS OF MENTAL IMPAIRMENT UNDER HYPOXIA. Proj. NM 001 101 104, Rep. 2, March 1956, 24pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

6686

To investigate the characteristics of the decrement in performance on a conceptual reasoning test under conditions of oxygen deprivation, ten subjects were given pre-experimental training to a learning plateau on a conceptual reasoning test. A criterion for impaired responses (three standard deviations above mean time to complete a problem after training) was used to evaluate performance under exposure to various simulated altitudes (sea level, 13,000, 16,000, 17,000, and 18,000 feet) for 129 minutes or until unconsciousness. Performance data for each subject were divided into five phases of equal numbers of responses made during period of consciousness. Altitude and phase effects are analyzed in terms of performance means and performance meeting the criterion. Typical behavior under oxygen stress is discussed. T.G. I. R 18

6687

Mann, C.W., & Ray, J.T. THE PERCEPTION OF THE VERTICAL. XIII: AN INVESTIGATION OF QUADRANT DIFFERENCES. Prepared under Contract Nonr-475-05, Proj. NR 142-455, Proj. NM 001 110 500, Rep. 39, May 1956, 11pp. USN School of Aviation Medicine, Pensacola, Fla.

6687

This paper reports the findings of an experiment designed to investigate the possibility of right and left quadrant differences in the judgment of the postural vertical. Using the Tulane lateral tilt chair, four subjects were tested under the condition of a constant amount of time out of the vertical where three rates of displacement and three amounts of tilt were employed. The data are analyzed by means of analysis of variance techniques.

T. G. R 8

6688

Mann, C.W., & Ray, J.T. THE PERCEPTION OF THE VERTICAL. XIV: THE EFFECT OF RATE OF MOVEMENT ON THE JUDGMENT OF THE VERTICAL. Tulane University Contract Nonr-475-05, Proj. NM 001 110 500, Rep. 40, (ONR Proj. NR 142-455), May 1956, 11pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

6688

To investigate the possibility of right and left quadrant differences in the judgment of the postural vertical without aid of visual reference, four subjects were tested. Time out of vertical (movement time to inclination, delay at inclination, and return to vertical) was held constant at approximately 82 seconds with varying movement rates (0.77, 1.10, and 1.33 degrees per second), and degrees of tilt (10, 20, and 30 degrees). Error data were evaluated by analysis of variance techniques for differences due to quadrants, rates, tilts, and subjects. The findings are related to other studies in the literature.

G. T. R 8

6689

Newman, R.W., & Munro, Ella H. THE RELATION OF CLIMATE AND BODY SIZE IN U.S. MALES. *Amer. J. Phys. Anthropol.*, March 1955, 13 (1), 1-18. (Quartermaster Research & Development Center, Natick, Mass.).

6689

To study possible statistical relationships between climatic environment and body size, data from 15,000 young, white, American men (Army inductees) were analyzed. The subjects were divided on basis of birth into 48 groups, and average biological values (stature, weight, surface area, weight/surface area) and environmental values (mean annual, July-noon "effective", mean July, and mean January temperatures) were analyzed by correlational techniques. These results are compared with similar findings on other groups. Possible causal factors are discussed.

T. R 13

6691 Nottingham, W.B. SURVEY OF METHODS USED TO DETERMINE THE OPTICAL PROPERTIES OF PHOSPHORS. Contract N36 039 sc 32037, Proj. 1028, DA Proj. 3 99 10 022, Tech. Rep. 110, May 1949, 13pp. Army Signal Corps, ONR, Air Materiel Command, Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.

A brief review of the theory of phosphors is given in terms of the electron-band picture of impurity semiconductors in order to show the reasons for researches designed to obtain the optical properties of phosphors. The automatic spectroradiometer is described, since it is an instrument which yields so much information of value in phosphor research, development and quality control. Some problems of spectroradiometer standardization are discussed in detail; since the data obtained cannot be correctly explained by the I.C.I. system of color specification and interpretation unless satisfactory standards are maintained and used. A brief discussion is given of the application of the I.C.I. system to aid in the choice of phosphors required to produce a suitable white for television cathode-ray tubes. Other researches discussed include the determination of phosphor excitation curves, the emission of light as a function of temperature and of time, and the correlation of spectral excitation and absorption data.

R 16

6692

Newman, R.W. SKIN-FOLD CHANGES WITH INCREASING OBESITY IN YOUNG AMERICAN MALES. *Hum. Biol.*, May 1955, 27 (2), 53-64. (Quartermaster Research & Development Center, Natick, Mass.).

6692

Two problems involving skin-fold measurements to calculate body fat were examined in this paper. Data used were taken on 2,000 young American men (1,702 white, 292 Negro) soon after induction into the United States Army. (1) Negro and white skin-fold relationships were analyzed by comparing correlation coefficients between skin-fold sites and average skin-fold values for increments of obesity. (2) A graphic comparison was made of the various skin-fold sites in a combined series of the 2,000 men to study changes in proportional representation of the average site values between lean and fat subjects. The uses and limitations of the data are discussed.

6693

Provins, K.A. THE ROLE OF RECEPTORS IN MUSCLE AND TENDON IN CONTROLLING THE APPLICATION OF FINGER PRESSURE IN MAN. *J. Physiol.*, March 1955, 128, 55-56. (Medical Research Council, Working Efficiency Unit, Oxford University).

6693

To investigate the sources of sensory control in the judgment of applied pressure in man, the accuracy with which nine subjects were able to reproduce a particular pressure with the index finger with their eyes closed was recorded. Five pressure values were tested at a slow and at a fast rate of application under normal conditions and with the digital nerves of the index finger blocked with Xylocaine. Differences in accuracy due to rate of pressure and to normal and nerve-block series are discussed and related to sensory receptors. No data are given.

R 2

6694

Provins, K.A. "HANDEDNESS" AND SKILL. *J. exp. Psychol.*, May 1956, 8 (2), 79-95. (Medical Research Council Unit for Research on Climate and Working Efficiency, University of Oxford).

6694

To investigate basic factors in "handedness" and skilled movements, a series of tasks were performed by 26 men and women involving various levels of complexity and training with both preferred and nonpreferred bodily members. Measurements were made of accuracy of reproducing a given pressure and speed of attempted tapping of index finger and big toe; accuracy of dart throwing; and consistency of timing in applying force in cranking at high speed before and after training. The data were analyzed for differences attributable to bodily member used and to training. The role of "timing" or "phasing" of muscular contractions in skilled movements is related to the results.

T. G. I. R 34

6695

Katchmar, L.R., & Azrin, N.H. EFFECTIVENESS OF WARNING LIGHTS AS A FUNCTION OF FLASH RATE. *Tech. Rep.* 23, Aug. 1956, 5pp. Human Engineering Laboratory, Aberdeen Proving Ground, Md.

6695

To investigate the extent to which changes in flash frequency would change the effectiveness of a warning light in eliciting a reaction, ten subjects were required to judge which of two flashing lights they would turn off first. Two light sources were used each flashing at a different rate, duration of flash was constant, flash rates varied, from one to sixty cycles per second, intensity of light was approximately one foot candle (at source). The data (preferences) are analyzed as a function of flash rate. Discussion relates the results to subjective feelings caused by intermittent stimulation of various frequencies. Study of other factors is recommended.

6696

Kobrick, J.L. A STUDY OF PERFORMANCE DIFFERENCES AMONG FIVE TYPES OF BUTTONS. *Proj.* 7-95-20-0038, Oct. 1955, 7pp. *Quartermaster Research and Development Center*, Natick, Mass.

6696

To investigate design factors, exclusive of size, which contribute to ease of operation, five types of buttons 3/4 inch in diameter were tested for differences in ease of buttoning and unbuttoning. Subjects (75) performed on each type of button using the bare hand or wearing the wet-cold glove ensemble. Performance data (time to button and unbutton) were analyzed for differences among the five types. The results were compared to those of a previous study where size was the variable to establish the critical design variable. Recommendations are included.

T. I. R 1

6697

Mackworth, J.F. & Mackworth, N.H. THE OVERLAPPING OF SIGNALS FOR DECISIONS. *Amer. J. Psychol.*, March 1956, 62(1), 26-47. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU Rep. 225/56).

6697

To investigate the effect of varying the number of sources of visual information upon performance, 28 subjects performed a task in which symbols on a fixed card were matched to those on moving cards. Channels supplying cards for matching were varied from two to twelve; speed was varied from five to ten seconds per comparison in one experiment but was constant at six seconds in another; only one moving card could be seen at any stage; criterion of performance was percentage of failures (wrong plus omitted answers). An index of signal-overlap (total sum in seconds of the various periods during which any signal is overlapped by any other signal) was used in analyzing speed-stress produced by multichannel displays and its effect upon accuracy of performance.

6698

Provins, K.A. MAXIMUM FORCES EXERTED ABOUT THE ELBOW AND SHOULDER JOINTS ON EACH SIDE SEPARATELY AND SIMULTANEOUSLY. *J. appl. Psychol.*, Jan. 1955, 7 (4), 390-392. (Medical Research Council Unit for Research on Climate and Working Efficiency, University of Oxford).

6698

To determine maximum forces which could be exerted about the elbow and shoulder joints on the two sides separately and together, twelve subjects were tested in both seated and standing positions. The upper arm was adducted to side of body with elbow flexed to a right angle as subject grasped handle and attempted flexion or extension movements exerting as much force as possible. Strength of attempted movement was recorded for both sides separately and simultaneously in a cooperative movement. The data were evaluated by analysis of variance and applications are made to practical situations.

T. I. R 34

6699

Provins, K.A. EFFECT OF LIMB POSITION ON THE FORCES EXERTED ABOUT THE ELBOW AND SHOULDER JOINTS ON THE TWO SIDES SIMULTANEOUSLY. *J. appl. Psychol.*, Jan. 1955, 7 (4), 387-389. (Medical Research Council Unit for Research on Climate and Working Efficiency, University of Oxford).

6699

To ascertain forces exercisable on a handwheel, twelve subjects were tested for both maximum torque exercisable and maximum length of time a fixed proportion (4/5) of their maximum torque could be exerted on a handwheel while in a seated position. Six different handwheel positions were tested using three angles of shoulder flexion (0, 45, 90 degrees, with elbow always flexed to right angles with upper arm) so that attempted movement was either about the shoulder or elbow joint. Both clockwise and counterclockwise rotation was tested. The data were evaluated by analysis of variance and optimum conditions for exertion of maximum torque are discussed.

T. I. R 7

6700

Lenzycki, H.P. & Channell, R.C. HUMAN ENGINEERING IN THE DESIGN, OPERATION, STORAGE, AND TRANSPORTATION OF AMMUNITION, PYROTECHNICS AND RELATED MATERIEL - PHASE II. DESIGN SUGGESTIONS FOR THE HAND-HELD SIGNAL LAUNCHER. *Memo. Rep.*, Contract DAI-28-017-501-ORD-(P)-1294, April 1955, 8pp. *Dunlap & Associates, Inc.*, Stamford, Conn.

6700

To provide design suggestions employing human engineering principles that would be beneficial to the operation of hand-held signal (pyrotechnics) launcher, a study was made of (1) design and operation of firing mechanism, (2) auxiliary equipment, (3) design of launcher (weight, diameter, and length), and (4) operational instructions. Recommendations are included for each of these areas, accompanied by illustrations and diagrams.

T. I.

6701 Klein, G.S. THE RELATION BETWEEN MOTION AND FORM ACUITY IN PARA-FOVEAL AND PERIPHERAL VISION AND RELATED PHENOMENA. *Arch. Psychol.*, Oct. 1942, (275), 71pp. (Columbia University, New York City, N.Y.).

The present study involved an investigation of 2 main problems: a) an analysis of the stimulus-limit for motion in foveal vision; b) a comparison of motion and form acuity at various points in the visual field. Motion acuity in the foveal region was studied in a series of experiments by means of a reaction-time technique on 5 Ss. The tests were made under a photopic illumination of 1.8 ft. candles, using monocular vision. An analysis of threshold-distance for the motion of 1.8 ft. candles, using monocular vision. A systematic comparison of form and motion acuity at a photopic level (4.9 ft. candles) was made at various points on the retina up to about 60° displacement from the fovea in the nasal quadrant on 5 Ss. Threshold determinations for both functions were made under the same stimulus conditions. (MEIAS)
R 51

6702 Killian, D.C. SURVEY OF TRAINING CHARACTERISTICS OF THE B-52 FLIGHT SIMULATOR. Proj. 7713, Rep. AFPTC TM-56-69, June 1956, 26pp. Aircraft Observer Research Lab., AFPTC, ARDC, Mather AFB, Calif.

6702

This paper reports a study of the B-52 Flight Simulator to determine what additional functional characteristics might be incorporated in the B-52C and B-52D Simulators to improve their training capabilities. The five informant sources surveyed were: reported B-52 aircraft incidents, recommendations for modifications, comments from flight instructors on training problems, comments from student pilots who had trained on the B-52 Simulator, and engineering changes to be made in future B-52's. Several significant, and many minor, training capabilities which might be added to the design of the Simulator are discussed.
R 5

6703 Goldsmith, C.T. NOTE ON THE PORTABILITY OF AMMUNITION BOXES (U). Tech. Memo. 6, June 1956, 12pp. Samuel Peltman Ammunition Laboratories, Picatinny Arsenal, Dover, N.J.

6703

To provide design recommendations for a class of boxes with single rope handles on the end, a preliminary investigation of problems of portability was conducted. Anthropometric measurements were made from photographs on a sample taken from The Atlas of Man (W.H. Sheldon) of the distance from middle knuckle to ground. Six boxes (20 to 26 inches in length) with rope handles on the end (position varied) with load varying (from two to 88 pounds) were carried by three subjects over a slightly inclined terrain. The subjects represented the 29th, 71st, and 96th percentiles in hand-to-ground characteristics. On the basis of subjective preferences and observations, tentative recommendations for box design are given. The need for a systematic study is pointed out.
T. I. R 11

6704 Goldsmith, C.T., & Vandenberg, J.D. AN EVALUATION OF A METHOD FOR SPECIFYING BARRIER MATERIAL COHESIVENESS. Tech. Memo. 6, April 1956, 14pp. Samuel Peltman Ammunition Labs., Picatinny Arsenal, Dover, N.J.

6704

To evaluate the Shear Force Test (SFT) as a measure of the adhesion of barrier material, subjects were trained in wrapping packs with various materials. The subjects rated and ranked the cohesiveness of the materials. The correlation between SFT values and the subjects' expressed opinions of barrier materials cohesiveness were obtained as well as correlations between SFT values and time required to wrap.
T. R 2

6705

Provins, K.A., & Salter, Nancy. MAXIMUM TORQUE EXERTED ABOUT THE ELBOW JOINT. *J. appl. Psychol.*, Jan. 1955, 7 (4), 393-398. (Medical Research Council Unit for Research on Climate and Working Efficiency, University of Oxford).

6705

To study factors limiting the strength of elbow flexion and extension, twelve subjects were tested for maximum torque exerted about the elbow. The angles of elbow joint investigated were 45, 90, and 145 degrees for three forearm positions (fully pronated, mid-position, supinated) using either a wrist cuff or handle. Each side was tested separately. Measurements of the volume of the hand, forearm, and upper arm were taken. The results (kilograms) were evaluated by analysis of variance for differences due to subjects, elbow position, side, and direction of attempted movement. The relation between limb volume and strength was analyzed.
G. T. R 17

6706

Lockard, R.B. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS ON TRACKING. NOTS 744, NAVORD Rep. 5272, April 1956, 88pp. Instrument Development Division, Naval Ordnance Test Station, China Lake, Calif.

6706

This report is a bibliography of human engineering reports on tracking. The concept of a power-driven tracking instrument is implicit throughout, and the order of categories roughly follows a theoretical tracking loop. Topics covered are: target characteristics, display characteristics, the human, tracking instrument controllers, control-display relationship, apparatus, and general tracking.
R 600 (approximate)

6707

Lockard, R.B. & Fozard, J.L. THE EYE AS A CONTROL MECHANISM. NOTS 1546, Aug. 1956, 43pp. USN Ordnance Test Station, China Lake, Calif.

6707

This paper is concerned with the use of the human eye as an optical error-sensing and self-positioning device for tracking purposes, such as detecting errors or controlling instruments. Characteristics of eye movements that would affect tracking accuracy and techniques of taking a signal off the eye suitable for controlling the movement of a tracking instrument or operating a digitizer are reviewed. The tracking accuracy of the eye is experimentally approximated and applications are discussed.
T. G. I. R 29

6708 Lee, R.H., Pilon, K., Catchpole, H.R., & Finch, E.M. PERIODIC FLUCTUATIONS AND THRESHOLD LEVELS IN DARK ADAPTATION AND THE EFFECTS PRODUCED BY PAREDRINE, OXYGEN, CARBON DIOXIDE, AND ASCORBIC ACID. Res. Proj. X 211, Res. Rep. 2, Sept. 1944, 7pp. USN Medical Research Institute, National Medical Center, Bethesda, Md.

Threshold fluctuations have been observed during the course of dark adaptation in human Ss. These fluctuations have a period of several min. and amplitudes from crest to trough as much as 0.5 log units. Absence of fluctuations in the curves of some individuals and occasional variations in the amplitude and period, characteristic of the curves of individuals who exhibit them suggested that environmental factors might be discovered which would produce or suppress these variations. Breathing a 3% mixture of CO₂ and air for 1/2 hr. elevated the threshold by as much as 0.16 log units but had no effect on the fluctuations. A 2% mixture of CO₂ and air had no effect on threshold level or on fluctuations. 100% oxygen, likewise, had no effect. During mydriasis, produced in 4 Ss by administration of paredrine, dark adaptation thresholds were significantly lower for the first 20 min. of testing. Ss normally exhibiting fluctuations continued to do so under the influence of paredrine. Changes in pupillary diameter, therefore, are not the cause of the fluctuations. The juice of 15 oranges consumed daily for 3 days did not significantly lower the threshold of the group. One gram of ascorbic taken daily by 2 Ss for 4 days failed to affect their thresholds. R 4

6709 Noble, Rosalie. HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS: PART 19. DESIGN AND DEVELOPMENT OF AN ELECTRONIC TACHISTOSCOPE. TED NAM AE-7047, Rep. 290, Part 19, Oct. 1956, 18pp. Naval Air Experimental Station, NAWC, Philadelphia, Penn.

6709 A tachistoscope, composed primarily of commercially available components and designed for use in short interval visual presentation studies, is described. Calibration curves, derived from tests to determine the relationship between the frequency setting on the audio oscillator and actual flash duration, are given with the useful position from about six milliseconds to 1.5 seconds flash duration. Photographs, wiring circuits and directions for use are included. I. C.

6710 Peters, G.A., Jr. HUMAN ENGINEERING--A NEW APPROACH TO OPERATIONAL DESIGN. Mechanical Engng., Oct. 1956, 78, 926. (Samuel Feltman Ammunition Laboratories, Picatinny Arsenal, Dover, N.J.).

6710 This paper gives a short resume of the background for the emergence of the field of activity known as "human engineering." The varied sources of knowledge for this field are mentioned. The need of some formal organization for individuals working in this field is pointed out--the primary need being opportunity for communication. R 6

6711 Peters, R.W. STUDIES IN EXTRA-MESSAGES: THE EFFECT OF VARIOUS MODIFICATIONS OF THE VOICE SIGNAL UPON THE ABILITY OF LISTENERS TO IDENTIFY SPEAKERS' VOICES. Contract N60MR 22525, Res. Proj. M1 001 104 500, Joint Res. Proj. Rep. 61, May 1956, 14pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

6711 To evaluate factors relative to listener identification of speakers' voices, six groups (24 listeners in each) heard 150 speech samples which had been recorded by five speakers, and attempted to identify the speaker. Six modifications of the voice samples were tested: variations in sound pressure level--both increased and decreased 14 decibels by two-decibel steps, short interruptions at rates from one to twelve per second, addition of octave frequency bands of the signal to the original signal, high-pass filtering, low-pass filtering, variations in signal-noise ratios from plus to minus ten decibels. Identification scores (percent correct) were analyzed to assess the effect of these factors. T. R 3

6712 Rakes, C.E., Kaune, J.E. & Burch, W.J. ACOUSTIC POWER LEVEL DETERMINATION FOR MACHINERY IN HARD AND SEMI-HARD ROOMS. R & D Rep. 050016, NS-713 212, Feb. 1956, 5pp. USN Engineering Experiment Station, Bureau of Ships, Annapolis, Md.

6712 To determine the feasibility of writing machinery noise specifications in terms of acoustic power (or acoustical power level, PML) instead of sound pressure levels, tests were made determining the validity of power level measurements in acoustically untreated rooms. Measurements of the acoustical power of three different sound sources (1/6 horsepower refrigerator compressor, 3 horsepower air compressor, white noise generator) were made in an anechoic chamber and in a variety of hard and semihard rooms. The room constant or acoustical index of each room was established. The data consist of PML Estimated, PML Calculated, and the diffuse field sound power level (SPLd) for the various sound sources and rooms. Equations and procedures used are given in appendices. T. G. I

6713 Provins, K.A. A STUDY OF SOME FACTORS AFFECTING SPEED OF CRANKING. R.N.P. 53/755, O.E.S. 237, June 1953, 19pp. Research on Climate and Working Efficiency Unit, MRC, Oxford University.

6713 To study some of the factors affecting speed of cranking, times for six subjects to turn a crank against a known load at maximum speed for a set number of revolutions under a variety of operating conditions were recorded. These conditions included differences of height and forward positioning of the crank, direction of rotation, and hand used. Tables giving means, tests of significance, analysis of variance, and correlations between the various measures are presented and discussed. T. G. I. R 18

6714 Holzman, P.S. & Klein, G.S. INTERSENSORY AND VISUAL FIELD FORCES IN SIZE ESTIMATION. Percept. Mot. Skills Res. Exch., 1956, 6, 37-41. (Menninger Foundation & New York University).

6714 To study some factors in size estimation, sixty subjects judged the sizes of disks which were varied as to weight and figural compactness. Three disks (48.5 millimeter, 65 gram, gray; 48.5 millimeter, 10 gram, gray; and 50 millimeter, 10 gram, black) were hand-held while subject adjusted a circle of light to match it. Four disks (42 millimeters, pink mounted on black, with a picture placed in center) were placed on a wall while subject matched the size. Percentages of over- and under-estimations were analyzed for size-weight interactions and for effects of phenomenal compactness (strong contour and centered figure). The findings are discussed in relation to size distortions attributed to value and need. T. R 10

6715
Borg, J.C. RESEARCH INTO BASIC METHODS AND TECHNIQUES OF AIR FORCE JOB ANALYSIS-IV. Train-
ing. AFTRC TR-66-61, April 1956, 69pp. Train-
ing Air Research Lab., AFTRC, AEC, Chasote
AFB, Ill.

6716
This paper presents the results of a project in which five commonly used job analysis techniques were evaluated in the military situation. Teams of four analyzed four jobs each at 25 Air Force bases using the following techniques: questionnaire survey, group interview, individual interview, observation interview, and technical conference. The relative efficacy of the methods was evaluated through the determination of the coverage of job elements, tasks, equipment, and inter-
able verbal cues, which were provided.
T. G. R 24

6718
Anon. MINOR BOX FOR SONAR OPERATORS. Rep.
R-17, Oct. 1956, 96. (Office of Naval Re-
search, Washington, D.C.).

6716
The Sonar Classification Logical Computer is de-
scribed briefly and at a simple level in this note which
also describes the Naval Patent Program in some detail.
T.

6717
Galaby, P.H., & Macbrook, H.A. PREVENTION OF INJURIES IN "UNPREVENTABLE" AIRCRAFT ACCIDENTS. Rep. Navy, Aug. 1956, 1-19. (Office of Naval Research, Washington, D.C., and Aviation Crash Injury Research, Cornell University).

6717
Crash injury research and procedure are reviewed in this article, with special emphasis on the many design faults which have been the cause of injuries in crashes which were perhaps unavoidable.
T.

6719
USN Office of Naval Research, Washington, D.C. NAVY COLD WEATHER CLOTHING. Rep. Navy, Sept. 1956, 7-8.

6719
This note describes recent advances in cold-weather garments which have been developed by the Navy. Two basic outfits known as the Extreme Cold Weather Outfit (A-1) and the Intermediate Cold Weather Outfit (A-2) are described in some detail.

6720
Roby, T.B., & Lanzetta, J.T. AN INVESTIGATION OF TASK PERFORMANCE AS A FUNCTION OF CERTAIN ASPECTS OF WORK-GROUP STRUCTURE. Rep. AFTRC-TR-56-74, June 1956, 12pp. Crew Research Laboratory, AFTRC, Randolph AFB, Tex.

6720
To make a preliminary investigation of the relation-
ship of the task communication structure to team per-
formance, groups of three subjects were required to per-
form a laboratory task which simulated an aircrew task
at a general level. Four communication structures were
used varying from that in which control agents had direct
access to none of the information needed to operate their
six controls to that in which they had direct access to
information for all but one of their controls. Scores
consisted of number of errors made in a period of 27
trials (15 seconds/trial) and were evaluated by analysis
of variance for effects of communication structures,
training, and specific controls. Further experimentation
is recommended.
T. R 4

6721
Lewycki, R.F., Cooper, R.C., & Channell, R.C. HUMAN ENGINEERING IN THE DESIGN, OPERATION, STORAGE AND TRANSPORTATION OF AMMUNITION, PYROTECHNICS AND RELATED MATERIAL. PAGE 11. EXPERIMENTAL EVALUATION OF EN-
CODED CHARACTERS FOR TACTICAL IDENTIFICATION OF CERTAIN
PERFORMANCES. Contract DAM-20-617-501-600-77-1294,
Aug. 1956, 7pp. Quincy and Associates, Inc., Stamford,
Conn.

6721
To establish a system for identification of pyro-
technic items for use under combat field conditions;
experimental comparisons were made between two sets of
experimental letters (single and paired, height 7/8 inch,
width 5/8 inch, embossing 1/16 inch), one set of symbols
(diagonal, period, and dash), and the letters currently
in use (paired letters, height 1/2 inch, width 3/8 inch,
embossing 1/22 inch). Subjects (22) wore opaque goggles
and attempted to "read" symbols by touch, either with the
bare hand or wearing various combinations of the tactile
mitts. Mean discrimination times and percentages of
errors of identification were analyzed. Recommendations
for identification systems are made on basis of the
findings with a discussion of human engineering factors.
T. G. R 1

6722
Rispoli, A.J. ACCLIMATIZATION AND INDOCTRINATION STUDIES RELATING TO COLD WEATHER LIVING AND THE USE OF QUARTERMASTER CLOTHING AND EQUIPMENT. Contract DA-44-100-gp-1129, Proj.
7-65-20-0034, Tech. Rep. EF-32, Aug. 1956,
76pp. Quartermaster Research & Development
Center, Natick, Mass.

6722
To establish a sound basis for developing training
doctrine about cold weather living and the care and use
of Quartermaster cold weather clothing and equipment, a
cold weather information survey was developed. The sur-
vey was used to assess knowledge of correct principles
and practices of cold weather living from (1) enlisted
soldiers with and without overseas experiences, (2)
soldiers at various stages of military training, (3)
trainers receiving cold weather indoctrination at dif-
ferent stages of training, and (4) soldiers at varying
intervals after leaving basic training. Implications for
the development of training doctrine are discussed.
T. G. R 19

6723
Sandberg, K.O.W., & Lipschultz, H.L. RELATIVE PERFORMANCE FOR CRANKING A HAND WHEEL AT DIP-
PERENT POSITIONS ON A VERTICAL SURFACE. Con-
tract W5ori-166, Task Order 1, April 1948,
22pp. Industrial Engineering Lab., New York
University.

6723
This investigation measured the speed with which
subjects can crank a hand wheel at different positions
on a vertical surface. Eleven male subjects were used.
During all tests the subjects were seated in a straight-
backed chair whose back was 24 inches from the vertical
surface. Test positions were spaced at four inch
intervals vertically and horizontally and covered an
area of 44 inches vertically and 40 inches horizontally.
The areas of best performance were determined for each
hand and the relative performance at all test positions
is charted.
T. G. R 1

6724
Schipper, L.N., & Versace, J. HUMAN ENGINEER-
ING ASPECTS OF RADAR AIR TRAFFIC CONTROL: I. PER-
FORMANCE IN SEQUENCING AIRCRAFT FOR LAND-
INGS AS A FUNCTION OF CONTROL TIME AVAILABIL-
ITY. Contract AF 33(616)-43, Proj. 5-(7-7192)
Tech. Rep. 56-67, Feb. 1956, 12pp. Aero
Medical Laboratory, WADC, Wright-Patterson
AFB, Ohio.

6724
To investigate some problems of radar air-traffic con-
trol, four inexperienced controllers were required to
vector blips representing aircraft on a dynamic display
to a hypothetical GCA gate. Air speeds and turn rates
of aircraft were fixed (120 knots and three degrees per
second), thus control was effected with turn only.
Four aircraft were represented at equal distances from
GCA gate; azimuth positions and distances were varied
systematically in five problem-difficulty levels. Ef-
ficiency (solution time over minimum possible time) and
safety (frequency counts of aircraft closer than 15 se-
conds in-transit and 30 seconds at GCA gate) were analyzed
as functions of difficulty or available control times
and practice.
T. I. G. R. 1

6725

Schoeffler, M.S. THE AMOUNT OF INFORMATION PRESENTED AS A PARAMETER OF TRACKING PERFORMANCE. AMRL Proj. 6-95-20-001, Rep. 197, June 1955, 12pp. USA Medical Research Lab., Fort Monmouth, Ky.

6726

An attempt was made to relate the amount of information received by a subject regarding the position of a target to time-on-target scores in a compensatory tracking situation. The 60 subjects manipulated a control handle according to "instruction" from a panel of lights. One group received no information regarding the size or direction of their error, while each of three other groups received increasing amounts of information from the display. Time-on-target and number-of-hit scores were averaged over each two-minute session for each group and the data were then treated by analysis of variance techniques.

T. G. I. R 3

5730

Casperson, R.C., Lenzky, H.F., Chancell, R.E. HUMAN ENGINEERING IN THE DESIGN, OPERATION, STORAGE, AND TRANSPORTATION OF AMMUNITION, PYROTECHNICS AND RELATED MATERIAL. PHASE II, VISIBILITY DATA AS IT APPLIES TO PYROTECHNICS. Contract DAI-28-017-501-045-(P)-1254, April 1955, 54pp. Dunlap and Associates, Inc., Stanford, Conn.

6730

To integrate and evaluate the available information regarding human visual performance that is important in the design and development of military pyrotechnics, this manual was prepared. Two primary areas are considered: illumination of a selected area (effects of color, duration, and brightness of light, and the contrast and size of target objects), and visual signaling (visibility and recognition as a function of flare or smoke characteristics and ambient conditions). Recommendations for design are accompanied by plans for experimental field evaluation. The appendices include: definitions of visual terms, conversion factors for brightness and illumination units, reflectance values of various surfaces, and some simplified approximation techniques. T-I. G. R 13

6727

Swanson, P.A. & Ashes, L.E. EVALUATION OF TRAINING DEVICES FOR B-47 FUEL, HYDRAULIC, AND RUDDER POWER CONTROL SYSTEMS. Proj. 7714, Rept. AFPTAC TN 56-2, Jan. 1956, 43pp. USAF Personnel & Training Research Center, Training Air Research Lab., Chanute AFB, Ill.

The purpose of this study was to provide information as to whether there are differences in the relative effectiveness of representative types of training devices when these devices are used as visual aids in lectures in the transitional maintenance training of skilled mechanics. 1906 skilled technicians were given instructions on one or another of 3 aircraft systems: fuel, hydraulic, and rudder control. Under one procedure the 5s were taught by lectures and under another procedure were taught solely by letting them inspect the devices. Following the instruction periods, the criterion test appropriate to the system was administered. 5 - 8 weeks later they were retested with the same examination. It was found that within any one system none of the differences among groups taught by means of a common lecture, but different devices, was statistically significant. In the "alone" procedure, significant differences were found among devices in the case of immediate recall scores for the hydraulic and rudder power control systems only. In terms of delayed recall scores no significant differences were found among the hydraulic or fuel devices. (MEIAS)

R 29

6728

Singleton, M.P. ERGONOMICS IN THE SHOE INDUSTRY. J. Brit. Boot & Shoe Institution, 1956, 7 (1), 15-20. Rep. S.A. 2056. British Boot, Shoe, & Allied Trades Research Association, Satra House, Kettering, England.

6728

This paper describes the nature and purpose of the Ergonomics Section of Satra House, England. The objective of this Section is to study the relationship between the worker and his working surroundings, particularly the machinery he uses, in the shoe industry for improvement of productivity. The work accomplished thus far is discussed and several examples given of techniques used in recording performance and of improved machine controls.

T. I. R 9

6731

Charney, E., Rose, A.J., & Lee, L.T. HUMAN ENGINEERING SURVEY OF ARMORED INFANTRY VEHICLE, M59. TBI-1000, Tech. Memo. 26, Sept. 1956, 47pp. Human Engineering Laboratory, Aberdeen Proving Ground, Md.

6731

To study human engineering problems in design of the Armored Infantry Vehicle, M59, from the point of view of the using soldier, an interview schedule was prepared covering problem areas for each crew position and a rating of the most serious problems. A group interview technique was used to gather information from 322 men in the First Armored Division. Questions asked and percentage results are listed followed by analysis of the problem, discussion and recommendations. Problems covered were temperature, intercommunication, equipment storage noise and vibration, placement of controls and displays, seating, bracing, entrances, visual requirements, and other miscellaneous problems.

6729

Skłodowski, V.A. SOME PHYSIOLOGICAL EFFECTS OF A BROAD BAND BLUE LIGHTING SYSTEM. June 1956, 9pp. Crosley Div., Avco Manufacturing Corp., Cincinnati 15, Ohio.

6732

Besnard, G.G., & Briggs, L.J. COMPARISON OF PERFORMANCE UPON THE E-4 FIRE CONTROL SYSTEM SIMULATOR AND UPON OPERATIONAL EQUIPMENT. Proj. 7709, Devel. Rep. AFPTAC TN-56-47, April 1956, 15pp. Armament Systems Personnel Research Lab., AFPTAC, ARDC, Lowry AFB, Colo.

6729

To evaluate a Broad Band Blue (BBB) lighting system before its use for ambient illumination in such areas as radar control centers, blood pressure, pulse rate, visual acuity and color vision were measured in 20 subjects under conditions of normal office lighting, low intensity white lighting and BBB lighting. Means and standard errors for the various measures are given for each lighting system.

T. R 3

6732

To determine the extent to which students' performance of selected maintenance procedures in the E-4 Fire Control System procedural simulator is similar to performance of these tasks in an operating fire control system, 80 students performed 3 maintenance procedures on the simulator or on an operating system. The two groups were then compared as to errors made, time required to perform the tasks, and proportion of students erring on each step required by the procedure.

T.G.I. R 2

6735
Davenport, R.W. AN INVESTIGATION OF FATIGUE
IN ASW HELICOPTER CREWS. Rep. 610, June 1955,
15pp. USN Electronics Lab., San Diego, Calif.

6733
To investigate the factor of fatigue in ASW (Air-
Search and Warning) helicopter operation, inflight per-
formance measures, postflight performance measures, and
subjective measures of fatigue were devised for use with
4 pilots, 4 sonar men, and 4 nonflying pilots who served
as controls. The experimental program consisted of 3
two-hour flights and 3 one-hour testing periods daily,
for 5 consecutive days. The flight performance was anal-
yzed in terms of the change in hovering performance on
the part of the pilots and change in accuracy of sonar
echo detection. Decrement in postflight steadiness,
speed, and coordination were checked, as well as flicker-
fusion threshold, auditory threshold, and subject atti-
tudes after flight.

6734
Corbin, H.H., Reese, E.P., Reese, T.W., &
Volkmann, J. EXPERIMENTS ON VISUAL DISCRIM-
INATION, 1952-1955. Contract AF 18(600)-344,
Rep. AFRC-TR-56-52, April 1956, 55pp. Oper-
ational Applications Laboratory, AFRC, Psy-
chophysical Research Unit, Mount Holyoke Col-
lege.

6734
This report is a summary of a research program (ap-
proximately twenty experiments) investigating four areas
of visual discrimination. 1) Judgment and scaling:
estimation of visual position and visibility of stimuli
in a large homogeneous field. Number of categories se-
lected by subjects to judge various distributions. Size
of constant error for bisection of visual position.
Comparison of two methods for scaling verbal items. 2)
Subjective Statistics: judgments of means, median,
range, and contingency. 3) Visual Grouping: identifica-
tion of groups of planes converging on a friendly target,
and 4) Judgment of position after Enforced Delay.
T. I. G. R 7

6735
Custer, S.A. & Mayer, Sylvia R. A COMPARATIVE ANALYSIS OF CURRICULA AND TECHNIQUES USED IN
THE TRAINING OF PHOTOGRAPHIC INTERPRETERS. Contract AF 33(616) 432, WADC Tech. Note 119,
March 1955, 115pp. Optical Research Lab., Boston University, Boston, Mass.

An exploratory study has been made to determine the optimal characteristics of photo-
interpretation methods and materials. An extensive analysis is presented of photointerpre-
tation training resources of civilian and military schools in the United States. Data
concerning photointerpretation course enrollment, staff, content, methods and facilities
has been compiled and analyzed separately for civilian and military groups; and then compared.
Implications of the findings are discussed and proposals offered for the augmentation and
optimization of military photointerpretation training.
R 4

6736
Faño, R.M. THE TRANSMISSION OF INFORMATION - II.
SC Contract W36 039 SC 32037, Proj. 102B, DA Proj.
399 10 022, Tech. Rep. 149, Feb. 1950, 29pp. Research
Lab. of Electronics, Massachusetts Institute of Tech-
nology.

6736
This report deals with the transmission of in-
formation through a discrete channel disturbed by noise.
The problem of reducing the equivocation by coding is
considered in particular. The behavior of the per-
unit equivocation as a function of the channel equi-
vation is computed in an approximate manner for a
number of coding schemes of increasing complexity.
The results indicate that the limiting condition of
vanishing per-unit equivocation is approached rather
slowly with increasing code complexity.
G. I. R 7

6737
Hackman, R.C. & Korshner, A.H. THE DETERMINATION OF CRITERIA OF READABILITY. Contract IR-
153 024, Tech. Rep., Aug. 1951, 59pp. SMR, University of Maryland, College Park, Md.

The purpose of this study was to develop a practical method for establishing readability
criteria. 200 reading passages were ranked on a 7-point scale. 2 groups of 121 passages were
set up. Sets of passages were administered to 420 Ss. Each S judged relative reading diffi-
culty for him for each pair of passages and unknown to him was timed in the process of read-
ing. Upon the basis of judged relative difficulty and relative reading time, 22 criterion
reading passages were selected, 11 "hard" and 11 "easy". An analysis of these passages yield-
ed 11 predictor variables and a discriminant function was calculated using 9 of the variables.
This produced a prediction equation which differentiated between the means of the predicted
values for the criterion passages at a highly significant level. Implications of this method
for the determination of readability parameters and for the solution of specific readability
problems are presented. These results suggest the readability of the method for the develop-
ment of practical readability criteria.
R 45

6739
Goldstein, A.G. JUDGMENTS OF VISUAL VELOCITY AS A
FUNCTION OF THE LENGTH OF OBSERVATION TIME OF MOVING
OR NON-MOVING STIMULI. Proj. 6-95-20-001, Rep. 258,
Jan. 1957, 11pp. AHRL, Fort Knox, Ky.

6739
To investigate the effect of increasing the duration
of prior observation of movement and non-movement stimuli
upon apparent (subjective) velocity judgments of visual
movement, three types of pre-test stimuli were used:
moving black and white stripes, stationary stripes, and
a blank area. Twenty-six subjects viewed each of these
stimuli for various periods of time (2, 8, 15, 22, and 30
seconds) before making judgments of the velocity of the
test stimulus (black and white stripes velocity, 14.28
centimeters per second). The data (time to move a stylus
across the field at the velocity of the test stimulus)
were studied by analysis of variance techniques for ef-
fects of type and duration of observation of pretest
stimuli.
T. R 1

6740

Hodge, D.C. THE EFFECTS OF MODIFIED M1-RIFLE SIGHTS ON MARKSMANSHIP AT LOW LEVELS OF ILLUMINATION. Proj. TBI-1000-22, Tech. Memo. 25, Aug. 1956, 15pp. Human Engineering Laboratory, Aberdeen Proving Ground, Md.

6741

To determine the optimal rifle sight for use under low and high illumination, several previously tested experimental sights together with some sights in use on rifles were compared with the standard M1 rifle sight. Testing was done in the laboratory situation where the task was reduced to alignment of target and sights. Two levels of illumination were used: fifty and one foot candles; eighty subjects (five for each of 16 combinations of sights and illumination). The accuracy data for the last five out of ten trials were analyzed for significant differences due to sight. Rank orders of sights for each illumination level were compared. Field tests are recommended.

T. I. G. R 6

6741

Goldstein, M., & Ellis, D.S. PEDESTAL SIGHT GUNNERY SKILLS: A REVIEW OF RESEARCH. Proj. 7709, Res. Rep. AFPTRC-TN-56-31, Feb. 1956, 29pp. Armament Systems Personnel Research Laboratory, AFPTRC, Lowry AFB, Colo.

6741

This report reviews the research on pedestal sight-gunnery skills for the period from 1944 to 1954. The pedestal sight is a part of the standard flexible gunnery equipment on the B-29 and B-36 aircraft. The aim of the studies were to develop and evaluate proficiency measures, training methods, and selection procedures through experimental investigations of the way individuals performed the sight-manipulation task. The outcome of this research are discussed in relation to the operation of more advanced bomber-defense gunnery systems which are superseding the pedestal sight.

G. I. R 53

6743

Dyall, W.T. A STUDY OF PERSISTENCE CHARACTERISTICS OF VARIOUS CATHODE RAY TUBE PHOSPHORS. Signal Corps Contract W-36-039-sc-32037, Tech. Rep. 56, Jan. 1948, 104pp. Research Lab. of Electronics, Massachusetts Institute of Technology.

6743

Persistence characteristics, as well as measurements of flash, build up, and fluorescence are presented in this report for five types of cathode ray tube screens: sulphide (Ag), zinc-cadmium sulphide (Ag), P4, P14, and P7. Plots of the characteristics and a discussion of them are given. The final section of the paper summarizes the conclusions regarding these characteristics.

T. G. I. R 31

6745

Graybiel, A. PROBLEMS INVOLVING THE PILOT AND HIS TASK: THE CHANGING EMPHASIS IN AVIATION MEDICINE. Res. Proj. NM 001 105 106, Rep. 1, June 1956, 12pp. U.S. Naval School of Aviation Medicine, Pensacola, Fla.

6745

This report discusses the changing emphases in aviation medicine. Most of the critical problems of the military and professional pilot are not radical but center around his task in the cockpit. The complexity of this task is elaborated and suggestions are made for solving the problem through coordination of work among many agencies with interlocking interests.

R 11

6746

Charney, E., Lee, L.T., & Rose, A.J. HUMAN ENGINEERING ARCTIC FIELD LIAISON STUDY. Rep. TBI-1000, Tech. Memo. 19, April 1956, 37pp. Human Engineering Laboratory, Aberdeen Proving Ground, Md.

6746

To gather human engineering information on specified ordnance equipment in use in the Alaskan Command, a field liaison team surveyed a typical Skysweeper battalion, the 867th AA at Fort Richardson, Alaska, observed a firing mission (Exercise Mooseheart), and visited the Arctic Test Branch at Fort Greely, Alaska. Interviews were conducted among both officers and enlisted personnel in addition to observations. The salient human engineering problems encountered and the field expedients employed to solve these problems are presented with recommendations. The problem aspects covered are: external (covering and protecting equipment); safety; operational (difficulties in performing normal radar, computer operator, firing, and maintenance tasks).

6747

Crannell, C.W., & Christensen, J.M. A STUDY OF PERIMETER TRAINING WITH DIVERSIFIED STIMULI. Contracts AF 18(600)-25, AF 33(616)-2844, WADC TR-56-63, June 1956, 16pp. Aero. Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Miami University).

6747

This report considers the third in a series of experiments designed to examine the possibility of increasing the size of the visual form field by specialized training. In the present experiment, an attempt was made to control subjects' learning to respond to the unique qualities of stimuli by including a great diversity of stimuli. In addition, the effect of training predominantly one eye was investigated. The progress made during training is presented as well as a comparison of pretests and post-tests with various reading tests.

T. G. R 4

6748 Goldsmith, C.T. & Vandenberg, J.D. A HUMAN ENGINEERING EVALUATION OF OPENING DEVICES FOR AMMUNITION CONTAINERS UNDER ARCTIC CONDITIONS. Tech. Memo. 2, Jan. 1956, 14pp. Samuel Feltman Ammunition Laboratories, Picatinny Arsenal, Dover, N.J.

To evaluate the methods of opening fiber and metal containers for use under Arctic conditions, 25 subjects were required to open the containers under simulated cold-weather conditions (wearing Arctic handgear) and containers aged at temperature of -65, -45, -25 degrees Fahrenheit, and room temperature (control). Fiber containers were sealed by wrapping tape with extended tab varying length (1.25, 1.50, 1.75, and 2.00 inches) to be grasped and pulled. Metal containers had key on top to be removed and used on a metal tear strip. Tests were run on three successive days; measure of performance was the time required to open container. The results are analyzed for effect of tab length, temperature, type of hand gear, and practice. Recommendations are included.

T. I. G. R 2

6749

Fletcher, J.L., & Solomon, L.N. A SURVEY OF HEARING LOSSES AMONG ARMOR PERSONNEL. Proj. 6-95-20-001, Rep. 282, Jan. 1957, 40pp. AMRL, Fort Knox, Ky.

6749

To study hearing losses among armor personnel, the hearing of 3027 men was tested. Individual and audiometry measures were obtained on some subjects and group audiometry measures (Navy Electronics Laboratory Modified Warble Tone Hearing Test) were obtained for the majority. All subjects filled out a hearing data questionnaire. The data on hearing losses were related to age, noise exposure, use of ear protection, type of ear protection used, previous ear medical history, and branch of service and type of hearing loss. The results from individual and group audiometry were studied for agreement. Recommendations for a hearing conservation program are included. T. G. R 10

6750

Stewart, W.K. DISCUSSION ON THE ROLE OF THE NERVOUS SYSTEM IN ADAPTATION TO HIGH PERFORMANCE FLYING. Proc. Roy. Soc. Med., Nov. 1955, 48, 42-51. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

6750

This paper presents four approaches to the role of the nervous system in adaptation to high performance flying: (1) effects of unusual environmental changes on organs and systems of man at a high level of physical efficiency; (2) the protection of man's cardiovascular and respiratory systems, the presentation of necessary sensory data, and the prevention of disorientation; (3) physical and psychological factors in man's failure to adapt to operational flying, the effect of flying stress on a susceptible personality; and (4) further remarks on personality factors predisposing an individual to breakdown under stress. T. R. 26

6753
Gagne, R.M. RESEARCH PLANNING CONFERENCE ON PERCEPTUAL AND MOTOR SKILLS. Conf. Rep. 49 2, Nov. 1949, 98pp. Perceptual & Motor Skills Research Lab., USAF Human Resources Research Center, Lackland AFB, San Antonio, Tex.

This report is divided into 7 parts. Part I lists the conference participants. Part II presents the condensed minutes of the meetings, supplementing the Agenda, which is given as Appendix A. Part III consists of the synopses and discussions of reports on Armed Forces problems of classification, selection, training and equipment design which require research on perceptual and motor skills. The complete texts of 2 of these reports were submitted and are presented in Appendix B. Part IV presents the synopses and discussions of reports given by conferees associated with the Perceptual and Motor Skills Research Laboratory concerning suggested organization, methodology and programs of perceptual and motor skills research. Certain of these reports were based in part upon a preliminary analysis of factors in psychomotor performance, which is included as Appendix C. The complete texts of a number of these reports are presented in Appendix D. Part V incorporates the synopses and discussions of the views of a number of the conferees regarding important theoretical and methodological problems in perceptual and motor research. Part VI, the report of the Subcommittee on Perception, and Part VII, the report of the respective Subcommittees with regard to the organization of research within these 2 areas, priorities to be assigned to various programs, and the nature of contracts with outside agencies for research and literature surveys relevant to the mission of the laboratory.

6754

Sell, R.G. REPORT ON CEEC EPA SEMINAR ON "FITTING THE JOB TO THE WORKER". PE/NE/114/57, Sept. 1958, 16pp. Plant Engineering and Energy Division, The British Iron & Steel Research Association, London, England.

6754

This report describes the proceedings of a seminar held at Leiden from 28 March to 3 April 1957 on "Fitting the Job to the Worker" in so far as they interest the steel industry. The topics considered are: physiological assessment of heavy muscular work and heat stress, effect of noise and noise abatement, display of information, psychological factors resulting from work design, anthropometry and engineering psychology as applied to working postures and machine design, communication between industry and research, and training in ergonomics. Recommendations are included regarding future work.

6755
Lindsay, D.B. (Proj. Direc.). A STUDY OF THE SCR-584 BASIC TRAINER AS A TRAINING DEVICE FOR LEARNING RANGE TRACKING. Contract DEMR 919, Proj. SC-70, NS 146, OSD Rep. 3344, Res. Rep. 7, Feb. 1954, 14pp. Applied Psychology Panel, National Defense Research Committee. (Verkes Laboratories of Primate Biology, Orange Park, Fla.).

An experimental investigation was made on the use of the SCR-584 Basic Trainer to determine the value of the trainer as an aid in improving tracking ability. Specifically it was desired to find the degree of skill obtainable by the uninitiated subject at various stages of practice. 25 enlisted men without prior tracking experience were trained on the device to carry out the study. An attempt was also made to determine how closely tracking ability acquired on the actual SCR-584 equipment corresponds to that developed by means of the trainer. For this purpose 66 enlisted men were studied. Conclusions are given to the effect that the task as such is dependable as a measure of operator tracking skill.

6756

Flanagan, R.E. & Latham, A.J. USE OF A CONTACT FLIGHT SIMULATOR IN THE TRAINING OF BASIC STUDENT PILOTS. Proj. 508 017 0002, Res. Note 52 1, April 1952, 5pp. USAF Human Resources Research Center, Air Training Command, Lackland AFB, San Antonio, Tex.

In summary, 10 airmen who had no previous pilot time were taken to the University of Illinois to act as students in the training of the 10 flight instructors from Pilot Training Research Laboratory. This note presents information on student which, while incidental to the primary purpose of the activity (that of instructor training) and unsuitable for statistical analysis, contains interesting implications for training research. A large proportion of the pre-solo maneuvers and skills appeared to have been learned in the P-1 trainer by the rather highly selected sample of men utilized. The extent to which these can be learned by regular cadet samples, what other skills can be so gained, and the best combination of trainer and aircraft time, are topics which require a major and rigorously controlled investigation.

6757

Breher, R.E., Peterson, P.G. & Deuel, P.D., Jr. AN ANALYSIS OF THE RADAR FLIGHT GRADING SYSTEM AT MATHER FIELD. Res. Notes DQM: 50 4, Sept. 1950, 20pp. USAF Human Resources Research Center, Mather AFB, Calif.

The purpose of this project has been to evaluate the present serial check missions in the radar phase of AOB training at Mather Air Force Base. This project represents one aspect of a broader program in progress to determine the adequacy of proficiency measures now in use at Mather Field. 2 closely related problems present themselves in an evaluation of this type. The first has to do with the discriminability of the flight check as a measuring device--the adequacy of the items used on the check. The second problem places emphasis on the actual use or functional value of the flight checks, as administered by the flight instructors. It is obvious that these 2 problems are inextricably interrelated in this evaluation. For purposes of clarity, however, they will be considered separately.

6758

Molunphy, G.G. REPORT OF DIVING TRAINING IN USS CHANTICLEER OFF KEY WEST, FLORIDA DURING THE PERIOD 19 OCTOBER TO 8 DECEMBER 1948. Proj. NS 186 042, Rep. 1, 5pp. Bureau of Ships, Navy Dept., Washington, D.C.

This report deals with the results of diving training the object of which was to: a) train members of the diving party in operations at deep depths; b) evaluate surface decompression procedures; c) test modified diving gear; d) prove newly computed decompression schedules; e) promote confidence in helium-oxygen diving. After equipment was tested and divers drilled in ventilating, circulating and going on open circuit in shallow water alongside the dock, a total of 67 dives were performed between 272 and 485 ft. Conclusions drawn are as follows: a) the training is valuable; b) surface decompression procedures as used proved satisfactory for all dives made; c) tentative decompression schedules to at least 550 ft. may be computed without considering tissues slower than the 70 min. tissue for dives up to 20 min.; d) a larger venturi discharge nozzle and larger high pressure nozzle used with gas at 50 lb. over bottom pressure gave satisfactory results; e) helium-oxygen diving is safe to partial pressures of 410 ft.; f) current is a major obstacle to planned diving operations; g) 40 lb. diving shoes are useful on a hard bottom; h) the personnel involved have confidence in helium-oxygen diving. (HEIAS)

6759

De Valois, R.L. & Law, O.T. STUDIES OF ALLEGED D-C ELECTROSENSITIZATION OF NIGHT VISION. Contract DA36-039-SC-52654, Proj. DA 3-99-10-024, Rep. 2144-56-T, Jan. 1956 31pp. Vision Research Laboratories, Engineering Research Institute, University of Michigan.

6759

To assess the feasibility of increasing the sensitivity of visual detection at night by direct electrical stimulation of the eye (d-c), experiments were conducted in which peripheral visual sensitivity at low luminance was measured before, during, and after the application of direct current to the eye. Comparison measurements were made in the absence of current. Both anodal and cathodal currents, variations from 0.05 to one milliamperes, and two electrode positions temporal and infratemporal were utilized. The data were analyzed by comparing thresholds obtained in the series with and without current, and threshold obtained before, during, and after stimulation. These results are discussed in relation to previously reported studies of similar nature.

T. T. G. R 13

6760

Staff & Consultants, Bio-Systems Group. HUMAN PERFORMANCE IN INFORMATION TRANSMISSION. Contract DA-36-039-SC-56695, Projs. 8-103A, D/A 3-99-10-101, Rep. R-62, March 1955, 70pp. Control Systems Laboratory, University of Illinois.

6760

To explore the limitations of human information-processing abilities, a series of experimental studies on well-learned activities were conducted. Piano playing was investigated as an example of information transmission through sequential acts. Three expert pianists played at eight sequences of random notes; speed and range were varied and for each changes in precision measured. Typewriting, reading English text, and mental arithmetic were investigated in similar manner. The results were analyzed in terms of rate of transmission and limiting factors of speed, range, channel capacity or confusion due to overabundance of information. General discussion centers about the contribution to methodology, importance of estimates obtained, and implications on mechanisms of information processing. T. G. I. R

111 - 747

6761 Brown, W.B. THE SHIP RECOGNITION TRAINER. BuMed Proj. X 271 (Av 159 c), NRL Rep. 75, Sept. 1945, 13pp. USN Medical Research Laboratory, New London, Conn.

This report on the ship recognition trainer includes a history of its development, a description of the construction of the stage, with photographs and blueprints, a discussion of the methods of instruction recommended, and a summary of the advantages of the stage over other methods of ship-recognition instruction. The advantages in the use of the trainer over other methods are: a) extremely realistic setting; b) elimination of all irrelevant detail; c) theoretically infinite number of views of any one subject; d) ease and simplicity of operation. The total appearance of a ship--from broadside through all possible target angles--can be presented. At least a half dozen slides would be necessary to achieve this; e) ease with which comparisons can be made. Any number of ships can be exposed to the class at the same time for purposes of comparison. This is impossible with slides; f) face validity; presents ships at distances and angles of observation closest to reality, and under realistic conditions of observation; g) control of illumination intensities from twilight to bright daylight making possible a broad range in the presentation of material--either in sharp detail, or as a dim mass silhouetted against the horizon.

5762

Verplanck, W.S. NIGHT LOOKOUT TRAINING STAGE. BuMed Proj. X-350(Av 197 p), NAL Rep. 99, March 1946, 14pp. USN Medical Research Lab., New London, Conn.

This report covers the development and use of the Night Lookout Training Stage at the Lookout School, Medical Research Department, U.S. Submarine Base, New London, Connecticut. Included is a brief history of its development, a description of the construction of the stage, a discussion of the instruction methods recommended for use with the stage, with suggested drill techniques, and a summary of the advantages of this stage.

6763

Verplanck, W.S. EXPERIMENTAL EVALUATION OF THE SHIP RECOGNITION TRAINER. BuMed Proj. X-271(Av 159 c), NAL Rep. 101, March 1946, 10pp. USN Medical Research Lab., New London, Conn.

A classroom experiment, designed to determine the relative effectiveness of slides and models in ship recognition training has been performed. The results indicate that these 2 media are almost equivalently effective, although there is a definite and reliable margin in favor of models.

6765

Saul, E.V. & Jaffe, J. RELIABILITIES AND CORRELATIONAL INDEPENDENCE OF MEASURES OF MARKSMANSHIP PERFORMANCE. Contract DA 19 020 ORD 3461, Proj. TB 1 1000, Proj. Rep. 5, July 1955, 30pp. Human Engineering Services in the Design of Small Arms, Tufts University, Medford, Mass.

The present study was designed to provide empirical information on the reliabilities and correlational independence of 11 measures of marksmanship performance. The results of the study are based on the performance of 2 groups, one having 29 subjects and the other 22. The first group fired a 2-string test (total 16 rounds) and the second a 4-string test (total 32 rounds), both under standard conditions. Evaluation of the obtained data in terms of the criteria of score reliability, independence, diagnostic value, and ease of computation permits the recommendation that 2 specific scores, one reflecting precision and one accuracy, be used for rigorous marksmanship research. In addition, the results permit tentative recommendations in regard to minimum test length and minimum sample size for such experimental research.

R 5

6766

Willard, N. Jr., Bancroft, C.A. & Fiddan, J.G. THE TRAINING EFFECTIVENESS OF A STEREOSCOPIC RANGE-FINDER TRAINER. Tech. Rep. 12, Oct. 1954, 18pp. Human Resources Research Office, George Washington University, Washington, D.C.

This experiment was designed to answer specific questions about a range-finder training instrument, Device OROPT-T1: Will it satisfactorily identify potentially good operators, as distinguished from those who need special training? Will it be suitable for remedial training for poor operators? Will it provide for satisfactory range-finder training? The data from the experiment show that a) Device OROPT-T1, after about 130 rangings, will aid in differentiating those operators who will make normal progress from those who need special training; b) the device has no special value for training poor students; c) although the trainer group did not demonstrate improved performance on the trainer, there is evidence that as a result of their instruction on the trainer their performance on the range finder improved; d) the range-finder group is significantly more proficient at the end of training than the trainer group; e) the trainer is useful as a familiarization device; and f) it speeds up the ranging operation during training.

6767

Rittenhouse, C.H., Goldstein, K. & Woodward, D.H. A PRELIMINARY STUDY CONCERNING THE EFFECT OF SPECIAL TRAINING IN RANGING ON PERFORMANCE OF THE TOTAL PEDESTAL SIGHT TASK. Res. Note FG: 52 3, Proj. 512 024 0001, July 1952, 9pp. Human Resources Research Center, USAF Air Training Command, Lackland AFB, Tex.

A preliminary study concerning the effect of special training in ranging on performance of the total pedestal sight task has yielded the following tentative conclusions: a) Practice on the ranging task in isolation results in improved performance of the total pedestal sight task. This improvement is most clearly demonstrated in the later stages of practice on the total task. b) Airmen given 15 daily periods of training on the Pedestal Sight Manipulation Test, 5 periods of which were devoted to special instruction on ranging exclusively, performed at the total task at about the same level of proficiency on the 15th day as did airmen given 15 days training on the total task without special ranging instructions. In this respect, the introduction of 5 periods of special ranging practices proved no more (but not appreciably less) effective than devotion of all training periods to practice on the complete task.

R 3

6768

Calvert, E.S. VISUAL AIDS AND THEIR EFFECT ON LANDING SUCCESS AND SAFETY. Rep. EL 1486, R.A.F. Ref EL/1404/ESC, Oct. 1955, 17pp. Royal Aircraft Establishment, Farnborough, Hants, England.

6769

This report reviews the matter of the effect of visual aids on landing success and safety. More specifically, the success of the Crossbar system of approach lighting is evaluated. The need for some simple means of improving Visual Guidance during flare-out is stressed and some tentative suggestions for improvement are made at the end of the report.

G. R 2

6769

Dickson, E.D.D., Hinchcliffe, R., Wheeler, L. J., et. al. EAR DEFENDERS. FPRC 884, June 1954, 106pp. FPRC, Central Medical Establishment, Air Ministry, England.

6769

To investigate the sound attenuating properties of ear defenders, a binaural free-field audio-metric method was used. Attenuation versus frequency curves were determined on twenty subjects and for sixteen ear defenders (six of the insert type, seven noise occluding pads, and three helmets). Additional tests were made on a few defenders using a miniature microphone and objective measurements of attenuation. Auditory fatigue-protection was measured by listening for speech hearing loss after listening to aircraft noise for durations of 1/2, one, or two hours. Assessment of the defenders was made with reference to attenuating factors and subjective comfort of wearing the device. Recommendations are included.

T. G. I. R 60

6770
Gogel, W.C. RELATIVE VISUAL DIRECTION AS A FACTOR IN RELATIVE DISTANCE PERCEPTIONS. Psychol. Monogr., 70, (11), (Whole No. 418), 1956, 1-15.

6770
Two hypotheses concerning visual direction were tested by using them to predict the apparent path of movement of a small object attached to an Ames rotating trapezoidal window. In the experiment the trapezoidal window was viewed either monocularly or binocularly with four conditions of attaching the object to the window. The differences between the results from the various conditions were used to confirm or deny the predictions made from the two hypotheses. An equation for predicting the apparent relative depth of a binocular object as a function of its physical relative position and the physical and apparent relative positions of other objects in the field is given.
T. G. I. R 4

6774
Civil Aeronautics Board. ACCIDENTS IN U.S. AIR CARRIER PASSENGER SERVICES, 1953-1954. July 1955. 66pp. Bureau of Safety Investigation, Civil Aeronautics Board, Washington, D.C.

6774
This report furnishes accident rates for U.S. Air Carrier Passenger Operations during 1953 and 1954 and an analysis of accident types and causal factors. The material is presented in tabular form.
T.

6775
Special Devices Center. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS (UNCLASSIFIED). NAVEXOS P-1491, Jan. 1956, 18pp. SDC, ONR, Port Washington, N.Y.

6775
This report presents a bibliography of unclassified human engineering studies produced under the sponsorship of Special Devices Center (Department of Navy, Office of Naval Research) from 1946 through 1955. Titles are organized under subject matter classifications: learning (training, instructional films, television), motor skills (general, positioning, transfer), perception (vision, audition), speech communications (intelligibility, measurement, training, devices), extreme environmental factors, systems analysis (general, subsurface, aircraft, radar), controls and displays, training devices (general, gunnery, flight), research tools and general texts.
R 430

6777
Hunter, G., et. al. SUGGESTIONS FOR DESIGNERS OF ELECTRONIC EQUIPMENT. 1956. 4pp. U.S. Naval Electronics Laboratory, San Diego, Calif.

6777
This pocket-sized booklet was prepared to help electronic equipment manufacturers produce simpler, more economical, and more reliable electronic equipment for the Bureau of Ships. Suggestions and recommendations represent specific findings and are drawn from basic data sources. Topics covered: design concepts, common faults found in electronic equipment manufactured by the Bureau of Ships, technical suggestions for designers, human engineering suggestions for designers (common mistakes in planning operator's task, common faults in equipment design for human use, one hundred human engineering considerations for improving man-machine effectiveness), and points for proper parts application.
R 4

6778
Burrows, A.A., & Ford, H.K. SOUNDS AS WARNINGS IN AIRCRAFT. FFRC 966, May 1956, 21pp. Flying Personnel Research Committee, RAF Institute of Aviation Medicine, Farnborough, Hants, England.

6778
The problem of auditory aircraft warning is discussed in terms of the potential and existent requirements of such systems and the results of previous applications of auditory signals as aircraft warning devices. Three experiments were conducted to investigate the following aspects of the problem: (1) to compare the choice reaction time for six different sounds and six words; (2) to evaluate the potential effect of a noise background upon signals presented at varying intensity levels; and (3) a replication of the second experiment with a modification imposed to reduce the effects of learning. Results are discussed in terms of the relative reaction time and number of errors incurred with sounds vs. words and the differential effect of noise upon the perception of such signals. T. G. I. R many

6779
Howarth, C.I. THE TIME COURSE OF PRESSURE BLINDNESS. FFRC 968, Aug. 1956, 2pp. Flying Personnel Research Committee, RAF Institute of Aviation Medicine, Farnborough, Hants, England.

6779
On the basis of self-observation and data obtained with five subjects the author discusses three possible causes of peripheral vision restriction. These are said to consist of: "the higher sensitivity of the fovea; a possible storage of oxygen in the macula pigment; and the greater effectiveness of a minimal blood flow around the optic disc and along the course of the main retinal arteries." The time course of pressure blindness is discussed briefly and related to the phenomenon of blackout.
T. R 4

6781
Alluisi, E.A. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL. Contract WADC, AF 33(616)-3612, Proj. 7192, Rep. 690-2, Oct. 1956, 19pp. Research Foundation, Ohio State University.

6781
This is the second quarterly progress report (see 6782) of research on human engineering aspects of Air Traffic Control (ATC). The progress of studies in the following areas is reported: operational analysis of existing ATC systems; evaluation of display, traffic, and procedural variables on simulated ATC operations; technical studies and supporting basic research; theoretical formulations; design and development on research equipment; and liaison activities.
R 21

6782
Alluisi, E.A. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL. Contract WADC, AF 33(616)-3612, Proj. 7192, Rep. 690-1, July 1956, 16pp. Research Foundation, Ohio State University.

6782
This is the first quarterly progress report of research on human engineering aspects of air traffic control (ATC). Activities in progress or completed are reported as follows: (1) data collection of activity analysis on one existing ATC system, (2) experiments evaluating display, traffic, and procedural variables on a simulated ATC system, (3) technical studies of visibility and lighting systems, (4) computational formulae for a distribution-free test of analysis-of-variance hypotheses, (5) design and development of various pieces of research equipment, and (6) liaison activities.
R. 19

6783.

Westheimer, G. RESPONSE OF THE ACCOMMODATION MECHANISM TO VISUAL STIMULI. Contract Nonr-495(09); Proj. NR 140-105, Tech. Rep. 1, RF 654, Nov. 1955; 23pp. Research Foundation, Ohio State University.

6783

To study the effectiveness of an empty visual field for inducing accommodative responses in the human eye, measurements were made on five trained subjects. A beam was flashed into the same eye for 0.05 second every ten seconds whose configuration (recorded by subject pressing appropriate response button) indicated correct accommodation, over-accommodation, or under-accommodation for the measuring level. Changes in accommodation were followed by a bracketing procedure. The stimulus conditions were (1) dark empty visual field, (2) bright empty visual field, and (3) red fixation spot at optical infinity. Variations in the refractive state were analyzed for effects of the various conditions. The results are discussed in relation to "night myopia" and "space myopia" reported in the literature. T. I. R-8

6784

Brown, R.H. THE EFFECTIVENESS OF A COLLIMATED RETICLE AS AN AID TO VISUAL DETECTION OF AIRCRAFT AT HIGH ALTITUDE. NRL Prob. Y02 03, Proj. NR 401 000, NRL Rep. 4863, Nov. 1956, 12pp. NRL, Washington, D.C.

6784

To determine the effectiveness of a collimated reticle in improving the detection of small targets, experimental conditions were chosen to simulate search for aircraft against a bright uniform background. Cases for near vision were such as a plane's cockpit and windshield framework might provide. Fourteen subjects, using binocular vision, identified the position of a target dot (systematically varied in size) seen at optical infinity. The minimal size of target for detection was measured with three reticle patterns (collimated, checkerboard, and gunsight) and with no pattern. Data were analyzed by comparisons of geometric means and analysis of variance techniques for differences due to reticles, target positions, and subjects. Discussion is relative to operational applications of results. T. G. I. R-17

6786

Howes, D.H. USE OF WORD-FREQUENCY TABLES IN THE PREPARATION OF LABELS. Tech. Memo., WCRD 62-98, RDO 694-37, Nov. 1952, 5pp. WADC, Wright-Patterson AFB, Ohio.

6786

The problem of rapid and accurate recognition of labels is analyzed. Data is reviewed in the light of evidence that the time for which a word must be exposed in order to be recognized with a specified error depends upon the word's average frequency of occurrence. Recommendations are given for the choice of words to be used in the preparation of labels and standard operating procedures.

R 9

6788

Daniel, R.S., Butler, F.C. & Porter, P.B. DEVELOPMENT OF METHODS FOR PRODUCING RADAR MOTION PICTURES. Proj. 21 06 003, Res. Note 80: 50 7, Sept. 1950, 14pp. USAF Human Resources Research Center, Mather AFB, Mather Field, Calif.

This memorandum is a report of the equipment and operating procedures used in the successful filming of moving pictures of the indicator scope of airborne radar AN/APQ 23 A. The topics discussed are as follows: a) purposes of radar moving pictures; b) psychological requirements for production of radar motion pictures; c) photographic requirements for production of radar motion pictures; d) requirements of the radar equipment and operator; e) design of the camera mount assembly; f) flight plan for a photographic mission; g) description of films; h) a report of the proficiency test, first form. (HEIAS)

R 3

6789

Dey, M.K., & Ammons, R.B. STIMULATION-MATURATION PREDICTION OF DISTRIBUTION PHENOMENA IN COMPENSATORY PURSUIT. *Canad. J. Psychol.*, 1956, 10, (3), 139-146. (University of Louisville & University of North Dakota).

6789

To test the hypothesis of stimulation-induced maturation--that improvement in performance is more closely related to the time since practice started than to the amount of practice--5 groups of 21 high school boys received 45, 30, 23, 13, and 8 one-minute trials on a compensatory pursuit task with intertrial rest periods of 0, 1/2, 1, 2 1/2, and 5 minutes, respectively. The optimum duration of the rest period was determined and the implications of this finding for stimulation-maturation are discussed.

6790

Stevens, S.S. THE DIRECT ESTIMATION OF SENSORY MAGNITUDES-LOUDNESS. *Amer. J. Psychol.*, March 1956, 69, (1), 1-25. (Harvard University).

6790

To develop and refine a method for the direct quantitative assessment of subjective magnitudes in the field of audition, a series of studies were undertaken. Utilizing a standard stimulus with a convenient modulus (loudness designated by a number), the observer assigned numbers to the variables which show the ratio between standard and variable. Effect of range and level of stimulus, effects of presenting the standard only once, estimation versus adjustment, effect of context, effect of constraints are investigated by this method and the results compared. The assets and liabilities of the method of magnitude estimation are illustrated and discussed. G. R 20

6791

Miller, G.A. THE MAGICAL NUMBER SEVEN, PLUS OR MINUS TWO: SOME LIMITS ON OUR CAPACITY FOR PROCESSING INFORMATION. *J. Psychol. Rev.*, March 1956, 63(2), 81-97. (Harvard University, Cambridge, Mass.).

6791

This paper reviews the concepts of information measurement and summarizes data on absolute judgments of uni-dimensional stimuli and of multi-dimensional stimuli, of subitizing, span of immediate memory and recoding. The influence of all these processes on the amount of information that can be received, processed, or remembered is discussed. The value of the concepts and measures provided by information theory for the investigation of psychological problems is discussed. T. G. R 20

6792

Penndorf, R. LUMINOUS AND SPECTRAL REFLECTANCE AS WELL AS COLORS OF NATURAL OBJECTS: ALBEDO AND COLOR OF TERRAIN FEATURES. *APCRC-TR-56-203*, Geophysical Res. Papers 44, Feb. 1956, 19pp. Geophysics Research Directorate, APCRC, Bedford, Mass.

6792

The spectral reflectance of natural objects is taken from Krinov's measurements: (1) water surfaces, (2) bare areas and soils (snow, limestone, sands, clay, black earth), and (3) vegetative formations (dry meadows or coniferous forests in summer, lush grass or deciduous forests in summer, ripe field crops or forests in autumn). Most of the measurements were taken from the ground with one series from a low flying aircraft. Based on these data, the luminous reflectance (albedo) and the color parameters are computed for these objects. The results are compared with other published data. T. G. R-8

T. G. R-8

6793

Stevens, S.S., & Poulton, E.C. THE ESTIMATION OF LOUDNESS BY UNPRACTICED OBSERVERS. *J. exp. Psychol.*, 1956, 51, (1), 71-78. (Psychology-Acoustics Laboratory, Harvard University).

6793

To test the ability of unpracticed subjects to make consistent quantitative judgments of the relative loudness of tones on their first trial and to explore some of the biasing factors of such experiments, three studies are reported using 65 subjects and the methods of adjustment and magnitude estimation. Additional factors evaluated were 1. none potentiometer with turn of knob proportional to loudness produced and decibel attenuation, 2. initial measurement of absolute threshold or no measurement, 3. bracketing on single adjustment procedure, and 4. order of adjusting fractional loudnesses. Group means in decibels were calculated and analyzed. Suggestions as to methodological procedures are given.

6795
Daddy, R.R. THE QUANTITATIVE EVALUATION OF AN AIRCRAFT CONTROL SYSTEM. Rep. 29, Feb. 1956, 4pp. North Atlantic Treaty Organization, AGARD, Paris, France.

6795
This paper was prepared as an introduction to a panel discussion on the quantitative measurement of the ability of an aircraft-pilot system to perform given tasks. Two examples are given to illustrate the inadequacy of simple measurements of the accuracy of task performance primarily due to increased pilot effort. It is suggested that measurements of this effort need to be made. Measurement of the pilot's transfer function, which is known to vary with the severity of the task, is discussed.

6797
Dept. of Labor. JOB PERFORMANCE AND AGE: A STUDY IN MEASUREMENT. Bull. 1203, Sept. 1956, 72pp. Bu. of Labor Statistics, Dept. of Labor, Washington, D.C.

6797
To develop objective measures which would be useful for comparing the performance of production workers in different age groups, a pilot investigation of eight manufacturing establishments in two industries (footwear and men's clothing) was made. Output data were obtained for 2,217 workers, attendance data for 4,009, industrial injury data for 2,637, and records of separation for 2,734. A schedule for collecting the data was developed and tested in the plants visited; the method is fully described. Statistical treatments of the data are described together with clarification of underlying assumptions. The findings on the relation between job performance and age are presented as preliminary to further work in the area.
T. R 15

6798
Oyer, H.J. RELATIVE INTELLIGIBILITY OF SPEECH RECORDED SIMULTANEOUSLY AT THE EAR AND MOUTH. J. acoust. Soc. Amer., Nov. 1955, 27, (6), 1207-1212. (Dept. of Speech, Ohio State University).

6798
To determine the relative intelligibility of simultaneously recorded speech picked up at the lips and the ear, six male speakers recorded lists of monosyllabic words. The lists were randomly presented (with respect to origin and speaker) to 24 trained listeners at -12, -15, and -18 signal-to-noise ratios (white noise was mixed with the tape to produce the S/N ratios). The criterion measure was the total number of correct responses to six speakers for one listener at one S/N ratio. The data were evaluated by analysis of variance techniques for differences due to origin of signal pickup, S/N ratio, and listeners. Implications for practical usage are discussed.
T. I. R 5

6799
Moser, H.M., & Dreher, J.J. EFFECTS OF TRAINING ON LISTENERS IN INTELLIGIBILITY STUDIES. J. acoust. Soc. Amer., Nov. 1955, 27, (6), 1213-1219. (Ohio State University).

6799
To test the effects of training on listeners (in the typical intelligibility study), 12 subjects skilled in listening under conditions of noise were presented initially with lists of words (total of 600) formed by agglutination of English monosyllables and asked to record the words. Noise for the test sessions was furnished by a Harvard-type white noise generator. Following the initial test, alternate training and testing sessions were conducted. Differential responses to the words were plotted. The results are analyzed in terms of the effects of training and correct response as a function of the number of speech sounds contained in the particular word.
T. G. R 27

6801
Latham, P., & Spencer, J. AN ANALYSIS OF THE NAVIGATOR'S TASK. J. Inst. Navigation, Jan. 1956, 9(1), 56-55. (PRAC 549, Institute of Aviation Medicine, Farnborough, Hants, England).

6801
To analyze the task of the aircraft navigator, detailed recording of his activity in flight was made by a shorthand technique during 6 fully simulated operational bombing trips of 5 to 8 hours duration. The percentage of total time spent on various activities was tabulated and assessed to see what information the task analysis provided on the following factors: fatigue, effects of experience, and need for modification of work load.
C. R 2

6804
Bromiley, R.B. HUMAN ENGINEERING--PSYCHO-PHYSIOLOGY OR ENGINEERING? J. Aviat. Med., 1956, 27 (3), 231-235. (Defence Research Medical Laboratories, Department of National Defence, Toronto, Canada).

6804
In a discussion of the nature of human engineering the author differentiates between the research and practice aspects of human engineering as two relatively distinct fields of endeavor. Following a description of the role of each type of human engineer, differences in training are presented along with a statement of the present requirements for each type of human engineer.

6805
Phillips, W.H., Brown, P.B., & Matthews, J.T. Jr. REVIEW AND INVESTIGATION OF UNSATISFACTORY CONTROL CHARACTERISTICS INVOLVING INSTABILITY OF PILOT-AIRPLANE COMBINATION AND METHODS FOR PREDICTING THESE DIFFICULTIES FROM GROUND TESTS. RM L53F17a, Aug. 1953, 57pp. Langley Aeronautical Lab., NACA, Langley Field, Va.

6805
A number of examples are given of control difficulties which appear to result from a tendency for dynamic instability of the combination of the pilot, the control system, and the airplane. These difficulties have occurred in both conventional and power control systems. Tests of a bomber and a fighter equipped with hydraulic power controls were made to study this problem. The effect of friction in the control valves of the power control systems is discussed. An analytical study of the problem and a method of detecting such control difficulties by means of ground simulator tests are presented.
G. I. R 17

6809

Adler, R.B. & Fricker, S.J. SUMMARY REPORT ON THE FLOW OF SCHEDULED AIR TRAFFIC. Contract Cca 28152, Dec. 1951, 29pp. Electronics Research Lab., Massachusetts Institute of Technology, Cambridge, Mass.

Some of the effects upon air traffic of scheduling the aircraft and of controlling them en route are presented quantitatively in this report in the form of theoretical studies of 4 problems: a) Relations between the random en route deviations of aircraft from their schedules, and the resulting stack and total delays; b) Effectiveness of a single en route control point when 1) it reschedules the aircraft in an attempt to reduce terminal congestion, 2) it attempts to bring each plane back onto its original schedule; c) Congestion caused by relaxing the schedule; d) Effect of a sudden shutdown of the terminal. The limiting cases of random arrival and continuous control are discussed briefly, and some aspects of multipoint discrete en route control are treated. Numerical analysis, using IBM punched-card machines, is employed extensively in problems a)-c). Problem d) has been simplified enough so that purely analytic methods could be applied. It is presented merely for comparison purposes.

R 2

6810

Army Medical Research Laboratory. 2ND ANNUAL ARMY ENGINEERING PSYCHOLOGY CONFERENCE - 7-9 November 1956. Status Rep., 1956; 61pp. Research and Development Division, AMRL, Fort Knox, Ky.

6810

This report on the Army Medical Research Laboratory gives details of its history (1942-1956), objectives, organization, research, and development projects (biological, biophysical, psychological, and physiological problems of military significance). A bibliography of laboratory reports and journal publications is included covering operations at high and low temperatures, ration anthropometric measurements, ventilation, fire and flame protection, vision in tanks, errors in gunnery, and miscellaneous articles on methodology, instrumentation, and others.

6811
Bowers, R. UTILIZATION STUDY OF MANEUVERING TACTICS TRAINER, DEVICE 1 BZ 2. HUMAN ENGINEERING REPORT SPECDEVEN 20 A 10. NAVEXOS P 1060, Sept. 1952, 37pp. Special Devices Center, Port Washington, N.Y.

This study deals with the utilization of maneuvering tactics trainer, device 1 BZ 2. The purpose of the study was to examine the utilization of the trainer to recommend if possible, additional uses or new instructional procedures to improve its utilization, and to develop procedures for reviewing the utilization of other tactical trainers. By joint analysis of the function of the device and training requirements of the Navy, the best uses for the device were determined. By application of established principles of learning to the recommended uses, the best instructional procedures were determined. The results indicated that: a) the device is suited for training experienced or inexperienced officers; b) enlisted talkers and helmsmen can also be trained on it; c) the device should be used for practicing complete operational tasks and all operational procedures; d) officers in charge of training should conduct briefing sessions before using the device and self-assessing sessions following use of the device; e) the installation of time lapse motion picture equipment will provide a way of obtaining records of performance of device operations. Such records will permit broader and better utilization of the device by present users and will open up new important uses for the device. (HEIAS)

6812

Simons, C.W. & Roscoe, S.M. ALTIMETRY STUDIES: II. A COMPARISON OF INTEGRATED VERSUS SEPARATED LINEAR VERSUS CIRCULAR, AND SPATIAL VERSUS NUMERICAL DISPLAYS. Tech. Memo. 435, May 1956, 8pp. Weapon Systems Development Laboratories, Hughes Aircraft Company, Culver City, Calif.

6812

To determine the effects of three display variables upon pilot performance in making routine decisions required to follow vertical flight commands, time and error scores were obtained from 24 pilots (12 professional, 12 casual). Four altimetry displays were designed: (1) integrated vertical scale (spatial analogue), (2) integrated circular-scale (distorted spatial analogue), (3) counter (numerical analogue), and (4) separated circular-scale (distorted spatial analogue); printed problems for practice and for testing were used. Preference ratings were obtained after testing was completed. The data were analyzed in terms of differences due to shape, integrated versus separate presentation, and symbolic versus spatial analogue presentation of information. T. G. I. R 4

6814

Kunnick, Lillian S. AGING AND PUPILLARY RESPONSES TO LIGHT AND SOUND STIMULI. J. Geront., Jan. 1956, 11, (1), 38-45.

6814

To study the relationship between aging and pupillary responses, data were obtained for 94 normal subjects between the ages of 7-1/2 and 90 years of age. Cinephotography utilizing infrared illumination was used to record pupil responses when exposed to a light stimulus (12.2 foot candles) of one second duration, every four seconds. After 60 such presentations, a sound stimulus (97 db.) was presented to restore pupillary functioning. Pupil size, speed, and extent of pupillary constriction were evaluated in terms of: 1) increasing age and rate of change in pupillary response to light and sound stimuli, 2) velocity of response during total process of restriction, and 3) relative control of the iris over amounts of light admitted to retina. (See also 6815, 6816, 6817). T. G. R 3

6815

Kunnick, Lillian S. AGING AND THE EFFICIENCY OF THE PUPILLARY MECHANISM. J. Geront., April 1956, 11, (2), 160-164.

6815

To study the efficiency of the pupillary mechanism in response to light stimuli in relation to aging, cinephotography utilizing nonstimulating infrared illumination was used to record the size of the pupil as it alternately constricted and dilated. Sixty light stimuli (12.2 foot candles) of one second duration were presented every four seconds followed by an auditory stimulus (97 decibels) to elicit psychosensory restitution; fifteen additional light stimuli followed. Subjects (94) were divided into four age groups (7 1/2 to 90 years). Measurements (maximal and minimal pupil diameters and time between, extent and speed of pupillary constriction) were analyzed for states of rest, fatigue, restitution, and decay of restitution as a function of age. (See also 6814, 6816, 6817). T. G. R 4

6916
Kumlick, Lillian S. AGING AND DECAY OF PUPIL-
LARY PSYCHOSENSORY RESTITUTION. J. Geront.,
Jan. 1956, 11, (1), 45-52.

6816
To study the decay of pupillary psychosensory resti-
tution (reconstitution of pupillary response following
fatigue) in relation to aging, measurements were ob-
tained (94 normal subjects, age range 7 1/2 to 90 years)
by means of pupillometry. A second stimulus (98 decibels)
was given following 50 light stimuli, to obtain psycho-
sensory restitution. Fifteen additional light stimuli
were then given to record decay. Measurements of pupil
size, extent of constriction and response velocity were
analyzed as functions of age. (See also 6815, 6817).
T. G. R 2

6817
Kumlick, Lillian S. AGING AND THE LATENCY AND
DURATION OF PUPIL CONSTRICTION IN RESPONSE TO
LIGHT AND SOUND STIMULI. J. Geront., Oct. 1956,
11, (4), 391-396.

6817
To study pupillary responses in relation to aging,
cinematography utilizing nonstimulating infrared il-
lumination was used to record the size of the pupil as it
alternately constricted and dilated. Sixty light stimuli
(12.2 foot candles) of one second duration were presented
every four seconds, followed by an auditory stimulus
(97 decibels) to elicit psychosensory restitution;
fifteen additional light stimuli were then given. Normal
subjects (54) ranging in age from 7 1/2 to 90 years of
age were used. Data on the maxima and minima pupil
diameters and the time between them, extent and speed of
constriction were evaluated in terms of age and (1)
latency of dilation and constriction, (2) duration of
constriction, and (3) occurrence of maximum velocity of
constriction. (See also 6816, 6815, 6816). T. G. R 3

6818
Pinkel, I.I., & Rosenberg, E.G. SEAT DESIGN
FOR CRASH WORTHINESS. Tech. Note 3777, Oct.
1956, 42pp. Lewis Flight Propulsion Labora-
tory, NACA, Cleveland, Ohio.

6818
"On the basis of deceleration data obtained in full-
scale crashes, a description of crash deceleration pulses
is presented which is suitable for seat design. Charts
are presented for obtaining the maximum deceleration
loads experienced by the seat and passenger in response
to their deceleration pulses. Finally, a method is
presented for determining the seat strength, spring
stiffness, and deformation beyond the elastic limit re-
quired to serve in a crash deceleration pulse of given
description. Measurement of passenger decelerations in
full-scale laboratory and crash studies shows the general
principles presented in the report apply."
T. G. I. R 1

6819
Pesman, G.J., & Eiband, A.M. CRASH INJURY.
Tech. Note 3775, Nov. 1956, 36pp. Lewis
Flight Propulsion Lab., NACA, Cleveland, Ohio.

6819
To determine how impact injuries occur and how the
chance of such injuries may be reduced, airplanes
manned with dummies were guided into obstacles that pro-
duced the desired crash events. Motion pictures, the
acceleration and crash loads data, and a post-crash
examination of the wreckage constituted the experimental
data. The following hazards were considered: (1) being
crushed, (2) being struck by missiles, (3) striking ob-
jects, and (4) being injured by crash deceleration.
Transport, cargo, fighter, and light airplane crashes
were evaluated.
I. R 5

6820
Webb, V.A., & Jones, F.R. REPEATER PILOT ACCIDENTS IN THE UNITED STATES AIR FORCE. Contract
AF 33(038) 10506, HRL Rep. 30, Aug. 1952, 46pp. USAF Human Resources Research Lab., Wash-
ington, D.C. (Psychology Dept., Washington University, St. Louis, Mo.).

A comparison of pilots having accidents during 1941-1944 with those not having accidents
during the same period in terms of their accidents from 1945-1949 revealed that the first
period non-accident pilots did not differ from the first period accident pilots during the
second period. Accidents prior to jet flying did not predict jet accidents. Accidents in
training were not related to later accidents. Accidents on odd days during odd years
and even years when compared with accidents on even days during odd years and odd days
on even years for an 8-year period revealed a limited but consistent tendency for some pilots
to have accidents beyond chance expectancy. Grade increased control over exposure differ-
ences by separating groups into plane types or length of service decreased this beyond chance
factor in all cases except one. A limited but significant deviation from a chance distribu-
tion was found in the distribution of accidents. Increased homogeneity of exposure condition
by the crudest methods, reduced the amount of deviation from chance. Accident rates were
found to be related to instrument ratings, pilot ratings, age, and grade.

6821
USAF Human Resources Research Center. PRESENTATION MADE TO THE SIXTH MEETING OF THE AIR
TRAINING COMMAND HUMAN RESOURCES RESEARCH ADVISORY BOARD, Feb. 1953, 195pp. USAF Human Re-
sources Research Center, Air Training Command, Lackland AFB, San Antonio, Tex.

The conference included reports on the following topics: Methods of Operational Utiliza-
tion of Research Results; Training Analysis and Development Evaluation of the Operations Ap-
plicability of Human Resources Research Center Publications; Technical Training--Air Force;
Flying Training--Air Force; Crew Training--Air Force; Present and Anticipated Operational Utili-
zation of Research of the Personnel Research Laboratory, of the Technical Training Research
Laboratory, of the Perceptual and Motor Skills Research Laboratory and the Armament Systems
Training Research Laboratory; Present and Anticipated Operational Utilization of Research of
the Aircraft Observer Training Research Laboratory, of Research of the Pilot Training Research
Laboratory, of the Combat Crew Training Research Laboratory; Present and Anticipated opera-
tional problems within the Air Training Command; present and anticipated personnel problems
within the Air Training Command; some air force-wide research requirements in the personnel
and training areas; procedures for coordinating and validating research requirements and pro-
jects in the Air Training Command; Organization and Facilities of the Human Resources Research
Center; the functional organization of the Human Resources Research Center to maximize its
contribution to the air force. (HEIAS)

6822

Selinger, M., Rippelhouse, C.M. & Woods, J.P. STUDIES OF PERFORMANCE ON THE E-26 FLEXIBLE GUNNERY TRAINER. Res. Bull. 52 17, May 1957. 31pp. USAF Human Resources Research Center, Air Training Command, Lackland AFB, San Antonio, Texas.

2 studies of performance on the E-26 flexible gunnery trainer were conducted. Data were collected from 4 S-grades with samples of 4, 8, 9 and 11. Practice without tuition was given for 5 days to 2 of the groups (Study II) and for 11 and 12 days, respectively, to the 2 groups of Study III. Practice then continued with tuition in the case of the 2 later groups for 5 and 7 days, respectively. The results were during Study III satisfactorily high degrees of inter-day and odd-day vs. even-day reliability were obtained; scores for time-on-target, its azimuth and elevation were fairly high, while those for time-on-target in range, simultaneous azimuth-elevation range, and simultaneous azimuth-elevation range-triggering were low; practice on the trainer in the absence of tuition generally resulted in improved performance; all Ss had a tendency to overrange the target, and poor performers tended to participate the sight and range knob in an awkward manner; there were no consistent differences in reliability or learning among the 10 situations provided by the trainer; scores for azimuth and elevation were positively correlated with range scores did not display any consistent relationship with azimuth or elevation.

R 5

6823

Baker, F.C. & Tacher, J.A., Jr. A MOTION PICTURE TEST OF NOSE AIMING POINT DETERMINATION. Proj. 525 006 0002, Res. Note AD 51 1, Feb. 1952. 7pp. USAF Human Resources Research Center, Air Training Command, Lackland AFB, San Antonio, Tex.

This test was developed to serve as a reliable and valid measure of performance in scope interpretation and aiming point determination. Also information on several aspects of the test was sought: when aiming point is first located, accuracy of this location, duration of correct aiming point identification, and point in target break-up at which target is lost. Two experimental tests were administered to 39 officer navigators. Intercorrelations among subjects and test scores were obtained as well as odd-even reliability coefficients. A detailed item analysis for each test was also performed. (HELAS)

R 1

6824

Trautman, D.C. USE OF JOB ANALYSIS DATA TO IMPROVE TRAINING COURSE CURRICULA. HRP 200/1, June 1951, 6pp. Air Training Command, USAF Human Resources Research Center, Department of Defense, Washington, D.C.

With the possible exception of the Military Departments it appears to be a common practice for job analysis to be used specifically to develop or to improve job training course curricula. Within the Air Force, however, there has been little or no specific job analysis designed to provide direct support for training. This paper proposes the establishment of a program of job analysis which continually would provide as many as possible of the Air Force technical schools with complete field information as to the nature, scope, and requirements of the jobs for which the schools are training. Such a continuous flow of information, collected in the many places where the jobs are actually performed, would permit the schools to keep their curricula vital and up-to-date, to keep posted as to changes in the scope and nature of jobs, to keep abreast not only of technological changes but also of changes in duties and tasks performed, to note changed skills and knowledge required, to find the relative importance of and time consumed by various aspects of the jobs, and in other ways to keep the courses most realistic in terms of actual field job performance and requirements.

R 5

6825

Johnson, H.O. THE DEVELOPMENT OF MORE EFFECTIVE METHODS OF TRAINING ELECTRONIC TECHNICIANS. Res. Rep., June 1951, 42pp. Research & Development Board, Department of Defense, Washington, D.C.

This report is concerned with the experimental development of more effective methods of training electronic technicians in the Navy. 5 classes (U.S. Navy School—Electronics) of 14 students each were selected for the experimental instruction; each S was assigned a contemporary in the regular course of instruction for comparison purposes. Instruction was evaluated during the course presentation and after the Ss had entered the equipment phase. The salient features of the experimental method and the principles of teaching and learning on which this were based are enumerated. The achievements of the experimental and regular classes were evaluated by means of examinations and practical work situations. The performance of the experimental classes was attributed to: improved scheduling of course work, mathematics instruction, and modified classroom size and arrangement. (HELAS)

6826

Silver, R. & Ruteran, E. ANALYSIS OF SPEED CONTROL IN LEVEL FLIGHT. NACA-TN-55-2, Jan. 1955, 35pp. NACA, ARDC, Griffiss AFB, Rome, N.Y.

6827

Stapp, J. EDMAN AND CHIMPANZEE TOLERANCE TO LINEAR DECELERATIVE FORCE. Tech. Rep., 1952, 52pp. Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio.

6828

As part of an investigation leading to the development of automatic air traffic scheduling and display equipment, the theoretical response of a human pilot-aircraft combination in a control loop is analyzed in level flight. Included are cases in which pilot transfer function consists of proportional, derivative, and integral, plus combinations of these types of controls. Experimental results were obtained from human jet pilots operating the throttle within the level flight control loop as simulated on a Reeves Electronic Analog Computer. Results are discussed in relation to the display problem involved.

I. G.

6829

To obtain accurate information concerning the tolerable and survivable limits of men exposed to dynamic forces of short duration encountered in crash type decelerations, a special linear decelerator (a rocket propelled sled with mechanical friction brakes) was designed and constructed. A preliminary series of runs (72) were accomplished with chimpanzee subjects while oriented in six body positions to explore performance range of the decelerator and establish safe parameters for human experimentation. Human subjects (53 runs) were exposed to progressively higher decelerations in two body positions—facing forward and facing aft. In addition to records of the space-time forces, appropriate clinical and physiological observations were made and analyzed.

T. G. I. R 15

5828
Brogan, F.A. A DISCRETE-FREQUENCY AUTOMATIC AUDIOMETER
SIMULATING MANUAL TESTS. USAF Rep. 55-125, Sept. 1955.
12pp. USAF School of Aviation Medicine, Randolph AFB,
Tex.

6828

An automatic audiometer is described which utilizes discrete frequencies, offers one-second tones at random, and simulates manual audiometry. The time required for testing both ears and the frequencies at which this can be done are reported, as well as the intensity range available with the equipment. All types of recording equipment may be used in conjunction with the basic equipment and a feature of the device is that it prevents the subject from controlling the test results directly.

L. R. 34

5829

Pearson, R.G., & Bauer, R.P. THE EFFECTS OF MORPHINE-
NALOXONE MIXTURES ON FLYING PERFORMANCE. USAF
Rep. 55-137, June 1956, 8pp. USAF School of Aviation
Medicine, Randolph AFB, Tex.

6829

To assess the side effects of certain opiate-anesthetist treatments, 50 subjects received preliminary training on a complex compensatory pursuit task involving simulated aircraft instruments and controls. Six different drug treatments were then administered to the various groups: (1) saline solution, (2) 3 milligrams morphine, (3) 3 milligrams naloxone, (4, 5, 6) morphine-naloxone mixtures of 2:1, 1:1, and 1:2 milligrams. Work was continued for four hours. Two motivational levels were included: (1) knowledge of results and (2) no information on performance. Performance scores were evaluated by analysis of variance for drug and motivational effects.

T. G. R. 17

6830

Otis, A.B., & Henson, G.S. PSYCHOLOGICAL ADAPTATION TO
CHRONIC HYPOXIA. USAF Rep. 56-26, Mar. 1956, 7pp. USAF
School of Aviation Medicine, Randolph AFB, Tex.

6830

Some features of oxygen transport in hypoxia of circulatory origin are presented and compared with the situation present in altitude hypoxia. The polycythemia which develops in both types of hypoxia is described and discussed.

T. G. R. 5

6831

Bancroft, R.V. CABIN AIR ANALYSIS IN B-57 AIRCRAFT.
USAF Rep. 56-17, Feb. 1956, 3pp. USAF School of Aviation
Medicine, Randolph AFB, Tex.

6831

To determine the possibility of contamination of cabin air in pressurized aircraft, in-flight air samples were obtained from the cockpits of three B-57 aircraft. Samples were collected just before take-off and 30, 60, and 90 minutes thereafter at cabin altitudes ranging between ground level and 25,000 feet. Each air sample was analyzed for carbon dioxide and carbon monoxide content.

T. R. 5

6833

Gerathewohl, S.J., Straghold, H., & Taylor, W.F. THE OCULOMOTORIC PATTERN OF CIRCULAR
EYE MOVEMENTS DURING INCREASING SPEED OF ROTATION. Rep. 56-33, April 1956, 19pp. USAF
School of Aviation Medicine, Randolph AFB,
Tex.

6833

To study the basic pattern of guided circular eye-movements with regard to form and speed, a Master Ophthalmograph was used to record the saccadic eye-movements of ten subjects performing a visual pursuit task. Measurements were made with (1) a constant speed of 15 rotations per minute, (2) during increasing speeds from twenty to 45 rotations per minute, and (3) from forty to 85 rotations per minute. Both clockwise and counter-clockwise rotations were used. The data were evaluated with regard to number and extent of eye movements per cycle, per second, and per movement. Some tentative explanations for the findings are discussed.

T. G. I. R. 7

6837 U.C. & Bancroft, R.V. TRANSTHORACIC PRESSURE IN MAN DURING RAPID DECOMPRESSION. Sep.
Luf. 56-61, Aug. 1955, 13pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

Pressures were recorded in the human chest during rapid decompression under controlled conditions in a low-pressure chamber and compared with those observed in a dry, rigid container under similar conditions. Whereas the peak pressures measured in the mechanical analog varied in direct proportion to the absolute differential, regardless of the initial cabin pressure, the pressures in the human chest increased with the fractional differential (differential/initial pressure) in decompression. The analysis of transthoracic pressure transients permits an estimate of the radial decompression orifice permeability in a cabin of known volume without causing a significant rise in transthoracic pressure when decompression is sustained with open airways. The mean flow resistance offered by the human airways appears to be considerably greater in rapid decompression than during spontaneous, quiet breathing.

R. 24

6838

Gibson, J.J., & Gibson, Eleanor J. CONTINUOUS PERSPECTIVE
TRANSFORMATIONS AND THE PERCEPTION OF RIGID MOTION.
Contract N0001 401(14), Sept. 1955, 16pp. Cornell
University.

6838

To explore various aspects of the perception of continuous perspective transformations with polar projection, judgments of the degree of slant of the stimuli were made under two conditions: (1) continuous perspective transformation patterns, differing with respect to regularity of form and texture, were presented in two-second cycles (five degrees of semi-rotation 15 to 70 degrees) on a flat translucent screen to twenty subjects, (2) the same patterns were presented motionless at the end of a transformation sequence (sixty degrees of semi-rotation) to thirty subjects. Changes in observed slant and degrees of slant are evaluated in relation to length of transformation sequence versus stationary pattern and type of pattern—regularity of form and texture. T.G.I. R. 15

6839

Gibson, J.J. OPTICAL MOTIONS AND TRANSFORMATIONS AS
STIMULI FOR VISUAL PERCEPTION. Contract N0001 401(14)
Sept. 1956, 14pp. Cornell University.

6839

This essay concerns the way nations of objects are seen. An optical geometry is expounded which serves as a possible basis in optical stimulation for the ability to distinguish between and among rigid, elastic, and multiple moving things. Topics considered are physical motions and optical motions, continuous perspective transformations, continuous nonperspective transformations, disjunctive or separate optical motions, different degrees of transformation of superimposed patterns, and the internal depth of objects. An apparatus for producing optical transformations is described.

I. R. 14

6840 Townsend, J.C. EVALUATION OF THE LINK, MC-1, BASIC INSTRUMENT FLIGHT TRAINER. Develop. Rep. AFPTC TN 56-84, June 1956, 80pp. Personnel Research Lab., USAF Personnel and Training Research Center, Lackland AFB, Tex.

The Link, MC-1, basic instrument flight trainer was evaluated at Tyndall Air Force Base, Florida, during a 17-week period by personnel of the Air Force Personnel and Training Research Center. More than 70 individuals, representing all levels of skill in piloting conventional and jet aircraft, flew the trainer during the evaluation. 22 of these subjects were given structured training, which consisted of an hour ride on each of 4 successive days, during which time their performance was measured on a flight check which had been developed by the evaluation team. The results of the evaluation indicated that the MC-1 was rated average in housing requirements, excellent in instructional facilities, above-average in unloading, installing and calibrating, excellent in maintenance, below-average in human engineering, average in engineering, excellent in validity and stability of performance curves, excellent in cockpit motion and rough air capability, and excellent in training requirements. Evaluative opinion by all persons who flew the trainer was generally highly favorable.

6841 Briggs, G.E., Pitts, P.W., & Bahrck, H.P. LEARNING AND PERFORMANCE IN A COMPLEX TRACKING TASK AS A FUNCTION OF VISUAL NOISE. Res. Rep. AFPTC TN-56-67, June 1956, 15pp. Personnel Research Lab., AFPTC, ARDC, Lackland AFB, Tex.

6841 To examine the effect of degradation, in the form of visual noise, on learning, performance, and transfer of training in a tracking task, four groups of Air Force ROTC students were trained for five days in a simulator having some of the characteristics of the F-86D aircraft with its P-4 fire control system. On the first day, all groups were trained under no-noise conditions and, on the last day, tracking accuracy was measured under a varied noise condition. On the intervening days, Group 1 was trained with no noise, Group 2 with a moderate amount, Group 3 with a large amount, and Group 4 with varied amounts. Per cent time on target is plotted for each group by five-trial blocks.

T. G. I. R 7

6842 Ely, J.H., Thomson, R.M., & Orlansky, J. LAYOUT OF WORKPLACES. Contract AF 33(616)-419, Proj. 7180, Task 71501, Tech. Rep. 56-171, Sept. 1956, 104pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6842 This report provides a compilation of human engineering recommendations concerning various aspects of workplace layout. Whenever these recommendations are the direct outgrowth of research in this field, the appropriate research studies are cited. When no research has been done on a specific problem the authors draw upon their own experience to provide the recommendations. The four main sections are entitled: General Considerations, Workplace Dimensions, Location of Controls and Displays, Direction-of-Movement Relationships. Checklists, figures, and tables are used frequently as a means of presenting recommendations. A table of contents and a subject index are provided as aids to the user.

T. J. R 07

6843 Larnette, J.T. & Ruby, T.B. GROUP PERFORMANCE AS A FUNCTION OF WORK-DISTRIBUTION PATTERNS AND TASK LOAD. *Scientific*, 1956, 19, 95-104. (USAF Personnel Lab., Lackland AFB, Tex.). (AFPTC TN 56 97).

6843

To compare team performance under two conditions of task load and two methods of work distribution, three-man teams were assigned a simplified Air Defense task. They were to display interceptors to defend three target areas against enemy bombers. High task load was fifteen and low load was ten planes. The two methods: each individual performed one of the three essential activities -- observation, fuel calculation and identification, and decision making; and each individual performed all activities to defend a single target area. Performance scores (algebraic summation of scores for downing enemy planes and penalty scores) were studied by analysis of variance for effect of load and work method.

T. A 9

6844

Archer, J.E., Kent, G.W., & More, F.A. EFFECT OF LONG-TERM PRACTICE AND TIME-ON-TARGET INFORMATION FEEDBACK ON A COMPLEX TRACKING TASK. AFPTC-TN-56-102, Res. Rep., Aug. 1956, 12pp. AFPTC, Lackland AFB, San Antonio, Tex.

6844

To study changes in complex tracking performance over a relatively long training period and to examine the effect of delayed information feedback signal upon time continuously on target, thirteen subjects tracked a target in three dimensions (West Pedestal Sight Manipulation Test) in a 66-day experiment. One group (6 Ss) heard a tone after they had been on target for one second; the other group (7) heard no tone; tone reinforcement discontinued after forty days. All subjects were kept informed of daily progress by chart. A two-week rest was interposed between sessions 45 and 46. Total time on target and time continuously on target are analyzed as functions of practice and delayed reinforcement.

T. G. R 9

6845

Pollack, I. EVALUATION OF THE PRINCIPLE OF A NOISE-OPERATED AGC SYSTEM. AFPTC-TN-56-4, Aug. 1956, 7pp. Operational Applications Laboratory, AFPTC, Bolling AFB, Washington, D.C.

6845

To evaluate the feasibility of a noise-operated AGC (Automatic Gain Control) interphone system, speech and noise were presented to the listener with absolute levels changing sharply and often. In three test series four 50-item word lists were used with the conditions varied as to signal/noise ratio (12, 12, and 5 decibels), rate of alternation between two overall noise levels (constant or one to ten cycles per second), highest noise level (105 or 125 decibels), and difference between gain levels (constant or zero to 50 decibels). The data were average percentage of items correctly received by one listener (mean articulation scores) and were analyzed in terms of effect of varying the rate of alternation of noise levels and varying the difference between the noise levels.

T. R 3

6846

Moser, H.M., Dreher, J.J., Oyer, H., & O'Neill, J. EFFECTS OF SEQUENCE UPON THE RECEPTION OF RELATED AND NON-RELATED MESSAGE ELEMENTS. Contract AF 19(664)-1577, Proj. 664, Tech. Rep. 35, Aug. 1956, 35pp. Operational Applications Laboratory, AFPTC, Bolling AFB, Washington, D.C., (Ohio State University).

6846

To evaluate word order on the reception of short identification sequences of related and unrelated words, 295 listeners and five speakers participated in a series of experiments. (1) Loudness judgments were made between monosyllables and their equally intense time-ordered reversals (word recorded on tape and played backwards). (2) Identifications were made of whole word (spondees) with aural presentation of either the first or last half, and likewise for couplets (two commonly associated free forms). (3) Identifications were made of syntactically related two-unit call-signs and nonsyntactically related three-unit call-signs presented in various orders. The data are analyzed for order effects and related to the problem of optimum word ordering of typical air messages

6847

White, W.J., & Jorve, W.R. THE EFFECTS OF GRAVITATIONAL STRESS UPON VISUAL ACUITY. Proj. 7193, Task 71611, Tech. Rep. 56-247, Nov. 1956, 29pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6847

To determine the relation between gravitational stress and visual acuity when the factor of cerebral circulatory competence is minimized, nine subjects were tested. All subjects had a visual acuity of 20/20 or better, were free from ocular disease and were experienced with the equipment--human centrifuge. Visual acuities (binocular, right and left eyes both near and far) were measured with the checkerboard targets of Bausch and Lomb Ortho-Rater in the seated position (wearing anti-g suit), in the prone, supine, and semi-supine positions while exposed to a force environment ranging from one to eight "g's". Acuity values (expressed in means) were analyzed as a function of "g" units for each position and comparison made for all four positions. Hypotheses are advanced to account for the results. T. I. G. R 26

6848

Dupertuis, C.W., & Emanuel, I. A STATISTICAL COMPARISON OF THE BODY TYPING METHODS OF HOOTON AND SHELDON. Contract AF 18(600)-30, Proj. 7214, Tech. Rep. 56-346, Aug. 1956, 26pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Western Reserve University & Aero Medical Laboratory).

6848

To compare the Sheldon and Hooton methods of body-typing, a sample of 500 Air Force flying personnel was selected from approximately 4000 body-build photographs of an anthropometric survey (photographs had been rated by the Sheldon method). Selection basis was a flat distribution for all somatotypes occurring in the original analysis. The sample was then rated by Hooton and his associates. Results from the two sets of ratings were compared: the three primary components, dysplasia (uneven strengths of components in different body regions), and gynandromorphy (degree of bodily characteristics of opposite sex). Regression equations are given for the relationships between the primary components. T. I. G. R 14

6849

Alluisi, E.A. & Muller, P.F., Jr. RATE OF INFORMATION TRANSFER WITH SEVEN SYMBOLIC VISUAL CODES: MOTOR AND VERBAL RESPONSES. Contract AF 33(616) 43, Proj. 7192, WADC TR 56 226, May 1956, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

6849

To assess the relative merits of seven symbolic visual codes with respect to speed and accuracy of response, two experiments were conducted using motor (key pressing) and verbal readout responses. Coding alphabets were: conventional Arabic Numerals, symbolic numerals, three types of inclination symbols, ellipse-axis ratio symbol, and color. Subjects were required to respond under both self-pacing and forced-pacing conditions. The data were analyzed in terms of information transmission (bits) for the seven codes as a function of rate of information presentation and type of response. The importance of stimulus-response compatibility is discussed together with implications for engineering application to future radar air traffic control systems. T. G. I. R 14

6850

Cole, J.W. NOISE EVALUATION OF AIR FORCE GROUND SUPPORT UNITS. Proj. 7211, Task 71705, Tech. Note 56-335, Aug. 1956, 24pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6850

To study noise problems presented by the use of auxiliary ground power units of the Air Force, the sound radiating characteristics of several types of reciprocating and gas turbine units were measured. The data are evaluated in terms of exposure risks (hearing damage) and speech communication. The noise characteristics of the various units are discussed with some conclusions and recommendations for quieting the units are formulated. T. I. G. R 2

851

ertzberg, H.T.E., Emanuel, I., & Alexander, THE ANTHROPOMETRY OF WORKING POSITIONS. A PRELIMINARY STUDY. Contract AF 18(600)-, Proj. 7214, Tech. Rep. 54-520, Aug. 1956, pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio.

6851

To ascertain new body size data for various representative working positions, forty adult males, selected to insure a sample statistically representative of the Air Force, were studied. Measurements were made by use of photographs (maximum body depth), anthropometer, prone measuring board, and a measuring block (overhead reach, kneeling position height and length, crawling position height and length, and prone position height and length). Means, standard errors, standard deviations, and percentiles are accompanied by a pictorial representation of each position. Problems met in developing procedures for an anthropometry of working positions are discussed, along with possible approaches for data gathering. T. I. R 22

6852

Emanuel, I., Chaffee, J.W., & Wing, J. A STUDY OF HUMAN WEIGHT LIFTING CAPABILITIES FOR LOADING AMMUNITION INTO THE F-86H AIRCRAFT. Contract AF 18(600)-30, Proj. 7214, Tech. Rep. 56-367, Aug. 1956, 12pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Aero Medical Laboratory & Antioch College).

6852

To present data on weight lifting ability of young adult males in a representative work situation, nineteen subjects were studied. Lifting procedures were standardized and controlled in order to simulate a precise task (loading ammunition into the F-86H aircraft). An ammunition case with varying amounts of weight (based on a preliminary study of each individual's lifting ability) was lifted to platforms one, two, three, four, five, six, and seven feet above the floor. Weights were added (or subtracted) in units of ten pounds for the various heights. The results are based on the average of two tests at each level and include range, mean, standard deviation and percentiles. Suggested maximum weights required for actual lifting tasks are presented. T. I. G. R 3

6853

Kobrick, J.L. QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: I. SPATIAL DIMENSIONS OF THE 95TH PERCENTILE ARCTIC SOLDIER. Proj. 7-83-01-004, Tech. Rep. EP-39, Sept. 1956, 86pp. Environmental Protection Research Division, Quartermaster Research & Development Center, Natick, Mass.

6853

This report presents human engineering information on the body size of the soldier clothed in the full Arctic uniform. It should be used as a handbook by engineers and designers for establishing space allowances in the design and sizing of man-operated equipment. The criterion used is the 95th percentile of Army nude body size so that the data are concerned with upper size limit. Various body poses (standing, with arms in a variety of positions, sitting, with arms and legs in different positions, squatting, kneeling, on hands and knees, etc.) are presented pictorially with index scales so that dimensions can be measured on the pictures and referred to the index scale to establish actual size. I. R 10

6854

Iampietro, P.F., et al. CALORIC INTAKE AND ENERGY EXPENDITURE OF ELEVEN MEN IN A DESERT ENVIRONMENT. Proj. 7-83-01-004C, Tech. Rep. EP-40, Oct. 1956, 22pp. Environmental Protection Research Division, Quartermaster Research & Development Center, Natick, Mass.

854

To assess food requirements for active men in a hot dry climate, caloric intake and expenditure were studied in eleven men during a sojourn at Yuma, Arizona, (mean ambient temperature, 33 degrees Centigrade; relative humidity, 35 per cent). All foods were carefully weighed to determine the intake of each man. Time-motion studies were performed and energy expenditures for all activities were determined. Together with measures of body stores of fat and weight changes, a precise measure of caloric intake and expenditure was made. The results are discussed in terms of relation of environmental temperatures to caloric intake. Implications for army supply problems are noted. T. G. R 17

6855

Quartermaster Research & Development Center. ANNUAL--DECKMASTER 1955. THE GUIDED MISSILE PROTECTIVE CLOTHING PROGRAM OF THE DEPARTMENT OF THE ARMY. Dec. 1955, 30pp. Chemicals & Plastics Division--Textile, Clothing & Footwear Division, Quartermaster Research & Development Center, Natick, Mass.

6855

This report presents the background, review of technical progress, and unsolved problems of the Quartermaster Corps, Department of the Army, in the field of protective clothing for handling propellants (fuels such as aniline, hydrazine, furfuryl alcohol, JP4 and gasoline with such oxidizers as red and white fuming nitric acid, liquid oxygen, and 90% hydrogen peroxide) and for fighting propellant fires in the guided missile program. Photographs of the various design developments are included.

T. I.

6856

Baker, P.T. BODY COMPOSITION IN THE DESERT--RELATIONSHIP OF DESERT HEAT STRESS TO GROSS MORPHOLOGY. Proj. 7-79-01-0020, Tech. Rep. EP-7, March 1955, 23pp. Environmental Protection Division, Quartermaster Research & Development Center, Natick, Mass.

6856

To investigate the effect of a desert climate on gross morphology and the relationship between ability of the individual to resist heat stress and gross morphology two studies are reported. (1) Measurements of body composition (skin-fold test and x-rays) were made on 83 men before reporting for duty and at intervals during duty at Yuma Test Station in Arizona. Measurements were compared for significant changes. (2) Individual resistance to heat stress was measured by walking the men (fifty) for one hour at constant pace, then recording sweat loss, rectal temperature, and pulse rates. Measures of lean body mass, percent of fat, and stature were studied in relation to the stress measures. Possible uses of the findings are suggested.

T. I. R. 4:12

6857

Miller, B.P. A BRIEF HISTORY OF AERIAL EMERGENCY ESCAPE. ca. 1954, 24pp. USAF Wright Air Development Center, Aircraft Lab., Wright-Patterson AFB, Ohio.

The major reasons for failure to effect aerial escape from a disabled aircraft are indicated: deceleration, dynamic pressure, relative velocity of the bailout subject with respect to the tail of the aircraft, and lack of sufficient time. The characteristics of the ejection seat catapult are delineated and the record of successful AF emergency ejections is examined in terms of seat limitations. The other problems attendant to ejection also are considered relative to their solution. (HEIAS)

6858

Craik, K.J.W. LEGIBILITY OF DIFFERENT COLOURED INSTRUMENT MARKINGS AND ILLUMINATED SIGNS AT LOW ILLUMINATIONS. FPRC 415, Jan. 1943, 1p. Psychological Lab., FPRC. Camb. Edge, England.

6858

This note discusses some of the problems inherent in achieving an adequate fluorescent lighting system for colored instrument markings and illuminated signs. Mock-up blind flying panels in green and orange were compared for dazzle effect. Using three subjects, time to pick up silhouettes of aircraft was measured for each of the two colors as well as brightness level at which dazzle occurs.

G.

6859

Blau, B. A PRELIMINARY EVALUATION OF THE USE OF THE PRONE POSITION IN OPERATING A TRACK LAYING VEHICLE. Rep. 2, May 1953, 29pp. Human Engineering Lab., Aberdeen Proving Ground, Aberdeen, Md.

6859

To evaluate the use of the prone position in operating a track-laying vehicle, 22 experienced subjects drove four laps in the seated position and four laps in the prone position over a smooth course. Keeping their original starting positions (prone or seated laps first), 18 of the subjects drove five laps seated and five prone over a fairly rough course. The time required to complete each course was recorded and analyzed. Fatigue was evaluated by having four subjects drive six hours over the rough course. These four subjects received pre- and post-physical examinations.

T. G. I. R 2

6861

Mickett, J.C. & Bliss, J.Q. SURVIVAL FEEDING TRIAL OF RCAF SEAT PACK RATION. I.A.H. Rep. 52/4, Oct. 1952, 23pp. RCAF, Institute of Aviation Medicine, Toronto, Canada.

The purpose of this study was to ascertain the effectiveness and acceptability of the RCAF A-10 B Seat Pack Food Packets and to determine the time necessary for the reestablishment of physiological operational efficiency after a 10-day survival period. 31 subjects were placed in the bush under simulated survival conditions and subjected to certain dietary regimens. It was concluded that: a) The A plus B or B plus A Food Packets are adequate for survival over a ten day period during the Canadian summer; b) Carbohydrate as a survival food appears to be preferable to carbohydrate, fat and protein; c) Improvement of the packets is desirable from the standpoint of acceptability; d) A controlled diet for one day allowed a return to full duty. It is recommended that: a) The use of type A Food Packet be discontinued; b) The contents of type B Food Packet be modified to increase acceptability.

6861

Mickett, J.C. & Bliss, J.Q. SURVIVAL FEEDING TRIAL OF RCAF SEAT PACK RATION. I.A.H. Rep. 52/4, Oct. 1952, 23pp. RCAF, Institute of Aviation Medicine, Toronto, Canada.

6862

Anthony, G.C., Dougan, R.R., & Satyendra, K.N. STUDY OF PILOT-ASSIST DEVICES FOR ARMY FIXED-WING LIAISON AIRCRAFT. Contract DA 36-039-ac-63202, Quart. Engng. Rep. 3, Feb.-April 1955, 98pp. Air Arm Div., Westinghouse Electric Corp., Baltimore, Md.

6862

To study pilot-assist devices for Army fixed-wing liaison aircraft, pilot and manufacturer opinion was sampled, a control stick and instrument panel mockup was constructed, and 14 control configurations were evaluated by ranking the performance of the pilot-assist devices during simulated flight. Load droop characteristics, wind gust response, and flyability were determined for each control configuration. The data are analyzed and certain conclusions about the various devices are presented.

T. G. X.

6864

Pfaffmann, C. TASTE AND SMELL. Annu. Rev. Psychol., 1956, 7, 391-408. (Brown University).

6864

This paper reviews research contributions in the chemical senses. Taste is discussed under the major headings of receptor mechanisms involved, central neural processes, and behavioral processes. For smell there is discussion of methodology, neural mechanisms, behavioral relations, and theory.

R 128

6867
Day, W.F. RANDOMNESS OF THRESHOLD RESPONSES AT LONG INTERSTIMULUS INTERVALS. *Percept. Mot. Skills*, 1956, 6, 205-208. (Contract NS-ori-166, Proj. NR 145-089, Task Order 1, Rep. 166-I-206, July 1956. Johns Hopkins University).

6867

This experiment was designed to obtain an adequate sample of serial threshold behavior with a long inter-stimulus interval under conditions favorable to accurate psychophysical performance. Series of 100 threshold increments in the intensity of a 1000 cycle tone were presented at a fixed 15 second interval. Two conditions of stimulus response separation were used. The data were analyzed by the runs test and serial correlation to determine the randomness of serial threshold behavior. T. G. R 9

6870

US Bureau of Safety Investigation. STATISTICAL ANALYSIS OF ACCIDENTS INVOLVING FIXED-WING AIRCRAFT IN EXCESS OF 12,500 POUNDS TAKEOFF WEIGHT 1949-1954. (NCA-AIR-CARRIER OPERATIONS). Feb. 1956, 25pp. US Bureau of Safety Investigation, Civil Aeronautics Board, Washington, D.C.

6870

To furnish statistics on causes, types, injuries, aircraft damage and other pertinent data from accidents involving fixed-wing aircraft in excess of 12,500 pounds take-off weight during general operations, 96 accidents occurring during the period 1949 to 1954 are analyzed in this report. Detailed tabular material is included. T.

6871

Chapanis, A., & Malsey, Rita M. ABSOLUTE JUDGMENTS OF SPECTRUM COLORS. *J. Psychol.*, 1956, 42, 99-103. Contract NS-ori-166, Task Order 1, Proj. NR 145 089, Rep. 166-I-206, ONR, Johns Hopkins University.

6871

To express previously published data on percentage of correct absolute judgments of spectrum colors in terms of information measurements, a recomputation on the data was carried out using multivariate contingency analysis. The experimental data were obtained from highly trained subjects with sets of 10, 12, 15, and 17 spectrum colors between 430 and 642 millimicrons. The results are related to practical problems of color coding and to similar studies of other senses that are available in the literature. T. R 11

6872

Duerfeldt, C.W. INSTALLATION AND TEST OF AUTOMATIC LIGHT INTENSITY CONTROL SYSTEM FOR APPROACH AND RUNWAY LIGHTS. Proj. Ted PTR AE 2201, Final Rep. 2, April 1954, 5pp. Electronic Test Division, Naval Air Test Center, Patuxent River, Md.

6872

To evaluate an automatic brightness control system and visibility indicator developed by the National Bureau of Standards, the equipment was installed at the Naval Air Station, Patuxent River. The system, responsive to horizontal visibility, was used on three approach systems for 100 test flights made during varied visibility conditions. Tests were not completed because of unavailability of a control unit to operate in conjunction with new voltage regulators installed in the light system. Recommendations are made to improve the equipment with regard to maintenance and an indicator sensitive to vertical transmissivity data. No test data are included in this report. I. R 4

6873

Stolurow, L.H., Bergum, B., Hodgson, T. & Silva, J. THE EFFICIENT COURSE OF ACTION IN "TROUBLE SHOOTING" AS A JOINT FUNCTION OF PROBABILITY AND COST. *Educ. psychol. Monographs*, 1955, 15, 462-577. Res. Rep. AFPTAC TN 56 71, ARDC Proj. 7714, Task 67003, June 1955. USAF Personnel & Training Research Center, ARDC, Lackland AFB, San Antonio, Tex. (University of Illinois, Urbana, Ill.).

6873

To establish a suitable criterion for evaluating trouble shooting performance, maintenance records were obtained from 46 operational four-engine aircraft (28-cylinder reciprocating engine, R-3350). Instrument indications were analyzed to determine high, normal, and low readings, and each reading was related to both actual repairs performed and average work time for checking components that might have caused malfunction. Probability values of these relationships and patterns of symptoms were computed. Two methods for trouble shooting are given based upon the joint function of probability and cost (time). Experienced instructors were asked to estimate probability and cost factors by means of a questionnaire. Results from the two methods for gaining this information are compared.

6874

Detabel, M.H. & Stolurow, L.H. STIMULUS SEQUENCE AND CONCEPT LEARNING. *J. exp. Psychol.*, 1956, 51, 31-40. Res. Rep. AFPTAC TN 56 79, ARDC Proj. 7714, Task 67003, June 1955. USAF Personnel & Training Research Center, ARDC, Lackland AFB, San Antonio, Tex. (University of Illinois, Urbana, Ill.).

6874

To investigate relationships between concept learning and degree of synchrony (two stimulus components are in synchrony if both maintain their value, or both change value, from one trial to the next) of relevant and irrelevant components, a set of stimulus items (composed of three variable components only one of which was relevant to response called for) was used for training two groups (335, 275). By varying the sequence of items, training procedures were varied in synchrony for each group. Number of correct responses was analyzed for differences due to degree of synchrony and interaction with scholastic aptitude (A C E scores). Discussion relates results to arrangements of stimulus sequences for efficient training procedures. T. G. R 1

6875
Hauman, H.J. & Goldberg, S.C. NONTECHNICAL FACTORS IN THE JOB PERFORMANCE OF AIRCRAFT MECHANICS: STUDY II. Res. Rep. AFPTAC TN 56 59, Proj. 7950, Task 79507, May 1956, 23pp. USAF Personnel & Training Research Center, A/R Research Development Command, Lackland AFB, San Antonio, Tex.

This study is an attempt to verify and extend the findings of an earlier research project concerned with the dimensions of aircraft maintenance mechanics' on-the-job proficiency. This was done by analyzing the mechanics' characteristics, as rated by the mechanics themselves and by their supervisors. Factor analysis of the self-ratings revealed 5 dimensions of attitudes toward the job: Co-worker Relations, Work Satisfaction, Fairness of the Reward System, Crew Chief Ego-Status Behavior, and Acceptance of the Crew Chief. Factor analysis of the supervisors' ratings revealed the general factor, personal interaction, and the 4 other factors: Job Satisfaction, Relations with Co-Workers, Cooperativeness, and Technical Ability. Composite trait scores were also computed. It was concluded that a supervisor's rating of mechanics is bi-factor in nature, with halo and specific trait variance present in each item. (MEIAS) R 7

6880
Gulliksen, H. MEASUREMENT OF SUBJECTIVE VALUES. Contract Monr 270-20, Proj. Nr 150 088.
July 1955, 28pp. Office of Naval Research, Washington, D.C. (Psychology Dept., Princeton
University, Princeton, N.J.).

4 different value laws are developed and tested by using them to predict the scale value of composite stimuli from the scale values of their components. These 4 laws are an additive law, a square-root law, a logarithmic and a negative exponential law. They are tried out on a set of food preferences by means of Pearson's method of false position. The negative exponential law of diminishing returns gave the best fit to the data but was not markedly better than any of the other laws.
R 17

6881
Brown, R.H. THE UPPER SPEED THRESHOLD FOR THE DISCRIMINATION OF VISUAL MOVEMENT AS A FUNCTION OF STIMULUS LUMINANCE. NML Problem Y02-03, Proj. NR 401 000, Subproj. NR 401 001, Nov. 1956, 14pp. Applications Research Div., Naval Research Lab., Washington, D.C.

6881
To determine how stimulus luminance affects the upper speed threshold for the discrimination of visual movement, the observer viewed the center of a circular black area surrounded by a dialy illuminated area. A moving spot of white light traversed the path of a horizontal line centered in the circle. Two subjects made 50 responses, one 26 responses, to each of several combinations of luminance and speed of the moving spot, which were systematically varied in counterbalanced order. The results are interpreted in terms of previous research.
T. G. R 11

6882
Randle, R.J., Jr. VIBRATIONS IN HELICOPTERS: TRAINING CONSIDERATIONS. Proj. 7197, Task 71640, WADC TN 59 61, March 1959, 7pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

6882
To study in detail the role that vibrations play in piloting helicopters, individual interviews were held with helicopter instructor-pilots. Information was gathered about the classes of vibrations that exist during flight and which ones are utilized as cues in both normal control and the detection and diagnosis of system mal-functions. An analysis of the information led to a discussion of training considerations. Recommendations are made for simulation of each of the several classes of vibration in a proposed helicopter instrument trainer.
T.

6883
Smith, O.W., & Gibson, J.J. DISTANCE CONSTANCY: I. THE EFFECTS OF WINDOWS OF TWO SIZES ON MATCHES OF OBJECTIVE VELOCITY. II. APPARATUS FOR THE STUDY OF VISUAL TRANSLATORY MOTION. Prepared under Contract Monr 401(14), Sept. 1956, 15pp. Cornell University.

6883
This report contains the result of (1) a study of distance constancy in which 23 subjects judged a strip of cloth whose far edge was 125 feet away and whose length was varied as longer or shorter than a ten-foot long cloth whose far edge was 25 feet from the subject, (2) a study of the effects of windows of two different sizes on judgments of objective velocity, and (3) a description of an apparatus for the study of visual translatory motion. Some of the problems which might be investigated with the use of the apparatus are presented.
T. I. R 11

6884
Duerfeldt, C.H. JET INSTRUMENTATION PROGRAM, EVALUATION OF MODIFIED THREE-POINTER ALTITUDE CONFIGURATIONS. FINAL REPORT. Proj. Ted. PTR A: 7046.2, Rep. 1, July 1954, 11pp. Service Test Div., USN Air Test Center, Patuxent River, Md.

An evaluation was conducted of 5 altimeter presentations for a proposed replacement of the standard presentation in high performance airplanes. All of the proposed presentations were designed for ease of incorporation into standard instruments for immediate backfitting in present equipment. The counter-pointer type presentation, available only for new production, was included in the evaluation as a matter of general interest. The counter-pointer was determined to be the most desirable presentation. The configuration on the left was found to be the most suitable for immediate modifications. The barber pole area is a low altitude warning that appears below 16,000 feet. The instrument in the center was the next most suitable. The standard presentation is shown on the right for comparison. Altitude shown is 800 feet. Both project presentations would require minor changes.
R 120

6886
Setzer, L.E. THE TYPE IV ROTATABLE-PANEL PICTORIAL COMPUTER: I. DEVELOPMENT AND INITIAL TESTS. Proj. 43-1, Tech. Rep. 195, May 1954, 25pp. US Civil Aeronautics Administration, Technical Development and Evaluation Center, Indianapolis, Ind.

This report presents a description of the Type IV rotatable-panel pictorial computer for use with the omnibearing-distance navigational system, together with the results of early laboratory and flight tests. A later report will present results of more extensive evaluation studies which are now in progress. Laboratory tests indicate that maximum errors of $\pm 1/2^\circ$ in azimuth indication and ± 0.4 mile in distance indication may be attributed to the computer when it is adjusted for optimum performance, and flight tests indicate that the pictorial computer provides one of the easiest methods of air navigation. The ease with which the navigational problems are solved and the continuous plotting of the position of the airplane make the computer especially valuable for terminal-area operations. The indicated position of the airplane can be kept within 1/4 mile of a desired course drawn on a 1:250,000 scale chart. The utility of the computer can be improved more by improvement of auxiliary features such as chart handling and scale selection than by increasing the accuracy of the position indications.

6887

Setzer, L.E. & Leake, P.H. THE TYPE V PICTORIAL COMPUTER WITH AUTOMATIC CHART SELECTION: I. DEVELOPMENT AND INITIAL TESTS. Proj. 13-1, Tech. Rep. 159, June 1954, 30pp. US Civil Aeronautics Administration, Technical Development and Evaluation Center, Indianapolis, Ind.

This report describes the Type V pictorial computer and presents the results of early laboratory and flight tests. The results of more extensive tests and evaluation will be presented in Part II. The Type V computer is an airborne display of omnibearing and distance navigation information and provides continuous airplane position and heading indications, a mechanical chart selector, and an automatic receiver-tuning mechanism. The charts are printed in route sequence on a roll of 35-mm film and are projected on a 10 inch diameter, see-through-type screen. Laboratory tests indicated that the computer meets specification requirements for an accuracy of ± 0.4 nautical mile in distance, ± 0.5 in bearing, and $\pm 7^\circ$ in heading. Flight-test results emphasize the value of the following features: a) simplicity of control accomplished by the automatic-tuning and scale-selection features; b) an uncluttered chart due to the projected position indicator; and c) the huge amount of chart storage available by use of film. 2 features that can be improved are the contrast of the image projected on the screen and the means of replacing obsolete charts on the film roll.

6889

Lindsay, D.B., et al. USE OF THE PPI FLASH-READING TRAINER IN TRAINING NAVY SEARCH-RADAR OPERATORS. Contract OEMR 919, Proj. SC 70, NS 146, Rep. 17, OSRD Rep. 4831, March 1945, 12pp. Office of Scientific & Research Development, NDRC, Applied Psychology Panel. (Yerkes Laboratories of Primate Biology, Orange Park, Fla.)

A trainer for the Plan-Position Indicator (PPI) has been developed. It consists of a mechanical-optical simulation of the PPI screen. Targets may be presented in any desired order, position, and with varying persistence time. Because short exposure times, 1-5 sec., are used the instrument has been designated the Flash-Reading trainer. Experience and data derived from its use permit the following conclusions to be drawn: a) the trainer can be scored accurately and objectively; b) the best use is obtained when the scope markings are made to simulate the bearing and range scales of an actual radar; c) significant increases in scope reading ability occur with training; d) both individuals and classes may be distinguished reliably by their trainer scores; e) training in battlephone procedure and reporting can be coordinated closely with the scope reading training in a way that duplicates many of the elements of the combat situation; and f) the greatest improvement in performance is secured when the men are given 15 min. practice each day for about 15 days. (HEIAS)

6896

US Civil Aeronautics Administration. GENERAL AVIATION ACCIDENTS (NON-AIR CARRIERS): A STATISTICAL ANALYSIS. CALENDAR YEAR 1954. 13pp. US Civil Aeronautics Administration, Department of Commerce, Washington, D.C.

This statistical analysis covers accidents involving fixed-wing aircraft of 12,500 pounds or under engaged in general aviation (other than air carrier operations). Those incident to crop control activities have been omitted since they are being treated separately in a report entitled "Aerial Crop Control Accidents," which is being published by the Civil Aeronautics Board. The CAB will also publish a statistical analysis of civil aircraft accidents involving fixed wing aircraft over 12,500 pounds and helicopters or other non-fixed wing aircraft. In this publication we have combined the material previously presented in 2 separate publications: "A Statistical Analysis of Non-Air-Carrier Accidents" and "Statistical Details of Non-Air-Carrier Accidents by Individual States." The information previously contained in the publication by individual states is presented in tabular form by state within each Civil Aeronautics Administration region. We believe that such a presentation will not only furnish the state agencies and the CAA regions with the information they have previously received, but will also make available the greater detail found in the overall statistical data. This is intended as a quantitative study of accidents only.

6897

Senders, J.W. TRACKING WITH INTERMITTENTLY ILLUMINATED DISPLAYS. Proj. 7182, Task 71510, WADC TR 55 378, Oct. 1955, 8pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

Subjects performed a tracking task involving the simultaneous control of 2 indicators by the use of 2 controls. Their view of the indicators was periodically and simultaneously obscured. The data indicate that performance varies as a direct function both of frequency and relative length of the "on" portion of the cycle.

R 6

6898

Herrick, R.M., Adler, H.E., Coulson, J.E. & Howett, G.L. THE DETECTION OF SEPARATIONS BETWEEN ADJACENT SIGNALS ON A SIMULATED PPI RADAR SCOPE. Contract AF 33(038) 22616, Proj. 7186, Task 71544, Tech. Rep. 55 424, July 1955, 22pp. USAF Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.)

A simulated Plan Position Indicator (PPI) scope was used to evaluate the effects of a number of visual variables upon the minimum signal luminance increment (ΔI) required for the detection of a separation between 2 identical signals. The signal luminance increment is the difference between the signal luminance and the scope face luminance. All of the variables, viz., background luminance, distance between signals, scan rate, and simulated phosphorescence decay were of importance in determining threshold log ΔI values. Differences in threshold log ΔI among the observers were also statistically significant. Moreover, most of the interactions among the variables were statistically significant. As the background luminance increases, an increase in log ΔI is required for detection of a given separation. The background luminance is the most important determinant of the threshold log ΔI . In general, for a given background luminance, the threshold log ΔI must increase as the separation between signals decreases. The influence of simulated phosphorescence decay and scan rate upon log ΔI thresholds is relatively small with the type of target display used in the present experiment.

R 24

6900

Egan, J.P., Clarke, F.R., & Carterette, E.C. ON THE TRANSMISSION AND CONFIRMATION OF MESSAGES IN NOISE. J. acoust. Soc. Amer., 1955, 28 (4); 536-550. Contract AF 18(600)-571, AFRC-TN-56-51. Operational Applications Laboratory, AFRC, Bolling AFB, Washington, D.C. (Indiana University).

6900

To examine the interaction between sender and receiver utilizing a noisy communication channel, messages consisting of one of a list of 50 syllables and previous messages transmitted by each of three subjects (the authors) were transmitted with a signal-to-noise ratio of 0 to -16 db (which could be varied independently for sender and receiver). The receiver retransmitted the message to the sender who confirmed or transmitted it again. Each message was transmitted until confirmed, or until an arbitrary number of trials had been reached. A theoretical model is developed for determining the probability that any given message will be confirmed. The results are presented in terms of cumulative percent confirmed messages as a function of number of repetitions and signal-to-noise ratio. T. G. R. 12

6901

McCollom, I.N., & Chapman, A. A HUMAN ENGINEERING BIBLIOGRAPHY. Prepared under Contract Nonr-1268(01), Proj. NR 145-075, Nov. 1956, 128pp. San Diego State College Foundation.

6901

This bibliography of 5666 items includes references relevant to human engineering design and is organized under the following major headings: (1) general references, facilities and equipment, (2) man-machine systems, (3) visual problems, (4) auditory problems, (5) speech communication, (6) other sensory input channels, (7) comparison and interaction among sensory input channels, (8) design of controls and integration with displays, (9) control systems, (10) design and layout of workplaces, equipment and furniture, (11) body measurements and movements, (12) higher mental processes, (13) simulators and proficiency measuring devices, (14) environmental effects on performance, (15) efficiency, fatigue, and human capacities, (16) operator characteristics for specific jobs. R. 5666

6902

Dvorak, A., & Wright, C.E. SYMMETRIC CORRELATION MATRIX PROGRAM FOR THE IBM TYPE 650. Prepared under Contract Nonr-477(08), Dec. 1956, 5pp. University of Washington.

6902

This report constitutes the second of a series of program descriptions for the International Business Machines (IBM) Type Magnetic Drum processing machines. A program by which large correlational matrices can be computed readily from raw score data is provided.

6903

Dvorak, A., & Wright, C.E. PREDICTOR SELECTION FOR THE IBM TYPE 650. Prepared under Contract Nonr-477(08), Nov. 1956, 6pp. University of Washington.

6903

In this report, the first of a series of program descriptions for the International Business Machines (IBM) Type 650 Magnetic Drum Data Processing Machine is presented. Due to their complexity and size, a number of computational routines previously submitted are used for the programs included.

6904

Dvorak, A., & Wright, C.E. OPTIMAL TEST LENGTH FOR MAXIMUM DIFFERENTIAL AND ABSOLUTE PREDICTION ON THE IBM TYPE 650. Prepared under Contract Nonr-477(08), Dec. 1956, 7pp. University of Washington.

6904

To supplement two previous papers in which iterative techniques for determining the optimal distribution of testing items for differential and multiple absolute prediction had been presented, this paper presents a program for the International Business Machines (IBM) Type 650 Data Processing Machine designed to determine the distribution of test times so as to maximize differential prediction. With a minor change, optimal test times for maximum multiple absolute prediction may be obtained. R 5

6905

Briggs, L.J. A TROUBLESHOOTING TRAINER FOR THE E-4 FIRE CONTROL SYSTEM. Proj. 7709, AFTRC-TN-56-94, July 1956, 12pp. Maintenance Lab., AFTRC, ARDC, Lowry AFB, Colo.

6905

The device described in this paper is a prototype trouble-shooting trainer intended for experimental use in training and testing E-4 Fire Control System Mechanics. The trainer consists of a cabinet containing synthetic components of the system and a microfilm selector and projector unit. The potential uses of the trainer are discussed in detail. I.

6906

Webb, P., & Veghte, J.H. SEVERAL VARIABLES AFFECTING PERFORMANCE OF VENTILATED CLOTHING. Proj. 7155, WADC TR-56-43, Jan. 1956, 18pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

6906

To investigate variables affecting the performance of ventilated clothing, the heat protection afforded by light, medium, and heavy clothing assemblies was evaluated at ground level, 10,750 feet, and 27,500 feet in a chamber having temperatures of 120 degrees Fahrenheit, 140 degrees Fahrenheit, or 160 degrees Fahrenheit with the temperature of the ventilating air at 90 degrees Fahrenheit per 10.0 cubic feet per minute, 60 degrees Fahrenheit per 7.3 cubic feet per minute, or 30 degrees Fahrenheit per 5.5 cubic feet per minute, according to the orthogonal square method. Exposure was for three hours. T. G. I. R 6

6907

Sell, R.G. A SURVEY OF THE APPLICATION OF ERGONOMICS TO THE IRON AND STEEL INDUSTRY. PART I. DESIGN OF EQUIPMENT. PE/N/79/56, Jan./Feb. 1956, 25pp. Plant Engineering Division, The British Iron & Steel Research Association, London, England.

6907

This report is the first of two reports which show how ergonomics has been and can be applied to problems in the iron and steel industry. The problems considered here are those of equipment design. Ten large steelworks were visited, control points were inspected in relation to their intended functions and discussions held with personnel. Summaries of available ergonomic information, of the observations and recommendations are presented for each of the following: design of controllers, layout of controls, and design of display systems. T. I. R 15

6908

Kochevar, J.H. LETTER REPORT OF PROJECT Nr AA-1050/1454, INDIVIDUAL PROTECTIVE EQUIPMENT USED WITHIN THE AAFCS M33 VAN and Enclosure. DA Proj. Nr 5-13-07-002, ATDEV-4 413.6/38, May 1956, 12pp. Headquarters, Continental Army Command, Fort Monroe, Va.

6908

To determine the ability of personnel to operate the Anti-aircraft Fire Control System (AAFCS) 733 van while wearing individual protective equipment, the crew, equipped with various types of masks and gloves, tracked radar targets while their performance was observed. The effects of gas masks on visibility and the effects of gloves on manual dexterity are evaluated and specific recommendations are made with respect to the equipment.

6909

Sell, R.G. A SURVEY OF THE APPLICATION OF ERGONOMICS TO THE IRON AND STEEL INDUSTRY. PART I. DESIGN OF EQUIPMENT. PE/N/79/56 APPENDIX, March 1957, 43pp. Plant Engineering Div., The British Iron & Steel Research Association, London, England.

6909

This appendix (see 6907) presents a detailed and comprehensive account of information on design of equipment in eight large steel works. The purpose of the visits was to determine the present stage of development of ergonomics in the steel industry. Data were gathered by direct observation and interviews with engineers and managers concerned with efficient employment of personnel. Work space layouts are included. I.

6910
USAF School of Aviation Medicine. SUBJECT INDEX OF SCHOOL OF AVIATION MEDICINE RESEARCH REPORTS. JANUARY 1942-DECEMBER 1955. 60pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

6910
This index contains research report titles published by the School of Aviation Medicine from 1942 through 1955. The subject headings are arranged by major field of interest with subheadings and cross references where appropriate. The fields of interest are accidents, air evacuation, aviation medicine, dentistry, internal medicine, microbiology, neuropsychiatry, ophthalmology, otolaryngology, pathology, personnel, pharmacology and biochemistry, physiology, psychology (clinical and experimental), radiobiology, space medicine, statistics (medical), preventive medicine, surgery and anesthesiology, and veterinary sciences.
R-(approx.) 1100

6911
Quastler, H. INFORMATION THEORY IN BIOLOGY. Contract DA 11 022 Ord 721; 1953, 273pp. Control Systems Lab., University of Illinois, Urbana, Ill.

This volume, in which the formalism of information theory and cybernetics has been applied to some basic biological problems, is a compilation of papers mostly dealing with the first stage of analysis, quantification. Section 1 is concerned with the definition and measurement of information: the Shannon-Wiener function and the Fisher function are considered; relations between information and physical entropy are discussed, and applications to living systems are made. Section 2 is devoted to the structural and functional analyses of fundamental biological units. In Section 3 are gathered the tentative beginnings of analysis of whole systems. (HEIAS)
R 13

6912
Rockman, A.G., & Fussell, W.B. THE INFLUENCE OF FIELD OF VIEW ON THE TRANSMISSION OF LIGHT THROUGH TURBID WATER. NKL Problem H03-05, Proj. NR 663-050, Rep. 4708, March 1956, 7pp. Optics Div., Naval Research Lab., Washington, D.C.

6912
To determine the influence of field of view on transmission of light through clouded media, transmission through a seven-foot diameter tank of turbid water was measured in two ways: (1) with collimated light and a narrow field of view receiver (Macbeth Illuminometer), and (2) with uncollimated light and a wide field of view receiver (35 millimeter camera). A picture of a lamp bulb submerged in the water was analyzed to indicate the dispersion of energy around the source.
U. I.

6913
Augenstein, L., & Quastler, H. EMPIRICAL FLUCTUATIONS IN INFORMATION MEASURES. Contract DA-36-039-sc-56695, DA Proj. 3-99-10-101, Proj. 8-103A, Rep. R-77, Jan. 1956, 5pp. Control Systems Lab., University of Illinois.

6913
To obtain some knowledge of the small sample statistics of the information measures most commonly used in the application of information theory to psychological problems, empirical sampling fluctuations were studied and compared with the results obtained by Monte Carlo techniques employing multinomial sampling. The study uses data obtained in the flash recognition of playing cards.

6914
Seil, R.G. THE APPLICATION OF ERGONOMICS TO THE IRON AND STEEL INDUSTRY. PART II. PHYSICAL CONDITIONS OF WORK. APPENDIX. PE/N/80/56 APPENDIX, March 1957, 8pp. Plant Engineering Div., The British Iron & Steel Research Association, London, England.

6914
This appendix (see 6949) presents a detailed and comprehensive account of information gathered about working conditions in eight large steelworks. The purpose of the study was to determine the present stage of development of ergonomics in the steel industry. Data were gathered by direct observation and by interviews with engineers and managers concerned with the efficient employment of personnel.

6916
Luft, U.C., & Moell, W.K. THE MANIFESTATIONS OF SUDDEN BRIEF ANOXIA IN MAN. Rep. 55-E6, Jan. 1956, 14pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

6916
The cerebral manifestations of anoxia during and after exposure to a barometric pressure of 68 to 70 millimeters of mercury by rapid decompression while breathing oxygen were analyzed in a series of tests ranging from six to eighteen seconds duration in two subjects. The sequence of neurological events was followed by using observation, tape recording of communications, movie recording, oculographic and electroencephalographic recording.
T. I. R 25

6917
Madell, M.A. THE EFFECT OF VARIOUS LUMINANCE LEVELS AND TARGET CONFIGURATION ON THE REFRACTIVE STATE OF THE EYE. Contract AF 33(616)-2372, Proj. 7157, WADC TR-56-61, Feb. 1956, 30pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Los Angeles College of Optometry).

6917
To investigate night myopia and sky myopia, an infra red ophthalmoscope was used to measure the refractive state of the eye at increasing luminance levels from 0.05 foot lamberts to 300 foot lamberts. Various target configurations were employed in the first phase of the study in an effort to determine their relative efficiency in eliciting an accommodative response. In the second phase, a Snellen "E" and a flat white, homogeneous, unmarked wall were selected as targets to give data showing the extremes of accommodative response.
T. G. R 15

6918
Tanner, W.P. Jr., & Swets, J.A. THE HUMAN USE OF INFORMATION. I. SIGNAL DETECTION FOR THE CASE OF THE SIGNAL KNOWN EXACTLY. Contract DA 36-039-sc-15358, EDO Tech. Rep. 4, 1956, 14pp. Vision Research Lab., University of Michigan.

6918
In this paper, a theory of visual detection is developed, based on the model provided by the theory of signal detectability, and, more generally, by the theory of statistical decision. Two experiments are reported which test some predictions of the theory for the case of the signal-known-exactly (frequency known). The predictions of the theory are compared with contrasting predictions of conventional sensory theory. Finally, two specific cases of signal detection involving uncertainty in the frequency of a sound signal are compared with the case of the signal-known-exactly.
G. R 8

6919
Quastler, H. & Brabb, Betty. HUMAN PERFORMANCE IN INFORMATION TRANSMISSION. PART V: THE FORCE OF HABIT. Contract DA 36 039 SC 56695, DA Proj. 3 99 10 101, Proj. 8 103A, Rep. R 70, Jan. 1956, 27pp. Control Systems Lab., University of Illinois, Urbana, Ill.

6919
To measure the rate of information transmission in human subjects, an experimental arrangement including a device for displaying letters, an electric typewriter, timing and relay devices, was used. Reaction time as a function of alphabet size was measured for three subjects and the results are analyzed as indicating certain things about the quality and flexibility of the human machine.
T. G. R 5

6920

Burnett, W.A., Adorno, D.A., Bogar, J.E., & Ross, W.C. PROCEDURES FOR ANALYSIS OF COMMUNICATION TRAFFIC ENGINEERING DATA. Contract DA 49-025-SC-150, DA Proj. 3-99-01-001, SC Proj. 102 E, SC Tech. Requirements SCEL-2101 E, HRB Inc. Proj. 57, Rep. 57-M-12, Feb. 1956, 48pp. Haller, Raymond and Brown, Inc., Pennsylvania State College.

6920

This report is concerned with procedures for the analysis of communication traffic data. Techniques are presented for developing delay predicting equations for busy periods selected on the basis of (1) call arrival process, (2) call length distributions, and (3) queue discipline. An example of an analytical solution to the single-trunk system is given, and an approximation method for the multi-channel problem. Comparison is made between analytical methods and simulation techniques. G. R 21

6921

Gorham, W.A., Barker, W.S., Hanlon, T.E., & Older, H.J. A RESEARCH STUDY OF THE PREDICTION OF ADAPTABILITY TO THE NAVY. Prepared under Contract Nonr-1484(00), FRA Rep. 56-9, May 1956, 60pp. Psychological Research Associates, Washington, D.C.

6921

This paper constitutes the final report of a research study of the relationship between fleet performance and psychiatric prediction. A review of the literature on psychiatric screening research is presented as well as a description of the development of and evaluation of a multiple factor forced choice personality inventory. T. R 34

6922

Tanner, W.P., Jr., Swets, J.A., & Green, D.M. SOME GENERAL PROPERTIES OF THE HEARING MECHANISM. Contract DA-36-039-sc-63203, DA Proj. 3-00-04-042, SC Proj. 194B, EDG Proj. 2262, Tech. Rep. 30, March 1956, 96pp. Engineering Research Institute, University of Michigan.

6922

This report deals with the auditory processes of detection and frequency analysis. It presents a decision-making theory of detection and some data supporting the theory. Other data are analyzed in relation to a theory of frequency analysis that characterizes the human observer as instantaneously sensitive only to a limited range of frequencies. Finally, the problem of speech perception is considered in terms of this mechanism inferred from these studies. T. G. I. R 41

6923

Quastler, H. A PRIMER ON INFORMATION THEORY. Contract DA 11-022-ORD-1581, Tech. Memo. 56-1, Jan. 1956, 65pp. Office of Ordnance Research, Ordnance Corps, Durham, N.C. (Brookhaven National Lab., Upton, L.I., N.Y.).

6923

This rather lengthy memorandum attempts to bridge the gap between popular articles on information theory and the large number of highly technical books and papers on the subject which are available. In a textbook type of format, the status of information theory, the ways in which information is represented, the measures used, and certain special cases are discussed. T. G. I. R some

6924

Quastler, H. THREE SURVEY PAPERS: I. A SURVEY OF WORK DONE BY THE BIO-SYSTEMS GROUP OF THE CONTROL SYSTEMS LABORATORY. II. STUDIES OF HUMAN CHANNEL CAPACITY. III. THE INFORMATIONAL LIMITATIONS OF DECISION MAKING. Contract DA 36 039 SC 56695, Proj. 8 103A, Rep. R 71, 1956, 48pp. Control Systems Lab., University of Illinois, Urbana, Ill.

6924

This report presents (1) a survey of the work done by the Bio-Systems Group of the Control Systems Laboratory at the University of Illinois, (2) illustrative studies of human channel capacity, with emphasis on the limiting factors, and (3) a discussion of the informational limitations of decision-making. T. I. R 23

6925

McCulloch, T. VIEWER, NEAR INFRA-RED IN-LINE (NIGHT-DRIVING EQUIPMENT). ORD Proj. TT2-778, Final Rep. 3225, Feb. 1956, 26pp. Electrical Lab., Detroit Arsenal, Center Line, Mich.

6925

This report describes the development of an Infra-red In-line Viewer (Night Driving Equipment) to the pilot model stage. Results of preliminary tests of the instrument are given and comparison is made with the M-19 Periscope. T. I.

6926

David, H.T., Kruskal, W.H., Augenstine, L., & Quastler, H. APPROXIMATE DISTRIBUTIONS OF SAMPLE INFORMATION FOR USE IN ESTIMATING TRUE INFORMATION BY CONFIDENCE INTERVALS. Contract DA 36-039-sc-56695, Proj. 8-103A, Rep. R-75, 1956, 37pp. Control Systems Lab., University of Illinois.

6926

This study concerns the distribution theory of information functions and the main concern is the development of a suitable method for determining confidence intervals. Monte Carlo procedures were used to investigate the behavior of the distributions of a number of functions which it was felt could be used for this purpose. Plans for computing confidence intervals are presented. T. G. R 12

T. G. R 12

6927
Doyle, F.J. METHODS FOR OBTAINING DIMENSIONAL INTELLIGENCE FROM SINGLE OBLIQUE AERIAL PHOTOGRAPHS. Contract AF 18(600) 90, OSURF Proj. 485, Tech. Paper 187, Dec. 1954, 67pp. USAF Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation, Columbus, Ohio).

This report presents methods which may be employed by the photo interpreter in order to determine dimensional information about ground objects from measurements of their images on single oblique photographs. 3 simple computational methods and 2 semigraphical methods are developed with computing forms and examples for each. The semigraphical methods are based on overlays precomputed and predrawn for standard camera installations. A series of overlays are included with this report. Methods for determining the orientation of oblique photographs are described, and the accuracy of the solutions is investigated. R 4

6928

Money, J.F. DETECTION TECHNIQUES IN DOPPLER TRACKING SYSTEMS. FINAL REPORT. Contract DA 04 200 ORD 278, SRI Proj. 899, April 1955, 69pp. Ballistic Res. Labs., USA Aberdeen Proving Ground, Md.

A study of the detection problems involved in the reflection Doppler tracking system is reported. It is shown that, under the expected field conditions, detection errors due to noise may be made small compared to errors in field site surveying and errors due to unknown variations in the velocity of radio waves if suitable detection techniques are used. Interfering signals, particularly those due to multipath propagation, are considered to pose a principal problem of detection. It is suggested that selection of the desired signal from interfering signals may best be accomplished by an operator, since the decisions required involve the application of relatively complex information. Two data reduction techniques which utilize the capabilities of the operator in the selection of the desired signal have been proposed. The first is a frequency detection system in which the operator acts as the detector. The frequency vs. time characteristics of an estimate of the signal are adjusted by the operator to approximate those of the received signal in a series of convergent spectrographic presentations. The second technique provides visually supervised phase detection of the desired signal. Its use would normally follow the spectrographic analysis procedure. In this system, the operator is presented with a phase interference pattern of the desired signal with respect to the best estimated signal produced by the spectrographic process. Both of the data reduction techniques can be built around commercially available magnetic tape handling equipment. Laboratory experiments indicate that the visual frequency and phase detection operations proposed can be conducted successfully at signal and noise levels expected in a field installation of the reflection Doppler missile tracking equipment.

R 8

6929

Psychological Research Associates Corp. VISUAL SENSITOMETER. Contract AF30(602) 1236, RADC T.R. 55 41, April 1955, 8pp. Psychological Research Associates Corp., New York, N.Y.

This apparatus is designed to provide an increment luminous test stimulus in the center of a circular field. The latter may be made luminous or dark at the time of presentation of the test stimulus. There is also a visual fixation target which may be set in the horizontal meridian. A white light source is provided and its color and intensity may be controlled by suitable optical filters. The presentation of the large adapting field and the smaller test stimulus is controlled by a mechanical shutter system driven by synchronous electric motors.

6930

Straub, H.E., Gilman, S.F. & Konzo, S. DISTRIBUTION OF AIR WITHIN A ROOM FOR YEAR-ROUND AIR CONDITIONING, PART I. University of Illinois Engng. Exper. Station Bull. 435, July 1956, 52(82), 48pp. (University of Illinois, Urbana, Ill.).

This bulletin is a report of one phase of a research project on air distribution in an experimental room for year-round air conditioning which was conducted under the terms of a cooperative agreement between the Engineering Experiment Station of the University of Illinois and the American Gas Association. Engineering data were obtained for selecting the proper types of supply outlets at floor, baseboard, and sidewall locations only, which would give satisfactory air distribution in residential rooms during all seasons of the year. For this purpose the air temperature and air velocities were measured at 231 stations in the room for each different experimental arrangement. These data together with visual observations of the air motion by means of smoke provided a complete picture of the air distribution within the space. In spite of the fact that studies with almost 100 different experimental arrangements were conducted with the various outlets, only 4 distinct groups of room air patterns were obtained.

R 9

6931

Miller, G.A. HUMAN MEMORY AND THE STORAGE OF INFORMATION. IRE Transactions on Information Theory, IT-2 (3), Sept. 1956, 129-137. (Contract AF 33(038)-14343, AFRC TR 56-54; Contract Nonr-1866(15), Proj. NR 142-201, Rep. PNR-185. Harvard University).

6931

This paper presents an attempted analysis of human memory capacity in terms of communication theory. Rates of transmission of information through the human operator, his capacity as a storage device, and his capacity to process selective information are considered in the light of the problems involved in analyzing human behavior in terms of information theory.

R 14

6932

Brown, P.R., & Siegel, A.I. CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT. I. A REVIEW OF THE PRESENT STATE OF THE ART. Contract N156s-33252, NAMC-ACEL-313, Oct. 1956, 72pp. USN Air Materiel Center, Philadelphia, Penn.

6932

As the first part of a program studying the presentation of warning information to pilots, the results of a survey of current presentation techniques was given. Light indicators in 18 Naval aircraft were examined and comparisons made between indicators used in jet and propeller-driven aircraft. A review of the literature is provided as well as a summary of the present status of auditory warning techniques.

T. I. R 14

6935

Centor, J.P., & Brown, J.S. AN EVALUATION OF THE TRAINER-TESTER AND PUNCHBOARD TUTOR AS ELECTRONICS TROUBLE-SHOOTING TRAINER AIDS. Prepared under Contract Nonr-1257(02), Proj. 20-F-14, Tech. Rep. 1257-2-1, Oct. 1956, 36pp. USN Training Device Center, Port Washington, N.Y. (George Peabody College for Teachers).

6933

To evaluate the effectiveness of certain paper-and-pencil training aids in teaching elementary electronics trouble-shooting, students entering an electronics course were taught by (1) working with actual operational equipment, (2) working with the equipment plus the Trainer Tester, or (3) working with the equipment plus the Punchboard Tutor. The performances of the three groups of trainees were compared in terms of course exams, lab grades, over-all grades for the course, and follow-up data on trainees who went on to advanced schools.

T. I. R 15

6934

Jasper, J.P., & Corbett, R.T. THRESHOLD THRESHOLD AS AN INDEX OF SCENE-RECOGNITION. Rep. 34-36, May 1956, 5pp. USAF School of Airborne Navigation, Randolph AFB, Tex. (Anthology Lab., Northwestern University).

6935

To evaluate temporary threshold shift as an index of noise-induced hearing loss, temporary threshold shift after exposure was measured in 20 rats prior to their placement in an environment of high-level noise. In addition, one individual was made an audiogram, prior to the noise-exposure period, the second, 7 weeks after the termination. Temporary shifts on the pre-exposure exposure test were compared for each animal having data both during and after the noise period.

T. G. R. 1

6936

McKoy, John. DEVELOPMENT OF RECRUITMENT TESTS FOR THE ARMED FORCES QUALIFICATION TEST. PERS 3 AND 4. Proj. 7700, AFMPC 25-54-50, May 1956, 18pp. Personnel Research Lab., AFMPC, AFMPC, Lockland AFB, Tex.

6937

This report describes the development of special scoring keys for the Armed Forces Qualification Test in order to detect and also may be failing the test differently in order to avoid military service. Two keys were constructed, the better one being derived from a comparison of the responses made by subjects known trying to pass the test and able almost instructed to fail the test. Validation and effectiveness figures are given for the keys.

T. G. R. 2

6938

Bursey, S.E. ILLUMINATION CONTROL FOR A DETECTION-INDICATING SYSTEM FOR THE M-45 TRACKING CAMERA MOUNT. NORS 1679, NAVORS Rep. 3086, July 1956, 23pp. Naval Ordnance Test Station, China Lake, Calif.

6939

This report describes the design and development of an illumination control for a detection-indicating and recording system for the M-45 tracking camera mount. Difficulties which had to be overcome in the design of this control unit are discussed. Performance requirements of the system are also presented.

G. L.

6940

Adams, E.W., & Fagot, R.P. A MODEL OF RESELECTION DECISIONS. Prepared under Contract Nonr-225(17), Proj. 78 171-034, Tech. Rpt. 4, Aug. 1956, 65pp. Applied Mathematics and Statistics Lab., Stanford University.

6941

This paper presents a model for the explanation and prediction of individual decision making in situations of multiple choice, involving just two components. The model provides a method of measuring "subjective value" or "utility" which under some conditions leads to an ordered metric scale, and which still more restrictive conditions to an interval scale. Two possible extensions of the theory of decision making to wider classes of decision situations are considered. Finally, brief consideration is given to the problem of treatment of data.

6942

Stone, W.P. ALPHA-NUMERIC CHARACTER READER. MDC-78-56-194, June 1956, 13pp. Rome Air Development Center, AFMPC, Griffiss AFB, Rome, N.Y.

6943

This technical note describes a device, called the "Alpha-Numeric Character Reader," which rapidly converts hand- or machine-printed alpha-numeric characters into the standard tele-type code. With this aid for intelligence data processing, only thirteen bits of information are extracted from the latent information in a printed character, and despite slight recognition interpretation errors, virtually full content can be extracted economically.

I.

6944

Moore, T., & McNeill, W.A. THE ROLE OF LANGUAGE IN REMINISCENCE. Prepared under Contract Nonr-46116, Tech. Rep. 17, July 1956, 6pp. University of Minnesota.

6945

This report is part of a large series of studies of verbal behavior. Using the technique of systematic association, the verbal responses given by 63 subjects to 50 stimulus words from the Test-Retest word association test were analyzed with respect to their frequency characteristics. The hypothesis being that an individual tends to respond in systematic association with the same word response that comprises the kinship of cultural frequencies obtained from previously gathered data.

T. R. 3

6946

Cooming, L.J., Jr. ELEMENTS IN AIRCRAFT SCHEDULING SCHEDULING. Res. Rep., Jan. 1956, 48pp. Graduate School, Syracuse University.

6947

The purpose of this report is to bring together some of the factors that combine to make aircraft maintenance scheduling effective. Periodicals served as the major source of material for the report and the discussion is organized under the following headings: organization and operation of the scheduling function, methods and tools for maintenance scheduling, methods of evaluating effectiveness, and, in an appendix, a general plan for the planning and scheduling of aircraft maintenance.

T. R. 3

6948

Wissinger, R.L., & James, T.M. A TECHNIQUE FOR DISPLAYING TASK ANALYSIS INFORMATION. Contract AF 25(520)-175, Proj. 7800, Rep. 56-11, March 1956, 5pp. AFMPC, Air Force Special Weapons Center, Griffiss AFB, N.Y.

6949

This report illustrates a new technique for displaying a large quantity of task analysis information in a limited space and in a manner such that job requirements may be examined in full or separately by type of requirement. A portion of an analysis of high speed interceptor mission is included as an example of the technique. Processes involved producing the display are discussed and described.

I.

6950

Elkins, A. PERSONNEL REPLACEMENT AND TRAINING RESEARCH DEVICES. Prepared under Contract Nonr-1413(00), Proj. A, Rep. 8, July 1956, 66pp. Courtesy and Co., Philadelphia, Penn.

6951

This study was designed to determine the extent of replacement and the personnel situation aboard destroyers in order to make suggestions for handling these situations more efficiently. Present orientation techniques and training approaches are analyzed and recommendations for improvement are made, even to the extent of evaluating training manuals.

T. I.

6952

Elkins, J.I. CHARACTERISTICS OF SIMPLE MANUAL CONTROL SYSTEMS. Contract AF 19(122)-458, Tech. Rep. 111, April 1956, 145pp. Lincoln Lab., Massachusetts Institute of Technology.

6953

This report presents a method for measuring and describing the characteristics of manual control systems. The method is applied in an experimental study of the characteristics of simple manual systems. The experimental results are discussed and analytic models are derived that approximate the measured characteristics. An analogue computer developed to present the measurement of the system characteristics is described.

T. G. I. R 37

6344
Barr, N.L., & Macken, F.C. INVESTIGATION AND IMPROVEMENT OF SYSTEMS FOR SIMULATING INSTRUMENT CONDITIONS IN AVIATION INSTRUMENT FLIGHT TRAINING (INSTRUMENT FLIGHT TRAINING). Proj. No. 001 054.07.04, Jan. 1956, 154pp. Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md.

6345
This report is concerned with an evaluation of available methods for simulating instrument flight, with special reference to optical and operational requirements and the report of two improved methods. Current devices were evaluated according to criteria derived from the opinions of instructors and pilots, as well as by operational and laboratory tests.
T. C. 1.

6349
Gill, R.C. THE ATTENTION OF HUMAN BEINGS IN THE IRON AND STEEL INDUSTRY. Part II. PHYSICAL CONDITIONS OF WORK. Dec. 1955, Jan.-Feb. 1956, 24pp. Plant Engineering Division, The British Iron & Steel Research Association, London, England.

6350
This report is the second of two reports which show how ergonomics has been and can be applied to benefit the steel industry. It deals with the improvement of physical conditions in which operators have to work. Examples of available information, of the actual conditions prevailing, and of recommendations are given under five headings: a) seating, b) lighting, c) ventilation from dust, d) access to control panels, and e) heavy manual work. Details of the arrangements developed by the British Iron and Steel Research Association are given. Further work in basic design of cab structures and effects on work output of various types is needed.
T. I. R 9

6352
Berkefire, J.R., & Lyon, T.W. PERFORMANCE IN NAVAL AIR TRAINING AS A PREDICTOR OF SUCCESS IN THE FLEET. PRELIMINARY REPORT: FOLLOW-UP STUDY OF GRADUATES SENT TO COMBAT. Special Rep. 56-14, April 1956, 11pp. USN School of Aviation Medicine, Pensacola, Fla.

6353
This report covers the first half of a follow-up study of graduates of naval air flight training to determine the degree of performance in training as a predictor of success in the fleet. Grades for various stages of training are related to the later success or failure of the (pilot) leading to recommendations for speed-training system standards of performance for certain critical phases of training.
C.

6353
Scharf, C. A TRANSLATION OF ERGONOMICS - A NEGLECTED PRODUCTION FACTOR. RE/5/10/55, March 1956, 11pp. Plant Engineering and Energy Division, The British Iron & Steel Research Association, London, England.

6353
A general survey is given of the importance of a detailed study of the workers positions and movements in the design of machines. Suggestions are made relative ways in which the construction engineer, the manufacturers and work-repair personnel, and the workers should be educated about this important production factor.
1.

6354
Anon. TEST OF THE STANDARD AND MODIFIED M5A1 COMBAT AND ES1R15 AND ES1R17 NONCOMBAT PROTECTIVE GAS MASKS. DPCR 168, Industrial Funding Proj. Order 6015, Jan. 1956, 35pp. Dugway Proving Ground, Utah.

6354
To compare the E 51R15 and E 51R17 non-combat protective gas masks with the standard and two modified models of the M 5A1 combat mask, each of the five masks were tested by 20 men while performing field training activities and the M 5A1 mask was worn by 18 men during 20 minute trials doing calisthenics and digging fox-holes. The masks were compared for suitability and ease of wearing under desert conditions and for need of modification in design.
T. I.

6356
Taylor, D.W. RESEARCH ON PROGRAM DESIGNING AND COGNITIVE TRAINING. Prepared under Contract N600-11115, Proj. No. 150-149, Final Rep., Jan. 1956, 6pp. Stanford University.

6355
This is a final report on research originally intended to investigate factors relating to creativity and productivity in research activities. In the second year, the scope was changed to include experimental studies of problem solving. A list of reports describing the research completed is appended, as well as a statement of research to be completed and a list of reports to be published.
E. 7

6356
Taylor, D.W. STUDIES OF PROGRAM DESIGNING. Prepared under Contract N600-11115, Proj. No. 150-149, Final Rep., Jan. 1956, 6pp. Stanford University.

6355
This report describes briefly a series of experimental studies concerned with problem-solving performed to cause possible more effective training of individuals in such processes. A list of the articles describing the research is appended, as well as an analysis of reports yet to be published.
E. 15

6357
Scharf, C. THE DESIGN OF A 100-TON LOOSE CRANE. RE/5/10/55, Jan.-Feb. 1956, 24pp. Plant Engineering Division, The British Iron & Steel Research Association, London, England.

6357
This report describes how the interior of the cab of a crane was laid out and discusses the human engineering factors underlying the particular layout. The aim was to provide a cab which could be used with ease and comfort by a variety of operators, and operated at the maximum of their capabilities. Factors considered are seating, controllers layout, positioning, location of controls, lighting, and visibility.
T. R 5

6358
Martocci, C.T., & Nelson, W.E. INSTRUCTOR PREDICTION OF STUDENT AIRCRAFT ACCIDENTS IN NAVAL AIR FLIGHT TRAINING: A NEGATIVE FINDING. Special Rep. 56-11, April 1956, 3pp. USN School of Aviation Medicine, Pensacola, Fla.

6356
To determine whether flight instructors can predict in the pre-solo stage which students will subsequently have aircraft accidents, predictions were obtained for 762 Naval air students. Comparisons were then made between the instructor prediction and the subsequent accident behavior of the students during basic air training.
T. R 2

6359
Richards, C.C. MOBILE MACHINERY CONTROLS. APPLICATION OF ERGONOMIC PRINCIPLES IN DESIGN. Iron & Steel, Dec. 1956, 20, 574-576.

6359
The use of ergonomic (human engineering) principles in the design of mobile plant and machinery is discussed with specific reference to electric overhead travelling crane controls as designed by the British Iron and Steel Research Association. Seating, fitting machine to operator (type of controls and arrangement), realistic control movement, control identification, and visibility are discussed.
T. R 7

6940
G'Connor, W.F., & Blair, J.T. ANXIETY AND
FLYING: II. MAJOR SOURCES OF ANXIETY AMONG
FIVE-SEVEN STUDENTS. Special Rep. 56-7, Feb.
1956, 13pp. The School of Aviation Medicine,
Pensacola, Fla.

6941
This is the second report of a study designed to assess the nature and extent of anxiety expressed by the normal pilot candidate in the early stages of flight training. Group interviews were conducted with 55 normal aviation cadets before (to assess expectations) and after their seventh instructional flight. After the second interview, the subjects were given a sentence-completion test designed to elicit their reactions to flight. The different content analyses were performed on the responses to the test, as well as analysis of the interview material.
T. R. 2

6942
The British Iron & Steel Research Association. DESIGN OF STEEL AND ALUMINUM. 1956 Summary 98, Jan. 1956, 3pp. The British Iron & Steel Research Association, London, England.

6943
A summary of recommendations for the design and use of dials and instruments is presented. The recommendations are based on previously published experimental research.
L. R. 2

6944
Knight, J. ACCURACY IN STOPPING A MOVING SECTION AS A FUNCTION OF THE SPEED OF THE SECTION. RESEARCH, Jan./Feb. 1956, 15pp. Flight Engineering Division, The British Iron & Steel Research Association, London, England.

6945
A frequent criticism leveled out by men engaged in controlling the movement and processing of steel ingots and sections is to stop the steel at some point. This experiment investigated the accuracy with which a section was stopped as a function of its speed and of the degree of visibility of the section. A laboratory situation was set up based on the real situation in which the steel comes toward the operator. The subject, on a raised platform, viewed a moving section and attempted to stop it at an exact mark. Six speeds from 0.38 to 2.33 feet per second and two situations (screen or bridge to provide different degrees of visibility of section) were used. Error data were analyzed.
T. R. 1

6946
Gorb, D., & Johns, R.J. EFFECTS OF ACETYLCHOLINE (ACh) AND CHOLINE ON KENOSYNTOMAL TRANSMISSION IN JOURNAL STRENGTHS. Contract DA 18-108-CML-5611, Proj. 4-59-12-007, CML Rep. 2002, March 1956, 8pp. Army Chemical Center, Md. (Johns Hopkins University).

6947
This report describes the probable function of acetylcholine (ACh) in nerve impulse transmission and its effects if present in excessive amounts at motor end plates. Also described are the vascular, stimulating, "prompt" depressant, and "late" depressant effects of ACh, the dose-effect relationship, and how neuromuscular transmission is effected if ACh is used either before or after other drugs. Similar information is given for choline itself.

6948
USA Quartermaster Food & Container Institute for the Armed Forces. IMPROVEMENT OF THE marginally ACCEPTABLE CANNED MEAT ITEMS. TERMINATION REPORT. Proj. 7 R 4 06 031, Jan. 1956, 6pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

6949
This paper reports investigations conducted to study the improvements which could be applied to canned meat rations. Formula modification, reduction in the heat process used, and partial dehydration of the meat prior to canning were tried with varying success. The results with specific products are itemized.

6945
Hesse, W., Fies, D., Lieberman, B., & Dehols, J. RESEARCH ACTIVITIES DURING 1955. Prepared under Contract Nour-432(04), Annual Tech. Rep., Jan. 1956, 13pp. Boston University.

6946
This is an annual report on work done for the Office of Naval Research by the Division of Research at Boston University. The current status of various research studies is given with brief summaries of five studies also included. The focus of the research for the year was in the general area of opinion-attitude change, with emphasis on motivational factors as effective independent variables.
R. 12

6947
Yalab, R.T., & Janssen, H.L. COMMUNICATION NETWORKS. I. OPTIMAL DESIGN AND UTILIZATION. RM-1557, April 1956, 21pp. Rand Corp., Santa Monica, Calif.

6948
This is the first of a series of research reports dealing with communication networks. In this paper it is shown that several fundamental optimal routing and design problems for communication networks may be treated in a straightforward, computationally feasible manner by linear programming methods. Various aspects of implementation and generalizations are discussed.
R. 12

6949
Keely, E.L. THE SPELLING ALPHABET. Proj. CWT-54-45-07, Canadian Flight, the Pilot's Magazine, Feb. 1956, 3pp. (Defence Research National Labs., Toronto, Ontario, Canada).

6950
This article describes spelling alphabets, an integral part of voice-communication in systems such as air traffic control. The alphabets are used to provide a more efficient method of transmitting letter information (e.g., C - Charlie). The International Civil Aviation Organization Alphabet (ICAO) is described in detail.
T. R.

6951
Bryson, G.L. ELECTRONICS TROUBLE SHOOTING: A SYSTEMATIC ANALYSIS. Prepared under Contract Nour-228(02), Proj. NR 153-095, Tech. Rep. 13, March 1956, 260pp. University of Southern California.

6952
In this lengthy report step-by-step protocol from four data sources are examined with the objective of developing a framework for behavioral analyses of electronics trouble-shooting. In an attempt to integrate various facets of such performances, qualitative segments are identified in each protocol, and reference is made to their frequency, position, consistency, and behavioral consequences. Separate treatment is given to redundancy, errors, time, and action rate. The generalizability of the results is stressed throughout.
T. G. I. R. 9

6970
Shepherd, R.J. CHANGES OF PHYSIOLOGY AND PSYCHOMOTOR PERFORMANCE DURING ACUTE HYPOXIA: SOME OBSERVATIONS WITH THE NULL-BALANCE DISCONTINUOUS PURSUIT METER. FFRS 963, March 1956, 16pp. RAF Institute of Aviation Medicine, Farnborough, Hants, England.

6970
Changes of physiology and psychomotor performance were studied during the acute exposure of ten normal subjects to an altitude of 20,000 feet for ten minutes. Arterial oxygen saturation, pulse rate, and respiratory minute volume were checked, and psychomotor performance was measured by the null-balance electrical pursuit meter. The response to hypoxia was evaluated in terms of general changes and inter-subject differences.
T. G. R. 39

6971
Dewick, M. A STUDY OF CONDITIONS AFFECTING COOPERATION. Prepared under Contract Number 2854101, Tech. Rep. 4, Feb. 1956, 26pp. Research Center for Human Relations, New York University.

6972
This paper reports part of a program of research on the conditions affecting cooperation. One of the studies included investigated the effects of motivational orientation, psychological similarity, and opportunity to communicate upon the development of mutual trust. Another reports on the influence of some types of power relationships on the development of trust, while the last two studies have to do with (1) the establishment of trust between two people via their relations with a third person, and (2) personality structure and interpersonal trust.

T. G.

6973
Shuman, A.L., Radin, A.O., & Gmelin, W.C. A STUDY OF "THROW RIDE" CHARACTERISTICS OF CHAIRMAN CHAIRMAN VS. SUSPENSION TYPE SEATS IN MILITARY VEHICLES. Contract DA 11-022-ORD-1999, ORD Proj. 171-496, DA Proj. 57701001, Final Rep., March 1956, 60pp. Boeing Aircraft and Aberdeen Proving Ground, Aberdeen, Md. (Boeing Air Corp., Milwaukee, Wis.).

6974
To study the environmental factor of vibration as related to truck drivers, the 3-8 cycles per second acceleration and/or jerk component was measured (electronically) on the driver and on the truck cab in three directions: vertical, longitudinal, and transverse. Various terrains and speeds were used with two types of seats: standard and suspension. The effect of laboratory vibration studies on man in both types of seats was studied. The accelerations and frequencies were compared for field and laboratory studies and related to accepted tolerance levels reported in other studies. The efficiency of the two seats in reducing vibration was compared. Some theories are presented on man's expenditure of energy in attempts to reduce vibrations.

T. L. G. R 25

6975
Quartermaster Food & Container Institute for the Armed Forces. ACCEPTABILITY OF IMITATION BLACK PEPPER. Proj. 7-34-15-007, Termination Rep., May 1956, 25pp. Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.

6976
The acceptability of an apparently superior imitation black pepper was investigated in a field test at a large army post. Ten 6 ounce 10 ounce balls used the imitation pepper while 10 comparable new balls used natural pepper. The products were intentionally mislabeled for half of each group. Preference for 30 foods before and after the period was measured by a general food preference questionnaire administered to random samples of the men who regularly ate in the participating mess halls.

T. R 3

6977
Thislethwaite, D.L., Kamenetzky, J., & Schmidt, H. FACTORS INFLUENCING ATTITUDE CHANGE THROUGH REPUTATIVE COMMUNICATIONS. Speech Monographs, March 1956, 23(1), 14-25. (Contract AF 33(033)-25726, Proj. 7705, AFTRC TX-56-54, June 1956. AFTRC, ARDC, Lackland AFB, Tex.).

6978
This paper is concerned with the most effective methods of presenting persuasive communications. In the first of two studies, explicitly refutative versus implicitly refutative communications were studied as well as one-sided versus two-sided communications. In the second, climax versus anti-climax order of presentation of explicit refutations were the concern - and the use of second-person versus third-person grammar in describing the source of the counterarguments refuted. Audience affective reactions to tape recorded speeches were measured and checked against opinion questionnaires.

T.

6979
Kasell, Dorothy M. RELATIONSHIPS BETWEEN ATTITUDES OF SQUAD CREWS IN TRAINING AND THEIR ATTITUDES AND PERFORMANCE IN COMBAT. Proj. 7713, AFTRC TX-56-48, April 1956, 44pp. Crew Research Lab., AFTRC, ARDC, Randolph AFB, Tex.

6980
Attitudes of members of 12 B-29 crews in training were compared with those they expressed later in the 1953 combat situation. The attitudes were assessed as predictors of the crews' combat performance ratings. Both attitude surveys were factor analyzed to find common factors suitable for prediction purposes. In addition, the item composition of the attitude scales was studied.

T. R 5

6981
Sorgatta, L.P. AWARENESS OF SOCIAL INTERACTION: ACTUAL, ROLE PLAYING, AND PROJECTIVE. J. Abnorm. Soc. Psychol., Nov. 1956, 51(3), 354-358. (Contract AF 33(033)-17726, Proj. 7730, Res. Rep. AFTRC TX-56-50, April 1956. AFTRC, ARDC, Lackland AFB, Tex. Russell Sage Foundation).

6982
This research concerns the relation of verbal statements about an action to the actual behavior. Data were collected for 125 enlisted men who participated as three-man teams in three situations (role playing, projective test requiring writing of a conversation, and actual behavior). Responses in these situations, scored in Baltes' 12 behavioral categories, were correlated with scores for military adjustment and popularity, and performance on the test of Primary Mental Abilities. Factor analysis was performed with the data and the results are discussed in relation to the problem of predicting social interaction of team members.

T. L. R 13

6983
Eby, T.B. SOCIOMETRIC INDEX MEASURES AS PREDICTORS OF MEDIUM-BOOMER CREW PERFORMANCE. Proj. 7713, AFTRC TX-56-48, April 1956, 12pp. Crew Research Lab., AFTRC, ARDC, Randolph AFB, Tex.

6984
To evaluate sociometric index measures as predictors of medium-boomer crew performance, conventional self-report data from 30 B-29 crews in training were analyzed from three standpoints (the inferred role behavior of the raters, the inferred attitudes of the raters, and interactions expected to occur between raters and rateres). Indices were developed from these approaches and correlated with each other and with performance measures and instructor ratings. The results with the technique are compared with results from conventional sociometric measures.

T. R 6

6985
French, E.G. DEVELOPMENT OF A MEASURE OF COMPLEX MOTIVATION. Proj. 7704, AFTRC TX-56-48, April 1956, 10pp. Personnel Research Lab., AFTRC, ARDC, Lackland AFB, Tex.

6986
This paper describes the development of an independent measure of complex motivations for use in studies of the role of such motivations in systems operations. A projective test, constructed to measure achievement and affiliation motivation, was given to pre-flight cadets as a Test of Insight. A reliable scoring system was developed and validity testing initiated by correlating test scores with observer ratings, goal attainment, and questionnaire responses.

T. R 13

6979

Getzels, J.W., & Gaba, E.G. ROCK CONFLICT AND INSTRUCTOR EFFECTIVENESS AT THE AIR COMMAND AND STAFF SCHOOL. Contract AF 15(600)-5, Proj. 7750, AFMTC IX-56-41, Feb. 1956, 57pp. Cy-ficer Education Research Lab., AFMTC, AFMTC, Maxwell AFB, Ala.

6977

To study the effect of role conflict on effectiveness as an instructor in a service school, instructors were given an inventory in which each item described a conflict situation. In answering each question they were to give an objective appraisal of how widespread each situation was in the school; in a second version they were to say how deeply they were disturbed by each conflict situation. The results were analyzed in relation to personal history questionnaires and ratings, by the other instructors, of their teaching effectiveness.

T. I. R 5

6980

Baldwin, A.W. A DIAL DISPLAY INCORPORATING A DATA REFERENCE CURVE AND A DISCRETE GO-NO-GO SWITCH INDICATOR. Report NO G10-520, Rep. 4387, Aug. 1957, 3pp. Engineering Psychology Branch, Naval Research Lab., Washington, D.C.

6978

In order to avoid the common tendency to regard the use of information as a reaction, an experiment in decision making was conducted. A subject was presented with a signal reference curve. The operator is furnished with a computer "read-to-read" information display in which the operator checks in the form of a "go-no-go" error indicator.

T. I. R 5

6982

Ferguson, L.D., Bertman, A.B., Ransome, A.J., & Christensen, Margaret L. MEASUREMENTS, VARIABILITY AND RELIABILITY OF REGIONAL SWEATING RATES IN HUMANS AT CONSTANT AMBIENT TEMPERATURES. Contract AF 15(600)-96, Proj. 7155, WADC TR-56-39, Feb. 1956, 47pp. Aero Medical Lab., WADC, AFMTC, Wright-Patterson AFB, Ohio.

6982

This paper describes observations of sweating rate by the desalinating capsule technique on ten regions of the body surface of six male male subjects. The subjects were exposed to accurately controlled climates of 90, 100, 110, and 115 degrees constant dry bulb temperatures with one constant vapor pressure. The magnitudes, variability, and reliability of regional sweating rates are described. The implications of the results for future testing and for the design and use of ventilated clothing are discussed.

T. G. I. R 6

6983

Taylor, A.A., & Finkelstein, Beatrice. AN OPERATIONAL EVALUATION OF PRECOOKED FROZEN MEALS. Proj. 7156, WADC TR-56-12, April 1956, 28pp. Wright Air Development Center, AFMTC, Wright-Patterson AFB, Ohio.

6983

This report contains the results of a field evaluation of pre-cooked frozen meals. Questionnaires were answered by aircrew personnel and others at seven air bases. The acceptability of the various menus was measured and certain suggestions for the improvement of pre-cooked frozen meals are made.

T. I.

6984

Berry, J.R., Fallowers, S.C., & Sells, S.B. ADAPTABILITY SCREENING OF FLYING PERSONNEL: RESEARCH ON THE HARKINS REPORTING TEST. Rep. 56-5, March 1956, 7pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

6984

This paper describes an attempt to develop a means of screening flying personnel with respect to adaptability. The Harkins Reporting Test, a 315-item, paper and pencil test requiring simple perceptual-motor responses under non-stressful and speed-stress conditions, was administered to 428 co-pilot: entering B-29 combat crew training. The test was evaluated in terms of criteria provided by various measures of adjustment in subsequent training.

T. I. R 9

6985

Montgomery, A.L. & Birzis, Lucy. MEASURES OF THE EFFECT OF HYPERICIN ON THE EFFECT OF HYPERICIN ON SLEEPING. Proj. 8-7321, Rep. 5, April 1956, 9pp. Aviation Medical Lab., Alameda Air Command, Ladd AFB, Alaska. (University of California at Los Angeles).

6985

To study the effects of hypericic acid on sleeping, 20 rats were anesthetized so that sleeping was either absent or vigorous and then subjected to hypericic acid. The percentage of oxygen in the labeled anesthetic was progressively decreased over a one to three hour period. The effects on sleeping were observed over this period.

G. R. 17

6986

Harris, J.D., Kaines, E.L., & Myers, C.E. A NEW FORMULA FOR USING THE ADDITION TO PREDICT HEARING LOSS FOR SPEECH. Proj. 7155, WADC TR-56-37, Rep. 273, Feb. 1956, 28pp. AFMTC, AFMTC, Wright-Patterson AFB, Ohio.

6986

To provide a means of assessing the effects of high intensity engine noise on human hearing, a new formula was developed for using the audiogram to predict hearing loss for speech. A series of 197 partially-defective ears was used to compare several systems; the best predictor, a system based on the Multiple Regression Equation and an average of hearing losses at frequencies of 500, 1000, and 2000 cycles per second, is described in detail.

T. G. R 15

6987

White, H., & Christie, L.S. QUEENING WITH PRESUMPTIVE PRIORITY IN WITH BREAKING. 50pp. Operations Research Office, 7100 Connecticut Avenue, Chevy Chase, Md.

6987

This article defines presumptive priority queuing and contrasts it with head-of-the-line priority queuing. Presumptive priority queuing is defined as a Markov process and the effect of various multiple entry disciplines on effective service rates is specified. State probabilities for two presumptive and other types of priority are discussed. Queuing with breakdown and rejection situations is discussed in terms of the similarities to queuing with presumptive priority.

B 5

6988

Jones, R., & Taylor, C.L. METABOLIC EFFECTS OF WORK AND HEAT IN A SIMULATED PILOT'S TASK. Contract AF 33(616)-32, Proj. 7155, WADC TR-56-2, April 1956, 30pp. Aero Medical Lab., WADC, AFMTC, Wright-Patterson AFB, Ohio. (University of California at Los Angeles).

6988

The metabolic effects of heat and work were studied by having two subjects perform stick and rudder control movements on a flight simulator in a comfort environment, 60 degrees Fahrenheit, and in a hot environment, 160 degrees Fahrenheit. Energy expenditure in terms of the temperature coefficient of metabolism was measured for rest and work under the two conditions. An extensive compilation from the literature of aircrew metabolic rates is given in the appendix, covering fighter and bomber craft in combat and non-combat conditions.

T. G. I. R 19

6989

Nagel, M.W. ILLUMINATION, CONTRAST, SPECTRUM, AND COLOR CONDITIONS IN AN "AVERAGE" OUTDOOR SCENE AS FUNCTIONS OF GROUND REFLECTANCE, OBJECT ORIENTATION, AND VIEWING DIRECTION. Proj. 6472, Tech. Rep. 56 H, Aug. 1955, 43pp. Serial Reconnaissance Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio.

In the report, an attempt is made to define the concept of an "average" outdoor scene for application to the development of photographic equipment and material. It consists primarily of a white sphere on a neutral gray or white ground under a clear sky at a sun altitude of 40 degrees. The distribution of illumination, reflection spectra, and color on the surface of such an object is investigated. The contrast (or exposure range) and the spectral uniformity of the illumination on the object are determined as a function of both the ground reflectance and the direction from which the object is photographed or viewed. R. 13

6990

Wicks, E.W. THE EFFECTS OF SIMULTANEOUS DECELERATION, TUMBLING AND WINDBLAST ENCOUNTERED IN ESCAPE FROM SUPERSONIC AIRCRAFT. Proj. 7218-71726, WADC TN-54-12, March 1956, 147pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

6991

To investigate the effects of simultaneous deceleration, tumbling, and windblast encountered in escape from supersonic aircraft, two chimpanzees were ejected by ejection seats from a rocket travelling at Mach 1.1 and 1.5, both at 21,500 feet altitude. Information from three accelerometers, three rate gyros, and two electric monitors, as well as heart and respiration rates was recorded on magnetic tape during the ejection. Cures were mounted on the seat to photograph the effects of windblast. Film and tapes were recovered in usable form from the wreckage and results are analyzed in this paper. T. G. I. R 9

6992

Euradio, A., Velasquez, T., Reynafarje, C., Lissano, R., Chavez, R., Salazar, E.A., Reynafarje, B., Sanchez, C., & Mancy, J. MECHANISMS OF NATURAL ACCLIMATIZATION: STUDIES ON THE LATE PRESENT OF MEXICO, PERU, AT AN ALTITUDE OF 14,900 FEET. Rep. 56-1, March 1956, 62pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

6993

Investigation was made of the physiological characteristics, at rest and during physical activity, of the Indian native resident of Maricao, Peru, a mining town located in the Andean region at an altitude of 14,900 feet with an average barometric pressure of 116 millimeters of mercury (see Rep.). Comparative observations were carried out on healthy men living in Lima, which is at sea level. The study sought information on adaptive mechanisms in the respiratory, hematic, and circulatory functions. T. G. I. R 64

6992

Drum, L.B. HUMAN ENGINEERING RECOMMENDATIONS FOR THE DESIGN OF A TIMING DEVICE. Ordnance Proj. T51-1000, DA Proj. 535-20-001, Tech. Rep. 2339, Aug. 1956, 15pp. Picatinny Arsenal, Dover, N.J.

6992

The human engineering aspects of a timing device to cover the range of .1 to 100 seconds accurately by intervals of .1 second were studied. Detailed recommendations are presented concerning the design of dial markings, pointer, adjusting knobs, and control-display relationships. The design of counter markings is also dealt with in detail. T. I. R 6

6993

Pippitt, R.G. RATION, SPECIAL SURVIVAL, RS-1, FIELD TEST OF COMPONENT ACCEPTABILITY. Proj. 7156, WADC TN-56-216, April 1956, 14pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

6993

This paper reports the results of a field test conducted to determine the acceptability of the various components of a special survival ration (RS-1). Questionnaires were completed by 1063 Air Force subjects who were issued survival rations for use during nine day periods of simulated survival conditions. T. I.

6994

Wilson, M.E., & Harrod, D.C. DEVELOPMENT OF MECHANICAL BREATHER FOR EVALUATION OF RESPIRATORY EQUIPMENT. Interim Rep. 124, May 1956, 13pp. Biological Warfare Lab., Chemical Corps Research and Development Command, Fort Detrick, Md.

6994

This report describes the development of a mechanical breather for evaluation of respiratory equipment. The device is a cam-driven, piston-cylinder type which simulates breathing of human subjects in sedentary position and working at rates varying from light to moderately heavy (20, 45, 62, and 83 kilograms-meters per minute). G. I. R 6

6995

Johnson, C.E. AN ANALYSIS OF THE CONTENT OF LOW ALTITUDE HIGH SPEED PILOTAGE CHARTS. Contract AF 33(616)-2378, Proj. 555, Tech. Paper 202, June 1956, 34pp. Mapping and Charting Research Lab., Ohio State University Research Foundation.

6995

In an attempt to determine what should be the content of charts for low altitude high speed pilotage, ground features are discussed from the standpoint of their frequency, availability, time available for recognition, and their positions in relation to different types of flight paths. The problem of obstacles and their avoidance is considered. Various types of physical and cultural terrain features suitable for guidance are described in relation to their local environment. Finally, some general conclusions regarding pilotage charts are given. I.

6996

See Clair, R.S. EVALUATION OF FLIGHT ATTITUDE INDICATOR MODEL NO. 1055 - SWAGERS GYROSCOPE COMPANY DOUGLAS SPEC. NO. 7545077. Contract 54-521, Rep. 26322, June 1956, 20pp. El Segundo Div., Douglas Aircraft Co., Inc., Santa Monica, Calif.

6996

To study the operational suitability of a moving aircraft symbol attitude indicator, ten Navy pilots flew a SNJ-5 airplane in which the new type of flight attitude indicator was installed. Flights were for two hours and consisted of time turns, slow rolls, barrel rolls, loops, spins, and recoveries from unusual attitudes. The pilots were interviewed immediately following their flights and the interviews analyzed for acceptability of the device and suggested design changes. I.

6997

Niblat, H.B. A SIMPLIFIED AUTOMATIC DATA PLOTTER. Contract WOrd 7386, Bumlebees Rep. 253, May 1956, 23pp. Applied Physics Lab., Johns Hopkins University.

6997

This report describes the simplified Automatic Data Plotter, its performance characteristics, and its uses primarily for the recording of telemetering data. The device, which automatically plots function versus real time, eliminates the need for reading and replottng manually. T. G. I.

6998

Russell, T.S. STATISTICAL ANALYSIS OF MILITARY RISKS RESULTING FROM EXTREME ENVIRONMENTAL CONDITIONS: EXAMINATION OF INDIVIDUAL VARIATION IN AN UNREPLICATED TWO-WAY CLASSIFICATION. Contract DA 44-109-ga-1468, Proj. 7-93-05-003, Rep. 9, June 1956, 108pp. Dept. of Statistics and Statistical Lab., Virginia Polytechnic Institute.

6999

As part of a program to develop statistical techniques for the analysis of military risks resulting from extreme environmental conditions, this paper reports on estimates which were derived for estimating the individual error variances in a non-replicated two-way classification of the type involved in experiments in which individuals give subjective scores (e.g., judging ease of operation of equipment under certain adverse conditions). Certain tests of significance are proposed for testing the homogeneity of variances.
T. R 6

6999

Ash, W.C., & Nulton, P.D. STATISTICAL ANALYSIS OF MILITARY RISKS RESULTING FROM EXTREME ENVIRONMENTAL CONDITIONS: I. AN EXAMINATION OF A STATISTICAL ANALYSIS WITH RESPECT TO EVALUATION. II. DISTRIBUTIONS RELATED TO COGNITIVE TOTALS IN SOCIOLOGICAL RESEARCH. Contract DA44-109-ga-1468, Proj. 7-93-05-003, Rep. 10, June 1956, 84pp. Dept. of Statistics and Statistical Lab., Virginia Polytechnic Institute.

6999

This report consists of two sections, the first being an analysis of the statistical design used in testing summer-weight uniforms. The second section presents original mathematical advancements in the field of sociology. These are applicable wherever sociometric techniques may be used, but for the purposes of the environmental program concerned here, the techniques are suggested as useful for the selection of judges and crews to operate in extremely cold environments.
T. R 29

7001

Miles, J.B. & Spain, C.R. AUDIO-VISUAL AIDS IN THE ARMED SERVICES. 1947, 97pp. American Council for Education, Washington, D.C.

7001

This is a text concerning the utilization of training aids by the armed services. A discussion of training needs in the military setting is presented as an introduction to an extensive description of the types of training aids used in various training programs. The aids are discussed in terms of their production, utilization, and effectiveness.
I. R many

7002

Hoban, C.F., Jr. MOVIES THAT TEACH. 1947. Dryden Press, New York, N.Y.

7002

This is a text concerning the effective utilization of training films. It deals with such aspects as techniques of film production, the training techniques and goals reflected in particular films, distribution and film library services, and the conditions most appropriate for effective utilization of films. Also included are reviews of research studies on effectiveness and extent of film utilization.
T. G.

7004

Ellis, E. AUDIO-VISUAL METHODS IN TEACHING. 1954, 534pp. Dryden Press, New York, N.Y.

7004

This text presents an extensive treatment of audio visual instruction. There are three major sections: 1) theory of audio-visual instruction (e.g., the role of communication, the evaluation of audio-visual methods, etc.); 2) materials for audio-visual instruction (e.g., models, mockups, television, films, etc.); and 3) the applications of audio-visual methods (e.g., to human relations, health, safety, etc.).
I. R many

7005

Dean, R.C. THE AUDIO-VISUAL HANDBOOK. 1942, 211pp. Society for Visual Education, Chicago, Ill.

7005

This is a handbook on audio-visual aids which presents a discussion of the general value of audio-visual instruction and a detailed description of particular types of aids (e.g., maps, sand tables, slides, films, etc.). Recommendations are offered concerning the utilization of the particular aids. Also included is a section on sources of information, materials, and equipment pertinent to audio-visual instruction.
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7006

United Nations Educational, Social & Cultural Organization. VISUAL AIDS IN FUNDAMENTAL EDUCATION: SOME PRACTICAL EXPERIENCES. PHOTOS, FILM, AND RADIO IN THE WORLD TODAY. 1947, 148pp. United Nations Educational, Social & Cultural Organization, Paris, France.

7006

A series of reports is presented concerning the utilization of visual aids in education in several parts of the world: Africa, Asia, Australia, America, and Europe. Films, filmstrips, episcopes, posters, mobile devices, and magazines are only some of the aids discussed. The types of programs described are fundamental education, and staff or technical training. Some statement concerning results of particular programs may be found in the majority of the reports.
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7007

United Nations Educational, Social & Cultural Organization. THE USE OF MOBILE CINEMA AND RADIO WAYS IN FUNDAMENTAL EDUCATION BY FILM CENTRE, LONDON. 1949, 192pp. United Nations Educational, Social & Cultural Organization, Paris, France.

7007

In a report on the utilization of mobile cinema and radio ways in fundamental education, in various parts of the world, such topics are discussed as: the organization of mobile cinema programs, the types of equipment utilized (e.g., projectors, mobile cinema vans, screens, lenses, etc.), the training of crews to operate mobile units, and the current status, techniques and problems of research. Included are photographs and descriptions of particular aids and devices.
I. R many

7008

Simont, G.V. FILM AND EDUCATION. Philosophical Journal. 1948, 597pp.

7008

This is a symposium on the role of the film in education. Some of the topics discussed are as follows: the genesis of the educational film, the psychology of seeing motion pictures, basic techniques and applications of films, the utilization of films beyond the classroom (e.g., in training industrial workers, sales personnel, the armed forces, etc.), the status of educational films in various parts of the world, and some of the problems pertaining to the administration of audio-visual programs.
T. G. I. R many

7009

Hughes, H.G.A. & Read, S. THE FILM AND FUNDAMENTAL EDUCATION. Pamphlet 1, 1950, 20pp. Film Centre, Ltd., London, England.

7009

The authors discuss the utilization of films and filmstrips as aids to fundamental education in terms of the utilization of this medium, the organization of a film program, and factors pertinent to the production of educational films. The problem of understanding through film is also discussed.
R 15

7010

Brinson, P. FILM AND FILMSTRIP PROJECTION IN FUNDAMENTAL EDUCATION. Pamphlet 2, 1950, 21pp. Film Centre, Ltd., London, England.

7010

The author discusses film and filmstrip projection in fundamental education in terms of their design, operation, and maintenance. Also discussed are some aspects of optical aids in general, such as the distinction between episcopic and discopic projection, the deficiencies inherent in the episcopic, and so forth. A specimen log book and a series of logbook charts are presented.

R 10

7011

Brinson, P. CHOICE AND CARE OF FILMS IN FUNDAMENTAL EDUCATION. Pamphlet 3, 1950, 21pp. Film Centre, Ltd., London, England.

7012

In a discussion of the choice and care of films in fundamental education, the author presents specific recommendations concerning maintenance and storage of films, suggestions for the improvement of film distribution programs, and remarks concerning the factors involved in selecting films for particular audiences. He also presents detailed information concerning sources of films in various parts of the world.

R 12

7012

Seser, G. CHOICE AND CARE OF FILMSTRIPS IN FUNDAMENTAL EDUCATION. Pamphlet 4, 1950, 19pp. Film Centre, Ltd., London, England.

7012

The author discusses the factors involved in the choice and care of filmstrips in fundamental education. He describes the various types of filmstrips (i.e., the narrative, instructional, and reference strips), techniques of producing filmstrips, and examples of and suggestions for the utilization of this educational medium. Also included is a guide to sources of filmstrips of potential value in fundamental education.

R 13

7013

Brinson, P. FILM DISCUSSION GROUPS IN FUNDAMENTAL EDUCATION. Pamphlet 5, 1950, 21pp. Film Centre, Ltd., London, England.

7013

The author discusses the role of film discussion groups in fundamental education in terms of the factors involved in the effective utilization of films with such groups. He defines the film discussion group and presents an example of the approach and problems encountered in using films with discussion groups in fundamental education.

R 13

7014

Film Centre, Ltd. A GUIDE TO INTERNATIONAL FILM SOURCES. Pamphlet 6, 1951, 32pp. Film Centre, Ltd., London, England.

7014

This is a guide to the international sources for documentary, educational, and scientific films. The sources within each country are presented in terms of the name and address of the organization and a description of the types of films produced (e.g., instructional, classroom, informational, etc.).

7016

National Education Association. VISUAL AIDS IN SAFETY EDUCATION. Jan. 1940, 32pp. National Education Association, Washington, D.C.

7016

This publication presents a list of films dealing with street and highway safety, driver training, fire aid, fire prevention, and general safety. In addition lists of sound-slide films, filmstrips, and lantern slides are presented. Also included is a list of distributors of safety films, slides, and posters. Each film is reviewed with regard to content and potential application.

7017

Gatz, R.M. & Felix, C. VISUAL AIDS FOR THE PUBLIC SERVICE. 1954, 29pp. Public Information Service, Chicago, Ill.

7017

In an attempt to bring visual aids to the attention of those persons interested in training, a brief description and discussion is presented concerning the following aids and related topics: problems of communication, mock-ups and models, television, films, displays, charts, graphics, etc.

R 14

7018

Brinson, P. COMMUNICATION IN THE MODERN WORLD. AUDIO-VISUAL MATERIALS OF INSTRUCTION. "Forty-Eighth Yearbook of the National Society for the Study of Education, Part 1." 1949, 4-27. University of Chicago, Chicago, Ill.

7018

An extensive discussion of communication is presented in terms of an analysis of the media of communication, the development of pictorial forms of communication, and the role of education in communication. One of the specific aspects discussed includes the definition of language, trends in the use of language, the social significance of communication, recent developments in the use of pictorial media of communication, and so forth.

R 20

7020

Helen, M.F., Jr. FOCUS ON TEACHING. 1949, 177pp. American Council on Education, Washington, D.C.

7020

The utilization of films in education is discussed in terms of the history of this technique of teaching, the problems presented by the technique, the nature of the educational film, the reaction of students to the motion pictures in the curriculum, and the primary role of films in the educational process (e.g., developing concept formation, critical thinking, etc.). The author also discusses the role of the teacher in utilizing educational films and presents some general results concerning the use of films in education in terms of comparisons of ratings by teachers, students, and panels of subject-matter specialists and teachers.

R 22

7022

Larson, L.O. SUGGESTED ANSWERS TO SOME FREQUENT QUESTIONS IN THE AUDIO-VISUAL FIELD. "Forty-Eighth Yearbook of the National Society for the Study of Education, Part 1." 1949. University of Chicago, Chicago, Ill.

7022

The author discusses the role of audio-visual aids in education, the effect of such materials on the role of the teacher, the levels of application of audio-visual programs, and other questions pertinent to the preparation, utilization, maintenance, and administration of audio-visual aids and programs. Such aids as the following are mentioned: films, slides, charts, graphs, models, exhibits, displays, and others.

R 52

7025

Dale, E., Finn, J.D. & Hoban, C.F., Jr. RESEARCH ON AUDIO-VISUAL MATERIALS. "Forty-Eighth Yearbook of the National Society for the Study of Education, Part 1." 1949, 253-293. University of Chicago, Chicago, Ill.

7025

The authors present a description of research on the utilization of audio-visual materials in the armed forces and in industry during World War II. The aids and devices studied include the followings: films, filmstrips, graphic materials, and such synthetic devices as mock-ups, gunnery trainers, etc. The researches cited cover such aspects as retention of material learned by aids, the effect of aids on learning factual material, the influence of film in the learning of habits and skills, the effectiveness of films with subjects of varied intellectual capacity, and many other aspects of visual aid instruction.

R 163

7025

Ministry of Labour and National Service. **TRAINING NEW ENTRANTS TO INDUSTRIAL WORK.** 1943, 21pp. Ministry of Labour and National Service, London, England.

7026

This report presents suggestions concerning the training of new personnel in industry. Some of the aspects discussed are as follows: on-the-job training techniques, training aids, basic principles of effective training, the organization of a training program, the utilization of job analysis as a basis for training, and so forth.

7026

Cookman, F. **TRAINING PROCEDURE.** 1940, 230pp. Chapman & Hall, Ltd., London, England.

7026

This text presents a discussion of the organization and operation of a training program for employed personnel. The author discusses the problems of in-service training, the definition of training objectives, training methods and devices, techniques of evaluating training outcomes, etc. In addition, the author presents an outline of a proposed instructor-training course and a conference-leader training course.

T. G. 2-16

7027

Peterson, D.G. & Tinker, M.A. **HOW TO MAKE TYPE READABLE** 1940. Farrar & Son, New York, N.Y.

7027

This text on techniques of making type readable is based on extensive research by the author on the relative legibility of italic, all capital and lower case printing. Some of the factors discussed are as follows: kinds and size of type, width of line, spatial arrangement, color of print and background, and so forth. A general discussion of speed in reading the authors mention fatigue, eye movements, illumination, etc., relevant factors in the investigation of typography.

T. I. 2 103

7028

Eiselen, Elizabeth. **VALUES AND PROBLEMS IN THE USE OF COLOR TRANSPARENCIES WITH A SOURCE LIST OF COLOR TRANSPARENTS.** J. Gen., May 1950, 42, 200-206.

7028

The author discusses the utilization of color transparencies as a teaching aid in terms of the relative advantages over other aids such as movies, strip-films, and black and white slides. The contribution of color is emphasized. A detailed source list of color transparencies available for purchase or loan is also presented.

7029

Scott, R.G. **DESIGN FUNDAMENTALS.** 1951, 199pp. McGraw-Hill Co., New York, N.Y.

7029

This textbook on design in visual arts presents information concerning contrast, color relationships, depth and plastic illusion, movement and balance, three-dimensional organization, and other aspects of design. The discussion of the visual and structural elements of design contains implicit implications for the design of visual aids.

I. R many

7030

Cardwell, Irene. **ADULT READING IMPROVEMENT WITHOUT MACHINES.** Sch. & Soc., 1955, 82, 71-72.

7030

In an investigation of adult reading improvement without the use of mechanical aids, 20 Ss between the ages of 26 and 58 were given the California Achievement Test and other reading tests to ascertain the individual reading levels. Formal education of the group varied from incompletion of secondary school to achievement of technical degrees. The group met for 12 two-hour sessions of lectures, discussions, practice exercises, and tests. The group was retested at the completion of the course. The results were discussed in terms of the degree of reading improvement as a function of the course of instruction. Such variables as age, interest, formal education, etc., were also treated.

R 1

7031

Kelso, H.C. **CLASSROOM DISCUSSION VIA TELEVISION.** Sch. & Soc., 1955, 82, 120-122.

7031

This is a report of an experiment in which television was used as a technique to facilitate the teaching of a large class of students. A group of 87 students were placed into three discussion groups and taught a course by means of closed circuit television and open audio circuits. Additional arrangements to permit intergroup and group-instructor communication were employed. The results are described in terms of the relative effectiveness of this technique as observed both by participants and nonparticipants.

7033

Allen, K.M. **AUDIO-VISUAL LEARNING: A COMMENT ON RESEARCH.** Sch. & Soc., 1953, 78, 25-27.

7033

This is a reply to a critical evaluation of published audio-visual research studies (see 7034). The author denies reliance of contemporary studies on classical studies and presents evidence of the contributions being made to this area of research. He reviews studies dealing with such aspects of audio-visual instruction as applications of audio-visual aids, the influence of communication upon learning, and mentions the variety of factors being investigated by Army, Navy, and Air Force research programs.

R 11

7034

Erickson, K.M. **AUDIO-VISUAL LEARNING.** Sch. & Soc., 1953, 78, 197-203.

7034

In a review of audio-visual learning, the author cites and evaluates approximately 30 books dealing with many aspects of audio-visual instruction. A general criticism of the entire field of research is reflected in the author's belief that contemporary studies rely too much upon earlier classical studies.

R 12

7035

Dunbar, F. **EDUCATION PREPARES TO USE TELEVISION.** Sch. & Soc., 1952, 76, 374-376.

7035

This is a report on the effectiveness of television as an aid to education. The author cites the results of several investigations and analyzes these results in terms of the probable factors involved in the successful utilization of television. A brief survey of the television facilities being used throughout the country for educational purposes is also presented.

R-3.

7037

Jehring, J.J. **VISUAL COMMUNICATION IN THE CLASSROOM.** Sch. & Soc., 1952, 76, p. 75.

7037

In an attempt to answer certain questions raised concerning visual communication in the classroom (see Acc. Jo. 7039), the author presents an analysis of some of the dangers involved in the use of visual materials. The positive aspects of learning by means of visual materials are also discussed. The potential effects of both correct and incorrect use of such materials are considered.

R 1

7038

Millen, R.W. **TEACHING PSYCHOLOGY BY TELEVISION.** Sch. & Soc., 1952, 76, 133-134.

7038

The author describes his experience in teaching a psychology course by means of television in terms of the differences between this technique and the customary classroom techniques. In particular he speaks of adjustment to the atmosphere of a television broadcast, the teaching techniques required in teaching through television, and the applicability of visual aids such as slides, pictures, graphs, etc., to the television teaching medium.

7039

Casper, K. IS THERE DANGER IN THE USE OF VISUAL AIDS? *Sch. & Soc.*, 1951, 24, 58-59.

7039

The author discusses the potential dangers involved in the utilization of visual aids in teaching. He raises questions concerning such aspects as the tendency of visual aids to reduce reading competency, the amount of mental effort involved in comprehension of material presented in this manner, the potential effect on the imagination of learners, and so forth.

7040

Witty, P. TELEVISION AS AN AID TO INSTRUCTION. *Sch. & Soc.*, 1951, 24, 273-276.

7040

In this article on television as an aid to instruction, the author discusses the educational potentialities of television, the current status of television in elementary, high school, and college programs, and the use of television for special education, i.e., teaching deaf children. In addition, three types of educational program transmission are described and discussed.

R 25

7041

Winstley, B.H. & Maclean, W.S., Jr. A CONCEPTUAL MODEL FOR COMMUNICATIONS RESEARCH. *A-V Communication Rev.*, 1955, 3, 3-12.

7041

The authors attempt to define a single conceptual model which might be used to unite the various approaches to communications research. This conceptual model leads to implications for a generalized theory of communication encompassing elements of various theoretical systems. In describing the model such concepts as the following are discussed: feedback, face-to-face vs. mass communication, message transmission, and so forth.

I. R 13

7042

Harris, C.M. & Ruenger, Louise R. RELATION BETWEEN LEARNING BY FILM AND LEARNING BY LECTURE. *A-V Communication Rev.*, 1955, 3, 29-34.

7042

To investigate the relation between learning by instructional film and learning by lecture, three college classes were presented with information concerning certain aspects of European history by both techniques. An objective test covering the items presented by film (film test) and those presented by lecture (lecture test) was administered along with an essay type of exam on three occasions during two semesters. The results are discussed in terms of the correlation between the film test and the lecture test, the correlation between both of these and the essay test, and the reliability of the two sections of the objective test.

R 2

7043

Spaulding, S. RESEARCH ON PICTORIAL ILLUSTRATION. *A-V Communication Rev.*, 1955, 3, 35-45.

7043

The author reviews some of the research on pictorial illustration in order to indicate the areas where research seems warranted and to communicate the general implications of illustration research for the audio-visual worker. The studies described mention such factors in illustration as color preference, previous experience, eye movement tendencies, and size and page position. Comparative effectiveness of various types of illustrations is also discussed.

R 14

7044

Meyerhenry, W.C. BRIDGING THE CURRICULUM THROUGH MOTION PICTURES. *A-V Communication Rev.*, 1955, 3, 91-98.

7044

This article describes the research on films conducted by the Kohnstien Program of Educational Enrichment Through the Use of Motion Pictures. The scope of the study, the curriculum areas explored, e.g., biology, physics, general science, etc., and the texts and films utilized in the studies are described. The results of the studies are presented and discussed in terms of the relative effectiveness of instructional films in the particular areas of instruction.

R 1

7045

Rimmer, J.H., Smyth, R.P. & Desiderato, G. TELEVISION AS A TRAINING AND EDUCATIONAL MEDIUM. *A-V Communication Rev.*, 1955, 3, 163-172.

7045

The authors discuss the implications of television research for television as a training and educational medium. Such aspects as the following are discussed: the application of military research results to civilian problems, the relative advantages of television as an instructional device, the requirements imposed by television upon the instructor and the student, the selection of subject matter for this medium, and the techniques of evaluating television instruction.

R 15

7046

Merzer, J. & Becker, S. THE DISORIENTATIONS OF EDUCATION: AL TV. *A-V Communication Rev.*, 1955, 3, 173-182.

7046

This article presents a critical evaluation of television as an educational device. The authors describe the inequalities of this medium in terms of the loss of interaction between viewer and telecaster, the problem of programming, production, curriculum integration and other technical aspects of television utilization. Specific recommendations are offered concerning the factors to be considered in attempting solution of the various problems in educational television.

R 1

7047

Allen, W.H. RESEARCH ON FILM USE: CLASS PREPARATION. *A-V Communication Rev.*, 1955, 3, 183-196.

7047

The author presents a review of the research dealing with preparation of a class for instruction by instructional films. The studies selected deal in general with the effect of various types of set or motivation upon learning. The findings are discussed in terms of the various factors found to have an effect on film learning. The implications of these findings for teachers is presented along with a description of problem requiring further investigation.

T, R 14

7048

Hurst, P.M., Jr. LEARNING SETS: KINESCOPE VS. FILM. *A-V Communication Rev.*, 1955, 3, 257-263.

7048

This study was designed to evaluate the effects of two learning sets upon the amount of learning achieved (a) from a training film and (b) from a kinescope recording. Six pairs of matched groups (reflecting a total of 931 subjects) were presented with a learning situation under the following conditions: (a) presented with a film and told it was a kinescope; or (b) presented with a kinescope and told it was a film. The subjects were pre- and post-tested on knowledge of the material. Results are presented and discussed in terms of comparisons between each of the six pairs of groups as indicative of the relative influence of a particular set upon learning.

T, R 2

7049
Banyon, R.P., Desiderato, C.L. & Kanner, J.H. FACTORS LEADING TO EFFECTIVE TELEVISION INSTRUCTION. *A-V Communication Rev.*, 1953, 3, 264-273.

7050
This article presents the results of research on factors pertinent to television teaching effectiveness. The effect of manipulating presentational variables was investigated by categorizing presentational methods and then analyzing 18 hours of television and regular line instruction according to the categories. This problem was also studied by characterizing the dominant method of presentation during the same 18 hours of training. The results of both approaches are discussed in terms of the factors which were found to be effective in television instruction. Results of a study on the relation of quality of visual image to teaching effectiveness are also reported.
T, I, R 5

7050
Kortberg, K. PERCEPTION RESEARCH AND AUDIO-VISUAL EDUCATION. *A-V Communication Rev.*, 1953, 1, 18-29.

7050
The author presents a summary of a few representative Banover Institute demonstrations in perception which seem to possess implications for audio-visual research. A general interpretation of the demonstration is presented along with a discussion of some possible implications for audio-visual education.
I, R 3

7051
Hoban, C. DETERMINANTS OF AUDIENCE REACTION TO A TRAINING FILM. *A-V Communication Rev.*, 1953, 1, 30-37.

7051
In an exploratory study of the determinants of audience reaction to training films, two groups of soldiers were shown a training film. One group, designated as the target audience, consisted of 45 trainees enrolled in three projectionist training courses, while the other group (non-target audience) consisted of 43 trainees not enrolled in such a course. The content of the film dealt with projector operation. Each subject was asked to rate the film characters on a list of words reflecting their behavior. A comparison of the two groups yields results which are discussed in terms of the degree and type of involvement reflected by each group. Two hypotheses are postulated concerning the role of audience aspirations in audience reaction. T, R 7

7052
Carpenter, C.R. A THRESHOLD ORIENTATION FOR INSTRUCTIONAL FILM RESEARCH. *A-V Communication Rev.*, 1953, 1, 38-52.

7052
The author presents certain theoretical hypotheses concerning experimentation on instructional films and cites experimentation of the Instructional Film Research Program relevant to each hypothesis.
R 13

7053
Lumsdaine, A.A. AUDIO-VISUAL RESEARCH IN THE U.S. AIR FORCE. *A-V Communication Rev.*, 1953, 1, 76-90.

7053
The author presents a description of the U.S. Air Force program of audio-visual research in terms of the research facilities and areas of research, e.g., evaluation of specific films, development of equipment, development of theory, etc.
I, R 13

7054
Finn, J.D. TELEVISION AND EDUCATION: A REVIEW OF RESEARCH. *A-V Communication Rev.*, 1953, 1, 106-126.

7054
The author presents a comprehensive review of the research dealing with educational television. He presents the material under four major categories: (1) the general social effects of television; (2) studies concerning the content of television programs; (3) studies of the instructional effectiveness of television; and (4) studies of the technical aspects of television utilization.
R 54

7055
Vernon, M.D. PRESENTING INFORMATION IN DIAGRAMS. *A-V Communication Rev.*, 1953, 1, 147-158.

7055
The author presents a summary of her studies dealing with the effective utilization of graphical techniques to present information. Illustrations of various charts and graphs are presented. Some general conclusions are discussed concerning the factors involved in the effective use of graphical techniques.
I, R 5

7057
Kinder, J.S. AUDIO-VISUAL RESEARCH: WHERE TO FIND IT. *A-V Communication Rev.*, 1953, 1, 234-241.

7057
The author presents a summary of the bibliographic publications and a listing of sources of audio-visual research. In this source list he includes textbooks, journals, newsletters, and unpublished bibliographies.
R 42

7058
Hoban, C.F., Jr. DETERMINANTS OF AUDIENCE REACTION: STATUS. *A-V Communication Rev.*, 1953, 1, 242-251.

7058
The author discusses status as a determinant of audience reaction. He cites a number of researches dealing with this aspect of audience and discusses in detail two studies reflecting the relation between film content and audience reaction as a function of such variables as social status, military status, amount of education, training rating of film, etc.
T, R 11

7060
Zuckerman, J.V. PREDICTING FILM LEARNING BY PRE-RELEASE TESTING. *A-V Communication Rev.*, 1954, 2, 49-56.

7060
This is an investigation of the degree to which film learning can be predicted by pre-release testing. Two comparable groups of Air Force trainees, reflecting a total of 90 subjects, were pretested on knowledge concerning the content of a film. Then one group was shown the regular film while the other group was presented with a film strip mocked-up to resemble the regular film. The subjects were retested and the results are treated in terms of the correlation of scores between the groups as indication of the film-strip's ability to predict amount of learning from the film.
T

7061
Finn, J.D. DIRECTION IN AV COMMUNICATION RESEARCH. *A-V Communication Rev.*, 1954, 2, 83-102.

7061
The author presents an extensive discussion of the trends in audio-visual research and the problems which need yet to be investigated. The problems of action research and the problem of critical evaluation of audio-visual devices are discussed in terms of their place in research dealing with the more general areas of the social sciences.
R 34

7062
Leeston, R. DIRECTED OBSERVATION IN FILM UTILIZATION. *A-V Communication Rev.*, 1954, 2, 103-108.

7062
This is a brief article in which the author discusses the necessity for directing the viewer's observation, i.e., establishing a learning set, in the utilization of educational films. In addition to citing research indicative of this need, he suggests specific techniques for establishing sets conducive to learning, e.g., projection techniques, photographic techniques such as attention-directing devices, color, labels, and so forth.
R 8

- 7063
VanderWeer, A.M. COLOR VS. BLACK AND WHITE IN INSTRUCTIONAL FILMS. *A-V Communication Rev.*, 1954, 2, 121-134.
- 7063
To evaluate the relative effectiveness of color and black and white films in instruction, two experiments were conducted. In the first, 500 high school students were divided into two groups: one group was presented with five color films on five successive days; and the other with five black and white prints of the same films. In the second experiment an alternation technique was used in presenting the films. In both experiments subjects received intelligence tests prior to film showings and verbal and non-verbal learning tests following the showings. Results are discussed in terms of the relative performance of subjects viewing color vs. that of subjects viewing black and white films.
- 7064
Peterson, L.V. & Schramm, W. HOW ACCURATELY ARE DIFFERENT KINDS OF GRAPHS READ? *A-V Communication Rev.*, 1954, 2, 178-189.
- 7064
This article presents a summary of previous research on the problem of the relative accuracy with which different kinds of graphs are read and a study with eight kinds of common graphs. Eight forms of graphs containing the same five proportions plus a decoy of each graph (to conceal similarity of proportions in the test graphs) were administered in random order to 112 airman. The subjects were asked to estimate the proportions represented by each graph. The results are presented and discussed in terms of the relative accuracy of judgments and the size and direction of error that occurred with each kind of graph.
T, I, R:10
- 7065
Twyford, L.C. PROFILE TECHNIQUES FOR PROGRAM ANALYSIS. *A-V Communication Rev.*, 1954, 2, 243-262.
- 7065
The author presents an extensive discussion of the profile technique, a method of evaluating such learning media as television, film, lectures, and so forth. The discussion is presented in terms of the applications, validation, and reliability of profile techniques, profile equipment, e.g., audience response recorders and analyzers, the factors involved in selecting profile equipment, and the preparation and interpretation of learning profiles.
T, G, I, R 20
- 7066
Pischmann, G.K. THE FELTBOARD IN THE TEACHING OF LOGIC. *A-V Communication Rev.*, 1954, 2, 282-290.
- 7066
This article describes the utilization of the feltboard as a teaching aid in an elementary course in logic. The author presents a brief description of the feltboard and compares it with other such devices, e.g., the chalkboard. Suggestions for the most effective utilization of the feltboard are offered.
R 21
- 7068
Syer, H.W. MAKING MATHEMATICS SENSIBLE. *Nat. Educ. Ass. J.*, 1954, 43, 221-223.
- 7063
The author presents a brief discussion on the utilization of each of the following audio-visual materials as aids to teaching mathematics: recordings, posters, charts, models, pictures, movies, radio program, and television programs.
I
- 7070
Bulgrin, T.A. RELATIONSHIPS BETWEEN CERTAIN ATTITUDES TOWARD TEACHING AND TEACHING SUCCESS. *J. Educ. Psych.*, 1952, 21(1), 1-55.
- 7070
To investigate the relationships between various attitudes of teachers toward teaching and teaching success, two groups of 55, 63 men and 37 women, were tested as students and then again as beginning teachers. Various attitudes and interest tests were used along with measures of teaching efficiency. The results are presented and discussed in terms of the correlations between the various attitudes toward the teaching profession and the success achieved as teachers.
T, R 114
- 7072
Reed, H.J. AN INVESTIGATION OF THE RELATIONSHIP BETWEEN TEACHING EFFECTIVENESS AND THE TEACHER'S ATTITUDE OF ACCEPTANCE. *J. Educ. Psych.*, 1953, 21(4), 277-325.
- 7072
To investigate the relationship between teaching effectiveness and the teacher's attitude of acceptance, data were obtained on 160 teachers from their administrators and students. An extensive battery of tests was employed, e.g., projective techniques, rating scales, biographical data, etc., as predictor and criterion measures. The results are presented and discussed in terms of the correlation between the teachers' measured attitude of acceptance and the criterion evaluations of his teaching performance.
T, R:many
- 7074
Hyer, Anna L. TAPES FOR TEACHING. *Educ. Screen*, 1955, 24(1), p.21.
- 7074
The author discusses the educational use of tape recorded programs in terms of its growth as a teaching aid, the sources of tape recordings, and other aspects of tape use and evaluation.
I.
- 7075
Schott, A.F. ADVENTURE IN ARITHMETIC. *Educ. Screen*, 1955, 24(2), 65-67.
- 7075
The author describes the abacus-adding machine method of instruction in number-learning and discusses the results of its application to actual training programs. The findings are presented in terms of the relative performance of students taught by the machine method and those taught by the traditional method, the degree of acceleration of learning evidenced under this method, the effect of this type of training on problem-solving ability, and the facility of transfer of training to nonmachine arithmetic skills.
I.
- 7076
Frye, H. & McMahon, E. TRANSPARENCIES FROM THE PRINTED PAGE. *Educ. Screen*, 1955, 24(2), 68-69.
- 7076
The authors describe a technique of obtaining transparencies from the printed page which permits their utilization by educators as a substitute for actual pictures, illustrations and maps. The processing of the transparency is illustrated and described in detail.
I.
- 7077
Chauncey, H. CAN FILMS TEACH? *Educ. Screen*, 1955, 24(3), 110-111.
- 7077
The author discusses the utilization of films and television as instructional devices. Suggestions are offered concerning the application of these aids to programs which do not have a teacher present in the classroom.
I.

7081
Vanderhoof, A.W. HOW TO USE AUDIO-VISUAL MATERIALS EFFECTIVELY. *Educ. Screen.* 1955, 31(4), 248-249, 254.

7082
The author presents a discussion on the effective utilization of audio-visual materials in teaching. Under the general orientation of effective teaching as a function of knowledge and use of factors inherent in the learning situation, suggestions for the use of audio-visual materials are offered under three major headings: 1) preparing the groups; 2) presenting the material; and 3) following through. Such learning factors as the following are discussed: knowledge of results, reinforcement, directed attention, acceptability of materials, and so forth.
I. R 2

7083
Gossell, E.M. FIANNEL BOARDS IN ACTION. *Educ. Screen.* 1955, 31(6), 298-299.

7084
The author presents a description and illustration of the flannel board and discusses its utilization as a teaching device in terms of ease of construction, cost of materials and areas of application.
I.

7085
Milstad, J. LET THE ELECTRIC BOARD HELP YOU TEACH. *Educ. Screen.* 1955, 31(7), 292-297.

7086
The author presents a description and illustration of the electric board, a teaching aid designed for use at all levels of education. The construction and design of such a board is discussed in detail.
..

7087
Bernard, E.G. DEFINING THE OBJECTIVES OF AN A-V PROGRAM. *Educ. Screen.* 1954, 31(4), 144-145.

7088
The author defines the objectives of an audio-visual program in terms of the guiding principles of audio-visual education and the general principles of an audio-visual program. Some of the objectives mentioned are the following: to improve amount, speed, and retention of learning; to stimulate interest; to improve participation; to make instruction more realistic; and so forth. The guiding principles reflect such aspects of audio-visual utilization as concern for economy in meeting growing needs, proper coordination among audio-visual tools, careful selection of aid for the particular goal on basis of research and experience, etc.

7089
Tcham, K.B., Jr. SHOW IT WITH PULL CHARTS. *Educ. Screen.* 1954, 31(6), p.227.

7090
The author presents a description of the construction and utilization of the pull chart, a chart with a movable panel. Two primary advantages over poster-type charts are noted in terms of the manner in which each handles complex material and attracts attention. Suggestions are offered for the construction of various types of pull charts.
I.

7091
Forbes, G.W. & Schofield, E.T. A MODEL CLASSROOM WITH BUILT-IN A-V. *Educ. Screen.* 1954, 31(8), 324-325.

7092
This article describes a model classroom designed to permit maximal utilization of audio-visual aids. The facilities for audio-visual instruction, the furniture, equipment, and lighting conditions are discussed in terms of their role in the learning situation.
I.

7093
Sullivan, R.C. DETROITING AT OAK PARK HIGH. *Educ. Screen.* 1954, 31(9), 372-373.

7094
This article presents a description of the Acton Drivetrainer, a device which utilizes instructional action pictures and training cars. Each student's response to the synchronized film is recorded on a printed form. The relative advantages of this device in providing driver training and practice are discussed in terms of cost of the program, students' response to the program, and the skills taught by the Drivetrainer.
I. R 2

7095
Lewis, R.S. THE TAPE RECORDER GOES TO COLLEGE. *Educ. Screen.* 1953, 31(4), 158-159, 170.

7096
This article describes the utilization of the tape recorder as a teaching aid in a variety of courses at San Jose State College. The author discusses the various techniques employed with the tape recorder and emphasizes the value of this device as a motivating and teaching instrument.
I. R 1

7097
Barton, L. THE A-V WAY IS THE WAVY WAY. *Educ. Screen.* 1953, 31(9), 397-409.

7098
This article presents a brief description of the US Navy's utilization of audio-visual training aids in their AAVTU program. Also presented is a brief description of the topics discussed at the eighth annual Reserve Officer Training Corps Instructor Organization Conference at Northwestern University.
I.

7099
Educational Screen. CLASSROOM DETROITING. *Educ. Screen.* 1952, 31(5), p.192.

7100
This article presents a brief description of the Acton Drivetrainer, a multi-place driver training device. Utilizing synchronized instructional and practice films and automobile mockups, the responses of each student driver are recorded automatically.
..

7101
McIntyre, L.B. TEACHING BLACKBOARD DRAWING. *Educ. Screen.* 1952, 31(7), 276-277.

7102
Concerned with the teacher's somewhat inadequate use of the blackboard, the author presents a brief discussion of the principles of graphic communication and offers specific suggestions for more effective utilization of the blackboard. These suggestions are offered on the basis of seven laws of perspective.
I. R 3

7103
Stoops, Betty. FACTS AND FUN OF FIANNEL BOARDS. *Educ. Screen.* 1952, 31(8), 324-325 & 344

7104
The author describes the flannel board and discusses its construction and utilization. Its advantages over other types of boards are discussed in terms of attractiveness, flexibility of application and cost of this teaching tool. In addition, the various materials which can be used on the flannel board are described, e.g., pictures, diagrams, paper models, etc.
I.

7098
Cobb, Josephine M. USING FILMSTRIPS WITH ADULTS. *Educ. Screen.* 1951, 20(5), 42-44.

7099
This article presents a discussion on the utilization of filmstrips as a teaching aid with adults. The author offers specific suggestions for their use with regard to specific types of audiences and attainment of specific goals. Included is a partial source list of filmstrip producers.

7099
Fest, H.C. A POWER PACKAGE FOR DRIVER EDUCATION. *Educ. Screen.* 1951, 20(5), 176-177.

7099
The author discusses the General Motors Driver Education Film Series as an educational aid for driver training. He lists the titles of the films and filmstrips contained in the series and evaluates the potential effectiveness of a program incorporating such audio-visual materials.

7101
Lewis, P. TV TAKES A TEST. *Educ. Screen.* 1950, 20(5), 196-198 & 203.

7101
This article describes several experiments concerned with the utilization of television in the classroom. The various factors investigated include the following: seating arrangement, viewing distance, viewing angle, interior illumination, size of screen, and so forth. The results of the experiments are presented and discussed in terms of the role of each factor in the television experience. Implications and specific recommendations for the utilization of television as a teaching aid are presented.

7102
Carpenter, C.R., & Greenhill, L.P. USING INSTRUCTIONAL FILMS EFFECTIVELY. *Educ. Screen.* 1950, 20(5), 331-333.

7102
This article presents a discussion on the effective use of instructional films. The factors of film utilization which are evaluated concern those aspects inherent in the instructional film itself, those pertinent to the viewing audience, and those relevant to the learning process. The authors present a summary of their recommendations for effective instructional film utilization.

7103
Koss, E.I. REAL DAYLIGHT LANTERN SLIDES. *Educ. Screen.* 1950, 20(10), 426-437.

7103
The author describes a technique for producing and projecting lantern slides under ordinary conditions of daylight room illumination. The practicality of this technique is discussed in terms of the factors involved in the production process itself and those pertinent to viewing this type of slide (e.g., the amount of glare present; the reduction of eyestrain, etc.).

7104
Jassiel, R.M. RETENTION OF LEARNING AND TRANSFER OF TRAINING. *Progressive Educ.*, 1953, 31:1, 26-29.

7104
In this discussion of learning the author is primarily concerned with retention of learning and transfer of training. In his analysis of the theoretical aspects of these two learning phenomena, the following theories are discussed: localization of brain function, identical component theory, Judd's generalization theory, Dunlap's negative transfer theory, and training for transfer theory.

7105
Trotter, Lella. SOME DO'S AND DON'T'S FOR AN AUDIO-VISUAL PROGRAM. *Educ. Screen.* 1954, 23(3), 48-49.

7105
The author presents an extensive list of suggestions concerning the effective use of audio-visual teaching aids. The suggestions are organized under the following three aspects of audio-visual instruction: 1) organization of the audio-visual program; 2) the proper equipment and facilities to be used; 3) the utilization of audio-visual aids.

7107
Merritt, H.A. & Schiller, C.E. AUDIO-VISUAL MATERIALS: THEIR MAKING AND USE. 1933, 344pp. Harper Bros., New York, N.Y.

7107
This is a textbook on the nature and use of audio-visual materials. Included are chapters on learning, the chalkboard, graphics, films, recordings, television, and other kinds of aids and techniques. Frequent reference is made to the results of research studies in the discussion of each area of audio-visual instruction.

7108
Solys, H., & Souder, G. (Eds.) FIFTH ANNUAL REPORT OF SENECA, 1954/1955. N.Y.: Ed Publications, Inc., 1955, 615pp.

7108
In this fifth annual report on stress the following major sections are presented: (1) a synopsis of the stress concept; (2) an analysis of the principle problems of stress research; (3) a series of special articles on such topics as neuroendocrinology, the role of the adrenal cortex in disease, psychiatric stress in industry, etc.; and (4) a section on the physiology and pathology of stress. An extensive bibliography including reviews and critiques is presented.

8001
Carpenter, R.C. & Schlosberg, H. MONOCULAR AND BINOCULAR INTENSITY THRESHOLDS FOR FIELDS CONTAINING 1-7 DOTS. *J. Gen. Psychol.*, 1950, 40, 81-94. (Johns Hopkins University, Baltimore, Md. & Brown University, Providence, R.I.).

2 Ss reported the number of black dots they saw when plates containing 1-7 dots were presented. All exposures lasted 32 msec. at an intensity of .55 ml. Each dot subtended a visual angle of 33' and all were within a field of 1°. Each S received 200 trials with each eye and 200 binocularly for each number of dots. The percentage of correct responses fell off as a function of the number of dots exposed. The monocular results were in agreement with the curve described by p^n (p = percentage of correct reports, n = number of dots). The binocular results conform roughly to properly compounded monocular probabilities. (MEIAS)

8002
Davis, A.C. MOTOR RESPONSES TO AUDITORY STIMULI ABOVE AND BELOW THRESHOLD. *J. Gen. Psychol.*, 1950, 40, 107-120. (Indiana University, Bloomington, Ind.).

The study aimed at finding muscular responses produced by auditory stimuli at or near threshold. Muscle action potentials were recorded from 4 body locations for 27 Ss while a series of near-threshold auditory stimuli was delivered. Muscular responses were found after stimulus onset as well as after cessation of the stimulus. Responses to unheard stimuli were smaller than to those heard. There was an increase in response with increase stimulus intensity, and with repetition of the stimulus. The results are interpreted by a scheme of 3 principles: that of motor response, partial forward displacement, and self-excited system. (MEIAS)

8005
Meters, R.H. & Miller, J.G. THE RISE OF RECENTCY IN
LEARNING. *J. exp. Psychol.*, 1952, 42, 234-239.
(College of Wooster, Wooster, Ohio).

8006
"To study the accuracy...of the predictions validity of recentcy in maze learning, 20 Ss were given 10 trials on a revolving, raised-wire finger maze. Choices made at each choice point were predicted for the next choice at the same point. A total of 4200 individual predictions were analyzed." Number of correct predictions for the entire group and number of correct predictions per trial were interpreted with respect to the principle of recentcy.
R 3

8009
Rann, C.M. & Passey, G.E. THE PERCEPTION OF THE VERTICAL: V. ADJUSTMENT TO THE POSTURAL VERTICAL AS A FUNCTION OF THE POSITIVENESS OF POSTURAL TILT AND DURATION OF EXPOSURE. *J. exp. Psychol.*, 1951, 45, 108-113. (Yale University, New Orleans, La. & USAF Human Resources Research Center, Randolph Field, Tex.).

3 Ss were subjected to tilts of 5, 15, 25, 35, 45, and 55 degrees for periods of 0, 5, 15, 25, 35, 45, 55, and 65 sec. Each S was given 10 adjustments from each position; there were 10 experimental sessions. With increasing duration of exposure to tilt there was an increasing average error of adjustment and a shift of constant error of adjustment in the direction of initial tilt. The same were the effects of increasing amount of initial tilt. Results are related to previous work, and curves are fitted to the data. These curves are proposed as theoretical functions. (HEIAS)
R 5

8011
Melnick, J.S. PURSUIT LEARNING AS AFFECTED BY SIZE OF TARGET AND SPEED OF ROTATION. *J. exp. Psychol.*, 1951, 41, 126-138. (University of Southern California, Los Angeles, Calif.).

8012
To investigate the relation between difficulty of task and amount of reminiscence after one interpolated rest period during practice, ten groups of 25 Ss were tested for 20 trials on a Kierth-type pursuit rotor, under five conditions of difficulty. Difficulty was controlled by variations in the rate of rotation or in size of target. Five experimental groups had one-min. rest periods between all trials; five control groups had a five-min. rest period between trials five and six. Scores for time on target as a function of trials are compared for the groups.
T. G. 2 12

8012
Mechberg, J.E., Triebel, W. & Seamon, G. COLOR ADAPTATION UNDER CONDITIONS OF HOMOGENEOUS VISUAL STIMULATION (GANZFELD). *J. exp. Psychol.*, 1952, 41, 153-159. (Cornell University, Ithaca, N.Y.).

A technique is described whereby spatially homogeneous illumination may be presented to the eye, and the results of some exploratory experiments, using homogeneous colored light, are presented. Koffka's hypothesis that a colored Ganzfeld would lose its color was tested with red and with green light. Complete disappearance of color was obtained. In most cases, despite considerable individual differences in the course of the adaptation process and in the phenomenal content during adaptation. However, the results of presenting colored light to one eye after the other eye had been adapted to light of the same color, and of introducing a shadow into the field, make it difficult to ascribe the disappearance of the color to its adoption as a general "chromatic neutral point" for the entire visual field.
R 8

8013
Honey, D.H. & Solomon, R.L. VISUAL DURATION THRESHOLD AS A FUNCTION OF WORD-PROBABILITY. *J. exp. Psychol.*, 1951, 41, 401-410. (Harvard University, Cambridge, Mass.).

Data from 2 experiments, using 75 words, show that the visual duration threshold of a word, measured tachistoscopically by an ascending method of limits, is an approximately linear function of the logarithm of the relative frequency with which that word occurs in the Thorndike-Lorge word counts. Product-moment correlations between the two variables range from -.68 to -.75 in the main experiment. Empirical corrections for certain physical characteristics of the words and their component letters were found to raise the range of these correlations to -.76 to -.83. Viewed as a correlation between language behavior in a highly specific situation (duration threshold determination) and in general usage (Thorndike-Lorge counts), these data are of significance for the experimental analysis of language behavior. In addition, they point to the necessity for operational interpretation of a large number of perceptual experiments, since the size of threshold is found to be a function of a property (relative frequency) of the responses (words) that operationally define perceptual threshold.
R 4

8014
Birren, J.E., Casperson, R.C. & Botwinick, J. PAIN MEASUREMENT BY THE RADIANT HEAT METHOD: INDIVIDUAL DIFFERENCES IN PAIN SENSITIVITY, THE EFFECTS OF SKIN TEMPERATURE, AND STIMULUS DURATION. *J. exp. Psychol.*, 1951, 41, 419-424.

The purpose of the study was to determine the reliability of the Hardy, Wolff, and Good method of measuring pain sensitivity, the day-to-day variability in the pain threshold, and the influence of skin temperature and stimulus duration. A correlation of .91 was obtained between two successive determinations in routine pain measurements on 50 Ss. When stimulus duration was held constant at 3 sec., a significant variation in pain threshold was produced by varying the skin temperature. When skin temperature was held constant at 90°F, a significant relation was found between threshold and stimulus duration. The radiant heat method of pain measurement offers the advantage of an easily controlled and measured stimulus. (HEIAS)
R 14

8017

Masterson, R.K. THE EFFECT OF MOTIVATION AND AMOUNT OF PRE-REST PRACTICE UPON INTERSTIMULUS POTENTIAL IN MOTOR LEARNING. *J. exp. Psychol.*, 1951, 42, 162-172.

8018

To determine the effect of motivation and of pre-rest practice on response-produced inhibition of motor performance, 538 college students in 22 groups were formed the alphabet priming task under one of two conditions of motivation (task- or ego-oriented). Under each condition, a spaced and a massed control group received 50 30-sec. trials, with and without 30-sec. intertrial rests respectively, and six experimental groups received 50 massed trials with a ten-min. rest period introduced at varying stages of practice. Differences between mean scores per trial and in postrest performance are analyzed.

T. G. R 13

8018

Rossman, J.L. & Goss, A.E. THE ACQUIRED DISTINCTIVENESS OF CLUES: THE ROLE OF DISCRIMINATIVE VERBAL RESPONSES IN FACILITATING THE ACQUISITION OF DISCRIMINATIVE MOTOR RESPONSES. *J. exp. Psychol.*, 1951, 42, 173-182. (University of Massachusetts, Amherst, Mass.).

8021
Mistak, H. & Lozito, C.C. LATENCY AND DURATION OF MONOCULAR AND BINOCULAR AFTER-IMAGES. *J. exp. Psychol.*, 1951, 42, 247-262. (Fordham University, New York, N.Y.).

Latency and duration of monocular and binocular after-images of 20 cph 35 were measured and compared. The latency of binocular after-images was significantly shorter and the duration longer. This result suggests the existence of interaction between the mechanisms of the two eyes.

R 11

8025

Duncan, C.P. THE EFFECT OF UNEQUAL AMOUNTS OF PRACTICE ON MOTOR LEARNING BEFORE AND AFTER REST. *J. exp. Psychol.*, 1951, 42, 257-264. (Northwestern University, Evanston, Ill.).

8018

To determine whether the acquisition of discriminative verbal responses facilitates the acquisition of discriminative motor responses to identical stimuli, five matched groups of 15 Ss were required to learn a 12-unit paired-associate list of syllables and figures and then to learn motor responses to the figures. Initial learning proceeded to mastery for three groups and for one and four trials for the other two. One of the former groups underwent an interpolated-learning trial in which all verbal responses were followed by shocks; another was required to make the appropriate verbal response overtly during motor-learning. Comparisons of correct responses during the motor-learning trials are drawn between the various groups.

T. G. R

8025

To determine whether distributed practice produces superior learning, as well as performance, than massed practice when length of session (practice plus resting time) is held constant, 157 female Ss, four groups were required to perform on a pursuit-rotor through a five-minute pre-rest session, a ten-minute rest, and a five-minute post-rest session. Two groups worked under massed and two, under distributed practice during the pre-rest session; during the post-rest session, two groups worked under reversed conditions of practice. Percent time on target is compared for the groups.

T. G. R 11

8020

VanKrevelen, Alice. THE ABILITY TO MAKE ABSOLUTE JUDGMENTS OF PITCH. *J. exp. Psychol.*, 1951, 42, 207-215. (University of Rochester, Rochester, N.Y.).

17 Ss, who satisfied Bachem's criterion for absolute pitch, performed in 2 experiments. In one they identified randomly presented oscillator tones. In the second experiment they adjusted oscillator frequencies to produce specified pure tones. No particular frequency was agreed upon by all individuals to correspond to a particular tone; but when judgments were pooled the greatest number of judgments coincided with the true physical standard for a given tone. Experience seems important in establishing the tonal norm for an individual. Even with the established individual norms the Ss differed in the consistency with which they could retain their own standards through a long series of judgments. The group average error for both methods was about .3 semitone, greater than Bachem's estimate of .1 semitone, for his Ss. (HEIAS)

R 8

8021

Graybiel, A. & Niven, J.I. THE EFFECT OF A CHANGE IN DIRECTION OF RESULTANT FORCE ON SOUND LOCALIZATION: THE AUDIOGRAVIC ILLUSION. *J. exp. Psychol.*, 1951, 42, 227-230. (USN School of Aviation Medicine, Pensacola Air Station, Fla.).

An experiment was carried out in which 4 male Ss estimated the location of a source of sound while being subjected to a change in direction of resultant force with respect to themselves. A consistent error was made in terms of a non-visual vertical-horizontal frame of reference. The error amounted to about 70% of the angle ϕ and a linear relationship was found to exist between the two. This phenomenon has been termed the audiogravic illusion and it can be readily explained on the basis that the egocentric localization of the horizon, under the conditions of our experiment, accords with the change in direction of resultant force.

R 4

8027

Cogg, L.W. FRACTIONATION OF TEMPORAL INTERVALS. *J. exp. Psychol.*, 1951, 42, 3-7-312. (University of Wisconsin, Madison, Wisc.).

A reliable time function was established for 5 temporal intervals of 400, 800, 1,600, 2,400, and 4,800 msec. by the method of fractionation. 36 Ss made 10 judgments each for each of the 5 intervals. The means of the median half-values for all Ss were overestimations of 2.00, 2.09, 1.16, 1.16, and 9.31 %. A scale of subjective time, the "temp scale", was constructed from the fractionation data, and the variables that probably influence the form of the scale were discussed.

R 11

8028

Morrell, P. & Marks, M.N. THE EFFECT OF SLEEP PRIOR TO LEARNING. *J. exp. Psychol.*, 1951, 42, 313-316. (University of Texas, Austin, Tex.).

8029

To determine the effect of sleep on learning and the effect on retention of sleep before and after original learning, two Ss learned lists of 12 nonsense syllables to a criterion of one perfect repetition with and without one and one half hours of prior sleep. They relearned the lists to the same criterion after six and one quarter hours of sleep. Savings scores for trials and errors and original scores for relearning and learning, with and without prior sleep, are compared.

T. R 14

8030

Bilodeau, E.A. PERFORMANCE DECREMENT IN A SIMPLE MOTOR TASK BEFORE AND AFTER A SINGLE REST. *J. exp. Psychol.*, 1952, 43, 388-390. (USAF Human Resources Research Center, Lackland AFB, Tex.).

8031

In an investigation of response decrement and recovery in a simple motor task, 260 women students were required to lift weighted table-tennis balls from a cup at the base of a chute to the top of the chute. Three variables were combined factorially: 1) duration of an initial practice session (2, 4, 8, or 16 minutes); 2) duration of an interpolated rest period (1, 2, 4, or 8 minutes); 3) weight of the balls (21, 42, 84, or 166 grams). Rates of responding during initial practice and during final practice are analyzed as a function of the experimental parameters.

Y. G. R 9

8032

McNab, C.B. & McNab, J.E. FAMILIAR SIZE AND THE PERCEPTION OF DEPTH. *J. Psychol.*, 1952, 45, 187-194. (Cornell University, Ithaca, N.Y.).

The aim of the experiment was to compare "familiar size" which requires past experience, and "relative size", which does not, as cues for depth perception. Exp. I: On 2-dimensional "reversible-screen" drawings were drawn a man, 4 3/4 in. high, on one panel, and a boy of the same size and approximate contour, on the other. Each member of 4 groups of 15 college students viewed the figure monocularly through a reduction screen at a 70 cm distance, was shown its reversibility, and asked to allow the screen to reverse as it would and to let his gaze move freely. The results indicate that familiar size was ineffective in this situation. Exp. II: The procedure of Exp. I was repeated with the boy being on one panel, and a reduced version of the same boy on the other panel. The panel with the larger boy appeared nearer, suggesting the importance of relative size. (HEIAS)

R 33

8031

Cogg, L.W. & Brogden, M.J. THE EFFECT OF SIMULTANEOUS VISUAL STIMULATION ON ABSOLUTE AUDITORY SENSITIVITY. *J. exp. Psychol.*, 1952, 43, 179-186. (University of Wisconsin, Madison, Wisc.).

Auditory thresholds were measured under 3 conditions of auxiliary visual stimulation. A small light patch was fixated by S and increases in the brightness of the patch of zero, .005, and .055 ml. were used. For each S 3 auditory thresholds were determined for each of these light conditions. 1 group of 18 Ss received instructions to report the presence or absence of the light as well as that of the tone; another group of 18 Ss made no specific response to the light and were instructed to report presence or absence of the tone only. The results showed a significant elevation of the auditory thresholds for the light increases when a specific verbal response was required to the auxiliary stimulus and a significant lowering of the thresholds as the brightness of the light increased, when no response to the auxiliary stimulus was required.

R 10

8033

George, F.H. ERRORS OF VISUAL RECOGNITION. *J. exp. Psychol.*, 1952, 43, 202-206. (University of Bristol, Bristol, England).

2 experiments were undertaken on visual recognition, in which, in all, 3 sets of stimulus card were used, incomplete circles, arrows, and ellipses. Time intervals of 5 min., 24 hr., 4 days, and 8 days were used in the cases of circles and arrows, and 5 min. and 24 hr. for the ellipses. The findings were in accord with the Hebb-Foord findings, that there is no observable progressive change in recognition as it is predicted by the principle of Prägnanz. Thus, the principle of Prägnanz must be dropped altogether or redefined in more specific terms, the limits of application being clearly stated.

R 12

8034

Reynolds, B. CORRELATION BETWEEN TWO PSYCHOMOTOR TASKS AS A FUNCTION OF DISTRIBUTION OF PRACTICE ON THE FIRST. *J. exp. Psychol.*, 1952, 43, 341-348. (USAF Human Resources Research Center, Lackland AFB, Tex.).

8035

To determine whether the correlation between two psychomotor tests is affected by the spacing of trial on the test performed first, two groups of 100 airmen basic trainees were trained on a Balance Test, one group with and one without rest intervals. Both groups then underwent testing (with no rest intervals) on the Balance Test and were subsequently tested on the six-target form of the Rudder Control Test (6-TRC) without rest intervals. The data presented include time scores on the Balance Test for successive blocks of trials and intercorrelations between scores on the Balance Test and 6-TRC at two stages of training for each group.

T. G. I. R 5

8036

Kimble, G.A. TRANSFER OF WORK INHIBITION IN MOTOR LEARNING. *J. exp. Psychol.*, May 1952, 43, 391-392. Yale University.

8036

In a test of the hypothesis that inhibition generated during the acquisition of a motor response under massed practice is general, rather than confined to a specific effector organ, two groups of 13 male college students received 60 10-sec. massed trials on a pursuit rotor. For one group the first 30 trials were with the nonpreferred hand the second 30, after a five-min. rest, were with the preferred hand. For the second group the conditions were identical except that there was no rest period between the blocks of trials. The groups are compared with respect to mean time on target per trial.

G. R 1

8037

Gibson, J.J. & Ribble, F.M. EXPLORATORY EXPERIMENTS ON THE STIMULUS CONDITIONS FOR THE PERCEPTION OF A VISUAL SURFACE. *J. exp. Psychol.*, 1952, **43**, 414-419. (Cornell University, Ithaca, N.Y.).

Exploratory experiments were carried out to test the texture-hypothesis, i.e. that depth depends in the first instance on the relative density of the texture. 4 different experiments relating to the hypothesis are reported; only a few observers took part in each. 2 tentative conclusions emerged: a) It is probably a mistake to assume that a phenomenal surface is an elementary impression of visual space; and b) The visual hardness of a surface does not seem to be in psychophysical correspondence with texture as such. The texture-hypothesis as usually formulated is inadequate. The formula of the steepness of gradients of luminous intensity between regions of the image gives promise of being valid. The problem of the stimulus conditions for an edge involves several variables. 3 basic ways are suggested for producing retinal images which arouse an edge. (MEIAS)

R 6

8040

Ittelson, W.M. A NOTE ON "FAMILIAR SIZE AND THE PERCEPTION OF DEPTH". *J. Psychol.*, 1953, **35**, 235-240. (Princeton University, Princeton, N.J.).

In a recent paper, Hochberg and Hochberg state that they do not like theories which involve the concept of familiar size as a cue to depth perception, and argue that the evidence for the existence of this cue is questionable since most of it hopelessly confuses familiar size with relative size. They report an experiment in support of the latter argument and offer a theory of size-distance perception based on "an autochthonous tendency toward homogeneity." Reference is made to several experiments which are not considered in the paper by the Hochbergs. These experiments either successfully separate familiar size from relative size, or cannot be accounted for by an autochthonous tendency toward homogeneity, or both. The experiment reported by the Hochbergs is then discussed, and their conclusions are found to be unjustified both by their own criterion and on methodological grounds.

R 9

8041

Gibson, J.J., & Cornsweet, Janet. THE PERCEIVED SLANT OF VISUAL SURFACES—OPTICAL AND GEOGRAPHICAL. *J. exp. Psychol.*, 1953, **44**, 11-15. (Cornell University).

8041

The phenomenon of perceived slant of visual surfaces is defined in terms of optical and geographical slant. To test the hypothesis that optical slant occurs as a function of the direction of increasing texture-density in the retinal image (when geographical slant accompanies but is not in correspondence with optical slant), each of ten subjects was presented with a textured surface which was slowly rotated around a vertical axis and required to judge when the surface reached either of two positions: perpendicular to line of sight and at 45 degrees to surround; or parallel to surround and at 45 degrees to line of sight. Standard deviations and constant errors of judgment were analyzed to evaluate the consistency and accuracy of judgments. The results are discussed as indicative of the nature of optical and geographical slant. T.

8045

McGinnies, E., Comex, P.E. & Lacey, O.L. VISUAL RECOGNITION THRESHOLDS AS A FUNCTION OF WORD LENGTH AND WORD FREQUENCY. *J. exp. Psychol.*, 1952, **44**, 65-69. (University of Alabama, University, Ala.).

8045

To isolate the effects of word frequency and word length on recognition thresholds, 20 Ss (college students) were required to view 20 words each presented tachistoscopically for successively longer durations. The words were 5, 7, 9, or 11 letters in length and had frequencies of about 10, 100, 200, 300, or 400 occurrences per million. Recognition (duration) thresholds are shown as functions of word frequency and word length; the data are analyzed statistically in order to determine the interaction between length and frequency. T. G. R 7

8042

Gibson, J.J. & Carel, W. DOES MOTION PERSPECTIVE INDEPENDENTLY PRODUCE THE IMPRESSION OF A RECEDING SURFACE? *J. exp. Psychol.*, 1952, **44**, 16-18. (Cornell University, Ithaca, N.Y.).

17 Os looked at the bottom sector of a rotatable black disc through slits in an opaque screen. Narrow lines of luminous paint radiating from the center covered the entire surface of the disc. The Os first looked at the motionless spots, followed by a view of the rotating disc. All Os saw the motionless bank of lights in a plane perpendicular to the eye. When the disc was in motion, "sophisticated" Os reported that the spots were receding. Of the "naïve" Ss, 6 saw a group of isolated spots, 3 reported lights with a receding plane of distance. The results are thus negative; the moving spots functioned truly as cues for distance rather than as stimuli. (MEIAS)

R 5

8043

Broadbent, D.E. LISTENING TO ONE OF TWO SYNCHRONOUS MESSAGES. *J. exp. Psychol.*, 1952, **44**, 51-55. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

8043

In a study of the factors involved in a person's ability to respond to one of two synchronous messages, a total of 54 subjects divided into five groups were required to respond to one of two messages under varied conditions of one presentation for each group: Group I received the usual auditory call sign as the only cue; Group II received an additional visual call sign and pre-experimental instructions; Groups III and IV received the visual call sign under varied conditions of time of presentation; and Group V received only the auditory call-signs but modified to be more distinctive. The results are presented and discussed in terms of the relative performance efficiency of each of the above groups as indicative of the factors operant in message identification.

O. R 11

8047 Bilodeau, E.A. DECREMENT AND RECOVERY FROM DECREMENTS IN A SIMPLE WORK TASK WITH VARIATION IN FORCE REQUIREMENTS AT DIFFERENT STAGES OF PRACTICE. J. exp. Psychol., 1951, 41, 96-100. (USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.).

The Ss (N=40) practiced rotating a crank handle as fast as possible for 5 min. with either a light or heavy loading of the crank. One group practiced with the light load, a second group with the heavy load, and the third and fourth groups alternated between loads after each minute of practice but were not of phase. After a brief rest all groups practiced for 3 min. with the loading used just before the rest. During the first minute of practice, rate of responding dropped more rapidly with the heavy load than with the light load. Thereafter, differences between the loads remained fairly constant. After a brief rest both load groups recovered equally in terms of rate, but the heavy load group recovered more in terms of \dot{M} . When the two groups which had practiced under one load condition were instantaneously shifted to the other, rate output was approximately equal to that of the nonshifting groups. Furthermore, after rest both alternating groups spontaneously recovered to the level of their non-alternating controls as if unaffected by the alternation treatment of initial practice.

8049 Bilodeau, E.A. MASSING AND SPACING PHENOMENA AS FUNCTIONS OF PROLONGED AND EXTENDED PRACTICE. J. exp. Psychol., 1952, 44, 108-113. (USAF Perceptual & Motor Skills Research Lab., Lackland AFB, Tex.).

8049 To investigate the relation of 1) rate of responding early and late in a practice session and 2) amount of spontaneous recovery for relatively short and long rest periods to 1) amount and 2) distribution of previous practice, two groups of 26 airmen were required to practice cranking for eight min. on each of ten days; either continuously within each session or in two periods of four min. separated by a four-min. rest period. Mean numbers of revolutions per 20-sec. trials were plotted as a function of successive trials for different days; gain after rest was plotted as a function of successive recovery periods.

G. R. 6

8053 Brissenden, R.F. SOME GROUND MEASUREMENTS OF THE FORCES APPLIED BY PILOTS TO A SIDE-LOCATE AIRCRAFT CONTROLLER. Tech. Note 4171, Nov. 1957, 17pp. National Advisory Committee for Aeronautics, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).

8053 This paper reports the results of ground tests made to determine pilots' force capabilities on a proposed side-located aircraft controller. The controller is located at one side of the cockpit and situated so that the pilot's arm may be supported. The axes of the controller are in a plane through the center of the pilot's forearm to minimize the effects of acceleration forces. The ability of 11 pilots to apply forces in two directions at various angles of roll and pitch was determined; and the optimum neutral position, as well as the range of deflections of the hand grip, was established.

T. G. I. R. 4

8054 Mech, E.V. FACTORS INFLUENCING ROUTINE PERFORMANCE UNDER NOISE: I. THE INFLUENCE OF "SET". J. Psychol., 1953, 35, 283-298. (Indiana University).

8054

To evaluate the influence of set upon performance under conditions of noise, four groups of 15 subjects each performed a verbal addition task for 30 minutes a day for eight days (under two conditions each day: noise and quiet). Noise was provided by a commercial recording of a narrative description of news events (at average intensity of 70 db). Three of the groups performed the task following instructions designed to introduce a set concerning performance under noise vs. quiet conditions (on the basis of false experimental results). The results are presented and discussed in terms of level of performance under noise-quiet conditions as a function of the particular set or orientation towards that condition.

T. G. R. 13

8058

Perlmutter, H.V. GROUP MEMORY OF MEANINGFUL MATERIAL. J. Psychol., 1953, 35, 361-70. (MIT).

8058

In an investigation concerned with group memory of meaningful material, 16 groups comprised of eight two-person groups and eight three-person groups were read the story "War of Ghosts" twice and then asked to recall the story 15 min. and 24 hours after hearing it. Ten individuals working in isolation served as a control group. The story was divided into meaningful segments and the recall was scored according to number of segments reproduced. The results are presented and discussed in terms of a comparison among the two-person and three-person groups, and the control Ss with regard to the amount of recall.

T. R. 6

8059

Grice, G.R. & Reynolds, B. EFFECT OF VARYING AMOUNTS OF REST ON CONVENTIONAL AND BILATERAL TRANSFER "REMINISCENCE". Contract AF 33(038) 25726, Res. Bull. 3, 42, Dec. 1952, 6pp. USAF Perceptual and Motor Skills Lab., Lackland AFB, Tex. (University of Illinois, Urbana, Ill.). (Reprinted from: J. exp. Psychol., Oct. 1952; 44(4), 247-252).

8059

Two experiments dealing with reminiscence and "bilateral reminiscence" in motor performance as a function of length of rest interval are reported. The Ss, 432 right-handed basic trainees, received 15 30-sec. practice periods with the Air Force Rotary Pursuit Test prior to a rest period of .1, .5, 1, 3, 5, or 10 min. Practice was with the left hand before and after rest or with the right hand before and the left hand after rest. Results are presented as time-on-target and post-rest gain scores.

T. G. R. 15

8060

MacLeod, S. A CONSTRUCTION AND ATTEMPTED VALIDATION OF SENSORY SWEETNESS SCALES. *J. exp. Psychol.*, Nov. 1952, **44**(5), 316-323. (Hobart College, Geneva, N.Y.).

The present paper is an attempt to assess the validity of sweetness scales based on fractional judgments of one-half. The following conclusions may be drawn from the present experiment: a) Log concentrations of sucrose and glucose judged half bear a linear relationship to log concentrations of sucrose and glucose standards. In the case of glucose the equation describing this relationship is $\log I = .651 \log S + .043$; in the case of sucrose the equation is $\log I = .681 \log S - .110$. b) Log concentrations of glucose bear a linear relationship to equally sweet log concentrations of sucrose as given by the equation: $\log I \text{ glucose} = .681 \log I \text{ sucrose} + .439$. c) Inasmuch as hypothetically valid fractionation functions for both sugars could be fitted (within S-to-S variability) to the obtained fractionation values, it would appear reasonable to assume that the method of fractionation did, in this instance, provide data for valid interval scale construction.

R 12

8061

Doty, L.L. CAA CENTER TACKLES TRAFFIC CONTROL. *Aviation Week*, June 3, 1957, **66**(22), 187-193.

8062

This article describes the organization and function of the Civil Aeronautics Administration's Technical Development Center (TDC). With the general problem that of developing an optimally effective airway and air traffic control system, research has centered upon such specific problems as the following: development of an automatic electronic display of flight information, the development of air traffic control coordinating equipment, evaluation of contemporary radar equipment and long-range radar needs, the study of time representation and protective measures in the air, and many other projects of pertinence to traffic control.

8062

Taylor, D.W. & Faust, W.L. TWENTY QUESTIONS: EFFICIENCY IN PROBLEM SOLVING AS A FUNCTION OF SIZE OF GROUP. *J. exp. Psychol.*, 1952, **44**, 360-368. (Stanford University, Stanford, Calif.).

8062

To determine how efficiency in problem-solving varies with the size of the participating group, 105 Ss were divided into 15 individuals, 15 groups of 2, and 15 groups of four and were required to work four problems ("Twenty Questions") a day for four successive days. All Ss then worked four problems individually on the fifth day. Data are presented as time and questions per problem and are analyzed with respect to amount of previous practice, as well as size of group.

T. G. R 4

8063

Riopelle, A.J., & Stritch, T.M. PLACING PRECISION AND ANGLE OF REGARD. *J. exp. Psychol.*, 1952, **44**, 407-409. (Emory University).

8063

To study the relative effects of angle of regard and monocular vs. binocular vision upon perceptual-motor performance and, more specifically, the manipulation of small objects (placing precision), 18 groups of six subjects each were presented with tasks of placing pegs in a pegboard. Nine of the groups viewed the pegboard monocularly while the remainder viewed it binocularly. The nine groups of each viewing condition were tested at nine angles of regard (varying from 0 to 90°). The results are presented and discussed in terms of accuracy of performance as indicative of the relation between viewing condition and angle of regard.

G. R 2

8064

Broadbent, D.E. FAILURES OF ATTENTION IN SELECTIVE LISTENING. *J. exp. Psychol.*, 1952, **44**, 428-433. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

8064

In this study of failures of attention in selective listening, the general procedure consisted of presenting subjects with a series of yes-no questions concerning a visual display by means of a tape recorder. Following training in this procedure, a total of 32 subjects divided into five groups performed under the following variations of the task: (1) synchronous presentation of two messages; (2) the presentation of two questions by two methods: (a) one following the other, and (b) alternate words of each; (3) same condition as (2) but subjects required to answer only one of the questions; and (4) variations in availability of vocal cues. The results are presented and discussed in terms of percentage of mistakes as a function of the particular conditions of message presentation and conditions of response. T. R 8

8065

Eggington, E.S. KINESTHETICALLY GUIDED MOVEMENTS OF HEAD AND ARM. *J. Psychol.*, 1953, **46**, 51-57. (Psychology Dept., Kansas State College, Pittsburg, Kans.).

a) 2 experiments were conducted to determine the influence of certain factors upon the ability of a person to look where he is pointing or to point where he is looking, when vision of his pointing hand and arm are excluded. b) Differences in variability and differences of mean errors were both taken into consideration in the statistical analysis of the data. Mean errors were computed, considering the direction of the errors as well as the magnitude. c) The variability of localizing responses was found to be greater when a person looks where he is pointing than when he points where he is looking. d) In turning to where they were pointing, Ss did not move their heads far enough. When the arm was moved angularly, analogous to head movement, and in a constant direction (no back-tracking) Ss did not move the arm far enough when they were trying to point where they were looking.

8069

Garvey, W.D. THE INTELLIGIBILITY OF SPEEDED SPEECH. *J. exp. Psychol.*, 1953, **45**, 102-108. (USN Research Lab., Washington, D.C.).

8069

In an investigation of intelligibility of speeded speech, 96 subjects were presented with taped accelerated speech produced by a drop-slice technique. Eleven experimental tapes representing various relations between the amount of removed and remaining segments of speech patterns were used. The results are presented and discussed in terms of the general effect of acceleration on intelligibility, the effect of the amount of speech pattern removed, and the size of the drop removed with acceleration held constant.

8079

Swartz, P. A NEW METHOD FOR SCALING PAIN. *J. exp. Psychol.*, 1953, 45(5), 288-293. (University of Rochester, Rochester, N.Y.).

An algometric technique using 60-cycle alternating current as the stimulus and the tooth pulp as the site of contact has been described. By this method 24 male and 21 female Ss successively bisected pain intensities. For both sexes curves plotted for successive bisections against fractions of fractionating range have the same shape regardless of the actual size of the range being fractionated. Reversing the order of stimulus presentations and the direction in which S changes the size of the stimulus, reverses the direction of acceleration of the curves. Compensating for differences in fractionating technique indicates that the relation between the intensity of the stimulus and the estimation of its painfulness approximates a straight line with a slope fairly close to 1. It is concluded that: a) Within the range of intensities employed in this study, there is a one-to-one relationship between the intensity of the stimulus and the estimation of its painfulness; b) there are no sex differences in pain scaling behavior.

R 10

8080

Wertheimer, M. AN INVESTIGATION OF THE "RANDOMNESS" OF THRESHOLD MEASUREMENTS. *J. exp. Psychol.*, 1953, 45(5), 294-303. (Wesleyan University, Middletown, Conn.).

Successive measurements of auditory, visual, and pain thresholds were obtained at 6-sec., 1-min., 3-min., and 1-day intervals on a series of Ss. These psychophysical thresholds were subjected to 5 different kinds of analysis: autocorrelation, estimated power-spectrum transformation of the autocorrelation function, correlation of the thresholds of 2 modalities measured over the same period of time on the same S, correlation of the spectra of the thresholds of 2 modalities taken over the same period of time on the same S, and analysis of variance. The data obtained tended to confirm the hypothesis that the variations of thresholds in time, under normal conditions, are not "random". This evidence is: a) Reliable changes in thresholds can be shown to occur in S from day to day, b) changes in the thresholds of different modalities are slightly correlated, c) successive threshold measurements are not independent, d) some thresholds can be shown to undergo cyclical drifts, and e) the patterns of variation of thresholds of different modalities over the same time interval in the same S are not unrelated. The relevance of these findings for an approach to the total organism is discussed.

R 16

8085

Pattu, W.A., & Mech, V.E. INTERRUPTION: ITS EFFECT UPON PERFORMANCE IN A "TROUBLE-SHOOTING" SITUATION. *J. Psychol.*, 1953, 36, 153-64. (Indiana University).

8086

To investigate the effect of interruption upon performance in a "trouble-shooting situation", 27 female college students received training on the operation and location of defects in a gear-train apparatus. Each S then received three trouble-shooting problems under one of three test conditions: 1) interrupted during trouble-shooting, 2) interrupted after locating defect, and 3) no interruption. The results are presented and discussed in terms of the comparative ability to locate defect evidenced in each test condition.

T. G. I. R 8

8086

Hundy-Castle, A.C. & McKiever, B.L. THE PSYCHOPHYSIOLOGICAL SIGNIFICANCE OF THE GALVANIC SKIN RESPONSE. *J. exp. Psychol.*, 1953, 46(1), 15-23. (National Institute for Personnel Research, South African Council for Scientific and Industrial Research.).

The GSR's of 109 normal Ss were recorded while auditory stimuli were given at 30-sec. intervals. Recordings continued until adaptation occurred or until 35 stimuli had been presented. EEG's were independently recorded. GSR's were classified as labile, stable, and stable/labile. It was found that labiles tended not to adapt to the stimuli, whereas, stables did, their adaptation rate being significantly correlated with alpha frequency. Mean age of the labile group was significantly lower than that of the stable group. 2 factors were thought to have contributed to these results: a) A factor determining the relative strength of excitatory/inhibitory processes, which is also related to alpha frequency; b) Extent of cortical restraint over lower autonomic centers, this probably related to a maturation factor. (HEIAS)

R 40

8090

Slack, C.W. SOME CHARACTERISTICS OF THE "RANGE EFFECT". *J. exp. Psychol.*, 1953, 46(2), 76-80. (Princeton University, Princeton, N.J.).

The study aimed at discovering the shape of the range-effect error curve and the shape of the distributions of response errors under conditions of varying speed stress resulting from increasing stimulus frequency. The shape of the range-effect curve for a particular sequence of stimuli was found to be S-shaped on the average. The distributions of error at each input amplitude were found to have modes near zero and to be skewed toward the mean of the input distribution. Under conditions of lower speed stress the range effect decreases, the error curves flatten out, the SD's of the distributions of response errors to extreme inputs decrease and the distributions tend to be less skewed. A model for the range effect proposed by Craig was discussed in the light of these results. (HEIAS)

R 7

8091

Bendig, A.W. & Hughes, J.B., II. EFFECT OF AMOUNT OF VERBAL ANCHORING AND NUMBER OF RATING-SCALE CATEGORIES UPON TRANSMITTED INFORMATION. *J. exp. Psychol.*, 1953, 46(2), 87-90. (University of Pittsburgh, Pittsburgh, Penn.).

Ss (N = 225) rated themselves on their knowledge of 12 foreign countries on rating scales with 3, 5, 7, 9, or 11 categories and with these scales verbally anchored either in the center, at both ends, or at both center and ends. The data were analyzed within an information theory syntax as to the effect of variations in number of scale categories and amount of verbal anchoring upon the information transmitted by the scale. Results indicated an increase in the absolute amount of transmitted information as the number of scale categories was increased. Increased verbal anchoring of the rating scale resulted in a slight increase in the information transmitted by the scale.

R 7

8092

Poulton, E.C. TWO-CHANNEL LISTENING. *J. exp. Psychol.*, 1953, 46(2), 91-96. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

Selecting information from 2 simultaneous sources of speech was evaluated in terms of omissions (of which S was generally unaware) and mishearings, which were distributed independently. When relevant information was surrounded by irrelevant on the same channel, omissions exceeded mishearings. When it was covered by simultaneous irrelevant information on the other channel, mishearings predominated. Instructions to listen to both sources (distributed attention) gave more omissions than instructions to listen to one of them (restricted attention). This in turn gave more than instructions as to when and to what to listen (direct attention). Mishearings were independent of these instructions. Placing the speakers together increased both omissions and mishearings. Similarity of relevant material to irrelevant increased omissions; it also increased false selections, especially with the speakers together. When only one or neither source presented information continuously, omissions and mishearings were reduced, and none of these differences was significant. The results were discussed in terms of inattention and physical interference.

R 6

8093

Riopelle, A.J. & Chow, K.L. SCOTOPIC AREA-INTENSITY RELATIONS AT VARIOUS RETINAL LOCATIONS. *J. exp. Psychol.*, 1953, 46(5), 314-318. (Emory University, Atlanta, Ga. & Yerkes Labs. of Primate Biology, Yale University, New Haven, Conn.).

Absolute scotopic thresholds were determined for 10 areas of stimulation at each of 5 different retinal locations. All thresholds were made monocularly with the naked eye following at least 30 min. of dark adaptation. The largest area (subtending 57 min. of visual angle) was 64 times larger than the smallest area. The locations of retinal stimulation were 4, 8, 12, 24, and 48 degrees above the fovea. Stimulus durations were 50 and 250 msec. The authors alternated as S and as E. The results may be summarized as follows: a) There was a significant difference in over-all threshold at the various retinal locations; b) The longer the duration of the test flash, the lower the intensity required for threshold; c) The larger the stimulus patch, the lower the threshold; d) Area-intensity curves obtained at different retinal locations were parallel, indicating that within the range of this experiment the area-intensity relation is invariant with respect to locus of its determination.

R 12

8098

Mech, E.V., Schaefer, R.W. & Auble, D. THE EFFECTS OF "SET" ON GROUP PERFORMANCE UNDER STRONG AUDITORY STIMULI. *J. Psychol.*, 1953, 36, 187-194. (Institute of Educational Research, Indiana University, Bloomington, Ind.).

The purpose of the experiment was to study the effects of "set" upon group performance under noise. The following procedure was used. 3 high school groups of 13 Ss each worked at a routine coding task 20 minutes a day for 5 days under the following conditions. For 10 minutes of each session the groups worked under noise stimulation of 85 db, while for the remaining 10 minutes the groups worked under quiet conditions. Noise and quiet conditions were alternated in a simple ABBA sequence. One group was told only that they were serving in an experiment on the effects of noise. Of the remaining 2 groups, 1 was given a set to perform better under noise while the other was given a "set" to perform better under quiet. Analysis of the data indicated: a) The pre-task "sets" did not influence differential group results in the desired direction; b) Noise stimulation of an 85 db intensity level does not appear to have any effect upon routine performance.

R 5

8099

Bilodeau, E.A. & Bilodeau, Ina McD. THE CONTRIBUTION OF COMPONENT ACTIVITIES TO THE TOTAL PSYCHOMOTOR TASK. *J. exp. Psychol.*, Jan. 1954, 47(1), 37-46. (USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.).

Data for 2 multidimensional tracking tasks analyzed by components and total task were presented in an introductory analysis of the relative contribution of components to the total task. Whether the total task represented 2 or 3 components, the analysis (by trials) suggested that, as a first approximation, time of scoring in one component was essentially independent of times of scoring in the remaining components. The hypothesis of independence was tested by multiplication of the separate proportions of time on target and comparing the resulting value with that obtained by observation of the proportion for the total task. The comparison showed that fairly accurate prediction of total-task means and variances can be made, although small but systematic deviations suggest the need for additional research. The analysis brought out the implication that total-task performance can be improved by a redistribution of the on-target component proportions. Thus, for example, for a 2-component task, raising the proportion for one relatively low component at the expense of the second will raise the proportion of the total or criterion. In this way it is suggested that overall proficiency on some tracking tasks might be improved without raising S's general skill level. Methods for bringing about redistributions are still untested.

R 5

8100

Obonai, T. INDUCTION EFFECTS IN ESTIMATES OF EXTENT. *J. exp. Psychol.*, 1954, 47(1), 57-60. (Tokyo University of Education, Tokyo, Japan).

A series of observations with many figures has shown that the sizes of line, circles, squares, triangles, etc., are a) overestimated when they appear near small-to-medium extents, and b) underestimated when they appear near large extents. The data are considered in relation to a concept of physiological induction. The present account presumes that overestimation and underestimation of visual extents represent antagonistic processes. (HEIAS)

R 9

8101
Sellers, Virginia L. ON READING RELATED
MATERIAL WITH ENHANCED LIGHT. J. Gen.
Psychol., 1954, 47, 135-137. (Allison Col-
lege).

8102
The author presents a critical review of a contem-
porary article dealing with the use of the Heide-Burley
effect to increase the readability of low-contrast
printed matter. Referring to her own research, she sug-
gests that a re-examination of the results presented by
the authors in question leaves their belief that decrease
in print visibility paralleled the Heide-Burley effect rather
than the Heide-Burley effect.
S. R 2

8103
Pitts, P.W. THE DISCRIMINATION CAPACITY OF THE HUMAN MOTOR
SYSTEM IN DISCRIMINATING THE AMPLITUDE OF MOVEMENT. J. Gen.
Psychol., 1954, 47, 381-391. (Ohio State University,
Columbus, Ohio).

8104
Utilizing certain concepts of information theory,
this study attempts to relate the Weber function (vari-
ability of response as function of amplitude) to the phe-
nomenon of variability as a function of duration of re-
sponse. Specifically, three experiments are reported
which test the hypothesis that average duration of re-
sponse is directly proportional to minimum average amount
of information per response provided to the subject by
his own motor system in a particular task. A total of
fifty-two subjects were used in three experimental tasks
(recognition tapping, disc transfer, pin transfer) in
which amount of information available to the subject was
related to optimal motor performance. The constancy of
performance capacity of the human motor system is dis-
cussed. T. I. R 25

8105
Poulton, E.C. TWO-ALTERNATIVE SPAN IN SIMPLE SERIAL
TASKS. J. Exp. Psychol., 1954, 47, 403-410.
(Applied Psychology Research Unit, Medical
Research Council, Cambridge, England).

8106
In an investigation of the psychological factors
which determine eye-hand span in simple serial tasks,
79 subjects performed a three-choice double-joint task
and learned step-tracking tasks under conditions
designed to (1) determine the limits of eye-hand span
range, and (2) reduce eye-hand span to .30 seconds (in
an eight response three-choice task). The results are
presented and discussed in terms of the variations in
eye-hand span range, the effect of display speed upon
span, the effect of varied response lag upon performance,
and the effects of the attempt to reduce eye-hand span
(i.e., number of errors, omissions, etc.).
T. R 6

8107
Baker, C.A. INTERPOLATION ACCURACY AS A
FUNCTION OF VISUAL ANGLE BETWEEN SCALE MARKS.
J. Exp. Psychol., 1954, 47, 435-436. (Aero
Medical Laboratory, WADC, Wright-Patterson
AFB, Ohio).

8108
In a study of interpolation accuracy as a function
of visual angle between scale marks, 15 subjects were
required to estimate the position of a series of 125
targets presented between two concentric circles (range
rings) at varied range ring separations (1/8, 1/4, 1,
2, and 4 in.) and varied viewing distances (10, 15, 20,
30, and 40 in.). Visual angle subtended by the range
rings varied from 22' to 22°35'. The results are pre-
sented and discussed in terms of average error scores as
a function of ring separation. The effect of viewing
distance is also discussed.
G. R 5

8109
Ross, S. A STUDY OF SHOOTING GLASSES BY MEANS OF FIRING ACCURACY. J. Appl. Psychol., 1950,
34, 118-122. (Bucknell University, Lewisburg, Penn.).

6 different types of plastic filters were tested at shooting glasses at the rifle range.
Camp Lejeune, North Carolina. A neutral, clear plastic was used as a control. The Ss were
2) riflemen with the highest qualifications. They fired the standard M1 rifle from the
prone position at an 18" target from a distance of 100 yards. The shots were plotted immedi-
ately on reduced scale sheets of target design. The accuracy of fire was determined by the
standard method, known as the Mean Radius method. No statistically significant difference
in performance, as determined by the Mean Radius scores, was found between firing with glasses
and firing without glasses. No significant day-to-day trends were found. The major conclu-
sion reached was that the use of the plastic filters did not enhance range firing accuracy.
R 1

8110
Williams, A.C., Jr. & Roscoe, S.M. EVALUATION OF AIR-
CRAFT INSTRUMENT DISPLAYS FOR USE WITH THE OMNI-DIREC-
TIONAL RADIO RANGE (ODR). J. Appl. Psychol., 1950, 34
(2), 123-130. (University of Illinois, Urbana, Ill.).

8111
To measure the speed and accuracy with which 45
pilots used mockups of eight aircraft instrument dis-
plays for use with the omni-directional radio range
(ODR), three groups of pilots—military, commercial
with instrument rating, and scheduled airline—
were required to solve ten problems drawn for each
display. Time and error scores are analyzed with re-
spect to pilot groups and displays.
T. I. R 2

8112
Lawhe, C.H. & Cary, W. VERBALIZATION AND LEARNING A
MANIPULATIVE TASK. J. Appl. Psychol., 1952, 36(1),
44-46. (Occupational Research Center, Purdue Univer-
sity, Lafayette, Ind.).

8113
To determine the effect of verbalization on the
number of trials required to learn a manipulative task,
52 Ss (college students) in two matched groups were
required to learn to assemble subtest A-4 of the Purdue
Mechanical Assembly Tests. The experimental and con-
trol groups underwent identical treatment except for
the experimental Ss being required to "talk back" the
trainer's instructions as they assembled. The groups
are compared with respect to trials required to meet
a performance criterion and to errors on the first
three trials.
R 2

8110

Levitt, C.M. ERRORS OF INTERPOLATION IN INSTRUMENT READING AND SETTING. *J. appl. Psychol.*, 1952, 36, 49-52. (Lehigh University, Bethlehem, Penn.).

30 Ss of both sexes and of various ages and occupations were required to make interpolations between marks 10 mm. apart in 3 different situations: a) reading from a slide rule set by experimenter to exact tenths; b) setting the rule to tenths; and c) reading tenths from Miller cards. Each S made 304 interpolations in each of the 3 situations. Results showed large individual differences among Ss. Slide rule reading errors range from 0 to 87. Slide rule setting errors in excess of half a unit ranged from 6 to 134. Errors in reading Miller cards ranged from 0 to 77. Correlations between slide rule readings and the mean discrepancy in setting was .62, between slide rule readings and errors over .5 was .61, and between slide rule readings and Miller card readings was .37. In all 3 methods errors were made less frequently at position 5 than at any other. Readings at positions 1, 2, 8, and 9 showed an inward bias, possibly due to the use of the end lines as reference points. Readings at positions 3, 4, 6, and 7 showed an outward bias, possibly due to the use of an imaginary line at the center as a reference point.

R 1

8112

Flesch, R. REPLY TO "SIMPLIFICATION OF FLESCH READING EASE FORMULA". *J. appl. Psychol.*, 1952, 36, 54-55.

In a paper entitled "Simplification of Flesch Reading Ease Formula", Farr, Jenkins and Peterson proposed to replace the count of syllables per 100 words by a count of the number of one-syllable words per 100 words. In the present paper this proposition is criticized.

(HEIAS)

R 3

8113

Farr, J.W., Jenkins, J.J., Peterson, D.G. & England, G.W. REPLY TO KLARE AND FLESCH RE "SIMPLIFICATION OF FLESCH READING EASE FORMULA". *J. appl. Psychol.*, 1952, 36, 55-57. (University of Minnesota, Minneapolis, Minn.).

The authors produce experimental evidence that their suggestion of counting one-syllable words is faster than Flesch's syllable count. The mean time in seconds for making the one-syllable word count and looking up the reading ease scores was 82 with a standard deviation of 36.8. The corresponding numbers for the syllable count were 147 and 62.8 respectively. The authors also reply to other criticisms by Klare and Flesch.

(HEIAS)

R 5

8114

Zachert, Virginia & Levine, A.S. EDUCATION AND PREDICTION OF MILITARY SCHOOL SUCCESS. *J. appl. Psychol.*, 1952, 36, 266-268. (USAF Personnel Research Lab., Lackland AFB, Tex.).

8115

The use of years of formal education as a predictive variable in Air Force training programs was explored. Validity coefficients obtained for the first form of the Airman Classification Battery in predicting final grades in 32 technical schools are compared with coefficients obtained for years of education. The contribution of years of education to the multiple correlation coefficient for predicting final grades is also shown.

7, R 3

8116

Manolakes, G. THE EFFECTS OF TACHISTOSCOPIC TRAINING IN AN ADULT READING PROGRAM. *J. appl. Psychol.*, 1952, 36, 410-412. (State Education Department, University of the State of New York, New York, N.Y.).

8116

In a study of the effects of omitting tachistoscope training from the Reading Improvement course at the Marine Corps Supply Schools, two matched groups of subjects (Marine Corps officers) underwent training in improvement of reading for 36 sessions. One group received 18 sessions with the tachistoscope; the other group received additional training in vocabulary and reading comprehension during equivalent sessions. Pre- and post-test scores obtained by the groups on the Ophthalmograph in number of fixations, number of regressions, span of recognition, and duration of fixations are compared.

2

8115

Rubin, G., Von Trebra, Patricia & Smith, K.U. DIMENSIONAL ANALYSIS OF MOTION: III. COMPLEXITY OF MOVEMENT PATTERN. *J. appl. Psychol.*, 1952, 36, 272-276. (University of Wisconsin, Madison, Wisc.).

Due to the lack of experiments of a systematic nature which, with meaningful definitions and observations, demonstrate what conditions of complexity produce variations in efficiency of motion, this study was deemed necessary. Results indicate that variations in the complexity of a movement pattern in terms of the number of directional dimensions involved do not produce noteworthy changes in the efficiency of the manipulation and travel components of the movement. This study substantiates previous work in showing that it is mainly the manipulation component of a motion pattern that is influenced by practice and not the travel component. The present data point up a fundamental weakness of the traditional generalized approach to the study of psycho-motor learning, as well as concepts which have been derived from such an approach. The study suggests that a real problem of reliable measurement exists in the analysis of psycho-motor activity and that this problem may be avoided only by separate measurement of the unrelated components of the work task. The principles and techniques of motion study described here provide the basis for such new approaches to the study of reliability of performance in skilled movements.

(HEIAS)

R 3

8117

Zaccaria, A., Jr. & Bitterman, H.J. THE EFFECT OF FLUORESCENT FLICKER ON VISUAL EFFICIENCY. *J. appl. Psychol.*, 1953, 36, 413-416. (University of Texas, Austin, Tex.).

The experiment here reported was designed to study the effects of fluorescent lamp flicker upon visual fatigue. Performance of a standardized visual task was measured for 2 30-min. periods under 20 ft-candles of fluorescent daylight illumination. During 1 of the periods the lamps were operated with direct current, while during the other period they were operated with alternating current. In this way spectral characteristics, brightness level, and distribution were constant, with flicker being the only variable. Performance did not differ significantly under the 2 conditions, but the A.C. condition produced a significantly greater drop in critical fusion frequency than did the D.C. Only 25% of the 26 Ss detected a difference between the 2 conditions of illumination, but those that did uniformly expressed a preference for the D.C. condition. It may be concluded that single-lamp, or in-phase, multiple-lamp fluorescent installations are undesirable. Further experimentation is needed for the evaluation of out-of-phase installations.

R 20

8118

Gray, J.S., Sostare, G. & Thompson, A. AN APPARATUS FOR MEASURING OPERATIONAL HAND STABILITY. *J. appl. Psychol.*, 1953, 37(1), 57-58. (University of Georgia, Athens, Ga.).

This study attempted to investigate the contention that the degree of skill is affected by hand steadiness. An apparatus was devised to measure hand steadiness in 3 dimensions. Tests indicated that hand operational steadiness and hand static steadiness were not related. The stationometer is apparently a reliable instrument and may have some usefulness in selecting apprentices for various skilled occupations. (NEIAS)

R 1

8120

Ash, P., & Eobaugh, T.R. SOME PRIMARY RATABLE CHARACTERISTICS OF INSTRUCTIONAL FILMS. *J. appl. Psychol.*, 1953, 37, 293-29. (Penn. State College)

8120

To determine the extent to which the effectiveness of an instructional film (in terms of amount learned by the viewer) is intercorrelated with estimates of rated teaching effectiveness and rated affective quality, 276 high school and college students in seven groups were required to 1) see a film three times and rate it continuously with respect to teaching effectiveness or affective quality, or 2) see the film once and answer a multiple-choice test on the contents, or 3) take the test without having seen the film. An intercorrelated matrix for learning gains and ratings is presented.

R 2

8121
Edwards, A.S. THE RELATION OF LIGHT INTENSITY TO ACCURACY OF DEPTH PERCEPTION. *J. appl. Psychol.*, Aug. 1953, 37(4), 300-301. (University of Georgia, Athens, Ga.).

The experiment was performed to discover the relation of light intensity to the accuracy of visual depth perception. A series of 4 experiments was performed using university students with corrected or uncorrected vision of 20/20. Vision was checked on the Ortho-Rater. Color blind Ss were eliminated. 50 Ss and a 100-ft. and a 50-ft. light were used. The task was to align a movable object with a stationary one. The findings were: a) in terms of averages alone, it appears that Ss were more accurate in depth perception with greater illumination rather than with less; b) analyses of the data show that from 1/5 to 1/4 of the Ss were more accurate with less rather than more intense illumination; c) it appears that no one intensity of illumination was optimal for all Ss. (NEIAS)

R 1

8122
White, W.J., Warrick, M.J. & Grether, W.F. INSTRUMENT READING III: CHECK READING OF INSTRUMENT GROUPS. *J. appl. Psychol.*, Aug. 1953, 37, 302-307. (Aero Medical Lab., Wright-Patterson AFB, Ohio).

The paper summarizes a series of Exps. concerning the effect of variation in pointer alignment position, in dial diameter, and in pointer design on check and qualitative reading of instrument groups. Conclusions reached were: a) The pointer alignment position has little effect on simple check reading involving the mere detection of a pointer deviation; b) Uniform horizontal or vertical pointer alignment facilitates instrument check reading; c) Pointer alignment at the 9 o'clock position is optimum for qualitative reading; d) Pointer modifications of the type employed in the present exp. do not accomplish a satisfactory reduction in difficulty of detecting 180-degree deviation errors; e) A 1 3/4-inch instrument dial appears superior to either a larger or smaller dial in terms of the number and duration of eye fixations while check reading. (NEIAS)

R 8

8123

Parker, J.W. PSYCHOLOGICAL AND PERSONAL HISTORY DATA RELATED TO ACCIDENT RECORDS OF COMMERCIAL TRUCK DRIVERS. *J. appl. Psychol.*, Aug. 1953, 32(4), 317-320. (Tufts University, Medford Mass.).

This study has been concerned with studying the relationship of certain psychological and personal history data to the accident records of a sample of commercial truck drivers. The accident data used were of 2 types - preventable accidents and non-preventable accidents, and were equated for the number of miles driven. The Ss for the study were 104 commercial truck drivers employed by a large East Coast trucking concern. For each of the criterion groups 2 types of analyses were made: a) the significance of differences between the upper and lower halves of the accident group was computed; and b) the significance of differences between the accident and non-accident group was computed. In addition, a Sherry-Bohlittle Shrout-Multiple Coefficient of Correlation was computed for 4 of the variables and the criterion score based on the first analysis of significance of differences. From this study the following conclusions can be drawn: a) A difference seems to exist between preventable and non-preventable accidents. b) Psychological traits, as well as sensory capacities, are important in analyzing the accident liability for preventable accidents, while only personal history data and sensory capacities seem to be important in analyzing the accident liability for preventable accidents, while only personal history data and sensory capacities seem to be important in analyzing the accident liability for non-preventable accidents. This study also demonstrated the applicability of a technique for controlling exposure to accident hazard; that is, using the number of accidents per unit mileage rather than just the total number of accidents.

R 3

8124

Morgan, W.J. & Morgan, Antonia B. LOGICAL REASONING WITH AND WITHOUT TRAINING. *J. appl. Psychol.*, 1953, 32(5), 399-401. (Aptitude Associates, Merrifield, Va.).

8124

To determine whether formal training in logic is necessary for logical thinking to occur, two matched groups of 67 persons each were given the Morgan Test of logical reasoning. Members in one group had had no training in logic, while members in the other had had at least three semester hours of college training in logic. A third group consisted of nine Ss with the Ph. D. degree and no training in logic. Differences between the groups in scores obtained on the test were analyzed statistically.

R 12

8126 Johnson, K.W. CHECK-READING AS A FUNCTION OF POINTER SYMMETRY AND UNIFORM ALIGNMENT. *J. appl. Psychol.*, Oct. 1953, 32(5), 407-411. (State College of Washington, Seattle, Wash.).

A tachistoscopic study in which simulated instrument dials were observed at short exposure was performed to determine efficiency in locating deviating dial pointers in 4 instrument panels employing the principles of uniform alignment, pointer symmetry, and sub-grouping of pointer pattern. A null hypothesis was stated that the 4 patterns would equally well facilitate check-reading. Ss totalled 48 naive male students. The results of the experiment allow a statement of the following tentative conclusions: a) Configurations in this experiment employing pointer symmetry facilitate check-reading equally as well as do panels with uniform alignment. There is reasonable evidence that one of the former type is superior to the latter in terms of number of correct responses, and that another might prove superior with practice. The null hypothesis was rejected. b) Panels employing pointer symmetry and uniform alignment are superior to sub-groups for check-reading. c) Check-reading improves with a relatively short amount of practice and some transfer exists between panels with differing pointer positions. d) It was suggested that the use of a rectangular sixteen-dial panel of aircraft engine instruments with rotatable dials would facilitate rapid check-reading, and that these principles might profitably be applied in other situations where multi-engine panels are used.

R 14

8127

Rock, M.L. VISUAL PERFORMANCE AS A FUNCTION OF LOW PHOTOPIC BRIGHTNESS LEVELS. *J. appl. Psychol.*, Oct. 1953, 32(5), 412-427. (C.N. Hay & Associates, Inc., Philadelphia, Penn.).

A systematic investigation of performance in visual tasks as a function of low photopic brightness levels was attempted. 4 types of visual tasks were investigated: judgment of magnitude of an illusion, absolute threshold for motion, depth perception and a simple addition task. All tasks were investigated under 5 brightness levels in the range of .005 foot-lamberts to 1.00 foot-lamberts. In each of the experiments, critical brightness levels were found below which performance was increasingly poor. Increased brightness above the critical level improved performance relatively little or not at all. The critical level for motion threshold was .1 foot-lamberts; for the other tasks approximately .05 foot-lamberts. It was suggested that for maximum performance on visual tasks, with minimum brightness, illumination should be adjusted to yield brightness values of .05 to .1 foot-lamberts.

R 42

8128
 Cohen, J., Vanderplas, J.H. & White, V.J. EFFECT OF VIEWING ANGLE AND PARALLAX UPON ACCURACY OF READING QUANTITATIVE SCALES. *J. appl. Psychol.*, Dec. 1953, 37(5), 482-486. (Antioch College, Yellow Springs, Ohio).

Two experiments were performed to evaluate and quantify the effects of decreased viewing angles and parallax upon accuracy of reading instrument scales. In the first experiment, viewing angles were varied, and subject-controlled tachistoscopic presentation of the stimulus was used. Dial photographs were used as stimulus materials to isolate effects of viewing angle from those of parallax. The results show that reading errors increased as viewing angle decreased from 90° to 25°. Reading time was unaffected by changes in viewing angle. In the second experiment the effect of parallax was studied by requiring the Ss to align a movable pointer with a mark. The apparatus was set at viewing angles between 90° and 25°, and 4 pointer-mark displacements were used. The average error of the settings increased as the viewing angles decreased. The increase is approximated by a function proportional to the cosecant of the viewing angle. The constant error tends to increase systematically with viewing angle. With increasing pointer-mark displacement the average error tends to increase, but the constant error is inversely related to the amount of pointer-mark displacement. The error curves in both experiments are approximated by a function proportional to the cosecant of the viewing angle. An interpretation in terms of a least discriminable visual angle is advanced to account for the results.

R 6

8129
 Briggs, S.J., McDermick, E.J., & Kephart, N.C. THE EFFECT OF HAMMER SIZE ON EFFICIENCY IN THE TASK OF NAILING. *J. appl. Psychol.*, Feb. 1954, 38, 1-6. (Purdue University).

8129
 This is a study of the effect of hammer size upon efficiency in the task of nailing. Six hammers (7, 10, 13 and 16 oz. claw and 16 and 20 oz. rip hammers) were used by six subjects in nailing a variety of nails (both common wire and wire finishing nails ranging from 2 to 10 penny). The data were treated by analysis of variance and Tukey's process and the results are presented in terms of the significance of difference among the various factors, their interaction, and various significant hammer-nail combinations. Specific recommendations are offered concerning selection of hammer and nail for efficient performance.

T. R 308

8130
 Hodge, J., Jr. & Brown, A.H. EVALUATION OF COMMERCIAL ELBOW ADULT SIZE, ARTIFICIAL, INTERNAL ALTERNATING FOR ABOVE ELBOW AMPUTEES. Tech. Rep. 5741, Aug. 1957, 3pp. *USI Prosthetics Research Lab.*, Walter Reed Army Medical Center, Washington, D.C.

8130
 Two complete internal elbow units, commercially available, were evaluated according to regulations set forth in tentative standards approved at the FEB Clinic at the University of California at Los Angeles. The units were evaluated for design, construction, and appearance, and were submitted to both functional tests and tests of physical strength. Recommendations are made concerning approval of the two units.

8133
 Conrey, A.L. & Deskin, G. FURTHER RESULTS ON GROUP MANUAL DEXTERITY IN MEN. *J. appl. Psychol.*, 1954, 38(2), 116-118. (University of California, Los Angeles, Calif.).

A previously reported experiment was repeated with an altered design to test the former results and a hypothesis offered to account for the fact that group performance scores on a manual dexterity task could only be predicted rather imperfectly from knowledge of individual scores on a similar task. The hypothesis was offered that the prediction might be substantially improved by a change in design to make the group and individual tasks more comparable in the character of the operations involved. The amount of improvement in prediction obtained was so slight as to require the rejection of the hypothesis.

R 2

8131
 Daniels, H.W. & Edgerton, H.A. THE DEVELOPMENT OF CRITERIA OF SAFE OPERATION FOR GROUPS. *J. appl. Psychol.*, Feb. 1954, 38(1), 47-53. (Richardson, Bellows, Henry & Co., Inc., New York N.Y.).

The development of criterion measures of safety of operation for groups reported in this paper proceeded from a consideration of previous measures reported in the literature, to utilization of rating and ranking procedures to obtain preliminary criterion groups of motor vehicle units. The criterion was not accepted as valid, however, until an investigation of damages showed a relationship to the preliminary grouping of units. It is the authors' opinion that criteria derived from ratings or rankings should be verified by showing them to be related to some critical behavioral aspects of effectiveness, acceptable to the psychologist, to the raters, and to the groups being studied.

R 3

8132
 Kephart, N.C., & Deutsch, S. EFFECT OF ILLUMINATION ON SCORES WITH INSTRUMENT ACUITY TESTS. *J. appl. Psychol.*, 1954, 38, 59-60. (Purdue University).

8132
 This study was designed to evaluate the effect of variations in lighting (illumination), such as those which occur in industrial establishments as a function of variations in power source, upon the accuracy of visual acuity tests. Fifty-five subjects were tested on a standard Ortho-Rater under eight levels of illumination for both near and far acuity and right eye vs. both eyes. The results are presented and discussed in terms of the relative effect of change in illumination upon near and far acuity scores and upon acuity scores for one vs. two eyes.

T. R 3

8134

Harris, S.J., & Smith, K.U. DIMENSIONAL ANALYSIS OF MOTIONS. VII. EXTENT AND DIRECTION OF MANIPULATIVE MOVEMENTS AS FACTORS IN DEFINING MOTIONS. *J. appl. Psychol.*, 1954, 38, 127-130. (University of Wisconsin).

8135

This is a study of the effects of varying extent and direction of manipulative movements upon the component movements of travel and manipulation in the motion pattern. Utilizing an electronic motion analyzer (the analytic reactometer), 42 right-handed subjects were evaluated on performance of a repetitive switch-turning task under six varied experimental conditions (three extents of manipulation, 40, 80, and 120 degrees, and two directions of movement, clockwise and counterclockwise). Each subject performed one trial under each condition for seven consecutive days. Analysis of variance of the data for day one and day seven is presented along with learning curves for travel and manipulation components of motion. The relative effects of extent and direction upon performance are discussed in detail. T. G. R 6

8135

Sidman, M., Keller, F.S., Kennedy, E.J. & Wilson, M.P. TEACHING MORSE-CODE RECEPTION WITH SIGNALS WEIGHTED IN FREQUENCY ACCORDING TO THEIR DIFFICULTY. *J. appl. Psychol.*, Feb. 1955, 39(1), 1-4. (Columbia University, New York, N.Y.).

8135

To determine whether the learning of Morse code is facilitated when frequency of signal presentation is weighted according to difficulty, two groups of 19 college students were required to practice receiving Morse code for 26 sessions. The experimental groups was presented with signals each with frequency roughly proportioned to its difficulty for beginners as determined in a previous study. The control group received all signals an equal number of times. The groups are compared with respect to error scores obtained on successive test runs. T. G. R 7

8136

Safety Maintenance & Production THE SAFEST CAR IN THE WORLD. *Safety Maint. Prod.*, Dec. 1957, 114(6), 18-20, 26.

8136

This article describes an automobile designed and constructed with the safety of the occupants as its unique goal. Developed by the joint efforts of the Liberty Mutual Insurance Co., and Cornell Aeronautical Laboratory, Inc., the design presents such safety features as the following: adjustable control panel which also functions to secure the driver in his seat, lever control rather than steering wheel, bucket seats, a windshield providing 150 degrees of vision, a redesigned instrument panel with a warning light on each instrument to indicate malfunction, and many other features including modification of the structural design of the automobile body. I.

8137

Safety Maintenance & Production. SKID-WARNING SYSTEM FOR AIRCRAFT. *Safety Maint. Prod.*, Nov. 1957, 114(5), 22-29.

8137

This article describes the Skid-Warning System which utilizes a foot-thumping warning device to provide the aircraft pilot with knowledge of an impending skid. This system is contrasted with the automatic anti-skid system which automatically controls excessive brake pressure but offers the pilot little or no information concerning which tires are skidding. The new system provides "feel" along with complete control of the aircraft. The types of evaluative tests being conducted with this system are briefly described. I.

8138

Anon. UNAP PROBES SYSTEMS MAINTENANCE. *Aviation Week*, July 29, 1957, 67(4), 64-70.

8139

This article describes the research program of the Maintenance Laboratory of the U.S. Air Force Personnel and Training Research Center at Lowry AFB, Colorado. Two primary types of research are described, a technical program investigating devices, methods and techniques for the utilization, training and evaluation of maintenance personnel, and an operational program for the development of Qualitative Personnel Requirements Information (QPRI) on systems and weapons maintenance and service. Specific automation devices are described along with the problems inherent in their application. I.

8139

Anon. LABORATORY SEEKS SOUND INDEX. *Aviation Week*, Aug. 5, 1957, 67(5), p.25.

8139

A brief description is presented of the Douglas Aircraft attempt to devise an Acoustical Comfort Index for turbojet airliners. Its goal is to arrive at a meaningful unit of measure of the annoyance experienced by a passenger and attributable to noise. The major components of the experimental laboratory include an audition room, anechoic chamber, reverberation room, stress fatigue test room, and an analysis room. The anechoic chamber is illustrated. I.

8140

Anon. RUNWAY PLANS DESIGNED TO SPEED TRAFFIC. *Aviation Week*, July, 1957, 67(3), p.45.

8140

This article presents a brief description and illustration of a runway plan proposed by the Civil Aeronautics Administration. The plan was designed to increase the acceptance rate of air traffic by redefining the location of exits, taxiways and runways and by ensuring positive identification of each of these. A recommendation for holding apron design is also made.

8141: Bendig, A.M. RATER RELIABILITY AND THE HETEROGENEITY OF THE SCALE ANCHORS. *J. appl. Psychol.*, 1955, 39(1), 37-39. (University of Pittsburgh, Pittsburgh, Penn.).

Raters (N = 200) used 5-category rating scales, which varied in the heterogeneity of the verbal anchors defining the end categories, to rate for preference value two lists of 10 foods. The food lists differed in the homogeneity of food stimuli on each list. Measures of individual rater reliability and rater bias were computed and analyzed as to the effect of scale and list differences. Reliability was significantly smaller for the more homogeneous list and increased linearly as a function of the heterogeneity of the end anchors. Rater bias was unaffected by either scale or list differences. R 8

8142

Klare, G.R., Mabry, J.E., & Gustafson, L.N. THE RELATIONSHIP OF PATTERNING (UNDERLINING) TO IMMEDIATE RETENTION AND TO ACCEPTABILITY OF TECHNICAL MATERIAL. *J. appl. Psychol.*, Feb. 1955, 39, 40-42. (University of Ill-
1

8142

To determine the relationship of "patterning" (underlining of printed words) to the immediate retention and acceptability of technical material, three groups of 300 airman were required to read printed lessons on the "induction system" and on the "cooling system" of an aircraft engine in which 1) no words; 2) "important" words; or 3) words that were to appear as correct answers on a retention test were underlined. Scores obtained by the groups on a multiple-choice test of retention are compared and are analyzed with respect to the mechanical ability of the 5s; acceptability of material was measured by answers to three attitude questions.
T. R 9

8144

Leavitt, H.J. SOME EFFECTS OF CERTAIN COMMUNICATION PATTERNS ON GROUP PERFORMANCE. *J. Abnorm. soc. Psychol.*, 1951, 46, 38-50.

8144

To evaluate the effects of certain communication patterns upon group performance, a total of 100 subjects divided into appropriate groups were presented the task of discovering a single common symbol from among several symbols (printed on cards). Each group (5 subjects) received 15 trials in a workspace so designed as to provide a measurement of time of solution and type of communication pattern. Four types of communication patterns were utilized; chain, wheel, y, and circle. Additional analysis of the data was provided by a questionnaire and message analysis. The results are presented and discussed in terms of the relation between the particular communication pattern and such variables as number of messages transmitted, number of errors, enjoyment of the task, etc. T. G. I. R 2

8145

Festinger, L. & Thibaut, J. INTERPERSONAL COMMUNICATION IN SMALL GROUPS. *J. abnorm. soc. Psychol.*, 1951, 46, 92-99. (University of Michigan, Ann Arbor, Mich.)

The variables of a) amount of pressure toward uniformity existing in a group and b) the degree to which the members perceived the group as homogeneously composed, were manipulated experimentally in a laboratory setting of a discussion group to test certain hypotheses concerning the pattern of communication within the group and the amount of change in opinion which occurs. The results strongly support the theoretical hypotheses and may be summarized as follows: a) When there is a range of opinion in the group, communications tend to be directed towards those members whose opinions are at the extremes of the range. b) The greater the pressure toward uniformity and the greater the perception of homogeneous group-composition, the greater is the tendency to communicate to these extreme opinions. c) The greater the pressure toward uniformity and the greater the perception of homogeneous group-composition, the greater is the actual change toward uniformity which takes place.
R 7

8146

Mason, H.M. & Garrison, B.N. INTELLIGIBILITY OF SPOKEN MESSAGES: LINKED AND DISLINKED. *J. abnorm. soc. Psychol.*, 1951, 46, 100-103. (Whitman College).

8146

To evaluate the role of such value responses as liking and disliking in an individual's ability to transcribe noise-blurred messages (intelligibility), two groups of college students representing a total of 40 subjects were required to transcribe 63 noise-blurred messages. Twenty-one of these messages suggested activities generally liked by college students, another 21 suggested disliked activities, while the remainder were intended to suggest activities toward which such students would be indifferent. Following the performance, each subject received an accurate list of the messages and rated each in terms of like-dislike. The results are presented and discussed in terms of accuracy of transcription as a function of the valuing behavior reflected by the subjects. T. R 5

8149

Postman, L. & Brown, D.R. THE PERCEPTUAL CONSEQUENCES OF SUCCESS AND FAILURE. *J. abnorm. soc. Psychol.*, 1952, 47, 213-221. (University of California, Berkeley, Calif.).

8149

To investigate the role of stimuli connoting success and failure in perceptual relativity, three groups of subjects were defined as follows: a success group in which the subjects were given a context of success, a failure group in which subjects were given a context of failure, and a control group. The level of aspiration situation was used to define success and failure. All subjects received a span of apprehension test. The results are presented and discussed in terms of a comparison among the various groups with regard to their reaction to words connoting failure and words connoting success.

8153
Combs, A.W. & Taylor, C. THE EFFECT OF THE PERCEPTION OF MILD DEGREES OF THREAT ON PERFORMANCE. *J. abnorm. soc. Psychol.*, 1952, 47, 420-424. (School of Education, Syracuse University, Syracuse, N.Y.).

The prediction was made that the introduction of a mild degree of personal threat in the course of the solution of a simple task would result in an increase of time required to complete the task and of errors in performance. 50 college students were given the task of translating sentences into a simple code. Mildly threatening sentences were interspersed among neutral sentences. With a single exception, threat sentences required longer to complete and produced greater errors in translation. Experimental results appear to amply demonstrate the prediction.
R 9

8160

Bruner, J.S. & Rodrigues, J.S. SOME DETERMINANTS OF APPARENT SIZE. *J. abnorm. soc. Psychol.*, 1953, 48(1), 17-24. (Harvard University, Cambridge, Mass.).

One group of Ss was presented a penny, a nickel, and a quarter to judge; another judged correspondingly sized nickel-colored metal discs; a third judged gray cardboard discs. 60 Ss were in the "coin group", and 30 Ss were in each of the "disc groups". The Ss were children and were assigned randomly. 1/2 of each group were set to think of the buying power of money, and 1/2 were set to think about accuracy of size judgments. 1/3 of each group used a variable 6-chorded light figure for matching the sizes of coins or discs. Another 1/3 used a 9-chorded light, and a last 1/3 used a circular light figure. Order of presentation of the different sized coins was randomized for each subgroup as was the size of the variable light figure from which a match began. Conclusions are: the value of objects does not unequivocally affect their judged size; the value of objects does affect their phenomenal appearance; an accuracy "set" seems to increase absolute overestimation of discs and coins; it is difficult to say any thing definite about the effect of the shape of the variable light patch used; new types of experiments are needed which get at basic processes in the areas of perception and judgment. (HEIAS)

R 8

8162

Lazarus, R.S. & McLeary, R.A. AUTONOMIC DISCRIMINATION WITHOUT AWARENESS: A STUDY OF SUBCEPTION. *Psychol. Rev.*, 1951, 58, 113-122. (Johns Hopkins University, Baltimore, Md.).

a) GSR evidence is presented to indicate that at tachistoscopic exposure speeds too rapid for conscious discrimination (as measured by the S's inability to report which stimulus was presented), the S is still capable of making a discrimination. We suggest that the level of perceptual activity indicated by this finding be called subception. b) It is important to control for unequal preference for stimulus material before drawing conclusions about the accuracy of perceptual recognition. c) Pairing some of the stimuli with electric shock does not result in a change in the frequency with which they are accurately identified at various exposure speeds. d) Some of the implications of this experiment for perceptual and clinical theory are discussed.

R 24

8163

Gibson, J.J. THE RELATION BETWEEN VISUAL AND POSTURAL DETERMINANTS OF THE PHENOMENAL VERTICAL. *Psychol. Rev.*, 1952, 59, 370-375. (Cornell University, Ithaca, N.Y.).

The purpose of this paper is to suggest that beliefs concerning space perception which depend upon a motor theory or a phenomenological theory of space perception cannot be decided one way or the other but need to be resolved instead. Comparisons are made between the 2 theories and suggestions are made as to possible methods of resolution. (HEIAS)

8166

Homes, D. A STATISTICAL THEORY OF THE PHENOMENON OF SUBCEPTION. *Psychol. Rev.*, 1954, 61(2), 98-110. (Aero Medical Lab., Wright-Patterson AFB, Ohio).

The assumptions made in this theory are consistent with the symbolic-report hypothesis. From them it is possible to deduce some 13 definite inequalities of GSR between the Lazarus and McLeary experimental categories, whereas only 1 inequality follows rigorously from the subception hypothesis itself. The present assumptions assign a definite significance to exposure time as a parameter of the inequalities of GSR. Exposure time will affect inequalities differently according to the categories being compared. They yield, in addition to the interpretation of GSR inequalities, quantitative deductions of syllable probabilities for lower-order reports. The subception hypothesis offers no interpretation of these data. These assumptions are subject to quantitative formulation on the basis of experimental data. The 2 basic relationships needed are: a) the function relating average strength of a syllable process to the duration for which the corresponding syllable is exposed, b) the function relating mean GSR to the average strength of the processes underlying shock syllables. All these advantages may be subsumed under the statement that the statistical form of the symbolic-report hypothesis possesses far greater potentiality for the analytic description of perceptual phenomena than does the subception hypothesis. (HEIAS)

R 2

8167

Miller, G.A. WHAT IS INFORMATION MEASUREMENT? *Amer. Psychologist*, 1953, 8, 3-11. (Massachusetts Institute of Technology, Cambridge, Mass.).

The paper introduces basic concepts of information theory and points to their applications in psychology. Information theory provides a yardstick for measuring organization. Basic concepts, like "amount of information", "bit" are clarified. Transmission situations are described. The obvious psychological analogy to the transmission situation is between the S in experiment and a communication channel, between stimuli and inputs, and between responses and outputs. Another analogy arises in mental testing. It requires only a slight extension of this analogy to see the similarity between any process of measurement and the transmission situation. The sequential situation is described, the obvious analogy is verbal behavior. Taken together, the sequential and the transmission situations suggest a wide range of possible applications in psychology. A selected bibliography of 36 items is included.

8168

Baldwin, M.W. SUBJECTIVE MEASUREMENTS IN TELEVISION. *Amer. Psychologist*, 1954, 9, 231-234. (Bell Telephone Lab.).

8169

In this discussion of subjective measurements in television, the author defines the types of problems to be investigated, e.g., simulation, effect of blurring, etc., and presents some of the research results on such problems as determination of thresholds for perception of blurring, the subjective effect of a particular type of interference, and so forth. Other problems to be investigated from this approach are specified.

T. G

8173

Jones, F.N. AN OLFACTOMETER PERMITTING STIMULUS SPECIFICATION IN MOLAR TERMS. Amer. J. Psychol., 1954, 67, 147-151. (University of California, Los Angeles, Calif.).

This paper discusses the problems involved in the specification of the amount of an olfactory stimulus in terms other than concentration. The use of concentration as a means of quantitative measurement is made difficult by the factor of cost and the problems involved in controlling all other stimulus-variables. A solution by means of which olfactory stimuli are specified in molar terms is put forth for consideration. (HEIAS)

R 5

8174

Spiegelman, H., Terwilliger, C. & Fearing, F. THE RELIABILITY OF AGREEMENT IN CONTENT ANALYSIS. J. soc. Psychol., 1953, 37, 175-187. (Psychology Dept., University of California, Berkeley, Calif.).

After a discussion on the theory and methodology of reliability in content analysis, the paper reports an experiment carried out a) to investigate the effect of non-directed discussion of criteria upon agreement among judges when stimulus ambiguity and ambiguity of criteria are constant, and, b) to test the effect of such "training" when the ambiguity of the stimulus is also varied. 2 groups of 6 psychology graduate students each categorized a random sample of 49 comic strip characters on the basis of explicit criteria. The results indicated that non-directed discussion had no significant effect on reliability of agreement. The ambiguity of the material also had no effect. From a discussion of the current method for computing reliability, it was concluded that several different kinds of reliability should be applied in content analysis. (HEIAS)

R 8

8176

Young, F.A. STUDIES OF THE PROJECTED AFTER-IMAGE: I. METHODOLOGY AND THE INFLUENCE OF VARYING STIMULATION TIMES. J. gen. Psychol., 1952, 46, 73-86. (State College of Washington, Seattle, Wash.).

The study aimed at determining whether or not variations in time of stimulation were related to size changes in the after-images, and, further, whether there would be an increasing amount of inability to maintain fixation with the longer stimulation which would result in differences in the size of the projected after-image. Stimulation times of .01, .10, 1.0, 5.0, 10.0, 15.0, 20.0, 40.0 were used with 2 or 3 practiced Ss at different times. No differences were found. Major conclusions: a) There is no significant variation in the size of the projected after-image with variations in the time of stimulation. b) Individual differences in terms of the size of the after-image are not to be explained by assuming variations in fixation during stimulation. c) The method used in the experiment is reliable. (HEIAS)

R 11

8178

Edwards, A.S. A QUANTITATIVE STUDY OF VOLUNTARY VS. INVOLUNTARY MOVEMENT. J. gen. Psychol., 1952, 46, 93-99. (University of Georgia, Athens, Ga.).

2 kinds of involuntary movement were compared with measured results of certain voluntary activities by means of the coefficient of correlation and by measures of central tendency and of dispersion. 68 men and 51 women were measured a) for finger-tremor, b) for body sway c) by the Metfessel Pursuit apparatus and d) by the Purdue Peg Board. Conclusions: a) All relationships are small and some are negative. b) Body sway and scores on the rifle range showed the highest correlation, the second closest relationship was between the 2 kinds of involuntary movement. c) Women were less able than men to achieve high scores with a moving target, but were superior to men with the material that did not move. d) Men have more body sway and finger tremor than women. (HEIAS)

R 5

8182

Young, F.A. STUDIES OF THE PROJECTED AFTER-IMAGE: II. THE PROJECTION GROUND AND THE PROJECTED IMAGE. J. gen. Psychol., 1952, 47, 195-205. (State College of Washington, Seattle, Wash.).

2 experiments were performed. The first experiment determined the relation between the level of illumination on the projection ground, with the changes in visual cues which vary with changes in illumination, and the size of the projected after-image. The second experiment utilized backgrounds of varying degrees of linear perspective to determine the relation between the size of the projected after-image and a structured projection ground. No variation in the size of the projected after-image was found when the illumination on the projection ground was varied through 5 log steps. A structured ground influences the size of the projected after-image. The size of the after-image varied from S to S for the same position on the background and from one background to another background for the position and the same S. No hypothesis was offered to explain these results. These experiments refute the interpretation that the same variables are responsible for size constancy results and the size of projected after-images.

R 9

8183

Young, F.A. STUDIES OF THE PROJECTED AFTER-IMAGE: III. PROJECTION OVER LARGE DISTANCES. J. gen. Psychol., 1952, 47, 207-212. (Washington State College).

8183

To determine the character of after-images projected over large distances and evaluate the relation between distance and image size, three subjects utilizing a projector (see Acc. No. 8182) projected images in an open field over distances ranging from 25 to 1,250 meters. Sizes of after-images (measured with aid of surveyor's transit) were compared with those to be expected on the basis of Emmert's law. The results are presented and discussed in terms of the relative difference and direction of difference between theoretically anticipated and experimentally obtained sizes of projected after-images. The role of size of retinal image is discussed along with the probable cause of cyclical variations found in this and a previous study (see Acc. No. 8182).

T, R 7

8194

Wiener, G., Salpeter, M.M., Tobach, E., Vineburg, E., et al. THE EFFECT OF THE EXPERIMENTAL SITUATION ON THE AMPLITUDE OF THE PSYCHOGALVANIC RESPONSE IN HUMANS. *J. gen. Psychol.*, 1952, 42, 213-225. (Payne Whitney Psychiatric Clinic, New York Hospital, New York, N.Y.).

In order to determine the effect of the experimental situation on the magnitude of the psychogalvanic reflex (PGR) and to determine the usefulness of innocuous stimuli as conditioned stimuli, 2 groups of 12 female college students each were tested in experimental and non-experimental situations with a yellow pilot light, a nonsense syllable, and a square of white light as stimuli. Findings: a) No significant differences between responses to the same stimulus in the experimental and non-experimental situations. b) PGR's to different stimuli were also not significantly different in the experimental room. c) Reversals in the expected adaptation curves of the responses took place in the cases of the syllable KAX and the yellow pilot light. d) Differences in intensity of the stimuli did not correlate with amplitude of PGR. The data suggest that the attitude of the S toward the experimental nature of the situation, rather than the experimental situation per se, is more instrumental in affecting the amplitude of the PGR. (HEIAS)

R 5

8187

Torris, J.D. & Myers, C.K. EXPERIMENTS ON FLUCTUATION OF AUDITORY ACUITY. *J. gen. Psychol.*, 1954, 50, 87-109. (USM Medical Research Lab., New London, Conn.).

The auditory acuity of normal-hearing young men was tested by air and by bone conduction at each of 11 frequencies using the serial method of limits. The typical minute-to-minute fluctuation is of the order of slightly less than 21 decibel. There is no difference in threshold variability between air and bone conduction, or among frequencies. No trends are revealed for any hour of the day, or day of the week. The data at 8192 cps show more variability than at 1024 or 256 cps, probably as a result of a relative sensitivity of the initial section of the basilar membrane to any of a variety of (in this experiment) unknown physiological conditions. (HEIAS)

R 14

8188

Edwards, A.S. THE RELATION OF INVOLUNTARY MOVEMENT TO CERTAIN PSYCHO-MOTOR ACTIVITIES. *J. gen. Psychol.*, 1954, 50, 111-127. (University of Georgia, Athens, Ga.).

Hand and arm steadiness and body sway were measured to throw some light on the relationships between types of involuntary movement. The studies included feeble-mindedness, skilled groups, seniles, schizophrenics, perception, attention with and without distraction, emotional states, smoking and inhalation, controlled breathing, practice, and the relation of certain voluntary activities to involuntary movements. Conclusions: a) Involuntary movement appears to be fundamentally related to organic conditions, but may be modified greatly by some functional changes. b) It is related to the development and integration of children, and to senility. c) Improvement of steadiness may appear with generally improved conditions (e.g. in improved schizophrenics). d) Surgeons and musicians are steadier than normals, but individuals with great unsteadiness may show excellent performance in skilled activities (e.g. shooting). e) The relatively small correlation between measurements of finger tremor and of body sway, suggest somewhat different systems of psychosomatic function. f) Improvement in techniques, insight, and intelligence, rather than amount of practice, appear responsible for improvement during practice. (HEIAS)

R 14

8189

Miller, G.A., Bruner, J.S. & Postman, L. FAMILIARITY OF LETTER SEQUENCES AND TACHISTOSCOPIC IDENTIFICATION. *J. gen. Psychol.*, 1954, 50, 129-139. (Massachusetts Institute of Technology, Cambridge, Mass.).

An experiment was designed to test the hypothesis that, within reasonable limits, the total amount of information received by Ss familiar with the language is constant and unaffected by the redundancy of the language. Pseudo words were constructed representing different degrees of contextual constraint. The words were exposed tachistoscopically to 6 undergraduates who wrote what they saw. The total number of correct letters and the number of correct letters in the proper blank on the answer sheet were scored. Both scores were converted into percentages. Conclusions: a) The number of letters identified correctly increases when the stimulus sequence provides a context familiar to the observer. Thus it appears that context improves recognition. b) When the lower informational value of the contextually constrained sequences is considered, the corrected identification scores for familiar and unfamiliar sequences of letters become essentially equivalent. (HEIAS)

R 4

8191

Eisenson, Joan, Fischell, V.R. & Livingston, W. IMAGINED DIFFERENCES IN THE PERCEPTION OF IDENTICAL OLFACTORY STIMULI. *J. gen. Psychol.*, 1954, 84, 77-83. (Hunter College, New York, N.Y.).

This study attempted to determine the reliability of olfactory sensitivity in a modified test-retest situation using an identical stimulus. 2 samples of an identical odor were presented to 300 female college students, who had to judge them "same" or "different". Findings: a) Olfactory sensitivity appears to meet the reliability standards of logical expectancy for distilled water, but not for 2 brands of perfume and 2 brands of toilet-water. b) There appears to be no differential reliability when the aromatic substances are compared with each other. c) Greater alcohol content may decrease the reliability of olfaction. d) A significant number of Ss preferred the first of the 2 aromatic stimuli presented. e) This study demonstrated that where there are no differences, strong imagined differences may appear. (HEIAS)

R 5

8192

Osgood, C.E. THE NATURE AND MEASUREMENT OF MEANING. *Psychol. Bull.*, May 1952, 49(3), 197-237. (University of Illinois, Urbana, Ill.).

The first portion of this paper describes a behavioral conception of the sign-process as developed from a general mediation theory of learning. The remainder is concerned with the problem of measuring meaning. Various existing approaches to the problem--physiological, learning, perception, association, and scaling methods--have been evaluated against the usual criteria of measurement and have been found inadequate. The development of a semantic differential as a general method of measuring meaning is described. It involves a) the use of factor analysis to determine the number and nature of factors entering into semantic description and judgment, and b) the selection of a set of specific scales corresponding to these factors which can be standardized as a measure of meaning. Using this differential, the meaning of a particular concept to a particular individual can be specified quantitatively as a particular point in the multidimensional space defined by the instrument. Some of the possible uses of such a measuring instrument are briefly indicated.

R:118

8193

MacKay, D.G. ON COMPARING THE BRAIN WITH MACHINES. *Amer. Scientist*, 1954, 42, 261-268. (King's College, University of London, London, England).

The paper revolves around the question of how far it is possible to envisage a model that would imitate human behavior, and also work internally on the same principles as the brain. Designing a self-organizing statistical model may be a promising approach. Its function would be to serve as a research tool. Behind this approach lies the hope of providing a working link between the concepts of psychiatry and those of physiology and anatomy. (HEIAS)

R:7

8194

Bar-Hillel, Y. CAN TRANSLATION BE MECHANIZED? *Amer. Scientist*, 1954, 42, 248-260. (Research Lab. of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.).

In this article the feasibility of applying electronic computers to translation is considered. There is a need for mechanized translation of scientific material. Examples are given of how German sentences could be translated into English by machine. The author expresses his hope that progress will be made in the near future to free the human brain from the dull, routine part of translation. (HEIAS)

R:10

8199

Bugelski, B.R. POPULATION STEREOTYPES IN PEDAL CONTROL OF A "BALL-BANK" INDICATOR. *J. appl. Psychol.*, 1955, 39, 422-424. (University of Buffalo).

8199

This study was undertaken to assess the role of population (movement) stereotypes in pedal control of a "ball-bank" indicator. Utilizing two mock-up instrument panels, one in which displacement of indicator corresponds with particular pedal to be operated, and one in which the pedals do not correspond with indicator, 64 subjects performed a series of trials with both instrument panels. The results are presented and discussed in terms of accuracy of centering ball-type indicators as a function of the relation between instrument displacement and its correspondence to the "natural" tendency of subjects' reactions (population stereotypes for pedal action).

T. R 3

8200

Ross, S., Shepp, B.E., & Andrews, T.G. RESPONSE PREFERENCES IN DISPLAY-CONTROL RELATIONSHIPS. *J. appl. Psychol.*, 1955, 39, 425-428. (University of Maryland).

8200

This study represents an attempt to evaluate the usefulness of a paper-and-pencil technique to assess response preferences in display-control relationships. A paper-and-pencil display control relation utilizing three different controls (rotary, push-pull, and lever) was presented to 679 subjects who marked their responses on a test sheet. Each control was presented in three different planes. An analysis of the responses was made for the effects of controls, planes, and movement instructions. The results are discussed in terms of the nature of the response preferences manifested with this paper-and-pencil technique.

T. I. R 11

8201

Soar, R.S. STROKE WIDTH, ILLUMINATION LEVEL, AND FIGURE-GROUND CONTRAST IN NUMERAL VISIBILITY. *J. appl. Psychol.*, 1955, 39, 429-432.

8201

This study attempts to define the respective effects of stroke width, illumination level, and figure-ground contrast in numeral visibility. Forty subjects were presented with stimulus numbers under eight experimental conditions reflecting a combination of two stroke width to height ratios (1:4 and 1:16), two illumination levels (.5 and 500 foot-candles), and two modes of figure-ground contrast (black on white and white on black). Numeral were observed at three different distances and a subject's score reflected the estimated threshold distance at which he might be expected to read half of the numbers. An analysis of variance of the data was made. The results are discussed in terms of the effects of each of the variables and their interaction upon numeral visibility.

T. R 15

8202

Sanders, J.W., Webb, I.B., & Baker, C.A. THE PERIPHERAL VIEWING OF DIALS. *J. appl. Psychol.*, 1955, 39, 433-436.

8202

To investigate the possible role of peripheral visual cues in the reading of instruments, four subjects were tested on an apparatus presenting simulated dials and so designed as to determine the extent of displacement of a particular dial from the subject's fovea. Dials reflecting four pointer designs were viewed monocularly for a total of 256 readings. The results are presented and discussed in terms of reading time and errors as a function of degree of foveal displacement. Implications for the design of instrument panels are noted.

G. R 2

8203

DeNittis, G.L. RELATIVE EFFECTIVENESS OF TWO STANDARD COLOR-VISION TESTS. *J. appl. Psychol.*, 1955, 39(6), 437-441. (Fordham University, Washington, D.C.).

In this study a comparison was made between the commercial edition of the Illuminant-Stable (I-S) Color Vision Test, containing 12 plates, and the American Optical (AO) Color Perception Test, containing 18 plates. 10 color-blind and 40 normal male Ss were tested. Principal conclusions were: a) The I-S test was much more difficult than the AO test under all conditions of illumination; b) The types of illumination used in this experiment had no significant effect on the scores obtained; c) Within the range of the color temperatures used, the AO test is as stable as the I-S test. (MEIAS)

R 5

8204

Tinker, M.A. PROLONGED READING TASKS IN VISUAL RESEARCH. *J. appl. Psychol.*, 1955, 39, 444-446. (University of Minnesota).

8204

Two experiments are presented to demonstrate the usefulness of prolonged reading tasks in visual research. Two approximately equivalent forms of a reading task were constructed. A total of 24 subjects were presented with this task in two experiments. In the first, roman type was compared with italic type, and in the second, lower-case type was compared with all capitals. The results are presented and discussed in terms of the relative effect of each type of typography upon speed of reading.

T. R 5

8205

Gordon, L.V. TIME IN TRAINING AS A CRITERION OF SUCCESS IN RADIO CODE. *J. appl. Psychol.*, Oct. 1955, 39, 311-313. (USN Personnel Research Field Activity, San Diego, Calif.).

8205

To assess the validity of time in training as a criterion of success in the learning of radio code, intercorrelations between time in weeks to reach a criterion of 20 words per min., average weekly grades, grade on a final proficiency examination, and score on the Navy Radio Code Aptitude Test were computed with the scores of three groups of trainees (139, 118, and 143 individuals respectively) in the Radioman course.

T. R 2

8206

Lutz, Mary C. & Chapanis, A. EXPECTED LOCATIONS OF DIGITS AND LETTERS ON TEN-BUTTON KEYSSETS. *J. appl. Psychol.*, Oct. 1955, 39(5), 314-317. (Bell Telephone Laboratories, Murray Hill, N.J. & Johns Hopkins University, Baltimore, Md.).

300 Ss, stratified according to age, sex, and previous experience on keysets, were asked to write on diagrams of keysets either numbers or letters in the arrangements that they felt were most natural. Our results show: a) People expect to find numbers on keysets arranged in left-to-right order in horizontal rows starting with the top row, for all of the 6 configurations of keys. b) People expect to find letters on the keyset arranged in left-to-right order with 2 or 3 letters in order on each key, in horizontal rows, starting with the top row, for all of the 6 configurations of keys tested. c) With numbers already on the keyset: 1. People expect to find the letters arranged in horizontal rows, beginning with the top row, for those patterns in which the numbers are arranged that way. 2. When the numbers are arranged in patterns not having numbers in order in horizontal rows (beginning with the top row), people are equally divided between lettering arrangements following the numbering pattern and lettering as in 1. above even though this conflicts with the numbering arrangement.

2

8208

Pearl, Betty, Simon, J.R., & Smith, K.U. VISUAL TRACKING: IV. INTERRELATIONS OF TARGET SPEED AND AIDED-TRACKING RATIO IN DEFINING TRACKING ACCURACY. *J. appl. Psychol.*, Aug. 1955, 39, 209-214. (University of Wisconsin).

8208

To evaluate the assumption that aided-tracking time constant is a relatively fixed value over a wide range of tracking conditions, and to assess the effect of variation in target speed upon tracking accuracy, a specially designed aided-pursuit tracking device was utilized with 27 subjects. Each subject performed the tracking task (alignment of cursor with target by means of handwheel control) under varied conditions of target speed (23, 30, and 37 r.p.m.) and with three different aided-tracking time constants (.25, 0.5, and 1.0 sec.). The results are presented and discussed in terms of the relative effect of each of the variables and their interaction upon tracking accuracy.

T. G. I. R 11

8209

Ross, S., Katchmar, L.T., & Bell, H. MULTIPLE-DIAL CHECK READING: POINTER SYMMETRY COMPARED WITH UNIFORM ALIGNMENT. *J. appl. Psychol.*, 1955, 39, 215-218. (University of Maryland).

8209

Two experiments are reported in this study of the differential effect of uniform and symmetrical pointer alignment upon multiple-dial check reading time and accuracy. The same 24 subjects were used in both experiments. In the initial experiments the subjects were tested on uniform (at 12 o'clock) and symmetrical aligned dial patterns with regard to ability to discern a deviating dial. The second experiment replicated the first and in addition presented the uniform alignment at 6 o'clock. The results are treated in terms of transfer effects, reading time, and reading accuracy as functions of the type of pointer alignment.

T. I. R 5

8210

Green, B.F., & Anderson, Lois K. THE TACTUAL IDENTIFICATION OF SHAPES FOR CODING SWITCH HANDLES. *J. appl. Psychol.*, Aug. 1955, 39, 219-226. (MIT).

8210

Three experiments are presented on tactual identification of 16 differently shaped lever-switch handles. The first compares two methods of measuring confusability: a "learn" method--10 subjects learned to associate a number with each of the 16 handles; and a "find" method--10 subjects (blindfolded) were presented with "target" handle and were required to match it by tactually identifying an identical handle in the array of handles. The second compares 16 identically shaped but one-third smaller handles (14 subjects using learning method). In the final experiment, the learn method was used to evaluate two subsets of handles. The results are discussed in terms of the most effective measuring method, the ease and degree of transfer from one size handle to another, and the ease of learning an array when confusing handles are removed. T. I. R 2

8211

Green, B.F., & Anderson, Lois K. SPEED AND ACCURACY OF READING POLAR COORDINATES ON A HORIZONTAL PLOTTING TABLE. *J. appl. Psychol.*, 1955, 39, 227-236. (MIT).

8211

This is a study of the speed and accuracy of reading the range and azimuth of targets presented on six different polar-coordinate grids (displayed on a horizontal plotting table). Five subjects were required to locate and read the coordinates of targets presented on the various types of grids. The results are presented and discussed in terms of the relative effectiveness of each of the grids with regard to accuracy, speed, masking effects, and so forth.

T. G. I. R 9

8212

Sperry, S.W.S., & Wallock, J.W. THE EFFECT OF IMMEDIATELY PRECEDING TASK BRIGHTNESS ON VISUAL PERFORMANCE. *J. Appl. Psychol.*, Aug. 1955, 30, 237-243. (University of Rochester).

8222

To determine the relation between the brightness of an immediately preceding visual task and visual performance at low photopic brightness levels, a total of 21 subjects performed two visual tasks in three experiments. In the first task each subject was required to read photographs of instrument dials at a viewing distance of 28 in. and three task brightnesses (2.9, 6.03, and 0.005 foot-lamberts). In the second task, Landolt rings were viewed peripherally at a distance of 13 ft. with five brightnesses (6.0, 0.096, 0.01, 0.0007, and 0.0005 foot-lamberts). The initial experiment presented near and then far task, the second reversed this procedure, and in the third was a correlative check on the second. The results are presented and discussed in terms of the performance of task as a function of brightness of preceding task. T. C. I. R 9

8213

Ways, G.D. EFFECT OF TEMPERATURE UPON TECHNICAL TRAINING. *J. Appl. Psychol.*, Aug. 1955, 30, 244-246.

8213

This study was designed to investigate the effect of temperature upon performance and specifically, the effect of air conditioning vs. exhaust-fan cooling of rooms on learning electronics. Two equal groups of 424 men each were tested at the end of two weeks and four weeks of instruction. The results include grades on tests and subjective reports regarding the temperature. T. R 6

8214

Topmiller, S.A. THE EFFECT OF STROKE WIDTH ON LINEAR INTERPOLATION. *J. Appl. Psychol.*, Aug. 1955, 30, 273-276. (Lehigh University, Bethlehem, Penn.).

8214

To evaluate the effect of stroke width upon linear interpolation, 20 subjects were required to make a series of interpolated settings (56% for each subject) on six different scales. On half of the trials the subjects were informed of stroke width while on the others they were uninformed. Differences in stroke width were as follows: hairline, 1, 2, 3, 4, and 5 mm. The results are presented and discussed in terms of the relative effect of stroke width under both conditions of instruction concerning the width under both conditions of instruction concerning the width upon speed and accuracy in making the appropriate settings. T. I. R 5

8215

Evans, R.I., Roney, H.B. & Madams, W.J. AN EVALUATION OF THE EFFECTIVENESS OF INSTRUCTION AND AUDIENCE REACTION TO PROGRAMMING ON AN EDUCATIONAL TELEVISION STATION. *J. Appl. Psychol.*, Aug. 1955, 30, 277-279. (University of Houston, Houston, Tex.).

8215

The effectiveness of instruction and audience reaction to programming on an educational television station were evaluated. 1) Ninety-six college students were enrolled in a campus lecture section of an elementary psychology course, 17 in a TV-lecture and correspondence section, and 30 in a TV-lecture and campus discussion section; two groups of 78 matched students were enrolled in a TV-lecture and campus discussion or in a campus lecture section of an elementary biology course. Grades obtained by TV and non-TV groups on objective final course examinations were compared. 2) Interviews were conducted with 384 home television viewers to determine frequency of viewing educational programs and preferred programs.

8215

Siegel, A.I. INTEROBSERVER CONSISTENCY FOR MEASUREMENTS OF THE DYNAMIC PHASES OF PERFORMANCE. *J. Appl. Psychol.*, 1955, 30, 280-282. (Institute for Research in Human Relations, Philadelphia, Penn.).

8215

To test the hypothesis that, for individually administered performance tests, interobserver consistency is no greater for measurement of a final product than for observations of performance in process, four performance tests (three of "intangible" and one of "tangible" products of performance) for aviation structure mechanics or for aerial photographers were administered to 19 and 15 sailors by three and four independent examiners. Indices of interobserver agreement for each test are presented. T. R 2

8217

Stickle, M.L. & Michiel, A.I. TRANSFER BETWEEN INSTRUMENT AND CONTACT FLIGHT TRAINING. *J. Appl. Psychol.*, June 1955, 30, 145-147. (University of Illinois, Urbana, Ill.).

8217

Transfer of training between instrument and contact flying was investigated. The 74, 22 members of the Naval and Air Force ROTC divided into two groups, learned two flight maneuvers on contact and two on instruments in opposite orders. Transfer was measured by the difference in trials to performance criteria between first task for a given group and second task for the other group, expressed as a fraction of the former score. T. P 4

8216

McGuigan, F.J. & MacCassin, F.W. THE RELATIONSHIP BETWEEN RIFLE STEADINESS AND RIFLE MARKSMANSHIP AND THE EFFECT OF RIFLE TRAINING ON RIFLE STEADINESS. *J. Appl. Psychol.*, June 1955, 30, 156-159. (Human Resources Research Office, George Washington University, Washington, D.C.).

8218

The purposes of this study were to estimate the reliability of an ataxometer test of rifle steadiness, to determine the relation of rifle steadiness to rifle marksmanship, and to determine the effect of rifle training on rifle steadiness. The study was replicated with 148 and 200 basic trainees. The following data are presented: split-half and test-retest coefficients of correlation between steadiness and marksmanship scores under slow and sustained fire; and scores for rifle steadiness before and after rifle instruction. T. I. R 5

8219

Erikson, C.W. PARTITIONING AND SATURATION OF VISUAL DISPLAYS AND EFFICIENCY OF VISUAL SEARCH. *J. appl. Psychol.*, April 1955, 25(2), 73-77. (Johns Hopkins University, Baltimore, Md.).

The present study was concerned with the effect of several characteristics of visual displays upon speed of visual search. The time required to locate a constant number of signals in a square display was determined when: a) the number of irrelevant signals was varied (from 10 to 70) and b) the number of partitions of the display was varied by the use of grid lines. Grid lines were used to partition the display into a 5 X 5, a 13 X 13, and a 16 X 16 matrix. The results show that search time increases both when the number of irrelevant signals is increased and when the number of partitions is increased. An explanation was advanced for these effects in terms of the number of foveal fixations required for signal identification and the use that observers make of grid lines in their plan of search.

R 5

8220

Tiffin, J., & Robideau, G.F. REDUCED TRIALS AND RELIABILITY OF VISUAL-ACUITY THRESHOLDS OBTAINED BY THE METHOD OF CONSTANT STIMULI. *J. appl. Psychol.*, June 1955, 22(2), 78-81. (Purdue University, Lafayette, Ind.).

A psychophysical investigation was made to find what effect a reduction in trials per stimulus has upon reliability of visual-acuity thresholds computed by the method of constant stimuli and Müller-Urbach curve-fitting method. A goal was to find a practical minimum in terms of number of trials. Visual-acuity thresholds were determined for 15 college students, who were each subjected to 2 successive measurement series of stimuli. Thresholds were computed, using 5 stimulus values and 5, 10, 20, 30, 40 and 50 presentations per stimulus. The target used was the Landolt ring. Retest reliabilities of .92 and higher were obtained for as few as 10 trials per stimulus (50 per threshold). The following conclusions are warranted: a) insofar as this kind of psychophysical measurement may be typical of previous work, classical psychophysical investigators probably utilized more judgments than are necessary for computation of reliable thresholds; b) for purposes of estimating absolute thresholds, the Müller-Urbach constant method with 5 stimulus sizes appears to yield satisfactorily reliable thresholds for purposes of practical applications, when as few as 10 trials per stimulus and 4-choice response categories are used. This conclusion applies only under the conditions of the present experiment. (NEIAS)

R 14

8221

Klare, G.R., Maltz, J.E. & Gustafson, L.M. THE RELATIONSHIP OF HUMAN INTEREST TO IMMEDIATE RETENTION AND TO ACCEPTABILITY OF TECHNICAL MATERIAL. *J. appl. Psychol.*, April 1955, 32, 92-95. (University of Illinois, Urbana, Ill.).

8224

Murrell, K.P.H. NOTE ON THE EFFECT OF VIEWING ANGLE ON ACCURACY OF READING QUANTITATIVE SCALES. *J. appl. Psychol.*, Feb. 1955, 39, 11-12. (Tubes Investments Ltd., Birmingham, England).

8224

A brief discussion is presented on the effect of viewing angle on accuracy of reading quantitative scales. The results of research carried out in the British Admiralty are presented. The data refer to such aspects as rate of reading accuracy improvement, the effects of practice, and a theoretical representation of the relation between viewing angle and reading accuracy.

R 3

8221

To determine the relation between human interest of verbal material (as defined by Flesch) and two dependent variables, immediate retention and acceptability, 440 airmen were required to read a 1206-word lesson from an aircraft mechanics training course, half of which had a high and half of which had a low percentage of "personal words" and "person sentences." Amount read in 20 min., judgments of reading ease and "pleasantness", and scores on a multiple-choice test of immediate retention for each kind of material are compared.

T. R 5

8223

Simon, J.R., & Smader, R.C. DIMENSIONAL ANALYSIS OF MOTION: VIII. THE ROLE OF VISUAL DISCRIMINATION IN MOTION CYCLES. *J. appl. Psychol.*, Feb. 1955, 39, 5-10. (University of Wisconsin).

8223

This is a study of the effect of a specific visual discrimination upon the interrelation of component movements in a complex motion pattern. 24 subjects performed an assembly task consisting of four component movements - (assembly manipulation, grasp manipulation, loaded travel, and unloaded travel). A visual discrimination condition (a consistent color cue) a non-discrimination condition (inconsistent color cue) and three conditions of travel distance were manipulated. Motion analysis was accomplished by electronic methods. The results are presented and discussed in terms of the interaction and relative effect of each condition upon duration of motion with particular emphasis upon the role of visual discrimination.

T. O. I. R 12

8225
Kempel, V.E., Jr. & Fleishman, E.A. A FACTOR ANALYSIS OF PHYSICAL PROFICIENCY AND MANIPULATIVE SKILL. *J. appl. Psychol.*, Feb. 1955, 39(1), 12-16. (USAF Personnel & Training Research Center, Lackland AFB, Tex.).

15 factors were identified to account for performance on the 46 experimental tests (17 manipulative apparatus tests, 6 printed tests, 23 gross physical performance tests). While the precise nature of several of the factors is yet uncertain, some general conclusions appear possible. The results indicate that the abilities contributing to performance on gross physical tasks are quite independent of those contributing to fine manipulative skill. No factors were found that overlapped these areas. Pending the identification of additional factors or clarification of the present ones, the factors identified suggest a possible justification of ability areas primarily involved on a wide range of motor tasks, especially those of a gross physical nature. They at least point up a way of organizing more meaningfully such tests generally used in evaluating physical proficiency. 5 factors identified in the physical performance tests appear to fit under the following categories: strength, flexibility, balance, gross body coordination, energy mobilization. 4 factors identified in the manipulative tests are: manual dexterity, finger dexterity, arm-hand steadiness, aiming. A non-verbal reasoning factor was identified in certain of the printed tests. (NEIAS)

R 9

8226

Mummel, C.F. & Schneider, Gertrude R. DRIVER BEHAVIOR AT DANGEROUS INTERSECTIONS MARKED BY STOP SIGNS OR BY RED BLINKER LIGHTS. *J. appl. Psychol.*, 1955, 39(1), 17-19. (University of Delaware, Newark, Del.).

At 2 intersections of one-way streets with two-way streets provided with STOP signs and red blinkers automobiles were observed. Findings were: a) Only about 1/2 of the drivers stopped; b) A significantly greater percentage of the drivers stopped their cars too late (i.e., past the line of intersection) at the STOP sign than at the blinker; c) There was a significant difference in the percentage of drivers who stopped or slowed down at the STOP sign or at the red blinker, nor was there any significant difference between the newly erected sign and one that had been standing for several months; d) Some of the data approximate Allport's J curve of conformity behavior. (MEIAS)

R 1

8227

Jones, L.V. & Thurstone, L.L. THE PSYCHOPHYSICS OF SEMANTICS: AN EXPERIMENTAL INVESTIGATION. *J. appl. Psychol.*, Feb. 1955, 39(1), 31-36. (University of Chicago, Chicago, Ill. & University of North Carolina, Chapel Hill, N.C.).

51 descriptive adjectives were presented as items on a successive-interval schedule to approximately 500 Army enlisted personnel, who were asked to indicate the meaning of each word or phrase. For each stimulus a scale value and a standard deviation of meaning were determined. From these 2 parameters, an attempt was made to reproduce the cumulative proportions of response for each of the nine categories on the questionnaire. The suitability of the successive-interval method of scaling is demonstrated by the small average error of reproduction of proportions, about .015 in this case. A further check upon the method was derived by analysis of distributions of responses over the scale continuum. For all but 6 of the 51 stimuli, these distributions did not depart appreciably from normality. Results are compared with those reported in a similar study by Mosier. From results of the present study, it is possible to select suitable descriptive adjectives for use as labels of successive intervals on subsequent preference schedules.

R 5

8229

Soar, R.S. HEIGHT-WIDTH PROPORTION AND STROKE WIDTH IN NUMERAL VISIBILITY. *J. appl. Psychol.*, 1955, 39, 43-46. (Vanderbilt University).

8229

To evaluate the effects of height-width proportion and stroke width upon numeral visibility, a total of 72 subjects were required to identify a series of tachistoscopically presented numerals reflecting four combinations of height-width proportions (10:3, 10:4.5, 10:6, and 10:7.5) and three stroke widths (with the stroke-width to height ratio ranging from 1:8 to 1:5). An analysis of variance was carried out for each numeral (0 to 9). The results are presented and discussed in terms of the relative variation in visibility which may be attributed to the factors of stroke width and height-width proportions.

T, R 16

8234

Denny, M.R., Frisbey, M. & Weaver, J. ROTARY PURSUIT PERFORMANCE UNDER ALTERNATE CONDITIONS OF DISTRIBUTED AND MASSED PRACTICE. *J. exp. Psychol.*, Jan. 1955, 42, 48-54. (Michigan State College, East Lansing, Mich.).

8234

To investigate the relation between successive conditions of practice and performance level on a motor task, 64 college students in eight groups practiced on a Koeth-type pursuit rotor for three periods of 6, 12, and 3 min. Distribution of practice was massed (continuous) or distributed (alternating 30-sec. rest and work periods) during each period; for each group massed and distributed practice periods were alternated according to one of eight possible permutations. Performance curves (percent time on target as a function of trials) for the various groups are compared.

G, R 10

8235

Chernikoff, R., Birmingham, H.P., & Taylor, F.V. A COMPARISON OF PURSUIT AND COMPENSATORY TRACKING UNDER CONDITIONS OF AIDING AND NO AIDING. *J. exp. Psychol.*, Jan. 1955, 49, 55-9.

8235

To test the hypothesis that aiding applied to compensatory and pursuit tracking will result in improved performance in both and will eliminate differences in accuracy between them, six Ss were given six trials daily for ten days on each of four tasks: compensatory tracking, aided and unaided, and pursuit tracking, aided and unaided. Differences in tracking accuracy under each condition, measured by integrated-error scores, are evaluated statistically.

T, G, R 6

8236

Hauty, G.T. & Payne, R.B. MITIGATION OF WORK DECUREMENT. *J. exp. Psychol.*, Jan. 1955, 49, 60-67. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

8236

In an investigation of the effects of certain psychological and physiological variables on work decrement, 168 basic airmen practiced on the USAF SAM Multidimensional Pursuit Test for seven hours. The following treatments were combined factorially: 1) administration of drugs; dexedrine, caffeine, benadryl-hyoscine-dexedrine, or benadryl-hyoscine; 2) presentation of results: direct observation of instruments or knowledge of results via a visual or an auditory signal; 3) expected goal proximity: break expected after four hours or no break expected. Proficiency measures are analyzed statistically. Transferability of work impairment was inferred from subsequent performance on the SAM Self-Pacing Discrimination Reaction Time Test.

8237
Witcott, R.C. VARIABLES AFFECTING THE ANGULAR DISPLACEMENT THRESHOLD OF SIMULATED AUDITORY MOVEMENT. *J. exp. Psychol.*, Jan. 1955, 49(1), 68-72. (Institute for Juvenile Research, Chicago, Ill.).

The angular displacement threshold of auditory movement simulated by a linear step-wise change in interaural time delay was determined under various conditions. Variables investigated were: a) signal noise bands of 106-1200 cps and 2400-3400 cps; b) movement originating at the median and lateral planes; and c) 6 different velocities of movement ranging from a perceptually slow to fast movement. Lower thresholds were obtained with the low frequency noise band, and for both noise bands lower thresholds were obtained for simulated movement from the median plane. The threshold is directly related to the velocity of movement; the threshold increases as the velocity of simulated movement increases.

R 5

8238

Bricker, P.D. THE IDENTIFICATION OF REDUNDANT STIMULUS PATTERNS. *J. exp. Psychol.*, Feb. 1955, 49(2), 73-81. (Control Systems Lab., University of Illinois, Urbana, Ill.).

8238

To determine the effect of two variables, stimulus redundancy and response uncertainty, on the identification of stimuli composed of binary elements, 90 Ss underwent 200 learning trials in which a nonsense syllable was associated with each of eight visual stimuli. Three conditions of stimulus redundancy (addition of elements to the minimum number of elements necessary for identification), three conditions of response uncertainty (number of responses available), and two conditions of "deletion" of a stimulus element were combined factorially. Reaction times and errors for each stimulus were analyzed statistically.

T. G. R 3

8239

Hartman, B.O., & Pitts, P.M. RELATION OF STIMULUS AND RESPONSE AMPLITUDE TO TRACKING PERFORMANCE. *J. exp. Psychol.*, Feb. 1955, 49, 82-92. Contract AF 33(038)-10528, AFTRC-TN-55-20, Aug. 1955. APTRC, Lackland AFB, San Antonio, Texas. (Ohio State University).

8239

To investigate the role of stimulus and response amplitude in tracking performance, eight subjects were required to perform both pursuit and compensatory tracking tasks under different conditions of display and control amplification, intricacy of target course, and frequency of target motion. The results are presented and discussed in terms of the relative performance of the subjects under the various combinations of experimental conditions.

8243
Kunnepas, T.M. AN ANALYSIS OF THE "VERTICAL-HORIZONTAL ILLUSION". *J. exp. Psychol.*, Feb. 1955, 49(2), 134-140. (University of Stockholm, Stockholm, Sweden).

This study investigates the so-called vertical-horizontal illusion. Figures in addition to the L form and inverted T were analyzed systematically. 4 conditions were arranged according to the 4 directions of the dividing line. In each condition 9 different positions of the dividing line in relation to the divided line were used. The principal finding were: a) In the vertical-horizontal figures, 2 different illusions appear--the classical overestimation of the vertical line as compared with a horizontal line of equal length, and the overestimation of the dividing line. b) The main differences of these illusions are: the overestimation of the vertical line is always connected with the vertical whereas the illusion due to the division is independent of this direction; unlike the classical illusion, the latter is variable, it has a maximum at the midpoint position and 2 minima at the 2 end positions; the amount of the overestimation of the dividing line can be considerably stronger than the overestimation of the vertical line, depending on the distance from the midpoint section. c) Where the dividing line was vertical and the divided line horizontal, the 2 illusions operated in the same direction, and the amount of the total illusion was equal to their sum. Where the dividing line was horizontal and the divided line was vertical, the 2 illusions acted in opposite directions and the total effect was equal to the difference between their individual effects. (HEIAS)

R 25

8241

Conrad, R. ADAPTATION TO TIME IN A SENSORIMOTOR SKILL. *J. exp. Psychol.*, Feb. 1955, 49(2), 115-121. (Applied Psychology Research Unit, Cambridge, England).

An attempt was made to explain the temporal accuracy with which a series of responses could be matched to a series of signals, by reference to the continuously changing temporal relationships between these events. Although approximately half of the responses were made too soon and half too late, this distribution was not fortuitous. The temporal position of a response in relation to the signal which initiated it was influenced both by the position of the previous response, and by the position of the signal for the next response. Not only did these events determine whether a response would be made early or late, but to a large extent they influenced the size of this error. Thus, while the character of the temporal structure of events around a signal determined the relative accuracy of the response, the mean signal speed in relation to the mean response rate determined the frequency with which particular temporal structures occurred. The underlying factors that actually determined the character of the response were shown to be masked when the effects on response of the signal speed variable were presented as mean accuracy.

R 5

8242

Teichner, W.H., & Kobrick, J.L. EFFECTS OF PROLONGED EXPOSURE TO LOW TEMPERATURE ON VISUAL-MOTOR PERFORMANCE. *J. exp. Psychol.*, 1955, 49, 122-126. (Quartermaster Research and Development Center).

8242

In a study of the effects of temperature on the acquisition and performance of a visual-motor skill, five soldiers living in a constant temperature chamber were given 15 daily trials on a pursuit rotor for 41 days. The temperature was held at 75 degrees F for the first 16 and last 13 days of the period and at 55 degrees F for the middle 12 days. Temporary work decrement (warm-up decrement) per day and time-on-target scores per trial under each thermal condition are compared.

G. R 3

8244
McCollough, C. THE VARIATION IN WIDTH AND POSITION OF MACH BANDS AS A FUNCTION OF LUMINANCE. *J. exp. Psychol.*, Feb. 1955, 49(2), 141-152. (Olivet College, Olivet, Mich.)

The present experiment was designed to investigate the Mach band phenomenon quantitatively. A square stimulus field was used. Measurements of width of the apparent bright band were made at 5 different values for the log of maximum luminance of the field, over a range of 3.5 log units. Measurements were made for each of 2 gradients describing different rates of decrease of the log of luminance within the upper half of the field. When rate of decrease of log luminance is held constant, and the log of maximum luminance is increased, width of the band decreases according to a negatively accelerated function, and vice versa. The conditions giving rise to report of a contour dividing 2 fields of differing luminance may be described as a limiting case of that class of luminance gradients which, when the change of luminance is less rapid, gives rise to the report of Mach bands. 2 mathematical accounts of the band phenomenon, one by Mach and the other by Fry, fail to describe changes in width of band under the conditions giving rise to such changes in the present experiment. (M.I.A.S.) R 11

8245
Archer, E.J., Bourne, L.E. Jr., & Brown, P.G. CONCEPT IDENTIFICATION AS A FUNCTION OF IRRELEVANT INFORMATION AND INSTRUCTIONS. *J. exp. Psychol.*, 1955, 49, 153-164. Contract AF 33(038)-23294, Proj. 7708, Task 77143, Rep. AFTRC-TN-55-50, Nov. 1955. AFTRC, Air Research and Development Command, Lackland AFB, Texas.

8245
Two experiments on the relation between concept formation and amount of irrelevant stimulus information were carried out. 1) Twenty-four Ss on each of three days worked a different problem in which a visual stimulus was defined by two out of three dimensions, with one to three bits of irrelevant information present. 2) Thirty Ss in two groups were presented with problems, on each of six days, in which two bits of information were relevant and one to five bits, irrelevant. One-half of the group was given special instructions on how to test a dimension for relevance. The results are presented as mean times to completion for the successive problems. T. G. R 17

8246
Kendler, H.H. & D'Amato, M.F. A COMPARISON OF REVERSAL SHIFTS AND NONREVERSAL SHIFTS IN HUMAN CONCEPT FORMATION BEHAVIOR. *J. exp. Psychol.*, March 1955, 49, 165-174. (New York University, New York, N.Y.).

8246
To test the hypothesis that the presence of appropriate symbolic cues (from implicit responses to stimulus cards) facilitate concept formation and that thus reversal shift takes place more rapidly than nonreversal shift, three experiments using 112, 62, and 58 Ss were carried out. The conditions included card-sorting with or without stimulus cards, partial reinforcement effects being equated or not equated for reversal shift and nonreversal shift subgroups. Numbers of trials required by the subgroups to reach a criterion of learning are compared. T. R 5

8247
Green, E.J. CONCEPT FORMATION: A PROBLEM IN HUMAN OPERANT CONDITIONING. *J. exp. Psychol.*, March 1955, 49, 175-180. (Harvard University, Cambridge, Mass.).

8247
To determine how concept formation is controlled by fixed-ratio schedules of reinforcement and by the length of time that discriminative stimuli are exposed, 45 college students were required to perform a key tapping response to visual stimuli. Correct responses were reinforced under a 1s1, 15s1, or 30s1 fixed ratio; stimuli were exposed for 3, 30, or 60 sec. Rates of responding to positive and negative stimuli during conditioning and extinction under the various experimental conditions are compared, as are total number of correct verbalizations. T. G. R 7

8249
Goldstone, S. FLICKER-FUSION MEASUREMENTS AND ANXIETY LEVEL. *J. exp. Psychol.*, March 1955, 49(3), 200-202. (Duke University, Durham, N.C.).

This study involved 33 high-anxiety patients, 18 low-anxiety patients, 2 high-anxiety normals, and 21 low-anxiety normals. A flicker fusion test was administered to all Ss and the following reliable differences were found: a) Those groups designated high anxiety had a lower FET than those groups designated low anxiety, suggesting reduced sensitivity to flicker associated with high anxiety; b) Those groups designated high anxiety had a greater intrasubject variability of judgments than those groups designated low anxiety; c) Those groups designated high anxiety had a greater decline in sensitivity to flicker (FFT) associated with continued exposure to the flicker test than those groups designated low anxiety. R 5

8250
Grant, D.A., & Kaestner, N.P. CONSTANT VELOCITY TRACKING AS A FUNCTION OF S'S HANDEDNESS AND THE RATE AND DIRECTION OF THE TARGET COURSE. *J. exp. Psychol.*, March 1955, 49, 203-208. (University of Wisconsin).

8250
This is a study of constant velocity tracking as a function of handedness and rate and direction of target course. Twenty-four subjects (16 right-handed and 8 left-handed) were required to track a target for five minutes with a unidimensional tracking device under each of eight experimental conditions which varied target rate (5.33, 2.67, 1.78, and 1.33 in./sec.) and direction (right-to-left vs. left-to-right). Performance scores were treated by analysis of variance. The results are presented and discussed in terms of the relative effect of each of the variables and various combinations of these variables upon tracking performance. T. G. R 7

8251

Leibowitz, H.W. THE RELATION BETWEEN THE RATE THRESHOLD FOR THE PERCEPTION OF MOVEMENT AND LUMINANCE FOR VARIOUS DURATIONS OF EXPOSURE. *J. exp. Psychol.*, March 1955, 49, 209-214. (University of Wisconsin).

8252

This is a study of the threshold velocity for the perception of motion at a constant duration of exposure (referred to as the locomotor threshold velocity) with regard to determining the various luminance values and the nature of the function at five durations of exposure. Threshold velocities were obtained for three subjects by determining pairs of thresholds consisting of mean of movement thresholds for motion to right and left. These threshold velocities were determined at seven luminance levels (.016, .07, .16, .3, .5, .90, and 500 m). Five exposure times (1/8, 1/4, 1, 2, and 16 sec.) were employed. The results are presented and discussed in terms of threshold velocity as a function of luminance and duration of exposure.
T. G. R 15

8253

Mote, F.A., & Adair, E.R. DARK ADAPTATION AFTER INTERMITTENT AND CONTINUOUS PRE-EXPOSURES OF EQUAL DURATION. *J. exp. Psychol.*, March 1955, 49, 215-219. (University of Wisconsin).

8254

This is a study of dark adaptation after intermittent and continuous pre-exposures of equal duration. Two subjects were given both continuous and intermittent pre-exposures of 2, 4, 6, 8, 12, 16, 24, and 48 min. of stimulation at intensities of 140, 201, and 562 m. Rate of intermittence was 1 cycle/sec. Forty-eight dark-adaptation curves were obtained and compared in terms of the course of adaptation as a function of the type and duration of pre-exposure.
T. G. R 7

8255

Kruger, L. & Bonane, J.R. A RETINAL EXCITATION GRADIENT IN A UNIFORM AREA OF STIMULATION. *J. exp. Psychol.*, March 1955, 49(3), 220-224. (Yale University, New Haven, Conn.).

A method for testing excitation within a uniformly illuminated area is described, and intensity thresholds were obtained for a point source at 4 different horizontal positions within a large area in the dark-adapted human eye for the peripheral retina. A consistent relationship is shown between the intensity threshold and the distance from the center of the large area, for the point source, the threshold being lowest in the center of excitation. It is believed that the present experiment provides direct confirmation of Graham, Brown, and Mote's (4) hypothesis explaining the area-intensity relation in terms of neural convergence.

(4) "The relation of size of stimulus and intensity in the human eye: I. Intensity thresholds for white light", *J. exp. Psychol.*, 1939, 24, 555-573.

R 12

8256

Nystrom, C.O., Morin, R.E. & Grant, D.A. EFFECTS OF AMOUNT, RATE, AND STAGE OF AUTOMATICALLY-PACED TRAINING ON SELF-PACED PERFORMANCE. *J. exp. Psychol.*, April 1955, 49, 225-230. (University of Wisconsin, Madison, Wisc.).

8257

In an investigation of the effect of automatically paced (AP) training on subsequent self-paced (SP) training, 11 groups of male students (120 in all) underwent training on the Multiple Serial Discriminator for a total of 17 blocks of trials with 25 stimulus patterns per block. Three aspects of AP training were varied: amount (0, 1, 4, or 10 blocks), rate (1.28 or 1.80 sec. per pattern), and stage of practice (early or late) at which it was given. Performances (in mean sec. to match a pattern) of the experimental groups are compared with each other and with the performance of a control group that underwent SP training throughout.

T. G. R 4

8258

Anderson, W.H., Kresco, P.H., & Grant, D.A. EFFECT OF RATE OF AUTOMATICALLY-PACED TRAINING IN A MULTIDIMENSIONAL PSYCHOMOTOR TASK. *J. exp. Psychol.*, 1955, 49, 231-254. Contract AF 33(038)-23294. AFFTC, Lowry AFB, Denver, Colo. (University of Wisconsin).

8259

To determine the effect of rate of automatically-paced (AP) training on subsequent self-paced (SP) training in a multidimensional psychomotor task (with a general radar simulator), nine experimental groups received AP training on eight initial trials and subsequently received SP training on five test trials. For six groups, all initial training was at one of six constant rates of stimulus presentation (1.7 to 3.2 sec.). For three groups stimuli on successive trials were presented at faster rates. Each trial consisted of 40 stimulus patterns. Results are presented as time scores and errors in range, azimuth, and elevation obtained on the test trials by the experimental groups and by a control group that received SP training throughout.
T. G. R 5

8260

Voss, J.F. EFFECT OF TARGET BRIGHTNESS AND TARGET SPEED UPON TRACKING PROFICIENCY. *J. exp. Psychol.*, April 1955, 49, 237-243. (University of Wisconsin, Madison, Wisc.).

8261

In a study of tracking proficiency as it depends on target brightness, six groups of 16 subjects (college students) practiced on the Pedestal Sight Manipulation Test for five eight-trial sessions at one of six levels of target brightness (.0028-697 millilamberts). One-half of each group practiced at one of two target speeds. All groups underwent two transfer trials with the brightest target. The data, mean per cent. time on target for each group, are analyzed statistically.
T. G. R 2

8257

Battig, W.F., Voss, J.F. & Brogden, W.J. EFFECT OF FREQUENCY OF TARGET INTERMITTENCE UPON TRACKING. *J. exp. Psychol.*, April 1955, 49, 244-248. (University of Wisconsin, Madison, Wisc.).

Measures of proficiency of tracking on the Pedestal Sight Manipulation Test were obtained at frequencies of intermittent target presentation of 2, 4, 6, 8, 10, 12 and 14 cps and a steady state condition above fusion (16 cps). The brightness of the target was held constant for all conditions at .548 ml and the light-dark ratio for each of the frequencies was 50/50. 2 experiments were performed. In one, 10 Ss each received 8 trials of practice for one of the 8 conditions of target presentation. In the other, 2 Ss were selected at random from each of the 8 groups of the first experiment and these 16 Ss received 2 trials of practice on each of the 8 target conditions as determined by an 8x8 latin square. Although measures of tracking proficiency were obtained for azimuth (A), elevation (E), range (R), azimuth and elevation (AE), and azimuth, elevation, and range (AER), because of the similarity of results over these separate measures, only the AE and AER data were analyzed completely and presented. Analysis of variance demonstrated a significant effect of frequency of intermittent presentation of the target of tracking.

R 8

8258

Noble, M., Fitts, P.H. & Warren, C.E. THE FREQUENCY RESPONSE OF SKILLED SUBJECTS IN A PURSUIT TRACKING TASK. *J. exp. Psychol.*, April 1955, 49(4), 249-255. (Ohio State University, Columbus, Ohio).

The efficiency of highly skilled Ss in tracking a target which moves in a simple harmonic motion pattern, as measured by root-mean-squared error and by time-on-target within 5% of the target amplitude, was found to decrease steadily as input frequency was increased. Examination of objective scores and analysis of graphic records of the problem input, S's output and tracking error indicate that 5 types of changes in motor behavior contribute to the decrease in performance proficiency: a) variability in phase relations between stimulus and response, b) variability of output amplitude, c) variability in the point of termination of successive flexor or of extensor movements, d) a constant error in matching response amplitude to the average input amplitude, and e) loss of synchronization between output and input frequencies, i.e., periods during which the output frequency was independent of the input frequency.

R 14

8259

Fleishman, E.A. & Hempel, W.E., Jr. THE RELATION BETWEEN ABILITIES AND IMPROVEMENT WITH PRACTICE IN A VISUAL DISCRIMINATION REACTION TASK. *J. exp. Psychol.*, May 1955, 49(5), 301-312. (USAF Skill Components Research Lab., Lackland AFB, Tex.).

8259

This is a study of the effect of practice upon the abilities utilized in learning a complex visual discrimination reaction task. Two-hundred sixty-four basic trainees received practice on the Discrimination Reaction Time Test, and in addition were given printed and apparatus reference tests. Half of the Ss received practice prior to the reference tests while the other half received it following the reference tests. The data were treated by factor analysis and the results are discussed in terms of the effect of various stages of practice upon the structure of the factors involved in this type of psychomotor task.

T. G. R 15

8260

Conrad, R. SOME EFFECTS ON PERFORMANCE OF CHANGES IN PERCEPTUAL LOAD. *J. exp. Psychol.*, May 1955, 49(5), 313-322. (Applied Psychology Research Unit, Cambridge, England).

An experiment was carried out using 12 practiced Ss in which the perceptual load was systematically varied. The aim of the experiment was to determine whether changes in serial performance as well as changes in score could be associated with the experimental variable. Increasing the number of pointers from 4 to 12 had the effect of increasing both the number and duration of errors. Results were: a) Errors occurred when signals requiring action were bunched. b) Errors occurred when Ss failed to determine the correct signal order. c) With load increases, errors were more likely to arise in event sequences of identical temporal structure, even when an essential element of the sequence was an event which occurred after the error. d) Recovery from error took longer with greater loads. e) Even under the condition of practice, stress, attention was apparently distributed strictly according to display demands rather than in accord with either a spatial or a signal-frequency pattern. Results are discussed in terms of their value as criteria of changes in skilled performance under stress. A constant load stress is postulated. Objections made from a consideration of eye movements are reviewed. (HEIAS)

R 12

8261

Eriksen, C.W. & Hake, H.W. ABSOLUTE JUDGMENTS AS A FUNCTION OF STIMULUS RANGE AND NUMBER OF STIMULUS AND RESPONSE CATEGORIES. *J. exp. Psychol.*, May 1955, 49, 323-332. (Johns Hopkins University, Baltimore, Md.).

8261

In this study of the method of absolute judgments, an attempt is made to determine the effects of variation in stimulus range and response factors upon the accuracy of absolute judgments of visual size. Squares varying in size from 2 to 82 mm sq. and spread over two size ranges, 2-42 and 2-82 mm sq. were presented to 90 observers. The number of stimulus and response categories were equal (5, 11, or 21). Increment in size varied according to the number of stimulus categories. The results are presented and discussed in terms of the relative effect of each of the variables and their interaction upon absolute judgments.

T. G. R 13

8263

Morin, R.E. FACTORS INFLUENCING RATE AND EXTENT OF LEARNING IN THE PRESENCE OF MISINFORMATIVE FEEDBACK. *J. exp. Psychol.*, May 1955, 49(5), 343-351. (University of Wisconsin, Madison, Wisc.).

8263

To investigate the effect of misinformative feedback upon learning, 288 Ss were asked to respond to one of eight stimulus lights by hitting one of two response keys. Correct or improper selection of a key was indicated by a colored light and the amount of misinformative feedback presented in this manner was varied as follows: 0, 10, 20, 30, 40, and 50 percent of total feedback misinformation. The results are presented and discussed in terms of the degree of optimum response solution as a function of the percent of misinformative feedback.

T. G. R 10

8264

Smith, W.M. EFFECT OF MONOCULAR AND BINOCULAR VISION, BRIGHTNESS, AND APPARENT SIZE ON THE SENSITIVITY TO APPARENT MOVEMENT IN DEPTH. *J. exp. Psychol.*, May 1955, 49, 357-62. (Princeton University).

8264

This is a study of the effect of monocular and binocular vision, brightness, and apparent size upon the sensitivity to apparent movement in depth. 24 subjects were presented with a white equilateral triangle by means of a Glason projector with a moveable lens. Angular size and brightness were varied and each subject was instructed to respond upon perception of movement by pressing a key. Reaction times (used as index of sensitivity) for both monocular and binocular vision under two brightness conditions (.2 and 2 ft. L.) are presented and discussed as reflecting the relative effect of these variables upon sensitivity to illusory movement in depth.

T. R 15

8265

Weiner, M. EFFECTS OF TRAINING IN SPACE ORIENTATION ON PERCEPTION OF THE UPRIGHT. *J. exp. Psychol.*, May 1955, 49, 367-373. (Worcester State Hospital, Worcester, Mass.).

8265

To study the effects of training in space orientation upon perception of the upright, an experimental group (25 subjects) and a control group (20 subjects) were pretested on three tasks: (1) adjustment of a luminous cube-like frame with body tilted at various degrees; (2) adjustment of luminous rod and cube with body 28° to the right; (3) adjustment of cube with subject in upright position. The experimental group was then given one hour of training in space orientation and both groups retested. The results are discussed in terms of the differences between the groups with regard to improvement in performance. T. R 5.

8266

Gednow, J.J. & Pettigrew, T.F. EFFECT OF PRIOR PATTERNS OF EXPERIENCE UPON STRATEGIES AND LEARNING SETS. *J. exp. Psychol.*, June 1955, 49(6), 381-389. (Harvard University, Cambridge, Mass.).

8266

To investigate the effect of experience of a certain pattern of events upon the learning of subsequent patterns, 70 Ss were required to choose one of two keys on a slot machine apparatus. Half of the Ss received a consistent pattern of correct responses at the outset and then all of the Ss received an inconsistent and finally a consistent pattern. The results are presented and discussed in terms of the effect of the initial and secondary phase or pattern upon the learning of the final pattern. T. R 20

8267

Adams, J.A. A SOURCE OF DECREMENT IN PSYCHOMOTOR PERFORMANCE. *J. exp. Psychol.*, June 1955, 49(6), 390-394. (USAF Skill Components Research Lab., Lackland AFB, Tex.).

8267

To investigate the effect of inhibition of the visual response upon psychomotor performance, 356 basic airmen were presented the Rotary Pursuit Test. While some of the Ss performed the tracking test in the usual manner, others were asked to observe and record another group's accuracy on target by pressing a button. This repetition of the visual response was interpolated between initial and final sessions on the tracking task. The possible effects of button pressing, fatigue, and amount of rest were controlled. The results are discussed in terms of the effect of visual response repetition on tracking accuracy. Also discussed are implications concerning reminiscence-in-bilateral transfer. G. R 9

8268

Doten, G.W. THE EFFECTS OF REST PERIODS ON INTERFERENCE OF A WELL-ESTABLISHED HABIT. *J. exp. Psychol.*, June 1955, 49(6), 401-406. (Northwestern University, Evanston, Ill.).

8268

Two experiments were conducted to investigate the effects of rest on interference of a well-established habit. Ninety Ss (45 in each experiment) were given a list of 144 color words printed in different colors and asked to read the words five times. Then they received four days of practice (15 trials each day) in a naming task (identifying the colors of the words) and finally, a post-test on the reading task. The two experiments differed only in respect to number of post-test reading trials (five and ten) and amount of time between color naming and reading tests (30 sec. and 24 hours). The results are discussed in terms of the effects of the naming task interference upon the reading task. T. G. R 3

8269

Sourin, L.E. AN EVALUATION OF THE EFFECT OF INDUCED TENSION ON PERFORMANCE. *J. exp. Psychol.*, June 1955, 49(6), 418-422. (University of Wisconsin, Madison, Wisc.).

8269

To investigate the effect of induced tension on recall of paired adjectives, 40 Ss were asked to learn and recall a list of ten paired adjectives. Tension was induced by the S grasping a hand dynamometer. The time intervals between learning and recall were varied among the Ss (0, 30, 60, 120, and 240 sec.) as was the point of introduction of tension (during learning, recall, both learning and recall, or neither learning nor recall). The results are discussed in terms of the relative effect of tension on the learning and recall performance under each experimental condition. T. G. R 10

8270

Adams, O.S., Chambliss, D.J., & Riopelle, A. J. STIMULUS AREA, STIMULUS DISPERSION, FLASH DURATION, AND THE SCOTOPIC THRESHOLD. *J. exp. Psychol.*, June 1955, 49, 428-30. (Emory University).

8270

To investigate the effects of stimulus area, stimulus dispersion, and flash duration upon the scotopic threshold, three subjects seated in a light-tight room were presented with three series of black-painted metal masks containing parts of stimulus patches (varied in terms of distance of separation and area of patch). Two flash durations were used: 15 and 150 msec. Threshold determinations were made and the results are discussed in terms of the relative effects of the variables upon scotopic threshold. G. I. R 10

8271

Lichte, W.H., & Gray, R.F. THE INFLUENCE OF OVERTONE STRUCTURE ON THE PITCH OF COMPLEX TONES. *J. exp. Psychol.*, June 1955, 49, 431-436. (University of Missouri).

8271

To investigate the influence of overtone structure upon the pitch of complex tones, a total of 49 subjects, all of whom had scored above the 30th percentile on the Pitch Test (Seashore Measures of Musical Talent) were tested in two groups. One group made pitch judgments of pairs of tones at 250 cps while for the others the tones were at 700 cps. One of the pair of tones contained only the lower partials while the other contained many strong high partials. The subject adjusted a pure tone to equal the complex tone (as a measure of pitch). The results are presented and discussed in terms of the relative effect of overtone structure upon pitch. T. G. I. R 6

8273

Bahrack, H.P., Fitts, P.M., & Schneider, R. REPRODUCTION OF SIMPLE MOVEMENTS AS A FUNCTION OF FACTORS INFLUENCING PROPRIOCEPTIVE FEEDBACK. *J. exp. Psychol.*, June 1955, 49, 445-454. (Ohio Wesleyan University and Ohio State University).

8273

In order to determine the effect of three different kinds of resistance (elasticity, damping, and mass) presented by a control upon ability to replicate movements with that control, 40 subjects were required to make triangular and circular movements in time to a metronome. Type and degree of control loading were varied so that each subject performed under a total of fifteen experimental conditions. A specially constructed apparatus employing a camera recorded spatial and temporal accuracy of movements. An analysis of the resultant scores provides a basis for discussing the effects of these factors of proprioceptive feedback upon ability to reproduce simple movements. T. I. R 9

8274
Leibowitz, H.W., Myers, M.A., & Chinetti, P. THE ROLE OF SIMULTANEOUS CONTRAST IN BRIGHTNESS CONSTANCY. *J. exp. Psychol.*, July 1955, 50, 15-18. (University of Wisconsin).

8274
In order to determine the effect of simultaneous contrast on brightness constancy, 30 subjects made a series of luminance matches at seven levels of illumination: .00073, .0046, .012, .51, 50.1, 631, and 1580 ft. candles. The match occurred between a 1° square test field (varied illumination) and a photometric field identical in size. Color of the background against which the standard was viewed varied among the following: black, white, and gray. An Alexander trend analysis of the data was conducted to determine the relative effect of each background (contrast) on the production of the brightness constancy phenomenon.
T. O. I. R 6

8275
Goules, J.. EFFECT OF PHOTOMETRIC BRIGHTNESS ON JUDGMENTS OF DISTANCE. *J. exp. Psychol.*, July 1955, 50, 19-25. (Boston University).

8275
Two experiments were conducted to investigate the effect of photometric brightness on judgments of distance. In the first experiment, designed to determine the functional relation between photometric brightness and distance judgments under monocular and binocular viewing conditions, two subjects received 64 stimulus combinations (method of constant stimuli) composed of one stimulus at a constant brightness of 13.0 ft.-L. and the other decreased to yield five brightness ratios. In the second experiment, designed to determine the effect of variation of absolute brightness, two subjects made distance judgments with the light source set at particular brightness ratios. The results are presented and discussed in terms of the role of ocular dominance and brightness level on distance judgments.
G. R 10

8276
Duncan, C.P. DEVELOPMENT OF RESPONSE GENERALIZATION GRADIENTS. *J. exp. Psychol.*, July 1955, 50(1), 26-30. (Northwestern University, Evanston, Ill.).

8276
To discover whether response generalization gradients can be established by differential rate of extinction of generalized error responses, 78 subjects learned a perceptual motor task which required matching of colored lights with movement of a lever into a slot. Lights and slots were paired in twenty-five different combinations and sixty trials were given on the task. The results are presented and discussed in terms of the resultant error gradients as a function of differential rate of extinction of errors rather than as a function of parasitic reinforcement.
G. R 5.

8278
Hammer, M. THE ROLE OF IRRELEVANT STIMULI IN HUMAN DISCRIMINATION LEARNING. *J. exp. Psychol.*, 1955, 50, 47-50. (State University of Iowa).

8278
In a study of the role of irrelevant stimuli in human discrimination learning, a total of 70 subjects were presented successively with two discrimination problems. Irrelevant stimuli of the first problem served as irrelevant stimuli for another group in the second problem. The results are presented and discussed in terms of the effect of the transfer of irrelevant stimuli upon performance in each of the two secondary conditions.

8279
Senders, V.L., & Cohen, J. EFFECTS OF SEQUENTIAL DEPENDENCIES ON INSTRUMENT-READING PERFORMANCE. *J. exp. Psychol.*, July 1955, 50, 66-74. (Antioch College).

8279
In order to investigate the effects of sequential dependencies on instrument reading performance, 140 subjects were required to estimate the position of a pointer on a linear scale (projected on a screen). One hundred subjects received ten repeated successive exposures of each of 50 stimuli while the remaining 40 subjects received the same stimuli in an unsorted sequence. Conditional probability of any stimulus occurring in the former presentation was 1.00 while in the latter it was approximately .10. The performance of the two groups was compared and analyzed in terms of the amount of information transmitted under each of the two conditions. Implications for research in the area of instrument-dial design are discussed.
T. O. I. R 5.

8281
Heineman, E.G. SIMULTANEOUS BRIGHTNESS INDUCTION AS A FUNCTION OF INDUCING- AND TEST-FIELD LUMINANCES. *J. exp. Psychol.*, Aug. 1955, 50, 89-96. (Harvard University).

8281
This is an investigation of the phenomenon of simultaneous brightness induction (effect on the apparent brightness of a test field produced by a second or inducing field). Utilizing a disc-shaped test field surrounded by a contiguous annular field, two experiments, each employing two subjects, were conducted to evaluate the effect of varying the luminance of the test and inducing fields. In the initial experiment a match between test (presented at seven different luminances) and comparison field was made by varying the comparison field. The final experiment dealt with inducing field luminances in excess of test-field luminance. The results are presented and discussed in terms of the optimal level of inducing field luminance for enhancement of visual effect of test field.
G. I. R 22

8282
Gibson, Eleanor J., Bergman, R. & Purdy, Jean. THE EFFECT OF PRIOR TRAINING WITH A SCALE OF DISTANCE ON ABSOLUTE AND RELATIVE JUDGMENTS OF DISTANCE OVER GROUND. *J. exp. Psychol.*, Aug. 1955, 50(2), 97-105. (Cornell University, Ithaca, N.Y.).

8282
Two experiments are reported on the effect of prior training upon absolute and relative judgments of distance over ground. To test the effect on absolute judgment, 35 Ss trained to make such judgments by receiving practice with a scale of distance and knowledge of results were compared with 35 untrained Ss on an absolute judgment task. To test the effect on relative judgment, the Ss were divided in a similar manner and the practice group compared with the non-practice group on a relative judgment task. Results of both experiments are presented and discussed in terms of differences in constant and variable errors between pretrained and untrained Ss.
T. G. R 10

8283
Lincoln, R.S., & Alexander, L.T. PREFERRED PATTERNS OF MOTOR AND VERBAL RESPONSES. *J. exp. Psychol.*, Aug. 1955, 50, 106-112. (Johns Hopkins University).

8283
This is a study of response predictability on the basis of preferred patterns of motor and verbal response. Each of 32 subjects was presented with one of two panels of eight discs positioned so as to outline either a circle or square and instructed to select verbally and motorically in a random fashion the various discs so that all would have been selected equally often after a long series of such selections. Responses were recorded and analyzed by means of multivariate information analysis in order to determine the amount of predictability for each individual. The results are discussed in terms of the amount and most accurate sources of predictability (e.g., sequential vs. average frequency of response, etc.).
T. G. I. R 8

8286

Beck, J., & Gibson, J.J. THE RELATION OF APPARENT SHAPE TO APPARENT SLANT IN THE PERCEPTION OF OBJECTS. *J. exp. Psychol.*, Aug. 1955, 50, 125-33. (Cornell University).

8286

Three experiments are reported in this study of the relation of apparent shape to apparent slant in the perception of objects. The experiments were designed to evaluate each of the following aspects of the shape-slant relationship: (1) the effect on apparent shape of apparent slant when slant is not determined by stimulation (judgments of luminous shape in the dark); (2) the effect of illusory slant on apparent shape (judgments of shape against visible background); and (3) effect on apparent shape of apparent slant with stimulation provided for slant. The results of each of the experiments and all of the experiments as a whole are discussed in terms of redefining the relation between variables of apparent shape and apparent slant.

T. I. R 12

8287

Diamond, A.L., & Gilinsky, A.S. DARK-ADAPTATION LUMINANCE THRESHOLDS FOR THE RESOLUTION OF DETAIL FOLLOWING DIFFERENT DURATIONS OF LIGHT ADAPTATION. *J. exp. Psychol.*, Aug. 1955, 50, 134-43. (Columbia University).

8287

This study is concerned with the course of dark adaptation (luminance thresholds) as a function of time in dark following varied durations of preexposure, level of visual acuity, and the relative effect of duration vs. luminance of preexposure. Utilizing a modified Hecht-Schlaer adaptationster, luminance thresholds were obtained for two subjects under varied duration of light adaptation (1 sec., 30 sec., 5 min. and 10 min.) and varied acuity values of grating used in the test field (.042, .083, and .62). The results are presented and discussed in terms of the course of adaptation at various acuity levels and following varied duration of light adaptation.

T. G. I. R 9

8288

Diamond, A.L. FOVEAL SIMULTANEOUS CONTRAST AS A FUNCTION OF INDUCING-FIELD AREA. *J. exp. Psychol.*, Aug. 1955, 50, 144-52. (Northwestern University).

8288

Two experiments are reported in this investigation of foveal simultaneous contrast as a function of inducing field area. In the initial experiment, inducing field area was varied in terms of vertical dimension (0 to 33') and luminance (0 to 2.71 log m). Test field luminance was held constant at .60 log m. The distance between the near borders of the field was held constant while the second experiment differed in holding constant the distance between their centers. A binocular matching technique was employed in both experiments (total of three subjects). The results are presented and discussed in terms of test-field apparent brightness as a function of degree of increase in inducing-field area.

T. G. I. R 5

8289

Eriksen, C.W., & Hake, H.W. MULTIDIMENSIONAL STIMULUS DIFFERENCES AND ACCURACY OF DISCRIMINATION. *J. exp. Psychol.*, Sept. 1955, 50, 153-160. (Johns Hopkins University).

8289

This is an investigation of accuracy of discrimination as a function of the number of dimensions along which stimuli differ. Six subjects were presented with seven series of stimuli differing in terms of number and kind of dimensional differences (size, hue, brightness, size and hue, etc.). The method of absolute judgment was utilized to determine discrimination accuracy. An analysis of the data compares the relative ease of discriminability as a function of dimensional differences. Also discussed is the predictability of multi-dimensional discrimination accuracy on the basis of knowledge of accuracy on the compounded dimensions.

T. I. R 12

8290

Hake, H.W. & Eriksen, C.W. EFFECT OF NUMBER OF PERMISSIBLE RESPONSE CATEGORIES ON LEARNING OF A CONSTANT NUMBER OF VISUAL STIMULI. *J. exp. Psychol.*, Sept. 1955, 50(3), 161-167. (Johns Hopkins University, Baltimore Md.).

8290

This study is concerned with transfer in the learning of visual stimuli as a function of the degree to which the learner is able to specify a verbal label for the visual stimulus. Ninety-Ss received a series of visual patterns to identify by means of a set of labels. The number and kind of labels available to the S was varied among nine subgroups. Each S then received a transfer task in which the same patterns had to be identified with a new set of labels. Results are discussed in terms of the effect of number of labels upon the initial learning and transfer tasks.

T. R 11

8291

Kunnappas, T.M. INFLUENCE OF FRAME SIZE ON APPARENT LENGTH OF A LINE. *J. exp. Psychol.*, Sept. 1955, 50, 168-170. (University of Stockholm).

8291

To investigate the effect of frame size upon apparent length of a line, ten subjects were presented with a series of white cardboard squares differing in size (length of sides: 7, 9, 12, 16 and 21 cm.) and placed two at a time on a sky-blue background. The 7 cm. square served as the constant square on which was drawn a line 50 cm. long whereas on the squares it was varied (interval of variation: 1 mm.). The subjects were required to compare the lengths of the lines. An analysis of these comparisons was conducted to evaluate the influence of the frame upon apparent length of the line.

T. G. R 4

8292

Diamond, A.L., Scheible, H., Schwartz, E., & Young, R. A COMPARISON OF PSYCHOPHYSICAL METHODS IN THE INVESTIGATION OF FOVEAL SIMULTANEOUS BRIGHTNESS CONTRAST. *J. exp. Psychol.*, Sept. 1955, 50, 171-74. (Northwestern University).

8292

This study presents a comparison of three different psychophysical methods utilized in the investigation of foveal simultaneous brightness contrast with the aim of determining: (1) whether the characteristic effects are dependent upon the method of investigation; and (2) the most useful and reliable method. A total of six subjects were used in three experiments which compared the following methods: limits vs. constant stimuli, adjustment vs. constant stimuli, limits vs. adjustments. The general methodology entailed experimental matches with a 33' test field (at 0.6 log m), a match field, and an inducing field varied in luminance (0 to 2.71 log m). The results are treated in terms of the shape of the contrast curves as indicative of differences among methods.

T. G. R 6

8293

Cantor, Jean H. AMOUNT OF PRETRAINING AS A FACTOR IN STIMULUS PREDIFFERENTIATION AND PERFORMANCE SET. *J. exp. Psychol.*, Sept. 1955, 50(3), 180-184. (State University of Iowa, Iowa City, Iowa).

8293

To investigate the effects of pretraining upon the subsequent performance of a perceptual-motor task, three groups of 20 Ss each received varied amounts of relevant pretraining on the Star Discrimeter. The performance of these Ss was compared with that of Ss who received irrelevant and/or no pretraining. The results are discussed in terms of the effect of degree and kind of pretraining on the amount of positive transfer which occurs in such a motor task.

G. I. R 11

8294

Weiss, B. MOVEMENT ERROR, PRESSURE VARIATION, AND THE RANGE EFFECT. *J. exp. Psychol.*, 1955, 50, 191-196. (University of Rochester).

8294

To determine the role of pressure variation in positioning settings with small displacement ranges (less than 7.5") and to assess the role of range effect, eight subjects were required to compensate for the displacement of a spot of light from the center of an oscilloscope screen. Four pressure-displacement conditions were utilized: maximum displacement of 60 with maximum pressures of 0, 7.5, 15, and 30 lb. The results are presented and discussed in terms of the relative effect of pressure variation and range effect on accuracy of setting (treated in terms of constant error and Weber ratio).
T. G. R. 8

8295

Bilodeau, E.A. VARIATIONS IN KNOWLEDGE OF COMPONENT PERFORMANCE AND ITS EFFECTS UPON PART-PART AND PART-WHOLE RELATIONS. Proj. 7707, Task 77130, AFPMRC TN 56 36, Feb. 1956, 10pp. USAF Personnel & Training Research Center, Lackland AFB, Tex. (Reprinted from: *J. exp. Psychol.*, Sept. 1955, 50(3), 215-224).

8295

Two experiments were conducted on the effects of knowledge of component performance on performance of parts of and the whole task. Utilizing two units of the SAM Multidimensional Pursuit Test (CM813E), Ss were given varied instructions and knowledge of results to alter the S's pattern of attending to the four components of the task. The results are presented and discussed in terms of the effect of the various knowledge of results procedures upon part and whole task proficiency.
T. R. 3

8296

Wyckoff, L.B., & Sidowski, J.B. PROBABILITY DISCRIMINATION IN A MOTOR TASK. *J. exp. Psychol.*, Oct. 1955, 50(4), 225-231. (University of Wisconsin, Madison, Wisc.).

8296

In an investigation of probability discrimination in the performance of a motor task, 60 Ss were given a tracking task which incorporated anticipation of the target as an element of optimal performance. The direction of the target across the screen occurred at a fixed percentage for each of five subgroups (25, 40, 50, 60, and 75 percent from right to left). The amount of time on target required for a hit was .3 sec. for half the Ss and .5 sec. for the other half. The results are presented and discussed in terms of the percent of correct anticipations demonstrated by the various subgroups.
T. G. I. R. 6

8297

Weiss, B., Coleman, F.D., & Green, R.P. A STOCHASTIC MODEL FOR TIME-ORDERED DEPENDENCIES IN CONTINUOUS SCALE REPETITIVE JUDGMENTS. *J. exp. Psychol.*, Oct. 1955, 50, 237-244. (University of Rochester).

8297

In order to determine a stochastic model for the time ordered dependencies in a bisection task, 20 subjects while blindfolded were required to make 120 bisections of an angle of 40° (after sampling the angle by turning a knob). Monetary bonuses were offered for accuracy but there was no knowledge of results during the experiment. The data were treated by spectral analysis and autocorrelations between two series of trials. On the basis of these results a stochastic model is presented and discussed in terms of accuracy of response prediction. The role of past experience in such a task is also discussed.
T. G. R. 2

8301

Garvey, W.D., & Mitnick, L.L. EFFECT OF ADDITIONAL SPATIAL REFERENCES ON DISPLAY-CONTROL EFFICIENCY. *J. exp. Psychol.*, Oct. 1955, 50, 276-82. (NRL, Washington, D.C.).

8301

The purpose of this study was to determine the effect of fixed reference lines upon the rate of response in a display-control system consisting of a matrix of display lights and an isometric matrix of response switches. Preliminary practice in operating the response switches corresponding to display signals occupying the analogous positions was given to eight naval enlisted men. The experimental tasks consisted of a 10 x 10 matrix and a 2 x 10 matrix. Half of the subjects worked on unmarked matrices and half on matrices subdivided by reference lines. The learning curves of the control and experimental groups are compared with respect to the response rate over a series of 36 trials. In a further experiment five subjects were tested on an 8 x 8 matrix with still more reference lines.
G. M. 3

G. M. 3

To investigate various aspects of methodology and characteristics of ratio judgments in the constant sum method of scaling, 2 experiments were carried out with 9 weights ranging between 108.5 and 919.8 gm. Exp. I involved 20 Ss who divided 100 points between pairs of weights to express ratio judgments, while Exp. II had 10 Ss express their ratio judgments of the same pairs directly, i.e., say how many times heavier the one weight felt in comparison to the other. The data were used to derive psychological scales for the 2 conditions. Results were: 1. Exp. I yielded a scale which fairly closely approximated the physical scale, but there was a tendency to overestimate heavier weights and underestimate lighter ones. 2. Successive multiplication in the procedure used in computing scale values from judgments data introduced an artifact which influenced final scale values. 3. Averaged judged ratios between adjacent stimuli in the series reflected the patterns of over- and under-estimation seen in the relationships between psychological and physical scales for both methods of reporting judgments. 4. Individual pair comparisons revealed that in both experiments judgments were biased by the similarity between stimuli within a pair and by whether the lighter or the heavier stimulus was lifted first. (JNEAS)
R 10

8302

Baker, K.E., & Dudek, F.J. WEIGHT SCALES FROM RATIO JUDGMENTS AND COMPARISONS OF EXISTENT WEIGHT SCALES. *J. exp. Psychol.*, Nov. 1955, 50(5), 293-308. (University of Nebraska, Lincoln, Neb.).

8303
Gogel, M.C., & Harker, G.S. THE EFFECTIVENESS OF SIZE CUES TO RELATIVE DISTANCE AS A FUNCTION OF LATERAL VISUAL SEPARATION. *J. exp. Psychol.*, Nov. 1955, 50(5), 309-315. (USA Medical Research Lab., Fort Knox, Ky.).

2 experiments were conducted to investigate the change in the effectiveness of a size cue to relative depth as a function of the lateral separation of 2 differently sized objects. In one experiment, the 2 objects (playing cards) were viewed binocularly and in the other experiment the left card was viewed binocularly and the right card monocularly. 2 different amounts of lateral separation of the cards were used in each experiment. The change in the effectiveness of the size cue was determined by measuring the change in apparent depth between the 2 cards. The apparent depth between the 2 cards was measured by having the subject adjust a binocular disc to apparent distance equality with each of the cards. Controls were used to determine the effect of the increased lateral separation upon the apparent relative distance of the cards when both cards were the same size. It was found that the average apparent depth between the 2 differently sized cards increased as the lateral visual separation of the cards was increased. An equivalent change did not occur when one card was the same size. This happened both when the 2 cards were binocular and when one card was binocular and when one card was monocular. Under the condition of these experiments, the effectiveness of size cues to relative depth increased as the lateral separation of the differently sized cards was increased.

8304
Krulac, G.K., & Weisz, A. STUDIES IN THE VISUAL DISCRIMINATION OF MULTIPLE-UNIT DISPLAYS. *J. exp. Psychol.* Nov. 1955, 50, 316-324. (Tufts University).

8304
This study investigated the relation between the discrimination of numerals and the amount of information transmitted by them. In experiment I the amount of information was held constant while its distribution varied amongst three positions in the display. In experiment II the amount of information in any one position was limited to 0 or 1 bit, while the total information was varied. In experiment III the restriction to ten categories, imposed by the use of arabic numerals, was removed by using an augmented alphabet of 32 letters. Experiment IV attempted to measure the effects of the amount of information transmitted while the inherent difficulty of discriminating the letter form was controlled. The first two experiments were performed with nine college students and the last two with 16 enlisted men. T.R. 3.

8305
Payne, R.B., & Hauty, G.T. EFFECT OF PSYCHOLOGICAL FEEDBACK UPON WORK DECREMENT. *J. exp. Psychol.*, Dec. 1955, 50(6), 343-351. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

8305
In an investigation of the effect of psychological feedback upon work decrement, 144 Ss were given preliminary training on the USAF SAM Multidimensional Pursuit Test (CM 813E) and then a final four hour-work period (192 one-min. trials). Performance occurred under 35 combinations of three directive feedback, three incentive feedback, and four pharmacological (Dexedrine, Behadril-hyoscine, lactose placebo, and no drug) treatments. The results were presented and discussed on terms of the relative effect of each of the treatments upon psychomotor performance and subjective dispositions. T.G. R. 5.

8307
Leibowitz, H.W., Myers, H.A., & Grant, D.A. FREQUENCY OF SEEING AND RADIAL LOCALIZATION OF SINGLE AND MULTIPLE VISUAL STIMULI. *J. exp. Psychol.*, Dec. 1955, 50, 360-373. (University of Wisconsin).

8307
The frequency of seeing and the accuracy of localizing small circular patches of orange light 4.5° from the fixation point of the visual field are measured as a function of the number of lights presented simultaneously and their luminance and duration. In one experiment 30 subjects viewed stimuli with luminance of .02 to 3.12 millilamberts and durations of .02 to .20 seconds. The number of lights was fixed at one value between one and six for each of six subgroups of subjects. The position of the lights was varied at random. In a second experiment on six subjects the number as well as the position of the lights was randomized. The implications of the results for the interdependence of perceptual events are discussed. T. G. R. 6

8308
Purdy, J., & Gibson, Eleanor J. DISTANCE JUDGMENT BY THE METHOD OF FRACTIONATION. *J. exp. Psychol.*, Dec. 1955, 50, 374-380. (Cornell University, Ithaca, N.Y.).

8308
The accuracy with which an unaided observer can fractionate a stretch of ground by viewing it from one position was determined by the methods of bisection and trisection. The observer indicated his judgment by instructing a bicycle rider, who served as the stimulus, to stop at the one-half or one-third point. The distances to be fractionated were selected so that the true division points were at intervals of 25 yards. The results were compared to those expected on the basis of the size of the retinal image. The effects of the direction of motion of the rider on the constant error were shown as well as the effects of knowledge of results. T. G. R. 5

8309
Noble, C.E., & Broussard, I.G. EFFECTS OF COMPLEX TRANSFORMATIONS OF FEEDBACK UPON SIMPLE INSTRUMENTAL BEHAVIOR. *J. exp. Psychol.*, Dec. 1955, 50(6), 381-386. (Louisiana State University, Baton Rouge, La.).

8309
In an investigation of the effects of curvilinear transformations of feedback upon simple instrumental behavior, 96 Ss, assigned to three statistical treatment groups, were required to learn a micrometer turning task. Each statistical treatment represented a different conversion of true scores into reported scores. The Ss were blindfolded to remove conflicting visual cues. The results were discussed in terms of the relative accuracy of performance exhibited by each group. G. R. 7

8310
Bakan, P. DISCRIMINATION-DECREMENT AS A FUNCTION OF TIME IN A PROLONGED VIGIL. *J. exp. Psychol.*, Dec. 1955, 50, 387-390. (New York University).

8310
This study is an investigation of the differential threshold for brightness as a measure of vigilance. A test spot 15 minutes in diameter was presented at a distance of nine feet to 20 subjects, 11 male and 9 female. The test spot had a steady luminance of 2.1 ft. lamberts and flashed once every second. The brightness of the flash was varied from 3.1 to 4.0 ft. lamberts following the method of limits during trials which were spaced irregularly over a period of 1 1/2 hrs. In between trials the brightness of the flash was always 3.1 ft. lamberts. The mean difference limit and the number of false responses are reported as a function of the elapsed time on watch. T. G. R. 5

8311

Kennedy, J.L. SOME PRACTICAL PROBLEMS OF THE ALERTNESS INDICATOR. P 277, Feb. 1952, 3pp. The Rand Corporation, Santa Monica, Calif.

An alertness indicator could be based on brain waves; an alarm or alerting signal would come on when the frequency of the alpha rhythm of the brain waves changed. Experiments, however, showed great variability among individuals. Furthermore, some normal people did not show an alpha rhythm. Recording of electrical activity from the forehead appeared to be a reliable indicator of alertness, when muscle spike activity was translated into a moving average DC level. The device also contained a sensitive relay circuit to sound an alarm or activate a switch when the DC activity dropped below a certain level. Practical problems in using the alertness indicator in real life are discussed. (MEIAS)

8312

Ernst, W.H., Summney, R. & Kennedy, J.L. EXPERIMENTS ON THE CORTICAL CORRELATE OF PATTERN VISION. P 447, Nov. 1952, 4pp. The Rand Corporation, Santa Monica, Calif.

The Kikler-Held experiment on DC potential shifts related to visual stimulation has been repeated, using 2 channels of DC recording. In a preliminary experiment, 11 Ss were given 538 exposures to a moving bar of light. 23% of the trials were successful, i.e., a DC response from an occipital electrode referred to a vertex electrode was observed. When records of 8 of the 11 Ss were scored during non-stimulus periods, 32% successes were observed. It is concluded that the DC responses are not necessarily related to the occurrence of the visual stimulus. A second experiment was conducted on 19 Ss with 2 channels of DC recording. These results suggest that the source of the DC changes may be the corner-retinal potential from eye movement or other areas of the brain rather than the occipital areas. It is concluded that the Kikler-Held phenomenon, although it may be recorded from all Ss, is statistically infrequent and the conditions under which it does appear are rather obscure. It is suggested that the name, "The Cortical Correlate of Pattern Vision," is premature. R 3

8313

Flood, N.H. THE INFLUENCE OF ENVIRONMENTAL NON-STATIONARITY IN A SEQUENTIAL DECISION-MAKING EXPERIMENT. P 345, Nov. 1952, 3pp. The Rand Corporation, Santa Monica, Calif.

This paper reports on a series of pilot experiments, and on their theoretical background, that were conducted to study the effect on human decision-making of a belief that the environment is changing when in reality it is constant. The results suggest that Ss tend to search more among poorer alternatives when they believe that the situation is changeable, and in conformity with mathematical models suggested by W.K. Estes and R.R. Bush to describe the 2 types of decision-making behavior.

8314

Flood, N.H. TESTING ORGANIZATION THEORIES. P 312, Nov. 1952, 2pp. The Rand Corporation, Santa Monica, Calif.

This paper proposes a class of mathematical models to represent the behavior of a group of one or more individuals engaged in a decision-making process. 3 broad theories are synthesized to yield an organization theory to relate to the dynamic valuation, learning, interaction, and decision processes observed in group decision-making. The decision model is defined for groups with 2 members. Experiments are proposed to provide the data for estimating the parameters in the ~~member~~ group model. (MEIAS)

R 5

8315

Kirsch, J. COMMUNICATION BY VIBRATORY TACTILE STIMULI FOR MESCON SYMPOSIUM. Aug. 1955, 14pp. The Rand-Holdridge Corporation, Los Angeles, Calif.

This paper deals with an apparatus and method for communication whereby tactile vibratory stimuli replace or supplement the visual and auditory means. The basic system consists of a simple apparatus: the 5 fingers of the "speaker" rest on sensitive vibration sending diaphragms, and correspondingly, the 5 fingers of the "listener" rest on sensitive vibration receiving diaphragms. A duplicate reversed system allows the "listener" to become the "speaker". Experiments from the area of military communication relevant to the problem are discussed. The sensitivity of the skin to vibration is in the frequency range of 10 to 8000 cps. A system (FACT) is described for the study of communication by the sense of touch directly. Problems for future tests are outlined. (MEIAS)

R 8

8316

Fiedler, F.E. THE INFLUENCE OF LEADER-DEPMAN RELATIONS ON COMBAT CREW EFFECTIVENESS. J. abnorm. soc. Psychol., Sept. 1955, 51, 227-235. (University of Illinois, Urbana, Ill.).

This study of interpersonal relations among members of military crews tests the hypothesis that the "emotional distance" of the leader from his crew is positively related to crew effectiveness. The measure of "emotional distance" is derived from a questionnaire in which the leader describes the attributes of persons whom he finds it easy to work with and persons he finds it hard to work with. The difference between these descriptions is taken to represent "emotional distance". The attitude of the leader toward the crew member occupying the most crucial role in the crew's operations was also measured by a sociometric questionnaire. Air Force bomber crews (70) and Army tank crews (25) were studied by this method and the results related to the objective criteria of the effectiveness of the crew in training operations.

T. R 17

8317

Pierce, Alice M. A CONCISE BIBLIOGRAPHY OF THE LITERATURE ON ARTIFICIAL INTELLIGENCE. Proj. 4610, Task 46104, AFRC TN 59 773, Sept. 1959, 18pp. USAF Cambridge Research Labs., Hanscom AFB, Bedford, Mass.

This bibliography is a bare listing of the literature on artificial intelligence, as the term applies to systems whose operating behavior would be called intelligence if exhibited by man. Unindexed, it has a minimum of cross references to related subjects. The bibliography contains 239 items in alphabetical order. (MEIAS)

8318

Reidy, J.J. & Brury, H.F. SOME FACTORS IN THE EMOTIONAL ADJUSTMENT OF RADAR OBSERVERS IN JET FIGHTER INTERCEPTOR AIRCRAFT. SPECIAL REPORT 1. Proj. 22 1201 0000, Tech. Rep. 56, Nov. 1953, Top. USAF Arctic Aeromedical Lab., Ladd AFB, Alaska.

This report deals with the emotional adjustment of radar observers assigned to a jet fighter interceptor squadron based in the sub-Arctic. 2 groups were studied. The 13 reserve officers in the first group were older men, most of them with combat experience, several of them were large in body build. Most of them had many complaints about the pilots and aircraft, and displayed symptoms of alcoholism, fatigue and irritability. The second group of 6 reserve officers were younger, all except one lacked combat experience, they were short and slender and had few complaints. Each of them flew almost exclusively with the particular pilot with whom he was trained. After 5 months these men showed little change. Conclusions: a) the permanent assignment of each radar observer to a specific pilot was an important factor in the significantly better adjustment of the second group. b) the screening for size and body build is particularly important in climates where heavy clothing must be worn. c) the conditions resulting from the severe climate were a constant source of annoyance and complaints. (REIAS)

8319

Simon, C.W. & Emmons, W.W. THE EEG, CONSCIOUSNESS, AND SLEEP. P 655, April 1955, 17pp. The Rand Corporation, Santa Monica, Calif.

Monopolar occipital and vertex EEGs were taken from 21 normal, male, alpha-dominant adults during an 8-hour sleep. Information was presented by means of a tape recorder during this period. Ss reported if they heard the information during stimulation and were later tested, upon rising, to see if they could recall it. These 2 variables were correlated with electroencephalographic patterns occurring during the information presentation. The following conclusions were drawn: a) The probability of remembering and responding to meaningful auditory stimulation increased as the quantity and quality of waking alpha within the immediate vicinity increased. b) The absence of alpha does not mean unconsciousness. c) The presence of delta is an indication of unconsciousness. Unconsciousness is directly related to delta amplitude, and inversely related to delta frequency. d) Several seconds of EEG scored by eye is a reliable measure of the state of consciousness. e) For any particular EEG pattern, persons who have been asleep prior to stimulation absorb and retain relatively less information than those who have been awake. f) Movements per se are not a good criterion of consciousness.

R 21

8321

Grice, G.R. DISCRIMINATION REACTION TIME AS A FUNCTION OF ANXIETY AND INTELLIGENCE. J. Abnorm. Soc. Psychol., Jan. 1955, 50, 71-74. (University of Illinois).

8321

Relations found between anxiety, intelligence and reaction time among Air Force trainees are described. The measure of anxiety was the Taylor Scale of Manifest Anxiety, of intelligence the Air Force Clerical Aptitude Test, and of reaction time the Air Force Discrimination Reaction Time Test. The subjects were the 60 men (out of 300) who were in the upper and lower 10 percent on the anxiety test scale. Differences between these two groups in reaction time are described and the difficulties of separating emotional and intellectual individual differences is discussed.

T. R 8

8327

Aviation Week. NACA REVEALS CRASH DATA TO INDUSTRY. Aviation Week, Nov. 1953, 52(21), 26-30.

8327

This article presents information on the factors affecting human survival in aircraft crashes (data provided by National Advisory Committee for Aeronautics). Two types of aircraft, transports (Curtiss C-46 and Fairchild C-82) and lightplanes (Piper Cub) were studied under simulated conditions of engine failure during takeoff with the possibility of fire high but that of structural damage moderate. The results were discussed in terms of survival time, thermal and sound insulation in relation to escape time, and the protective value of the shoulder harness.

I.

8328

Coughlin, W.J. WHY RYAN BETS ON SIDE-BY-SIDE TRAINER. Aviation Week, Nov. 1953, 52(22), 42-43.

8328

This article describes the side-by-side primary trainer (Model 72) for US military pilots developed by Ryan Aeronautical Co. A comparison of this type of trainer with the tandem trainer is presented along with a discussion of the advantages offered by the side-by-side trainer in terms of such factors as audio-visual learning, instructor visibility, instructor evaluation of student, student learning rate, safety, maintenance problems, and others.

I.

8329

Shea, F., Jr. REFRESHER PILOT TRAINING PAYS OFF IN SAFETY. Aviation Week, Nov. 1953, 52(22), 21-24.

8329

This article described a refresher training program for business pilots (sponsored by Flight-Safety, Inc.) to promote flight safety. By utilizing a Curtiss-Wright-Dehmel automatic radio range training aid, simulated problems can be flashed to a Link cockpit where the trainee is called upon to fly ranges and practice approaches and holding procedures while the Dehmel records his actions. The general course included ground training (e.g., meteorology, aircraft performance analysis, etc.) and flight training (primarily to diagnose pilot's weak points).

I.

8330

Christian, G.L. TRAINER TEACHES F9F-9 COCKPIT ROUTINE. Aviation Week, March 1955, 52(13), 58-61.

8330

This article describes the development by Carmody Corp. of a synthetic aircraft training device, the "procedure trainer," which is being prototyped for the Navy's supersonic F9F-9 fighter. The devices in the synthetic procedure trainer do not attempt to teach flying or navigation but rather are designed to teach a pilot those things he cannot know about a new type of airplane: location of instruments, switches, control levers, etc. The function of the trainer and its advantages over other types of trainers are discussed in terms of areas of training, cost of device, etc.

I.

8331

Aviation Week. T2V USES BOUNDARY LAYER CONTROL. Aviation Week, April 1955, 52(15), p.15.

8331

This article describes the T2V-1 Navy jet trainer designed by Lockheed Aircraft Corp. The utilization of a boundary layer control system, navigational equipment, and cockpit safety features are some of the aspects mentioned along with a description of the trainer's design specifications, range and dimensions.

I.

8332

Aviation Week. CAPSULE TO TEACH HOW TO EJECT. *Aviation Week*, April 1953, 52(16), p.101.

8332

This article describes the development by Cernady Corp. of an ejection seat "capsule trainer" which contains information charts, working models of an ejection seat, and other components. The oversize, three dimensional, two scale panels demonstrate, among other things, the release of seat from pilot, and the automatic parachute opening device.

I.

8333

Aviation Week. MODEL TO TRAIN DRONE OPERATOR. *Aviation Week*, May 1953, 52(20), p.35.

8333

This article presents a brief description of the development by Aerolab Development Co. of a radio-controlled drone (a high-wing monoplane) for use in training target drone controllers. Details concerning the design, control, speed, and launching of the device are mentioned.

I.

8334

Aviation Week. USAF GETTING F-102A SIMULATOR. *Aviation Week*, July 1953, 53(1), p.69.

8334

This article describes the development by Link Aviation of a supersonic Convair F-102A interceptor flight simulator. A major deviation from usual simulators is reported as permitting more accurate computing over a greater range of aerodynamic variables and more precise and realistic simulation of certain flight characteristics. A picture and explanation of the training facility is presented.

I.

8335

Aviation Week. AUTOMATIC SAFETY BELTS FOR JET PILOTS. *Aviation Week*, Jan. 1953, 52(4), p.19.

8335

This article presents a brief description of a new automatic safety belt for bailouts at high speed and high altitudes being produced for the Air Force by Stanley Aviation Corp., Buffalo. Designed for use in conjunction with explosive ejection seats, it safeguards the jet pilot should he be knocked unconscious during bailing by actuating the seat release and the parachute ripcord.

8336

Anderson, D.A. TRAINERS EASE HUP COPTER SERVICING. *Aviation Week*, June 1953, 52(22), 30-36.

8336

This article describes the first mobile maintenance trainer for helicopters, designed and constructed for Piasecki Helicopter Corp. by Burton-Rodgers, Inc., being used to help train Navy ground crews who service Piasecki HUP copters. A detailed description of the composition and functions of the various components of the training unit (e.g., electrical system, longitudinal controls, tool panel, etc.) is presented along with a description of the training program itself.

I.

8337

Aviation Week. GROUND-BORNE MISSIONS READY PILOTS FOR COMBAT. *Aviation Week*, Dec. 1951, 52(25), p.53.

8337

This brief article presents pictures and a description of an Air Force trainer, the Sabre Fliteronic which simulates the North American F-86D all-weather fighter, and a Navy simulator, the F8F cockpit trainer which comprises a standard Grumman F8F Bearcat Link trainer and is designed to train pilots of all-weather squadrons.

I.

8338

Christian, G.L. PAN AM BUILDING DC-68 FLIGHT SIMULATOR. *Aviation Week*, Nov. 1951, 52(21), 56-59.

8338

Success with its electronic flight simulators has inspired Pan American World Airways to undertake construction of a "mock simulator" for the DC-68's. This article describes the contemplated design of this simulator and some of the aspects of the Stratocruiser electronic simulator (illustrated in the article). The assets of the latter simulator are discussed in terms of its operation, flight training efficiency, and the realistic conditions which it can achieve. The simulator provides training for all the crew of DC-68.

I.

8339

Aviation Week. AUTOMATIC APPROACH EQUIPMENT TRAINER. *Aviation Week*, Nov. 1951, 52(19), p.68.

8339

This article presents a brief description of the development by Northrop Aircraft, Inc. of an automatic landing approach flight simulator designed to simplify training of Air Force personnel in maintenance of automatic approach equipment. The device duplicates the flight of a Northrop F-89 Scorpion all-weather fighter. Comments are made concerning the operation and design of the model.

8340

Aviation Week. AF TESTS TEMCO, BEECH TRAINERS. *Aviation Week*, Aug. 1951, 52(8), p.14.

8340

A description is presented of an Air Force flight training evaluation test of three Temco T-35 Buckaroo trainers against two Beech T-34 trainers. Three flying cadets selected on the basis of identical stanine tests were assigned to each plane and the planes were then given a series of evaluative tests. Comments are made concerning the results of the tests in terms of suitability to primary-basic training mission, instrumentation, radio and flight characteristics, response of the controls, and night flying suitability.

I.

8341

Aviation Week. JET TRAINER PARTS GO MINIATURE. *Aviation Week*, Sept. 1951, 52(10), p.31.

8341

This article discusses space conservation in a new B-47 flight simulator (Link Aviation) achieved by the design of the following miniature instruments: servo amplifier, linear phase detector, oscillator, audio-amplifier, and other phase detectors. The implication of miniaturization for production, maintenance, and performance are also discussed.

I.

8342

Christian, G.L. LINK THRIVES ON SIMULATOR BOOM. *Aviation Week*, July 1951, 52(2), 43-44, 47-48.

8342

This article discusses the general development of flight simulators, pointing out the distinction between a flight trainer and simulator and the techniques being utilized by Link to evaluate the problems inherent in developing pilot proficiency. An automatic means of scoring a pilot's performance in an actual airplane is described as one of the methods being employed to improve simulated flight trainers. The Flex-Gunnery Trainer and some of the problems still existent in simulated trainers are also discussed.

I.

8343

Aviation Week. NEW RADAR TRAINERS FOR USAF. Aviation Week, June 1951, 54(25), 57-59.

8343

This article describes the development by Transducer Corporation, Boston, of two radar trainers, a gun laying trainer and a navigator-bomber trainer. From his control panel on the gun-laying trainer, the instructor can place blips representing attacking planes at various ranges and angles of elevation and azimuth on the gunner's radar screen and record the rounds fired and results. In the navigator-bomber trainer, a terrain map and radar antenna both submerged in water are two of the aspects of a device which can simulate navigational and bombing problems for the trainee.

I.

8344

Aviation Week. WEAK EYES DO NOT MEAN POOR PILOTS. Aviation Week, Jan. 1951, 54(3), p.55.

8344

This article presents a brief summary of a study conducted by the Committee on Aviation Psychology of the National Research Council concerned with the relation of deficient eyesight to pilot efficiency. An analysis was made of the records of 194 pilots divided into three groups: normal vision, vision corrected to normal by glasses, and deficient vision not necessarily correctable to normal with glasses. The results are presented in terms of the comparable safety records of each of the groups.

8345

Aviation Week. USAF COPTER INSTRUMENT COURSE. Aviation Week, 1951, 54(4), 27-28.

8345

This is a description of the development and results of the Air Force's application of the hooded instrument flying technique to their helicopter pilot training course. It discusses the basic program which includes such maneuvers as instrument takeoff, autorotations, turns, etc., and presents the results of observation of a group of students utilizing the trainer in terms of the difficulties encountered in the training, e.g., overcontrolling, pilot fatigue, radio signal difficulties, and others. Modifications in the instrument to overcome such difficulties are described.

8346

Lee, B.S. TRAINER-X. Aviation Week, May 1952, 56(20), p.17.

8346

A new training plane, the Air Force Trainer-X, is considered as the prototype of a training craft which will embody the best features of both the North American T-6 "Texan" and its postwar replacement, the heavier T-28. This article describes the need for such a trainer and also the general need for trainers which are capable of topping an air speed of Mach 1. The implications of training at such speeds for the design of a trainer are made explicit (e.g., dual controls to enable instructors to coach the trainee in high speed techniques and maneuvers).

8347

Klass, P. LINK SIMULATOR BOOSTS B-47 POTENTIAL. Aviation Week, June 1952, 56(24), 65-70.

8347

This article describes Link Aviation's new B-47 flight simulator designed to provide pilot training for the B-47 jet bomber. Some of the aspects discussed are the reliability of the instrument's components, maintenance of the equipment, and such advantages of the trainer as close supervision of trainee, simulation of emergency conditions, flight realism, instructor control position, and others.

I.

8348

Aviation Week. AF REVEALS HIGH-ALTITUDE PRESSURE SUIT. Aviation Week, Oct. 1952, 57(15), p.17.

8348

This brief article presents illustrations and a description of the Air Force T-1 high-altitude pressure suit. The suit is designed to inflate automatically if cabin pressurization is lost. Solution of the problem of applying counter pressure to the surface of the body and the problem of making the suit adaptable to various body sizes and shapes receive some comment.

I.

8349

McSurely, A. GOOD SEAT ENGINEERING SAVES LIVES. Aviation Week, Nov. 1952, 57(21), 87-89.

8349

The author notes in an analysis of Convair 340 aircraft seats a number of design features which minimize injuries to passengers under certain crash conditions, e.g., seat back moves forward, simpler adjustment of seat position, increased size of seat beams, and so forth. An analysis of an actual crash is presented along with a discussion of the future trends in seat design (material of seat, anchorage, etc.).

I.

8350

Aviation Week. BREATHING PILOT SEAT EASES LONG FLIGHTS. Aviation Week, Dec. 1952, 57(25), p.15.

8350

This brief article describes a pulsating seat designed to relieve the strain on fighter pilots kept in the air for long periods of time. The pulsating seat uses a "breathing" action to relieve pressure and promote circulation. The operation of the seat and its effectiveness over a flight period as long as ten hours are both discussed.

8351

Aviation Week. REACTIONS STUDIED IN RADAR READING. Aviation Week, 1951, 54(12), p.39.

8351

This article presents a brief description of the radar-screen interpretation studies conducted at the Air Force School of Aviation Medicine, Randolph AFB, Texas. It mentions the human factors being investigated (e.g., visual acuity, eye movements, perceptual skill, etc.) during the current phase of the program in which untrained airmen are taken on simulated long flights over strange territory to check on the stimulus and human factors incident to radar observation. The determination of individual differences in observer interpretation of radar pictures is described as an essential aim of the program. The implications of the studies to training and improvement of equipment are examined.

8352

Aviation Week. NEW SAFETY HARNESS FOR AIRBORNE TROOPS. Aviation Week, May 1951, 54(19), p.50.

8352

This article presents an illustration and brief description of a "side saddle" safety harness designed to replace lap belts and provide greater crash protection to paratroopers and combat infantrymen. Stressed for an impact force of 32 gs and consisting of tough nylon mesh webbing and straps, the harness was tested on the human decelerator at Edwards AFB, California.

I.

8353

Aviation Week. CHEAPER WAY TO TRAIN JET PILOTS. Aviation Week, Jan. 1950, 52(4), 32-34.

8353

This article describes the development of the C-11 ground trainer by Link Aviation, Inc. for jet aircraft. It presents information concerning the cost of production and operation, the similarity between the trainer and actual flight conditions, the electronic operation, instrumentation, and navigational equipment, as well as other aspects of the jet trainer.

8355
Aviation Week. NEW LOW-COST NAVIGATION TRAINER.
Aviation Week, Jan. 1950, 52(5), p.35.

8355
This article describes the development by Link Aviation, Inc. of an electronic device (all weather automatic radio aids unit) designed to give realistic low cost instruction in radio navigation procedures. A brief description of the operation and advantages of this device is presented.

8356
Aviation Week. IMPROVED TESTS FOR PILOT SKILLS.
Aviation Week, Jan. 1950, 52(5), 39-40.

8356
This article describes the development of an "objective" flight-check report designed by the American Institute for Research, Pittsburg, Pa., to minimize the check-pilot's personal bias or shortcomings while emphasizing a standard set of maneuvers of critical importance in piloting a transport plane. Other applications of the check list, the manner in which objectivity of the new report is attained, and tests of the efficiency of the flight-check report are also discussed.

8357
Aviation Week. NORTH AMERICAN TESTS TANDEN SABRE TRAINER.
Aviation Week, Jan. 1954, 50(2), p.13.

8357
A two-seat tandem trainer version of the F-86F Sabre fighter-bomber is described. Two modifications of the F-86F's airframe are noted. Special mention is made of wing slats and ejection seats.
I.

8358
Aviation Week. SKID UNIT SHOWS AA PILOTS BRAKING PLAIN.
Aviation Week, Feb. 1954, 50(7), p.63.

8358
An aircraft skid warning device that turns on warning lights in the cockpit when a skid begins is described. Tendencies of pilots to under- and over-brake that have been revealed through use of the device are noted.

8359
Anon. CAL WORKS TO ADJUST MAN TO SUPERSONIC
Aviation Week, 1955, 63(11), 71 & 73-74 & 76

8359
This is a summary of the human factors engineering research being carried on at Cornell Aeronautical Laboratory, Inc., Buffalo, New York. Primarily, it presents the results of research in three major areas: the function of the pilot, comfort, and safety. Results in the following studies are cited: 1) head impact studies; 2) movement of vehicle occupants during crashes; 3) binaural auditory signals in landing instructions; 4) the design of a supersonic cockpit; 5) effects of temperature on pilot; 6) air pressure in supersonic flight; and 7) the design of airplane control.

8360
Stone, I. PILOTS DEMAND BETTER CHANCE OF ESCAPE.
Aviation Week, Oct. 1955, 63(17), 31-36.

8360
This article describes the concern of pilots for adequate escape equipment in supersonic aircraft. It presents illustrations and a discussion of various escape techniques (escape chute, ejection seat, capsule). Mention is also made of research on human tolerance for deceleration as a means of developing adequate escape equipment (e.g., determination of the lift and drag of the man-seat combination).
I.

8361
Aviation Week. AF GETS ASSEMBLY-LINE F86D 'TRAINER.'
Aviation Week, Oct. 1953, 52(16), p.69.

8361
This article presents pictures and a brief description of the F-86D Sabre flight simulator designed for use by the Air Force to train new pilots and serve as a refresher training for experienced pilots. The training program is said to involve the following four phases: 1) transition from slow to high speed jet operation; 2) emergency training (flameouts, icing, etc.); 3) the utilization of avionics navigational aids; and 4) simulated tracking and gunnery by means of radar.
I.

8362
Aviation Week. ANIMATED PANELS EXPLAIN COMVAIR 340.
Aviation Week, Nov. 1953, 52(20), 85-86.

8362
This article describes the utilization of 16 animated training panels (designed and produced by Technical Training Aides, Inc.) to instruct personnel in the operation of the various systems of the Convair 340 transport (e.g., hydraulic main power system, brake and emergency air system, etc.). The results of their use by several airlines are presented in terms of their effect upon the training program, the instructor, the trainees, and follow-up mechanic training. The trainers' function in pretraining indoctrination is also discussed.
I.

8363
Anderson, D.A. HOW AIR FRANCE COMET TRAINING WORKS.
Aviation Wk., 1953, 52(20), 28-29 & 32, 35, 38.

8363
This article presents a detailed description of the Air France Training Program for Comet pilots. It discusses the integration of turbojet and turboprop transport operations with those of a piston-engined fleet in terms of the implications of a jet transport fleet for operations (e.g., runway characteristics), maintenance, flight training, as well as the handling and flight characteristics of the Comet (e.g., takeoff, control, landing) itself.
I.

8364
Anon. F9F MOBILE TRAINER FITS IN TRUCK.
Aviation Wk., 1950, 53(10), 36-37.

8364
This article describes the F9F-2 enclosed-trailer mobile training unit developed by the Engineering and Research Corporation to simulate any flight condition a pilot might encounter under normal or emergency flights. Designed primarily for use in transition of rated pilots from reciprocating to jet-engine aircraft, the trainer consists of three basic units: instructor console, pilot cockpit, and electronic computers. The various flight problems which can be simulated as well as the particular type of practice (instrument flight, navigation, etc.) available to the trainee are discussed.
I.

8365
Anon. NEW LINK ROLE. Aviation Wk., 1950, 53(10), 40.

8365
This article presents a summary account of an experiment with the School Link flight trainer ("Evaluation of the School Link in a Ten-Hour Pilot Flight Training Program", by R.E. Flexman, W.G. Matheny, and E.L. Brown, University of Illinois, Institute of Aviation, Urbana, Ill.). Two groups comprising a total of 47 students were trained to intellectual proficiency in a group of flight maneuvers. Following this, one group received Link training while the other attempted maneuvers in an aircraft. After ten hours of flight time each student received two private pilot tests. The results are presented in terms of the differences in test scores between the groups.

8366

Aviation Week. WHY CRASH PROTECTION IS NEEDED.
Aviation Week, March 1950, 52(10), 28-33.

8366

This article presented the results of an analysis of military and transport safety standards and accidents with specific discussion of the function of safety belts and seat action in accidents. Such aspects as strength of belts, load factors, position of seats, as well as others, were presented in terms of their actual role in recorded accidents.
T. G.

8367

Anon. PILOT'S JOB ANALYZED IN PSYCHOLOGY
LAB. Aviation Wk., 1950, 53 (5), 26-27.

8367

This article presents a brief description of some of the studies (fatigue, cockpit lighting, pilot eye movements, etc.) conducted by the Air Material Command with regard to making the pilot's task easier and safer through simplification of controls and equipment. The equipment utilized in the projects is described in some detail and the results of a study on the effect of fatigue upon pilot effectiveness are presented in terms of the loss of proficiency in skills, effects on retention of tasks, and so forth.
I.

8368

Anon. COCKPIT VIEW VS. SCREEN IMAGE.
Aviation Wk., 1951, 54 (20), 32.

8368

This article presents a brief description of the research conducted by Dr. S.N. Roscoe, University of Illinois on the feasibility of eliminating a plane's wind-screen and substituting a viewing screen for pilot guidance on the aircraft instrument panel. The results of tests in which eleven pilots flew a plane without the windows covered and then with the windows covered, using various screen sizes and magnification, are presented in terms of optimal screen and magnification sizes to permit efficient flying ability. A suggestion is offered for conditions of blind flying in which television or optical systems do not provide a view ahead.

8369

Anon. HIGH LATITUDE NAVIGATION TRAINER.
Aviation Wk., 1950, 53 (26), 31.

8369

This article describes a special navigation trainer (D-2 High Speed, High Latitude Celestial Navigation Trainer) developed by Link Aviation, Inc. said to be capable of accurately reproducing polar region navigating problems. The trainer permits six students at a time to take sights from the observers' platform using periscopic sextants to remain in constant communication with the instructor, and also to furnish data to a larger group of students. The operation of the trainer, its potential application, and the variable at the instructor's disposal are also discussed.
I.

8370

Aviation Week. NAVY TESTS SIMPLIFIED PANEL. Aviation Week, June 1954, 60(26), p.68.

8370

A simplified instrument panel for Naval jet fighters with a combined heading and altitude indicator is described and pictured.
I.

8371

Anon. TALON TESTS ANTI-COLLISION LIGHTS.
Aviation Week, 1954, 60(24), 80.

8371

A device is described that indicates position, altitude, and direction of movement of an aircraft to the pilot of another aircraft. The effect of stroboscopic motion is achieved by the use of two parallel rows of three flashing lights on the fuselage of the aircraft. Implication of the device ("Madsen Lights") for prevention of mid-air collision is noted.
I.

8373 Kaden, S.E., Wapner, S. & Werner, H. STUDIES IN PHYSIOGNOMIC PERCEPTION: II. EFFECT OF DIRECTIONAL DYNAMICS OF PICTURED OBJECTS AND OF WORDS ON THE POSITION OF THE APPARENT HORIZON. J. Psychol., 1955, 39, 61-70. (Psychology Dept., Clark University, Worcester, Mass.).

The present study, consisting of 2 experiments, is a continuation of previous work designed to demonstrate that visual directional dynamics exists as a behaviorally measurable event. The first of these experiments showed that a figure with directional dynamics upwards or downwards has the effect of shifting the physical location of the apparent horizon (eye line), opposite the direction of the dynamics. The second experiment used visually presented verbal symbols connoting uprightness or downrightness, e.g., "rising" vs. "falling". Analogous to the findings with meaningful pictorial material used in the first experiment, the physical position of the apparent horizon shifted opposite the direction of the dynamics conveyed by the words. Thus, in addition to demonstrating that visual dynamics in the upward-downward direction can be measured behaviorally, the study shows that certain semantic aspects of words can be conceived and dealt with experimentally in a theoretical framework developed for problems of perception.
R 10

8374

Beebe-Center, J.G., Rogers, M.S., & O'Connell, D.N. TRANSMISSION OF INFORMATION ABOUT SUCROSE AND SALINE SOLUTIONS THROUGH THE SENSE OF TASTE. J. Psychol., Jan. 1955, 39, 157-160. (Harvard University).

8374

The amount of information transmitted in absolute judgments of sucrose and saline solutions was measured for simple and compound solutions. The number of concentrations in an ensemble was varied from 3 to 17, but the range was always 100 gusts covered in equal log gust steps. The subject sipped the test solution from a shot glass, expectorated, and made his judgment in the form of a number from a pre-arranged scale. The experimenter gave him the correct identification after every response. Several experiments are reported, each involving from one to five subjects. The channel capacity of gustation for salt and sugar is estimated, and the effects of mixing stimuli on information transmission are described.
T.G. R 5

8375

Hamvi, Violet, & Landis, C. MEMORY FOR COLOR. J. Psychol., Jan. 1955, 39, 183-194. (Columbia University).

8375

The purpose of this study was to determine the accuracy and the duration of memory for a color. The subject was shown a chip of a certain hue and saturation which he was required to recognize later in an ensemble of 672 chips systematically arranged, or in an ensemble of 169 chips haphazardly arranged. The time between seeing the color sample and the recognition test was 15 min., 21 hrs or 65 hrs.. The results are reported in terms of the effects of the hue and saturation of the sample, individual differences among the 12 subjects, method of the recognition test, lapsed time, and practice.
T. R 7

8377
Green, R.F. TRANSFER OF SKILL ON A FOLLOWING TRACKING TASK AS A FUNCTION OF TASK DIFFICULTY (TARGET SIZE). *J. Psychol.*, April 1955, 39, 356-370. (University of Rochester).

8377
In a study of transfer of skill on a following tracking task as a function of task difficulty, 64 Ss were asked to perform on the SAM Two-Hand Coordination Test (CM101B). Task difficulty was defined by varying target size. Transfer was measured by having the S first perform on an easy (or hard) target and then on a hard (or easy) target. The results are presented and discussed in terms of the relative amount of transfer of training from a difficult to an easy task as compared to the amount of transfer from an easy to a difficult task.
T. G. R.6

8378
Alexander, S.J., Cotzin, M., & Wendt, G.R. CHEMICAL INFLUENCES ON BEHAVIOR: I. THE EFFECTS OF A SMALL DOSE OF HYOSCINE ON PERFORMANCE. *J. Psychol.*, April 1955, 39, 389-402. (University of Rochester).

8378
To determine the effects of small doses of hyoscine on performance, 15 subjects were tested on each of six successive days after receiving 0.6 mg of hyoscine hydrobromide or a placebo of milk sugar. The performance tests used were complex coordination, rifle target shooting, addition, code substitution, parts of the Army Alpha and a recognition memory test. The order in which the tests were taken was counterbalanced between two halves of the group which had been matched for body weight. The extent of the impairment of the performance of active young men as indicated by these tests is assessed in relation to the military use of hyoscine as a motion sickness preventative.
T. R 5

8379
Alexander, S.J., Cotzin, M., Hill, C.J., Jr., Ricciuti, E.A., et al. STUDIES OF MOTION SICKNESS: X. EXPERIMENTAL PROOF THAT AVIATION CADETS TELL THE TRUTH ON MOTION SICKNESS HISTORY QUESTIONNAIRES. *J. Psychol.*, April 1955, 39, 403-409. (Psychology Dept., University of Rochester, Rochester, N.Y.).

Questionnaires were given, under conditions which could be duplicated in the armed services, to 349 naval aviation cadets shortly after arrival at flight preparatory school. 14 of 42 questions were concerned with motion sickness in different circumstances. 1 to 10 weeks later they were interviewed to determine their face-to-face answers to the same items as had appeared on the questionnaire. The results show that 80% of the answers were identical. Changes of a magnitude large enough to be possibly indicative of falsehood occurred in 0.6% of the answers. It is concluded that this study gives no support whatever to the allegation that aviation cadets may be expected to falsify questionnaire answers. (HEIAS)
R 7

8380
Alexander, S.J., Cotzin, M., Kise, J.B., & Wendt, G.R. STUDIES OF MOTION SICKNESS: XIII. THE EFFECTS OF SICKNESS UPON RIFLE TARGET SHOOTING. *J. Psychol.*, April 1955, 39, 411-415. (Psychology Dept., University of Rochester, Rochester, N.Y.).

Tests of rifle fire accuracy at 25 ft. from the target have been administered to 117 Ss before and after exposure to motion on our vertical accelerator. The data were analyzed to determine whether those who became motion sick showed deficits in performance. The average deviation from the target center of shots by 26 sick Ss showed a mean deterioration of 0.1 mm in performance, whereas 91 who did not become sick showed a mean improvement of 1.6 mm. This difference is not statistically reliable, as shown by a critical ratio of only 0.5. Records of speed of firing indicated no tendency for sick Ss to slow down after wave-machine exposure. It was found that the sick Ss, when asked to predict their own post-exposure performance, tended to drop their estimates further below their pre-exposure performance than did the not-sick Ss. Other analyses showed that neither susceptibility to machine sickness nor past history of sickness bore any demonstrable relation to normal performance on the test administered before exposure to motion.
R 4

8381
Cotzin, M., Hill, C.J., Jr., & Wendt, G.R. STUDIES OF MOTION SICKNESS: XIV. SUBJECTIVE REPORTS OF THE APPARENT PATH OF MOTION ON A VERTICAL ACCELERATOR. *J. Psychol.*, April 1955, 39, 417-421. (University of Rochester, Rochester, N.Y.).

Ss exposed to wave motion on a vertical accelerator were asked to describe the apparent path of motion. Out of 267 Ss, 93 reported only one kind of motion, 122 reported 2 kinds, 44 3 kinds, 6 four, and 2 five kinds. Most of the reported motions other than the true vertical were ellipses or modified ellipses. The differences between Ss might have been due to small variations or differences in head position. Differences in perceived path of motion may be a causal factor in sickness, but it seems more likely that the perceptions were influenced by differences in attitude of susceptible and non-susceptible Ss and were thus less cause than effect. (HEIAS)
R 3

8382
Johnston, C., & Wendt, G.R. STUDIES OF MOTION SICKNESS: XVII. THE EFFECTS OF TEMPERATURE, POSTURE, AND WAVE FREQUENCY UPON SICKNESS RATES. *J. Psychol.*, April 1955, 39, 433-439. (Psychology Dept., University of Rochester, Rochester, N.Y.).

The study was designed to find how motion sickness rates on the vertical accelerator were affected by 2 temperatures, by 4 combinations of head and body posture, by 5 different waves and by 3 classes of susceptibility. 120 men were blindfolded and subjected to motion for 30 minutes (or less if vomiting occurred). Main findings: a) There was no difference of consequences between sickness rates at warm (86° F) and cool (65° F) temperatures. b) Sickness indices for different postures: seated with head upright, 47; seated with head back, 103; supine with head upright, 57; supine with head back, 53. c) A simple mechanical action of wave motion on blood distribution was not a factor in the production of sickness. d) The relation of sickness index to susceptibility was in the expected direction: susceptible, 100; intermediate, 65; non-susceptible, 30. e) Sickness indices corresponding to wave frequencies of 13, 16, 22, 26 and 32 cycles/min. were 54, 83, 92, 83, and 34 respectively. (HEIAS)
R 7

8383
Bilodeau, E.A. MOTOR PERFORMANCE AS AFFECTED BY MAGNITUDE AND DIRECTION OF ERROR CONTAINED IN KNOWLEDGE OF RESULTS. *J. Psychol.*, 1955, 40, 103-113. Proj. 7707. AFPMC, Lackland AFB, Tex.

8383
To investigate the effect of the magnitude and direction of error contained in knowledge of results upon motor performance, 682 Ss were presented with a micrometer knob-turning task. Knowledge of results was varied so that half the Ss received reported scores with an error greater than the true error while the other half received an error score lower than the true error. The results are discussed in terms of performance as a function of the error contained in knowledge of results.
T. G. R 5

8385
Jones, F.N. OLFACTORY ABSOLUTE THRESHOLDS AND THEIR IMPLICATIONS FOR THE NATURE OF THE RECEPTOR PROCESS. *J. Psychol.*, Oct. 1955, 40, 223-228. (University of California).

8385
This article is concerned with the implications of olfactory absolute threshold data for the nature of the receptor process. Using a "controlled-blast" technique, thresholds were obtained for 84 Ss and 20 substances (e.g., pyridine, benzene, fugenol, etc.). These data are treated as group results and discussed in terms of the problems of defining stimulus-receptor interaction and qualitative differentiation of stimuli. The process of adsorption receives major emphasis in the discussion of olfactory stimulation.
T. G. R 6

8386
Heidbreder, Edna, & Zimmerman, Claire. THE ATTAINMENT OF CONCEPTS: IX. SEMANTIC EFFICIENCY AND CONCEPT-ATTAINMENT. *J. Psychol.*, Oct. 1955, 40, 325-336. (Wellesley College).

8386
To investigate the relation between systematic variation of semantic efficiency and attainment of concepts, 41 Ss were presented with 16 series of nine phrases, each phrase representing one concept. Semantic efficiency was varied by modifying both the degree of explicitness and the syntactic direction of a phrase. The results are treated in terms of the effect of each of the factors of semantic efficiency upon ease of concept attainment.
T. R 6

8387
Angelino, H. & Mech, E.V. FACTORS INFLUENCING ROUTINE PERFORMANCE UNDER NOISE: II. AN EXPLORATORY ANALYSIS OF THE INFLUENCE OF "ADJUSTMENT". *J. Psychol.*, Oct. 1955, 40, 397-402. (University of Oklahoma, Norman, Okla.).

To investigate the potential relation between performance under noise and personality or "adjustment" measures, 28 subjects were selected from a total population of 150 college students on the basis of their scores on the California Test of Personality (i.e., the highest 14 and the lowest 14). Each of the subjects was required to perform a task involving simple addition under conditions of quiet and noise (a continuous tone of approximately 85 db). The results are presented and discussed in terms of the quantitative differentiation in performance between the two groups as indicative of the role of personality in performance under noise.
T. R 7

8388
Green, R.F., Andreas, B.G., Norris, E.B., & Spragg, S.D.S. PERFORMANCE ON A FOLLOWING TRACKING TASK (THE SAM TWO-HAND COORDINATION TEST) AS A FUNCTION OF THE CONTINUITY OF THE PLANE AND DIRECTION OF MOVEMENT OF THE CONTROL CRANKS AND TARGET FOLLOWER. *J. Psychol.*, Oct. 1955, 40, 403-410. (University of Rochester).

8388
To evaluate the effects of the continuity of the plane and the direction of movement of the control cranks and target followed on performance of a following tracking task, a total of 84 subjects performed on a modified SAM Two-Hand Coordination Test under conditions of varied display-control arrangements. Where that crank location was known on the basis of previous experiments to produce poor performance, spatial continuity was introduced. The results are presented and discussed in terms of the relative effect of spatial continuity as contrasted to that of position of control cranks.
T. G. I. R 3

8389
Green, R.F., Norris, E.B., & Spragg, S.D.S. COMPENSATORY TRACKING PERFORMANCE (MODIFIED SAM TWO-HAND PURSUIT TEST) AS A FUNCTION OF THE DIRECTIONS AND PLANES OF MOVEMENT OF THE CONTROL CRANKS RELATIVE TO MOVEMENT OF THE TARGET. *J. Psychol.*, Oct. 1955, 40, 411-420. (University of Rochester).

8389
This is a study of compensatory tracking as a function of directions and planes of movement of the control cranks relative to movement of the target. 32 subjects performed on a modified SAM Two-Hand Pursuit Test under varied conditions of direction and plane of controls movement. An analysis of variance of the data was conducted to determine the relative effects of each of the variables and their combinations, i.e., position, order, order and directions, etc. The results are discussed in terms of a comparison between effects of optimum display-control movement relationships on compensatory and following tracking.
T. R 4

8390
Andreas, B.G., Green, R.F., & Spragg, S.D.S. TRANSFER EFFECTS IN COMPENSATORY TRACKING (MODIFIED SAM TWO-HAND PURSUIT TEST) AS A FUNCTION OF REVERSAL OF THE DISPLAY-CONTROL RELATIONSHIPS ON ALTERNATE BLOCKS OF TRIALS. *J. Psychol.*, 1955, 40, 421-430. (University of Rochester).

8390
This study was designed to assess the transfer effects in compensatory tracking which result from reversal of display-control relationships during a series of trials. 216 subjects performed a series of tracking trials with the modified SAM Two-Hand Pursuit Test (CM 8106) under conditions in which display-control relationships were reversed on alternate blocks of trials. Different patterns of alternation were applied for various subgroups. The results are presented and discussed in terms of the degree of facilitation and interference effects on performance as a function of the pattern of display-control alternation.
T. I. R 5

8391

Hartzman, M., Seitz, C.P., & Orlansky, J. STABILITY OF PERSONALITY STRUCTURE UNDER ANOXIA. *J. gen. Psychol.*, Jan. 1955, 52, 66-74. (College of the City of New York).

8391

This study was designed to investigate the stability of personality structure under conditions of stress produced by severe anoxia. Two groups of 20 subjects each were tested at sea-level and a simulated altitude of 10,500 feet, with order of condition varied for each group. Group Rorschach tests were administered following a fifteen-minute exposure to each condition with the time interval between the two conditions averaging two weeks. Correlations between the tests were used as indices of personality stability. Specific effects of anoxia as reflected by change in Rorschach variables are noted and discussed.

T. R 7

8393

Bousfield, W.A., & Cohen, B.H. THE OCCURRENCE OF CLUSTERING IN THE RECALL OF RANDOMLY-ARRANGED WORDS OF DIFFERENT FREQUENCIES-OF-USAGE. *J. gen. Psychol.*, Jan. 1955, 52, 83-96. (University of Connecticut).

8393

To investigate the incidence of clustering in the recall of randomly arranged words of different frequency-of-usage, two lists of stimulus words, prepared from the Thorndike-Lorge table according to frequency-of-usage, were presented to two groups of 75 Ss. One group received low frequency words and the other, high frequency words. Immediately following presentation, the Ss were asked to recall as many words as possible. The results are presented and discussed in terms of the total amount and the changes in clustering as a function of frequency-of-usage or prior reinforcement.

T. G. R 3

8395

Chaplin, J.P. SEX DIFFERENCES IN THE PERCEPTION OF AUTO-KINETIC MOVEMENT. *J. gen. Psychol.*, Jan. 1955, 52, 149-156. (University of Vermont).

8395

To investigate the role of sex differences in perception of autokinetic movement, two experiments were conducted in which a total of 52 males and 51 females were presented several types of geometric figures as autokinetic stimuli. Direction and extent of movement and latent period for each stimulus, were recorded. The results are presented and discussed in terms of differences in the various variables as indicative of the role of sex differences.

T. R 6

8396

Newhall, S.M. WIDTH AND AREA THRESHOLDS OF DISCRIMINATION OF TWO COLORS. *J. gen. Psychol.*, April 1955, 52, 247-254. (Eastman Kodak Co., Rochester, N.Y.).

8396

This study was designed to determine the width and area thresholds of discrimination of two colors and stems from the general problem of defining color transitions so as to avoid perceptual fringing (between contrasting areas). Color discrimination thresholds with two-color (orange and magenta) objects of varied size and elongation were determined and threshold widths obtained for six subjects by a form of the method of limits. The results are presented and discussed in terms of the relative effects of size, shape and elongation of test field upon discrimination.

T. G. R 6

8397

Verplanck, W.S. & Cotton, J.W. THE DEPENDENCE OF FREQUENCIES OF SEEING ON PROCEDURAL VARIABLES: I. DIRECTION AND LENGTH OF SERIES OF INTENSITY-ORDERED STIMULI. *J. gen. Psychol.*, July 1955, 52, 37-48. (Stanford University, Stanford, Calif.).

8397

To determine the effects of direction and length of a series of brightness changes upon probability of response to such stimuli, the Hecht-Schlaer Model III Adaptometer was employed with six subjects. With direction and length varied to provide six conditions, each subject was asked to respond to series of stimuli presented at 4 sec. intervals and reflecting steps of 0.10 log μ L in brightness. The results are presented and discussed in terms of the effect of length and direction on mean 50% thresholds. Individual differences in mean thresholds were computed and evaluated for significance of difference.

T. R 12

8398

Cotton, J.W. & Verplanck, W.S. THE DEPENDENCE OF FREQUENCIES OF SEEING ON PROCEDURAL VARIABLES: II. PROCEDURE OF TERMINATING SERIES OF INTENSITY-ORDERED STIMULI. *J. gen. Psychol.*, July 1955, 52, 49-58. (Northwestern University).

8398

In order to determine the effect of the procedure utilized in terminating a series of intensity ordered stimuli on visual thresholds, six different procedures of stimulus presentation were employed with six subjects. Following a day of training each subject responded daily through five series with each of the six method variations for a period of six days. The results are presented and discussed in terms of significance of difference of mean 50% thresholds as a function of the particular method employed in presenting the stimulus series.

T. R 5

8399

Cotton, J.W. & Verplanck, W.S. THE DEPENDENCE OF FREQUENCIES OF SEEING ON PROCEDURAL VARIABLES: III. THE TIME-INTERVAL BETWEEN SUCCESSIVE STIMULI. *J. gen. Psychol.*, July 1955, 52, 59-66. (Northwestern University).

8399

In a study of the effects of procedural change on frequencies of response to weak visual stimuli, two experiments were conducted. In the first experiment, six subjects, experienced in visual experimentation, were tested for the effect of various inter-trial intervals (range of 3 to 12 sec.) upon the 50 percent visual threshold obtained in intensity-ordered stimulation (Hecht-Schlaer Model III Adaptometer). In the second experiment six subjects, with no previous experience, were used in an attempt to produce a more sensitive determination of the relation between inter-trial interval and 50 percent threshold. The results are discussed in terms of the relative lack of dependence of the 50 percent threshold on inter-trial interval.

T. R 3

8400

Verplanck, W.S. & Blough, D.S. AN APPARATUS FOR THE PRESENTATION OF VISUAL STIMULI AT LOW INTENSITIES. *J. gen. Psychol.*, July 1955, 52, 67-78. (Harvard University).

8400

This article presents a detailed description of an apparatus specifically designed to permit presentation of visual stimuli at low intensity levels and accurate recording of responses to such stimuli. The apparatus permits presentation of stimuli varying in intensity, duration, interstimulus interval, and stimulus patch size (with viewing conditions held constant). Descriptions of the following aspects of the apparatus are presented: the optical system, stimulus timing, intensity and wavelength controls, response recording, viewing conditions, and the experimenter's desk and control panels.

I.

8402

Sheer, D.E. & Worchel, P. CONFIGURATIONAL CONSTANCY: I. THE EFFECTS OF CHANGES IN THE INTRINSIC ELEMENTS. *J. gen. Psychol.*, Oct. 1955, 52, 265-280. (University of Houston, Houston, Tex.).

The present study was concerned with determining whether there is a tendency for configurations to remain constant even though individual elements of the pattern are modified. 60 inspection stimuli, each consisting of one configuration containing 3 elements and a center reference point, were individually projected on a screen for 30 sec. to both an experimental and control group of 50 Ss each. After the exposure of each inspection stimulus, a series of 4 multiple-choice configurations were projected simultaneously on the screen and the S was required to indicate which one of the 4 corresponded to the preceding inspection stimulus. In the multiple-choice configurations for the experimental group, 15 items were changed in each of the following factors: form and size of the elements, orientation of the configuration and distance between the elements. In the control group, the multiple-choice configurations were not changed in any of these properties. The results of this study clearly indicate that changes in the form and size of the elements and distance between elements and orientation in the configuration produced a significant decrease in the ability to recognize configurations as compared with controls. A comparison of group means between experimental categories indicated a significant difference in the degree of decrement produced by each modification.

R 11

8403

Craig, E.A. PERCEPTUAL-MOTOR TASK ACHIEVEMENT UNDER TWO CONDITIONS OF STIMULUS DISPLAY. *J. gen. Psychol.*, Oct. 1955, 53, 281-286. (U.S. Navy Electronics Laboratory, San Diego, Calif.).

8403

This is an investigation of perceptual-motor task performance under two conditions of stimulus display: (1) temporal presentation with item exposure time limited and (2) simultaneous presentation of all items. Utilizing an apparatus similar to a pursuit rotor, eight subjects were presented with displays of 10, 20, 30, 40, and 50 targets to be contacted under each of the two methods of presentation. Each subject was given 10 series of 5 trials under each condition for a total of 100 trials. The results are presented and discussed in terms of the relative accuracy of performance under each condition of target presentation.

T. G. R 2

8404

Horne, E.P. & Eschenbach, A.E. THE EFFECT OF LOCALIZED MONAURAL CUES ON A VISUALLY CONTROLLED TURNING MOVEMENT. *J. gen. Psychol.*, Oct. 1955, 53, 287-292. (University of Florida).

8404

To study the effect of an extraneous monaural stimulus upon the time required to introduce a 450 change of course in a Link trainer, an ICA Sigma Tone of approximately 600 cycles was occasionally presented either to the right or left ear of 10 subjects prior to the onset of a cockpit signal light (a danger signal and indicator for change of course). For half the subjects the trainer was set to turn at 6 revolutions per minute while for the remainder it was set at nine revolutions per minute. Position of monaural sound and signal light were varied. The results are presented in terms of the average reaction time for the slow-moving and fast-moving trainer groups under the various conditions of stimulus position. Performance on sound trials is compared with that on non-sound trials. T. R 2

8405

Stone, I. HELMET DESIGNED FOR SUPERSONIC BAILOUTS. *Aviation Week*, Dec. 1955, 63(24), pp.33 & 35.

8405

This article describes the development by Protection, Inc. of a pilot's helmet designed for survival in high-speed high-altitude bailouts and other emergencies. The helmet, still in the production stage, presents such features as integration in one unit of oxygen mask, visor and communication equipment. Illustrations and details of design are also presented.

I.

8406

Aviation Week. HELMET PROTECTS AGAINST JET NOISES. *Aviation Week*, Jan. 1955, 62(4), 34-36.

8406

This article presents an illustration and brief discussion of a fiberglass-shell helmet designed to meet military specifications and provide protection to pilots and crewmen against high-frequency noises of jet and turboprop planes.

I.

8407

Aviation Week. MAN-MACHINE TEAMWORK IS KEY TO BEST USE OF WEAPONS SYSTEMS. *Aviation Week*, March 1954, 62(11), pp.154 & 158.

8407

The areas of aero-medical science, human engineering, and human resources are defined. The relation of each to the field of weapons systems is discussed and illustrated.

8409

Anon. NAVY DEVICE TEACHES EJECTOR BAILOUT. *Aviation Wk.*, 1950, 53 (25), 29-30.

8409

This article describes the development of an ejection seat trainer by the Navy Special Devices Center which provides training for the pilot in ejection-seat bailout procedure. The device employs a catapult arrangement and a safety belt with an electrical connector in a safety circuit so that the safety device on the belt is disengaged prior to the firing of the seat. A description of the force exerted in catapulting the seat and of the controls employed in the device is given.

I.

8410

Taylor, Jean G. (Ed.) SYMPOSIUM ON THE ROLE OF STRESS IN MILITARY OPERATIONS. 1 AND 2 MAY 1953. Tech. Memo. ORO-T-256, Dec. 2, 1953, 56pp. *Operations Research Office*, Johns Hopkins University.

8410

This is a report of a symposium on the role of stress in military operations. The first part presents the results of a study of combat stress in Korea along with a discussion of this study by the participants. The second part presents a conference of administrators and representatives of military, government, and private agencies concerned with the military stress problem. The field study in Korea entailed the psychological and physiological measurement of infantrymen in the actual combat situation. Discussed are the indicators of stress and the nature of the recovery phase.

T. R some

8411

Brody, S.I. PROBLEMS OF HIGH ALTITUDE FLIGHT. USN Naval Inst. Proc., Nov. 1951, 77(11), 1190-1195.

Because of the advantage of higher altitude in air to air combat operations, efforts are being made to extend the operational ceiling of modern military aircraft. Samples taken at an altitude where the atmospheric pressure is 1/10th that of sea level have shown the percentages of O₂, nitrogen and other gases to be the same as it is at low altitudes. However, there are great variations in the air temperature. A significant factor is the ram compression temperature on the surface of the jet or rocket ship. New airfoil concepts in design are necessary for adequate performance and maneuverability at high altitudes. Visual difficulties may arise at high altitudes because it is harder to detect relative motion. Physiological limitations include anoxia, bends (due to the dissolved nitrogen in the bloodstream). Pressurized flying-suits and better ejection-seats are being developed. (NEIAS)

8412

Anon. ARMOR CLOTHING. U.S. Naval Inst. Proc., Nov. 1951, 77 (11), 1237-8.

8412

This article presents a brief description of the development by the Army of armored clothing and a new plastic helmet. The design of the clothing and helmet are described in terms of the kind and amount of protection afforded by each.

8413

Dowdy, H.S. INTERIOR DECORATING FOR SUBMARINES. US Naval Inst. Proc., Nov. 1950, 76(11), 1182-1185.

Prolonged stay in submarines results in decreased efficiency, and a number of unpleasant physiological and psychological effects. Experiments were carried out leading to recommendations of designs, colors, and materials for improving submarine compartments as regards visibility, comfort, and habitability. Various shades of grey were found the optimal color. The problem of lighting was solved by the use of bed-lamps, fresh-colored lights in recreation areas, spot-lights for control gauges. Interior design included linoleum for covering the deck, plastic table covers, upholstered seats, and other features which help to create the effect of home. (NEIAS)

8418

McDouall, B.H., & Welch, G. TRAINING METHODS AND EQUIPMENT IN THE JAPANESE AIR FORCES. Rep. F-IR-79-RE, June 1946, 10 pp. WADC, Air Materiel Command, Dayton, Ohio.

ATI 26549.

Returned.

8418

This is a report of the training methods and equipment used by the Japanese Air Forces. It is presented in the form of two tables, the first dealing with the construction and employment of equipment used in pilot, navigation, bombing, radar, etc., training, and the second with the manufacturing places of the various equipment used in training.

T.

8419

McDouall, B.H. FLEXIBLE GUNNERY TRAINING IN THE JAPANESE ARMY AND NAVY AIR FORCES. Rep. F IR 120 RE, July 1946, 9pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio.

8419

This report presents information concerning flexible gunnery training in the Japanese Army and Navy Air Forces. Obtained by interview with Japanese military personnel, the information includes descriptions of the selection, testing and training procedures employed with flexible gunners and instructors as well as descriptions of the training equipment used in the various training schools.

I. R 1

8429
Lindsley, D.B. & et al. EXPERIMENTS IN TRAINING RADAR OPERATORS IN VISUAL CODE RECEPTION. Contract OEM sr 919, Proj. SC 70, NS 146, OSD Rep. 4811, Res. Rep. 16, March 1945, 15pp. Office of Scientific Research & Development, WADC, Applied Psychology Panel. (Verkes Laboratories of Primate Biology, Orange Park, Fla.)

The Bainbridge experiment showed that radar operators trained in code reception on blinker lights transferred readily to reception of code on oscilloscopes. Following transfer, the majority of the men regained their previous level of code reception in 3-4 hrs. of training. Good men learned the code quicker when training methods included the use of the whole method in contrast to the part method. The letter sending device was found preferable to the tape method in the use of blinker code learning. A comparison of learning when different character speeds were used showed that a group whose initial band speed was .244 sec. acquired the character-letter associations quicker in early stages of training than did a group whose band speed was .122 sec. The letters used differed greatly with respect to learning difficulty. Age, General Classification Test Scores and Radio Aptitude Test scores were correlated with achievement on blinker code after incomplete learning. Correlations between RCAT scores and achievement ranged from .45 - .57, indicating practical value of the RCAT in the selection of blinker code trainees. (NEIAS)

R 7

8437
Housarth, C.I., & Bulmer, N.G. NON-RANDOM SEQUENCES IN VISUAL THRESHOLD EXPERIMENTS. *PPRC* 974, Sept. 1956, 7pp. *PPRC*, RAF Institute of Aviation Medicine, Farnborough, Hants. England.

8443
Pinsker, W.J.G. THE FLIGHT SIMULATOR IN AIRCRAFT CONTROL RESEARCH AND DESIGN. Tech. Note AERO.2467, Aug. 1956, 17pp. *Royal Aircraft Establishment*, Farnborough, Hants, England.

8437
The sequence of responses "seen" or "not seen" given by 10 subjects in an experiment on the absolute visual threshold are analysed for sequential tendencies. The sequence tendencies found are discussed with reference to the presence of fluctuations in the absolute threshold and the guessing habits of the subjects.

8443
This general paper discusses the use of experiments on relatively simple flight simulators for drawing conclusions about the handling characteristics of an aircraft still in the design stage. Principal types of simulators are described, with emphasis on the need for realism. The function of flight testing is also discussed.
G. I. R 12

8438
Bartlett, F., Broadbent, D.E., Pople, R.D. & Wilkinson, R.T. EFFECTS ON HUMAN PERFORMANCE OF VARIOUS STRESS CONDITIONS. *PPRC* 961, Jan. 1956, 6pp. *Flying Personnel Research Committee*, ARC, Unit for Research in Applied Psychology, Cambridge, England).

This report is a summary of three reports which in turn summarize the important conclusions that can be drawn from the effects on human performance of exposure to: a) noise; b) heat and humidity; c) sleeplessness. It was concluded that all three forms of stress may, under special precautions, be taken, seriously affect human behavior when great accuracy and speed are required. It was recommended that further experimental work be conducted concerning the further effects that may be produced when work has to be continued under these forms of stress for a relatively long period and under environmental conditions which are apt to change suddenly and unexpectedly. (HEIAS)

8444
Tinker, M.A. READABILITY OF MATHEMATICAL TABLES. *J. appl. Psychol.*, 1954, 18(6), 436-442. (University of Minnesota, Minneapolis, Minn.).

The purpose of this experiment was to investigate the influence of certain typographical variations upon the readability of mathematics tables. Times in seconds to look up squares, square roots and cube roots were obtained: a) when Ss always started with page 1 of the tables; and b) when the page containing the number sought was given. 20 adult Ss served for each of the 6 parts to the experiment, 120 in all. 5 mathematics tables representing a wide range of typographical variations were used. The results of the experiment revealed certain typographical factors which promote more effective readability as well as certain conditions that should be avoided. (HEIAS)
R 6

8442
Draper, J. (Ed.). THE APPLICATION OF INFORMATION THEORY TO HUMAN OPERATOR PROBLEMS. Weapons Research (Defence) Rep. 2/56, Sept. 1955, 92pp. Technical Information Bureau for Chief Scientist, Ministry of Supply, London, England.

Conference: The 5 papers presented are as follows: a) "The Information-Capacity of the Human Operator". An attempt is made to explain some of the variation of information capacity (in bits per sec.) which can be defined for the human operator over a range of tasks. A study is made of what underlies the use of information-capacity as a parameter of human performance and how its measurement can be carried out experimentally; b) "Application of Communication Theory to the Human Operator". An attempt is made to see how far the mathematical theory of communication is useful in the study of human behavior, particularly in operating mechanical devices where the motor activity can be described very simply; c) "On the Validity of Application of Communication Theory to Human Operator Problems". The basic assumptions and restrictions of communication theory are investigated; d) "Information Theory in Psychology". This report attempts to summarize critically the work in the field of information theory as it is used in psychology; e) "Some Miscellaneous on Information Theory and the Human Operator". Remarks set down in this paper are in the nature of miscellaneous observations and suggestions concerning the use of information theory in human operator problems. (HEIAS)

8446

Carter, O.W. & McManis, Olga W. EXPERIMENTAL STUDIES OF PROBLEM SOLVING. Contract N6001-25125, Tech. Rep. 10, Aug. 1955. 36pp. Office of Naval Research, Washington, D.C. (Psychology Dept., Stanford University, Stanford, Calif.).

This report describes several experimental studies of problem solving undertaken at Stanford University for the Office of Naval Research. The studies described are as follows: a) Group vs. individual achievement in solving arithmetic reasoning and spatial relations problems; b) Effectiveness of a brief interruption of work as a means of overcoming inappropriate sets in problem solving; c) Continuous vs. voluntary spaced work in problem solving; d) Appraisal of intellectual maturation and transfer as a function of breadth of training; e) The effect of stimulus redundancy on concept formation; f) A possible sex difference in the effect of success and failure on problem solving; g) The effect on problem solving of success and failure; h) The effect on problem solving of success and failure as a function of level of anxiety; i) Anagram and puzzle series for the study of set. (MILAS)

8447

Wickens, R.J. & Peterson, G.W. FACTORS INFLUENCING DIAL OPERATION: THREE-DIGIT MULTIPLE-TURN DIALS. SC 3635(13), Santa Fe 51 0315, Feb. 1955. 65pp. Sandia Corporation, Albuquerque, N.M. (Psychology Dept., University of New Mexico, Albuquerque, N.M.).

Tests devised and conducted by the Psychology Department of the University of New Mexico to obtain data on the frequency of occurrence of errors in reading and setting multiple-turn dials of 5 different designs are described. Analysis of the data obtained from the tests lead to the conclusion that dial design has marked effects on speed and accuracy with which the dials may be set and read. The design of Dial 5 is recommended for use under the specifications for this study. The set-check system used in the experiments is found to have an error probability of 0.0015 for this dial. A double-set system, in which two persons set two automatically interlocked dials, is suggested and it is predicted that this system would reduce the probability of error for Dial 5 to the order of 0.00003.

R 37

8448

Gillinsky, Albert S. THE RELATION OF PERCEIVED SIZE TO PERCEIVED DISTANCE: AN ANALYSIS OF GRUBER'S DATA. Amer. J. Psychol., 1955, 68, 475-480. (Columbia University, New York, N.Y.).

In a recent paper, Gruber presents data on perceptions of size and distance which he takes to indicate that perceived size is not related to perceived distance. Gruber performed 2 experiments. He rejects Exp. I for the purpose and offers Exp. II as a fair test of the hypothesis. In the experiment he obtained coupled observations of perceived size and perceived distance from 20 Os over a range of distances from 200 to 450 cm. Within this range 0 viewed a standard object at each of 5 different distances and so set a variable object that it appeared half-as-distant (1/2); equally distant (ES); equal in size (ES1/2) with the standard half as far from 0 as the variable; and equal in size (ESE) with the standard and variable equidistant from 0. Although unequivocal instructions are not reported, Gruber states that he instructed his Os to adopt a 'phenomenal' as opposed to an 'objective' attitude. The purpose of the present note is not to criticize Gruber's experimental procedure nor to question the validity of his results. Accepting his findings at face value, the question is simply: Do these results in fact reveal a situation in which relative size is underestimated when relative distance is overestimated—a size-distance paradox—as Gruber asserts? An alternative interpretation may better fit the facts and remove the paradox into which Gruber's discussion has plunged us.

R 5

8449

Brown, M.K. & Fitzsimons, J.T. ELECTROCARDIOGRAPHIC CHANGES DURING POSITIVE ACCELERATION. (WITH A NOTE ON VECTOR-CARDIOGRAPHY). FPRC 1009, BR 103363, June 1957. 17pp. RAF Institute of Aviation Medicine, Farnborough, Hants, England.

In the human centrifuge 53 subjects have carried out 366 fully instrumented runs under positive accelerations of 3-5 g. The results were analysed for pulse rates, pulse rate intervals, and changes in the electrical axis. Some vector-cardiograms were also recorded. No abnormal rhythms have been found and the only abnormal pattern was in a subject who lost consciousness at 4 g. Differences in cardiovascular response to g were found between experienced and inexperienced subjects, these were maximal at low g values and disappeared as the g level increased. Unconsciousness causes muscle artifacts in the limb-leads and T-wave changes which, however, require cautious interpretation. Analysis of the electrical-axis has been carried out. There are definite trends under g but these are overshadowed by the effect of respiration. Positional changes are complex and cannot be dissociated from respiration. Vector-cardiograms were easily carried out and gave reproducible results but were of little value in studying the heart during positive acceleration.

R 12

8451

Jones, G.M. AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE: VI. GASTRIC ACTIVITY MEASUREMENTS. FPRC 907.6, Aug. 1956, 36-41, 8pp. RAF Institute of Aviation Medicine, Farnborough, Hants, England.

An investigation of gastric activity in one S during a week of high intensity operational flying is described. The method chosen involved the ingestion of a daily test meal, by means of which it was possible to determine both motor and secretory responses of the gastric muscularis mucosa. The gastric activity determined in this way appeared to be increased by the operational experiences encountered, and it is inferred that this increase may have been due in some measure to the stressful or fatiguing nature of those experiences. The results, although of limited value in themselves on account of the limited experimental data available, are considered sufficiently positive to encourage continuation of the investigation. It is concluded, however, that a technique more appropriate to a field investigation should be employed.

R 16

8454
Helson, H., Judd, D.B., & Wilson, Martha. COLOR REACTION WITH FLUORESCENT SOURCES OF ILLUMINATION. *Illum. Engng.*, 1956, 51(4), 323-346. (University of Texas).

8454
This paper presents equations which enable one to predict object color changes for various fluorescent light sources. The theory does not attempt to include the influence of backgrounds of different reflectances. Tables are given showing the amount of agreement between calculated and observed hue, brightness, and saturation of samples under the various fluorescent illuminations.
T. C. I. R 16

8455
Jameson, Dorothea & Hurvich, L.M. SOME QUANTITATIVE ASPECTS OF AN OPPONENT-COLORS THEORY: III. CHANGES IN BRIGHTNESS, SATURATION AND HUE WITH CHROMATIC ADAPTATION. *J. opt. Soc. Amer.*, June 1956, 46(6), 405-415. (Eastman Kodak Company, Rochester, N.Y.).

A theoretical model for an opponent-colors theory of vision is used to predict and describe quantitatively changes in the brightness, saturation, and hue of colors with changes in chromatic adaptation. The systematic nature of such changes in color appearance is examined, and comparisons are made between specific theoretical predictions and results of experimental studies of chromatic adaptation.
R 30

8456
Hurvich, L.M. & Jameson, Dorothea. SOME QUANTITATIVE ASPECTS OF AN OPPONENT-COLORS THEORY: IV. A PSYCHOLOGICAL COLOR SPECIFICATION SYSTEM. *J. opt. Soc. Amer.*, June 1956, 46(6), 416-421. (Eastman Kodak Company, Rochester, N.Y.).

A system for the numerical specification of colors is developed on the basis of a quantified opponent colors theory. The derived HSB (hue, brightness, and saturation) system permits the quantitative specification of colors in terms of their primary psychological (perceptual) attributes for various adaptations and illuminations.
R 12

8457
Fraser, D.C., & Samuel, G.D. AIRCREW FATIGUE IN LONG RANGE MARITIME RECONNAISSANCE: III. EFFECTS OF VIGILANCE. *PRC 907.10*, Aug. 1956, 59-64. *RAP Institute of Aviation Medicine*, Farnborough, Hants, England.

8457
This paper describes the effects on post-flight vigilance of flying four fifteen hour sorties at night with one day's rest between each flight in Royal Air Force Coastal Command long range reconnaissance aircraft. The Fraser π -function technique was used with the eight subjects to measure variability of judgment under vigilance conditions. The amount of objective deterioration in post-flight vigilance is discussed as well as subjective reports of weariness.
T. R 12

8459
Helson, H., Michels, W.C. & Sturgeon, A. THE USE OF COMPARATIVE RATING SCALES FOR THE EVALUATION OF PSYCHOPHYSICAL DATA. *Amer. J. Psychol.*, 1954, 67(2), 321-326. (University of Texas, Austin, Tex.).

It has been shown in previous studies that the absolute type of judgment commonly employed in rating scales may be utilized for psychophysical measurements as well as in the evaluation of responses which have no basically measurable stimuli. The question arises: can the quantitative theory found adequate for absolute judgments be extended to direct comparison of standard and variables as in the method of constant stimulus differences? If this can be done then the theory of absolute judgment may be applied to the comparative type of judgment. In an attempt to answer the question, an experiment wherein 12 Os were required to judge weights--ranging from 300 gm to 500 gm--following a standard of 350 gm or 400 gm. The study demonstrated that reliable comparative rating judgments may be made of stimuli when a standard is provided. It was concluded that the comparative rating scale has an advantage over the method of absolute judgment because it provides a stimulus-standard which helps to stabilize the adaptation-level and therefore the judgments of the stimuli. (HEIAS)
R 3

8460
Michels, W.C. & Helson, H. A QUANTITATIVE THEORY OF TIME-ORDER EFFECTS. *Amer. J. Psychol.*, 1954, 67(2), 327-334. (Bryn Mawr College, Bryn Mawr, Penn. & University of Texas, Austin, Tex.).

The time-order error can be accounted for as being due to the role which adaptation-level plays in establishing PSE. The PSE is found to be a weighted mean of all stimuli, past or present, which affect the judgment. The standard, while exerting predominant influence, is only one of the determinative factors. Time-order errors have been studied by the use of a comparative rating scale. When the order of presentation of the standard and the stimulus is reversed, a new relation between stimulus and judgment is found. The only judgment that remains unaffected is that of a stimulus equal to the standard. If this stimulus evokes a judgment of equality, PSE or AL is equal to the standard and there is no TOE; if it evokes a higher judgment, TOE is negative; and if it evokes a lower judgment, TOE is positive. The average of the 2 PSE's obtained with the different time-order is not generally equal to the standard, although it may be in special cases.
R 10

8461
Bridges, C.C. & Bitterman, M.E. THE MEASUREMENT OF AUTOKINETIC MOVEMENT. Amer. J. Psychol., 1954, 67(3), 525-529. (University of Texas, Austin, Tex.).

This paper is a report of a new method of measuring autokinetic movement. Equipment diagrams, graphic results of some experimentation and operational procedure are included. The author expresses the opinion that logical considerations and the results of preliminary tests suggest that the method described is eminently suitable for systematic, quantitative work on the problem of autokinetic movement. (HEIAS)
R 4

8462
Crumbaugh, J.C. TEMPORAL CHANGES IN THE MEMORY OF VISUALLY PERCEIVED FORM. Amer. J. Psychol., 1954, 67, 647-658. (University of Texas, Austin, Tex.).

The problem of temporally progressive memory-changes in visually perceived forms was studied by the method of identical stimuli, in which identical figures (standard and variable) both were repeated in each comparison made by O as in a typical psychophysical experiment on the time-error. Luminous stimuli on a milk-glass screen were used, standard and variable being presented on opposite sides of a fixation-point. Each of the 5 figures employed contained a degree of asymmetry which O judged to be greater or less in the variable as compared with the standard. The results provide clear evidence of temporally progressive changes in the traces of visually perceived forms. The changes observed, which suggest autonomous rather than assimilative effects, differ in their pattern of development according to the particular form perceived. The traces of some forms progress rapidly toward greater symmetry, while the traces of others show an initial tendency toward decreased symmetry which soon is reversed. The direction and pattern of change is influenced by quantitative as well as by qualitative variations in the perceived figure. While autonomous changes as yet undiscovered may occur over longer intervals, the present experiment reveals important effects within the first few sec. of the life of the trace.
R 23

8463
Krauskopf, J., Duryea, R.A. & Bitterman, M.E. THRESHOLD FOR VISUAL FORM: FURTHER EXPERIMENTS. Amer. J. Psychol., 1954, 67, 427-440. (University of Texas, Austin, Tex.).

Foveal form thresholds were measured in terms of the intensity of illumination required to identify luminous figures briefly exposed in a dark room. Form threshold varies inversely with exposure-time, with magnitude of critical detail, and to some extent with area. The reciprocity of time and intensity is qualitative as well as quantitative; with short exposure-times distortions of form appear which are comparable to those obtained at low intensities of illumination. Brightness threshold, like form threshold, varies inversely with exposure-time and with area, but it is unaffected by extensive differences in configuration. Evidence is presented to show that O's knowledge of the forms employed may mask real differences in form threshold.
R 7

8464
Krauskopf, J. FIGURAL AFTER EFFECTS IN AUDITORY SPACE. Amer. J. Psychol., 1954, 67, 278-287. (University of Texas, Austin, Tex.).

If the Köhler-Wallach theory of figural after-effects is conceived as a general theory of neural organization applicable to all perceptual dimensions which have a placewise representation, it follows that prolonged stimulation in any such dimension should yield alterations in spatial relationships. In the experiments here reported evidence of figural after-effects in auditory space was sought on the basis of a place theory of auditory localization. The following deductions were tested: a) that satiation in the medial plane should reduce the variability of subsequent determinations of the medial plane; b) that satiation at a point removed from the medial plane should shift subsequent settings of the medial plane in the direction of the satiating tone; c) that these displacements should exhibit a distance-paradox, that is, the effects should first grow as a function of the distance of the satiating tone from the medial plane, and then decrease; and d) that the distortions induced should decay with time. These expectations were confirmed, although only the rising portion of the curve of the distance-paradox was obtained. The data of Jones and Bresslar suggest, however, that the curve would be completed if the measurements were made over a larger range. The evidence strongly suggests that the Köhler-Wallach model is a general mechanism applicable to generalized perceptual systems.
R 15

8467
Jareson, Dorothea & Hurvich, L.H. SOME QUANTITATIVE ASPECTS OF AN OPPONENT-COLORS THEORY. I. CHROMATIC RESPONSES AND SPECTRAL SATURATION. J. opt. Soc. Amer., July 1955, 45(7), 546-552. (Eastman Kodak Company, Rochester, N.Y.).

Saturation discrimination is assumed to be dependent on the ratio of chromatic to achromatic components in the sensory response to a given wavelength. The usual methods of measurement do not, however, permit independent control of the chromatic and achromatic variables. On the basis of an opponent-colors theory of vision, a method is described for measuring directly and separately the spectral distributions of the chromatic components. A series of experiments is reported in which this method was used to obtain measures of the paired chromatic responses associated with the four primary spectral hues. Results are reported for 2 observers, 1° foveal test field, for an equal brightness spectrum (10 nL), and a neutral state of adaptation (10 nL). The measured chromatic responses, together with achromatic (luminosity) functions measured earlier for the same Os, are used to predict the form of the spectral saturation discrimination function.
t 34

8469
USN Air Applications Branch. VISUAL PRESENTATION PROBLEMS AND THE CARRIER LANDING TRAINER. Proj. 12 BK 5a, Sept. 1954, 7pp. USN Special Devices Center, ONR, Port Washington, N.Y.

Visual presentation is essential for many training situations. Its 3 basic categories are: a) direct viewing of scale models, b) optical projection, and c) television. A demonstration is given of wide angular visual display controlled by a synthetic trainer, which also contains a ship travelling independently within a moving background. The carrier landing device incorporates an operational flight trainer for a carrier-borne aircraft together with a visual presentation system which realistically reproduces to the student pilot the landing approach to the carrier deck. The visual presentation is a wide angle television chain technique. A description is given of the requirements and the 2 major systems of the device: electro-mechanical portion and television chain equipment. (HEIAS)

8473

Rosenblith, W.A. EFFECTS OF NOISE ON MAN: PROBLEMS FOR STUDY. *Noise Control*, 1955, 1(4), 22-27. (Massachusetts Institute of Technology, Cambridge, Mass.)

Presented at a symposium on noise. The effects of noise on speech communication and its extra-auditory effects are reviewed. In industry a) significant hearing loss can be demonstrated long before the exposure noise reaches aural pain level; b) the hearing loss is progressive; c) hearing loss usually starts in the 4-6 kcps region; d) individuals differ greatly in their susceptibility. Problems unsolved at present include: intermittent and impulsive noises, speech audiometry, and field studies in industry. (NEIAS)

A 7

8476

Tinker, M.A. PERCEPTUAL AND OCULOMOTOR EFFICIENCY IN READING MATERIALS IN VERTICAL AND HORIZONTAL ARRANGEMENTS. *Amer. J. Psychol.*, 1955, 68(3), 444-449. (University of Minnesota, Minneapolis, Minn.)

The purpose of this experiment was to investigate the effect of a limited period of practice in reading materials arranged in vertical columns upon speed and patterns of eye-movements while reading comparable materials in vertical and in normal horizontal arrangements. Equated passages of easy material were employed for initial and final tests. 12 similar passages were employed for the practice materials. Each of the practice selections was read in vertical arrangement 3 or 4 times over a period of 6 wk. which elapsed between the initial and final tests. The following results were obtained: a) At the initial testing, the vertical reading was 50% slower than the horizontal, but after practice it was only 21.8% slower. Speed of reading the horizontal did not change from initial to final testing but there was a significant gain of 17.8% in the vertical reading. b) The records of the eye-movements on the initial test revealed that the vertical reading required fewer fixations, fewer regressions, and longer pause-durations. Practice yielded an improvement in number of fixations and regressions in vertical reading in comparison with the horizontal.

R 7

8479

Lightfoot, C. & Jerger, J.F. CUMULATIVE EFFECTS OF REPEATED BURSTS OF WHITE NOISE ON THRESHOLD FOR 4000-C.P.S. TONE PIPS. Proj. 21-1203 0001, Rep. 10, June 1955, 10pp. *USAF School of Aviation Medicine*, Randolph Field, Tex.

Results based upon 8 Ss, even though each one was tested a number of times, can only be regarded as bases for tentative conclusions. The data reported in the preceding section, however, definitely point to the reality of an increase in the effect of a 2-second burst of white noise upon the performance of normal ears when the burst is repeated regularly at the rate of 6 times per minute and its SPL is 90 db or greater. It would appear that the ability of an ear to hear a short pip of 4000 cps tone within the first second after such a burst is diminished with each successive burst--at least with each burst between the 15th and the 95th of a series. When burst-duration and repetition rate remain constant, it would appear that the level of the successive bursts is the main determinant of the rate of rise in the post-burst threshold. The accumulated elevation in threshold apparently disappears so slowly that the rate of accumulation is influenced little, if at all, by the amount of time between the end of the burst and the moment at which threshold is determined, provided that the measurement is made within a second of the burst's termination. There appear to be appreciable differences among individuals with respect to their reaction to the kind of serial stimulation under discussion. A fair proportion of persons exposed to a series of 110-db bursts may be expected to develop loss in acuity lasting several minutes and also abnormal sensations such as tinnitus.

R 8

8480

Pollack, I. THE ASSIMILATION OF SEQUENTIALLY-ENCODED INFORMATION: V. BINARY-ENCODED MATERIALS. *HFORL Rep. TR 54-5*, Jan. 1954, 11pp. Human Factors Operations Research Labs., *USAF Air Research and Development Command*, Bolling AFB, Washington, D.C.

This report considers the immediate recall of binary-coded verbal materials--messages in which each unit could assume only one of 2 possible alternatives. Binary materials are of special interest because of the ease of recoding the materials into alternative units which, presumably, aid in their reproduction. The contribution of 4 variables, which were believed to influence the assimilation of binary messages, has been examined. Of these, 3 are significant: the length of the message--the number of binary units per message; the rate of presentation of the message--the number of binary units presented per unit time; and, the statistical restriction of the message source--the maximum length run permitted. In general, over the experimental conditions examined, the information transmitted increased as: the length of message increased, as the rate of presentation decreased, and, as the statistical restriction upon the message source decreased. More important, however, were the interactions among the several variables. These interactions may be accounted for by a few assumptions regarding the recoding operations reported by the subjects. While these assumptions are entirely reasonable, it is concluded that a further continuation of this type of indirect analysis of encoding operations will not be fruitful. Rather, a direct examination, of encoding operations e.g., as performed by Miller and Smith, appears to offer a more promising hope for elucidation of these operations.

R 5

8482

Coonan, T.J. & Klemmer, E.T. INTERPOLATION AND REFERENCE MARKS IN READING A LINEAR SCALE AT BRIEF EXPOSURES. *AFCRC TR 55-3*, March 1955, 9pp. Operational Applications Lab., *USAF Cambridge Research Center*, Bolling AFB, Washington, D.C.

The study reported here was designed to investigate the relation between reading accuracy and the number of reference marks under conditions of brief exposure. Observers were asked to locate a point on a horizontal line with the aid of differing numbers of vertical reference marks. The scales used were line segments with 1, 2, 4, 8, 16 or 32 divisions indicated by vertical marks. The stimuli were presented tachistoscopically for exposure durations ranging from 0.02 sec. to 0.64 sec. The results may be summarized as follows: a) For 0.02 sec. exposure the addition of more than one reference mark does not materially increase scale reading accuracy. b) For exposure times of 0.04 sec. and longer the addition of quarter point marks improves accuracy over that for the scale with the center point only. c) At 0.04 and 0.16 sec. exposures the addition of eighth point or finer marks decreases accuracy from the level obtained with quarter point marks. d) At 0.64 sec. there was improvement in accuracy as scale marks were added through the addition of eighth point markers.

R 8

8483

Pollack, I. & Klemmer, E.T. VISUAL NOISE FILTERING BY THE HUMAN OPERATOR: II. LINEAR DOT PATTERNS IN NOISE. AFRC Tech. Rep. 54-15, July 1954, 12pp. USAF Cambridge Research Center, Operational Applications Lab., Bolling AFB, Washington, D.C.

The filtering of information by the human operator was investigated. Ss had to detect vertical dot patterns (signal) which were presented with extraneous dots (noise) for controlled time durations. Findings: a) the precision of localization of the 2-dot pattern deteriorates as the number of noise dots added to the figure is increased. The function is approximately linear; b) improved performance resulted when the exposure duration was increased to 1-2 sec. or when 2 successive 1/40 sec. exposures were presented with a time separation between flashes of about 1 1/2 sec.; c) for a given number of noise dots, the response uncertainty decreases as the size of the signal pattern increases; d) the effect of internal grid lines was small. The experiment demonstrated that information transmission through noise may be improved by selecting noise resistant subclasses. It has also been shown that transmission obtained with any subclass will be less than that submitted by the parent class. (HEIAS)

R 3

8484

Pollack, I. & Klemmer, E.T. THE ASSIMILATION OF VISUAL INFORMATION FROM LINEAR DOT PATTERNS. AFRC Tech. Rep. 54-16, July 1954, 11pp. USAF Cambridge Research Center, Operational Applications Lab., Bolling AFB, Washington, D.C.

The transmission of information from a simple linear display was investigated. The stimuli were patterns of filled and unfilled outlines (a binary or two-valued code) arranged along a line. These stimulus patterns were presented visually for short exposure durations to Ss who attempted to reproduce the pattern. Findings: a) the information transmitted with this linear display increased as the number of filled spaces was increased to 4 (out of a possible 8), and decreased thereafter; b) errors in the reproduction of the display were systematic rather than random; c) marked serial position effects were obtained for short exposures; d) as the duration of exposure of the display was increased, the information transmitted per stimulus presentation was increased; e) a comparison of the informational transmission obtained with simple linear and area displays suggests that the cardinality (i.e. the number of independent dimensions along which each element of the display varies summed over all independently varying elements) may determine the information transmitted under a given set of conditions. (HEIAS)

R 4

8485

Pickett, J.M. & Kryter, K.D. PREDICTION OF SPEECH INTELLIGIBILITY IN NOISE. AFRC TR 55-4, June 1955, 20pp. USAF Cambridge Research Center, Operational Applications Lab., Bolling AFB, Washington, D.C.

A study of the prediction of speech intelligibility in noise. The aspects of the problem dealt with are: a) test conditions (noise conditions, word and sentence material, acoustic presentation, signal-to-noise ratios and amount of testing, familiarization, speech monitoring); b) methods of calculating predictions (determination of noise and speech spectra, calculation of the octave-band predictions, calculation of BTL predictions). The results and discussion deal with prediction by Beranek's BTL method, by the BTL method of French and Steinberg, and by the octave band method. Included are discussions of a new octave band method of prediction for speech presented by loudspeaker or earphone and for person-to-person speech, along with a discussion of the effect of vocal effort in intelligibility. (HEIAS)

R 19

8486

Kryter, K.D. SPEECH COMMUNICATION IN NOISE. AFRC TR 54-52, May 1955, 41pp. USAF Cambridge Research Center, Operational Applications Lab., Bolling AFB, Washington, D.C.

A study of noise and its effect on communication by speech. The aspects of the problem dealt with are: a) acoustical characteristics of speech (speech spectra; distributions of speech energy, average power in speech sounds, amplitude-intensity-time analysis); b) measurement of speech intelligibility (test materials, language factor); c) effects of some acoustical factors upon speech intelligibility (masking of speech by noise, frequency distortion, predicting effects of frequency distortion on intelligibility, predicting effect of noise on speech intelligibility, reverberation effects, the effect of earplugs upon speech communication in noise, amplitude distortion, intermittent noise, interaural phase relations); d) practical limitations on speech communications in noise (maximum tolerable noise level, optimum systems for use in intense noise. (HEIAS)

R 81

8487

Mangelsdorf, J.E. VARIABLES AFFECTING THE ACCURACY OF COLLISION JUDGMENTS ON RADAR-TYPE DISPLAYS. Contract AF 33(616) 43, Proj. 5 (7 7192), Tech. Rep. 55-462, Dec. 1955, 51pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

The psychophysical method of adjustment was employed by 4 subjects who made a total of 4480 judgments. The task for a subject was to look at a pair of converging trials projected on an opal-glass screen and to adjust the position of one of the trials so as to produce a "collision" situation. The use of 3 variables (target speed, distance-to-go, and angle of convergence) resulted in 112 unique problems. Each observer made 10 successive judgments of each of these problems. Constant, average, and variable errors were calculated for each problem and were pooled for the 4 subjects. The resulting functions were markedly regular, and the constant and average error functions were nearly identical. A mathematical model was developed to relate variable error and the 3 experimental variables of speed, distance, and angle; this model provides a theoretical framework for relating the findings from several earlier empirical studies. Both general and applied aspects of the mathematical model are discussed.

R 14

8488
Chin, N.B. & Morn, R.E. INFRARED SKIASCOPIC MEASUREMENTS OF REFRACTIVE CHANGES IN DIM ILLUMINATION AND IN DARKNESS. Proj. 7157, Task 71808, WADC Tech. Note 55 479, Aug. 1955, 12pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio.

A brief review of the literature on night myopia and empty field myopia and the disagreement over their causes is presented. Measurements of the refractive state of the eye in reduced illumination and in darkness were made using an infrared skiascope. For about half of the subjects, there was an increase in the refractive state of the eye as the illumination was lowered. The contribution of accommodation to the night myopia measured, was generally small. Under conditions of complete darkness, all of the subjects showed variable spasms of accommodation.

R 7

8494
Lathan, F. LINEAR DECELERATION STUDIES AND HUMAN TOLERANCE. FPRC-1012, NRL 106950, June 1957, 15pp. RAF Institute of Aviation Medicine, FPRC, Farnborough, Hants, England.

The limits of physiological tolerance to linear deceleration lasting 0.2 to 0.4 secs. have been assessed for Ss wearing 4 types of Service torso-restraining harnesses without limb restraint. A combined harness alone, which is proposed for use in Service aircraft, should give protection up to 17 g, but above this figure serious injury is likely. If additional leg-restraint is employed, it is considered that the safe limit may be raised to at least 20 g. Above this figure arm, leg and head restraint, and a jerkin harness should give protection up to 25 g. Attention is drawn to the possible mechanism of injury to the larynx, face and chest. Peak intra-abdominal pressures of 450 mm. Hg. at 12 g have been recorded in a test S. When the test Ss were relaxed prior to impact a protective extensor response in the lower limbs tending to brace the S against the rudder pedals was not detected less than 100 msec. after impact.

R 13

8511
Vince, M.A. THE INTERMITTENCY OF CONTROL MOVEMENTS AND THE PSYCHOLOGICAL REFRACTORY PERIOD. Brit. J. Psychol., 1948, 38, 149-157. (University of Cambridge).

8508
Craig, K.J.W. THEORY OF THE HUMAN OPERATOR IN CONTROL SYSTEMS. I. THE OPERATOR AS AN ENGINEERING SYSTEM. Brit. J. Psychol., 1947, 38, 56-61. (Applied Psychology Research Unit, Medical Research Council, University of Cambridge).

11
A series of preliminary experiments are presented which were designed to determine whether an operator responds to a continuous series of stimuli by utilizing intermittent or continuous control operations. Having found that operators respond intermittently, an experiment was designed to evaluate the psychological refractory period occurring with successive stimuli presentation. Twelve subjects performed a tracking task in which time interval and direction (of stimuli presentation) were varied. Theoretical results were plotted and compared to the actual results in terms of initial reaction time and the duration of interval between response to initial and subsequent stimulus. Conclusions are drawn concerning response oscillation as a function of refractory period. T. O. R 4

8508
Within the general context of the theory of the human operator in control systems, this article discusses the operator as an engineering system. The human operator's behavior is seen to parallel that of the intermittent correction curve. Primary intermittent corrections which consist of "ballistic" movements (i.e., movements with predetermined time pattern which are triggered off as a whole) are compared with those of the human operator. Counteracting processes which tend to make controls seem continuous and the stimulation of the human operator's behavior by means of electrical models represent two additional topics of discussion.

8510
Craig, K.J.W. THEORY OF THE HUMAN OPERATOR IN CONTROL SYSTEMS. II. MAN AS AN ELEMENT IN A CONTROL SYSTEM. Brit. J. Psychol., 1948, 38, 142-148. (University of Cambridge).

8510
Within the general context of the theory of the human operator in control systems, the author discusses man as an element in a control system. The problem is stated in terms of defining those characteristics of the human operator (e.g., sensory resolving-power, maximum power output, etc.) which are comparable to an automatic system and evaluating the relative advantages of disadvantages of the human vs. the automatic system. Techniques of research are suggested and specific information is offered concerning the function of the visual sense organ and the human operator as a control system.

G. R 2

12
afford, E. & Hansel, C.E.H. THE IMPRESSION OF DEPTH IN PROJECTED PHOTOGRAPHS. Brit. J. Psychol., 1953, 44, 127-131. (University of Manchester, Manchester, England).

A series of 12 wooden blocks was made of square cross-section, varying in depth from 1/2 to 8 in., one of which was a perfect cube. The blocks were photographed in order of increasing size in an oblique position to the camera with a normal 2 in. Elmar lens and then with a 4 in. Triplet to give an image of the same size image on the screen. Positive film strips were made from these and used in the experiment. At each of the 5 viewing distances, 3, 6, 12, 18, 24 ft. from the screen, readings were taken using the limiting method of psychophysics to determine the point of subjective equality to a cube in the 2 series of photographs. From the data, the following were calculated: a) the percentage error of estimation of the depth of the cube; b) the interval of uncertainty; c) the movement or anticipation error. At 3 ft. from the screen the Ss experience considerable loss of depth, and this loss diminishes as distance from the screen increases. For an average audience viewing photographs taken with a normal angle lens, estimation of depth becomes reasonably accurate when viewing distance is greater than 12 ft.

R 1

8514

Zajac, J.L. INVESTIGATIONS ON DEPTH PERCEPTION IN INDIRECT VISION. *Brit. J. Psychol.*, 1953, 44, 132-144. (University of Edinburgh, Edinburgh, Scotland).

The present investigation is a continuation and development of experiments on visual space perception initiated by Prof. V. Heinrich and carried out in the Lab of Experimental Psych. in Cracow U., Poland. The experiments have given the following general results: a) Objects viewed in indirect vision through different colour filters are seen at different distances from the eyes. b) This phenomenon was observed both in the case of monocular vision, and also in binocular vision with double images. c) A relation seems to exist between depth perception and wave-length of light. Objects are seen as nearer with longer wave-lengths and as further away with shorter wave-lengths of light.

R 14

8515

Mansel, C.E.H. APPARENT MOVEMENT AND EYE MOVEMENTS. *Brit. J. Psychol.*, 1953, 44, 145-155. (University of Manchester, Manchester, England).

Apparent movement may be due to inability of the visual mechanisms to provide, under the stimulus conditions in which they are obtained, physiological cues which differ from those evoked by moving objects. Experiments have been carried out which show that intermittent excitation of a large area of the retina at a suitable frequency may produce inhibition of response on a small area intermittently illuminated at a similar frequency but out of phase. Such an inhibition effect is capable of reducing the physiological cues produced by real movement so that they are similar to those produced under stimulus conditions for apparent movement. It is postulated that not all the information provided by excitation of the retina under conditions of real movement is utilized by the brain. This seeming deficiency is thought to be due to a mechanism of use in providing increased efficiency of vision by suppressing signals from the retina which are produced during eye movements.

R 6

8516

Chrenko, F.A. PROBIT ANALYSIS OF SUBJECTIVE REACTIONS TO THERMAL STIMULI--A STUDY OF RADIANT PANEL HEATING IN BUILDINGS. *Brit. J. Psychol.*, 1953, 44, 248-256. (Environmental Hygiene Research Unit, Medical Research Council Lab., Hampstead, London, England).

This investigation is concerned with the determination of the maximum surface temperature of panels, which, with varying dimensions, embedded in ceilings of different heights, could be used without risk of causing discomfort to occupants of buildings. This entailed an investigation of the subjective reactions of persons exposed to radiation from heated ceilings. Since it was known that the critical area of disturbance due to excessive heating was the head, an analysis of the sensitivity of various portions of the head to temperature was performed. The experiments were conducted in a 12' X 18' room with a ceiling of adjustable height. The temperature of the walls, floor and ceiling were individually controlled. There were 156 Ss. Tables of maximum desirable temperatures of heated ceilings and panels at different heights were calculated. (HEIAS)

R 7

8517

Hall, K.R.L. STUDIES OF CUTANEOUS PAIN: A SURVEY OF RESEARCH SINCE 1940. *Brit. J. Psychol.*, 1953, 44, 279-294. (Barrow Hospital, Bristol, England).

The purpose of this survey of the literature is to give an account of the considerable amount of work of psychological interest which has been carried out since 1940. Among the topics discussed are: the relevance of certain general factors such as age, sex, verbal intelligence level, and attitude; the relation of the attitudes postulated to other personality characteristics; the major causes of variation in pain response; evidence for over-reactivity to pain stimulation in neurotics and for under-reactivity in some schizophrenics and depressive states; studies of the interrelationships between various measures of pain response and other forms of responsiveness, such as those of reaction-time; studies of lobotomized patients and its effect on cutaneous pain. (HEIAS)

R 62

8518

Broadbent, D.E. NOISE, PACED PERFORMANCE AND VIGILANCE TASKS. *Brit. J. Psychol.*, 1953, 44, 295-303. (Applied Psychology Research Unit, Cambridge, England).

A 5-choice reaction task was set to Ss under the same conditions as a vigilance task, that is with the S working alone in a monotonous environment without cigarettes or watch. One group of 9 Ss worked under these conditions 'unpaced'. Another group, of 6 Ss, worked 'paced'. It was found that in the paced condition the output of correct responses fell off after 10 min. work, while in the unpaced condition there was no decrement in output till nearly an hour had gone by. In the main experiment, 18 Ss worked at the task unpaced, for half an hour on each of 2 successive days. One day the room was quiet, while on the other day it contained a steady noise of high intensity. The previous results were confirmed for the first day under either condition but pauses ceased to show a decrement in performance with time on the second day; wrong reactions, however, continued to show one. Such errors were far more frequent in noise than in quiet, the average increase being more than half of the number occurring in quiet.

R 15

8519
Graham, Morah Z. MANUAL TRACKING ON A HORIZONTAL SCALE AND IN THE FOUR QUADRANTS OF A CIRCULAR SCALE. *Brit. J. Psychol.*, Feb. 1952, 43, Part 1. (The Hufield Department of Industrial Health, University of Durham).

8519
To evaluate the role of choice of target in performance of tracking tasks which present the target on a circular scale, two experiments were conducted with a total of 42 subjects. Each subject was required to track a target by rotating a control knob. Each trial lasted 1 1/2 minutes. Target position was varied while all other aspects of the task were the same for both experiments. Speed and accuracy of tracking were evaluated as a function of position of target (in one of the four quadrants of the circular scale).
T. G. I. R 7

8521
Argyle, M. METHODS OF STUDYING SMALL SOCIAL GROUPS. *Brit. J. Psychol.*, 1952, 43, 269-279. (University of Cambridge).

8521
The author presents an extensive review and discussion of the techniques utilized in the investigation of small social groups. The design of small-group experiments is treated in terms of the types of conditions varied and those held constant. Errors inherent in the process of generalizing the results of laboratory studies are specified. Finally, a brief survey of experimental research is presented and conclusions are drawn concerning the general status of small-group research.
R many

8522
Poulton, E.C. THE BASIS OF PERCEPTUAL ANTICIPATION IN TRACKING. *Brit. J. Psychol.*, 1952, 43, 295-303. (University of Cambridge).

8522
This article presents the results of experiments designed to investigate the source of information used in perceptual anticipation in tracking and to evaluate the deficiencies of the one-pointer display. Twelve subjects performing with a two-pointer display were given varied pre-exposures of the display to provide a cue in terms of speed of pointer movement. In experiment II speed cues were minimized and course anticipation emphasized. To evaluate the one-pointer display, subjects were required to counteract a harmonic stimulus movement using positional control with either one or two additional pointers being introduced during different phases of the task. The results are treated in terms of the primary aspects of information necessary for optimal perceptual anticipation and the principal deficiencies of one-pointer displays. III - 831

8523
Howarth, E. THE ROLE OF DEPTH OF FOCUS IN DEPTH PERCEPTION. *Brit. J. Psychol.*, 42 (1/2), 11-20.

An experiment to investigate the effects of varying the field illumination on the acuity of distance discrimination was attempted using 3 vertical white rectangles, with the central one movable towards and away from the observer who viewed them through a rectangular reduction tube. 12 OS were tested binocularly and it was found that, contrary to what might have been expected from visual acuity results, the lower illumination levels gave greater acuity of depth perception (smaller constant errors). An explanation in terms of depth of focus was put forward, i.e. that the small depth of focus (due to larger pupil aperture) produced in the lower illumination levels, caused the central movable rectangle to move more easily out of focus with the fixed side rectangles, so that distance differences were, on this count, more easily perceived. Visual acuities were also measured and the resulting rank correlations between V.A. and D.P. seemed to verify the main result in that they were largest (positively) in the central ranges. Visual acuity was measured both before and after the main depth perception task and slight, but clearly noticeable, decrements in visual acuity were found, due to the intervening optical work involved.
R 8

8524
Graham, Morah Z., & Dexter, I.G. & Brown, R.C. MANUAL TRACKING IN RESPONSE TO THE DISPLAY OF HORIZONTAL, VERTICAL AND CIRCULAR SCALES. *Brit. J. Psychol.*, 1951, 42 (1/2), 155-163. (University of Durham, Hufield Dept. of Industrial Health, Durham, England).

An apparatus is described for studying the speed and accuracy of manual tracking in response to a displayed scale arranged either as a vertical or horizontal strip or as a circular dial. The scales are comparable in every respect except that of shape. The apparatus consists of a display and control panel, a cam follower which introduces disturbances of known and easily adjustable characteristics and a multiple ink recorder. The task is to sit in front of the control and display panel and to maintain the pointer setting on a given scale reading notwithstanding the disturbances which are introduced. The graphic record of speed and accuracy is converted into figures by a special mechanical device which measures the lengths of time for which errors of given magnitude are exceeded. It is concluded that in a tracking task of this nature, with a circular control knob, the speed and accuracy of the S's reaction is significantly better in response to the horizontal scale than to either of the other 2 displays. A record is kept of the number of times the control knob is turned the wrong way in the attempt to counteract a disturbance. Significantly fewer mistakes are made in response to the horizontal scale.
R 4

8526

Gunter, R. BINOCULAR FUSION OF COLORS. *Brit. J. Psychol.*, 42(4), 363-372. (Medical Research Council, Vision Research Unit, London, England).

The experiments reported in the literature show great individual variations in the ability of observers to fuse colors and the results obtained seem in no small measure dependent on the experimental method. This paper reports several methods by means of which fusion was obtained. The following points emerge from the above investigations: a) Immediate binocular fusion of colours has been found to result on using appropriate methods, 3 of which are discussed in this paper. b) Yellow fusion could be obtained with ease in all Ss by using fields of less than 2°; conditioning to yellow light, using the galvanometer deflexion of the P.G.R. as an index; and by rhythmic binocular stimulation. c) The effects on yellow fusion of binocular stimulation with red and green lights has been investigated quantitatively by stimulating both eyes simultaneously; and by stimulating both eyes alternately. With this method, special regions of stimulus frequency were found which gave optimal fusion effects. The effect of stimulus size and stimulus intensity on these special stimulus frequencies was determined, and it was found that increase in both these variables had the effect of causing a rise in the frequency of stimulation at which colour fusion occurred.

R:21

8532

Tinker, M.A. ILLUMINATION STANDARDS. *Aero. Engng. Rev.*, 1946, 36, 963-973. (University of Minnesota, Minneapolis, Minn.).

8532

The author presents an extensive discussion of the relation between illumination standards and practices and optimal visual function. Among the various aspects of illumination, the following are discussed: the quality of lighting, intensity of illumination, visibility measurements, nervous muscular tension, frequency of blinking, lighting codes, visual adaptation, eye disabilities, and so forth. An evaluation of recommended illumination practice is presented.

R 30

8541

Fitts, P.M., Jones, R.E., & Milton, J.L. EYE MOVEMENTS OF AIRCRAFT PILOTS DURING INSTRUMENT-LANDING APPROACHES. *Aero. Engng. Rev.*, Feb. 1950, 9 (2), 24-29. (Air Material Command).

8541

In order to assess the nature of pilots' eye movements during instrument-landing approaches, a new recording technique employing a motion-picture camera and a mirror was utilized in a series of experimental flights. A total of 40 pilots were evaluated while landing under conditions of Instrument Low Approach System and Ground Controlled Approach System. The results are presented and discussed in terms of average fixation times (on particular instruments), the occurrence of blinking, the mean frequency of checking different instruments, etc., as reflected in each type of instrument landing system.

T. I. R 1

8542

Lippert, S. DESIGNING FOR COMFORT IN AIRCRAFT SEATS. *Aero. Engng. Rev.*, Feb. 1950, 9(2), 39-41. (Douglas Aircraft Company Inc., El Segundo, Calif.).

8542

Dimensional data (from American and British sources) are utilized as a basis for this discussion of designing for comfort in aircraft seats. Position in space, the utilization of cushions and pads, gust loads, cushion ventilation, etc., reflect the various aspects of seat design which are discussed.

G. I

8545

Kaplan, D.H. CONSIDERATIONS IN THE DESIGN AND INSTALLATION OF COCKPIT CHECK LISTS, PLACARDS AND MANUALS. *Aero. Engng. Rev.*, Sept. 1951, 10(9), 10-16. (Flight Safety Foundation, Inc.).

8545

This article is concerned with the design, installation, and adequate utilization of cockpit check lists, placards, and manuals. A discussion based on relevant research is presented in terms of the following aspects of the problem: location, legibility (brightness, visual angle, observation interval), illumination under night visual conditions, the variations in check lists and manuals, and so forth. A series of specific recommendations are offered concerning design, utilization, and experimentation with check lists, placards, and manuals.

T. G. I. R 14

8547 Hubbard, H.H. & Lassiter, L.W. SOME ASPECTS OF THE AIRCRAFT NOISE PROBLEM. *Aero. Engng. Rev.*, July 1952, 11, 28-33. (USAF Langley Aeronautical Lab., NASA, Langley Field, Va.).

Presented at a meeting on aircraft design, 3 aspects of the aircraft noise problem are considered: physical characteristics, effects on speech and hearing, and protection from noise. Propeller noise, noise from a pulsing flow, noise from jets, and noise from turbo-propeller units are analyzed and compared. Masking of speech is a common result of noise. Hearing losses may occur in persons who are working close to the noise source. Hearing loss is a function of intensity and duration of noise. Protection can be achieved by spatial isolation, soundproofing, and personal protection. (HEIAS)

R 15

8548

Stieglitz, W.I. COCKPIT DESIGN AND SAFETY. *Aero. Engng. Rev.*, Oct. 1952, 11 (10), 36-41. (Republic Aviation Corporation).

8548

The role of cockpit design in air safety is discussed in terms of the general implications for safety in the man-machine relationship and the specific implications in the design of instrument displays, their arrangement, and the design of controls. Also discussed are the various types of errors commonly involved in aircraft accidents, e.g., substitution, adjustment, reversal errors, etc. Control location, coding, and motion are treated along with the problem of evaluation and reduction of air crew workloads.

T. I. R many

8549

King, B.G. FUNCTIONAL COCKPIT DESIGN. *Aero. Engng. Rev.* June 1952, 11(6), 32-40. (US Civil Aeronautics Administration, Washington, D.C.).

8549

Relevant experimental data are presented as a basis for this discussion of functional cockpit design. Among the various aspects of cockpit design treated by the author, the following are included: the adequate selection of measures of man for use in engineering design; problems within the area of visibility (eye position, field angles, capacity, etc.), the location of controls, and pilot seating (body weight, body stability, etc.). The data which are presented include both previously reported and new unpublished material.

T. G. I. R 15

8550

Seltz, C. THE "E" FACTOR IN ENGINEERING DESIGN. *Aero. Engng. Rev.*, 1953, 12 (3), 42-43. (U.S. Navy Special Devices Center, Port Washington, N.Y.).

8550

The author presents a brief discussion of the human factor in engineering design. The general nature of this factor in terms of its role and evaluation is described. Emphasis is placed on its importance in engineering design.

R 8

8553

Luft, U.C. PHYSIOLOGICAL ASPECTS OF PROLONGED FLIGHT AT HIGH ALTITUDES AND SURVIVAL IN EMERGENCIES. *Aero. Engng. Rev.*, 1953, 12(4), 56-60. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

Presented at a meeting on aviation medicine. There is an astonishing degree of individual variation in tolerance to stress and in the range of adaptability. A temperature regulatory system is essential in aircraft to keep the temperature and humidity within the comfort zone. The following minimum cabin pressures are recommended: 10 lbs per sq. in. if the O₂ equipment cannot be used, 6 lbs per sq. in. when supplementary O₂ is used, and 3 lbs per sq. in. when pure O₂ is inhaled. The effects of decompression depend on the magnitude and rate of pressure change. Gases tend to expand affecting the intestines and the lungs. Hypoxia may lead to unconsciousness. The development of ejection seats poses a number of physiological problems. (HEIAS)

8554

Byrnes, V.A. VISION AT HIGH SPEED AND ALTITUDE. *Aero. Engng. Rev.*, 1953, 12(4), 61-64. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

Presented at a meeting on aviation medicine. Visual problems at high altitudes and high speed are discussed. Above 120,000 ft. eye protection is necessary because of damaging rays in the 288-292 micron band. As one ascends, the greater the altitude, the less scattering of light there is. The sky appears darker, and there is less light on the instruments and inside the cabin. It becomes much more difficult to see another aircraft. Light-reflecting paint should be used in the cockpit to reflect the light that is present on the instruments. Also of benefit would be the use of high-intensity instrument lighting and filters in front of the eyes. Hypoxia should not interfere with vision but decompression may black out areas of the visual field. High speeds of up to 2000 mph may pose the following visual problems: a) effect of slanting optical surfaces, b) visual distortion produced by shock waves, c) vibration, d) lag in visual perception, e) effects of acceleration, f) high temperature, and g) high-speed escapes. These factors should be considered in the design and operation of high-performance aircraft. (HEIAS)

R 8

8558

Carmody, E.O. THE ROLE TO BE PLAYED BY TRAINING DEVICES IN THE TRAINING OF AVIATION PERSONNEL. *Aero. Engng. Rev.*, May 1954, 13(5), 74-79. (Stanley Aviation Corporation, Denver, Colo.).

8558

This article presents a description and evaluation of the utilization of training devices in the training of aviation personnel. The current status is exemplified by the use of the flight simulator to offer training in such areas as cockpit familiarization, flight characteristics, navigation, gunnery, and bombing training, etc. The research requirements, the potential applications of training devices, and a brief history of the development of such devices are topics included in this discussion.

I.

8559

Pecoraro, J.N. THE USE OF AN OPERATIONAL FLIGHT TRAINER AS A RESEARCH TOOL FOR AIRCRAFT INSTRUMENTATION AND COCKPIT REARRANGEMENT. *Aero. Engng. Rev.*, May 1954, 13(5), 86-93. (USN Special Devices Center, Port Washington, N.Y.).

8559

This article presents a discussion on the use of helicopter and jet aircraft operational flight trainers as research tools in the problems of aircraft instrumentation and cockpit rearrangement. A program of investigation is reported in terms of the following topics: methods of display evaluation, techniques of experimentation, data on individual subjects, instrument and flight simulation problems, and the application of simulation techniques to training.

T. G. I. R 3

8560

Hale, F.C. HUMAN FACTORS IN JET-TRANSPORT DESIGN. *Aero. Engng. Rev.*, Oct. 1954, 13, 10, 84-6. (Douglas Aircraft Company, Inc., El Segundo, Calif.).

8560

In this discussion of the role of human factors in jet-transport design, the author describes the introduction of human engineering into the engineering division of Douglas Aircraft Co., and the general function of human engineering within that installation. Several studies are outlined to reflect the types of research being conducted in this attempt to evaluate the human factors in aircraft design (e.g., location of crew and instrumentation, passenger seating, lighting design, size and location of emergency exits, etc.).

G

8561

Heber, H. MAN AND MACHINE BETWEEN ATMOSPHERE AND SPACE. Aero. Engng. Rev., Nov. 1954, 12 (11), 56-62. (University of California, Los Angeles, Calif.).

The article deals with the progress and the problems encountered in high altitude flight throughout the period from 1910 to 1954. Specifically, man and machine in the aeroplane are discussed. Limitations of high altitude flight, current at the time of the writing of the article, are discussed along with possible future developments. (MEIAS)

R 32

8562

McMillen, B.J. CUSTOMER RELATIONS TRAINING BY MANUAL AND FILM. A.G.A. Proc., 1953, 248-250. (Cincinnati Gas and Electric Co., Cincinnati, Ohio).

8562

This is a brief report concerning customer relations training programs which utilize manuals and training films. The author describes the content of the manuals and films and discusses the potential application of these media to certain training problems.

8563

Howell, V.A. DRIVER TRAINING PROGRAM IN THE LONG ISLAND LIGHTING CO. A.G.A. Proc., 1953, 617-619. (Long Island Lighting Co., Hicksville, N.Y.).

8563

This article presents a description of the Driver Training Program instituted by the Long Island Lighting Company. The course is given in four or five days and is divided into six general sections: 1) driving and traffic problems, 2) general information concerning the vehicle and operator, 3) specific information concerning the vehicle, 4) psychophysical data concerning the operator, 5) field training, and 6) showing of a film and distribution of printed materials dealing with rules and regulations, safety, etc.

8564

Barthel, D.E. TRAINING SCHEDULE FOR UNDERGROUND PERSONNEL. A.G.A. Proc., 1953, 624-627. (Consumers Power Co., Flint, Mich.).

8564

This article describes a training program employed with gas company street department personnel. Some of the aids used in this program are equipment exhibits and models. The program utilizes both discussion and demonstration of solutions to problems of maintenance, repair, and installation.

8565

Aschenbrenner, C.M. THE INTERPRETATION OF TRIDIMENSIONAL FORM FROM STEREO PICTURES. Photogrammetric Engng., 1952, 18, 469-472. (Physical Research Laboratory, Boston University).

8565

The problem of interpretation of tridimensional form from stereo pictures is discussed in terms of two types of spatial distortions which interfere with such perception. The first occurs as a function of stereoscope placement in relation to position of the object, while the second reflects an exaggeration of depth as a function of eye convergence. The underlying geometry of these distortions is presented as potentially useful to photo-interpreters attempting a non-distorted spatial estimation.

I

8566

Aschenbrenner, C.M. A REVIEW OF FACTS AND TERMS CONCERNING THE STEREOSCOPIC EFFECT. Photogrammetric Engng., 1952, 18, 818-823. (Physical Research Laboratory, Boston University).

8566

Having surveyed the literature pertinent to the problem of perception of tridimensional form (stereoscopic effect), the author attempts to resolve many of the existing differences of opinion by clarifying certain definitions and interpretations of relevant terms and research results. The stereoscopic model, common perceptual errors of the multiplex operator, the mathematical equations which express stereoscopic effect, enhancement of stereoscopic effect (e.g., enhancement of relief, relief stretching), etc., represent the primary aspects treated in this review.

R 8

8572

Plasky, J.J. TRAINING FOR SAFETY. Coal Age, Nov. 1949, 54, 82-87. (Red Jacket Coal Corp., Red Jacket, W. Va.).

8572

This article describes a safety-training program employed by the Red Jacket Coal Corp. Discussed are such topics as the need for safety training, the importance of individual training, the relation between safety and efficiency, and the particular objectives of this company's program. The results of the program are presented in terms of the accident statistics recorded during the three year period of the program as compared to records prior to its organization. Suggestions for improving the program, primarily by use of instructional aids, are also discussed.

I.

8573

Plasky, J.J. TRAINING FOR BETTER MINE OPERATIONS. HOW TO TAILOR A PROGRAM TO YOUR NEEDS AND MAKE IT WORK. Coal Age, Nov. 1953, 58, 98-101. (Red Jacket Coal Corp., Red Jacket, W. Va.).

8573

This article presents a description of a training program designed to improve mine operation procedures. General evidence is presented concerning the effect of training programs on accident rates and operational efficiency. Many of the problems pertinent to the organization, effectiveness, and institution of such programs are discussed.

I.

8577

Moses, J.A. TRENDS OF 16MM PROJECTOR EQUIPMENT IN THE ARMY. J. SMPTE, Nov. 1950, 55, 525-535. (USA Pictorial Service Div., Washington, D.C.).

8577

"The Army's use of the 16-mm sound motion picture projection equipment during the past decade is outlined. A brief description of the Army standard 16-mm projector set AN-PFP is given, with particular reference to features which provide increased light and sound output, higher sound fidelity and improved maintenance characteristics."

I.

8578

Passman, P. & Ward, J. NEW THEATRE SOUND SYSTEM. J. SMPTE, May 1951, 56, 527-537. (General Precision Laboratory, Inc., Pleasantville, N.Y.).

8578

An integrated theater sound system is described and evaluated for reliability and rated performance. Among the components described are the power amplifier, the monitor amplifier, the speaker network, and the exciter/lamp power supply.

I. R 2

8579

Kiel, J.P. A 35MM PROCESS CAMERA. J. SMPTE, May 1951, 56, 551-558. (Producers Service Co., Burbank, Calif.).

8579

"This paper describes the unique features of the Acme Process Camera and their applications to special effects photography. Basic camera-design features include a color wheel for three-color successive-frame photography, interchangeable film movements with various location of the register pins, a reflex viewer, ... projection facilities for 'matte painting' ... The electrical and mechanical operation of two new types of drive motors ... and their use in conjunction with the camera are also discussed."

I.

8580

Leffen, J.S. EXPERIMENTAL UTILIZATION OF TV EQUIPMENT IN NAVY TRAINING FILM PRODUCTION. *J. SMPTE*, July 1951, 57, 15-17. (USN Photographic Center, Anacostia Air Station, D.C.).

8580

In an attempt to speed up the production of training films by combining shooting and editing, television cameras and a video recorder were utilized in an experimental production of a film. A detailed description of the equipment, the manner in which it was utilized, and the difficulties encountered, is presented along with a critical evaluation of both the film and this technique of film production.

8581

Mertz, P. DATA ON RANDOM-NOISE REQUIREMENTS FOR THEATRE TELEVISION. *J. SMPTE*, Aug. 1951, 57, 89-107. (Bell Telephone Laboratories, Inc., New York, N.Y.).

8581

This article presents a provisional evaluation of the amount of random noise permissible in theater television. The sources for the data were experience with 4-mc broadcast television and graininess in motion picture films. A suggestion is made for a limit figure of noise following a detailed examination of the variables involved in the relation between fineness of picture detail and degree of permissible random noise.
T. G. R 10

8582

Lozier, W.W. (Chm.). FOREWORD: SYMPOSIUM ON SCREEN VIEWING FACTORS. *J. SMPTE*, Sept. 1951, 57, 185-186.

8582

This is an introduction to a symposium (see 8583, 8584, 8585, 8586) on screen viewing factors in which the problems relating to screen brightness are briefly reviewed.

8583

Lowry, E.M. THE LUMINANCE DISCRIMINATION OF THE HUMAN EYE. *Soc. Motion Picture & TV Eng. J.*, 1951, 57, 187-196. (Eastman Kodak Co., Rochester, N.Y.).

8583

This is a study of the effect of the luminance to which an eye is adapted upon its ability to discriminate luminance differences (i.e., contrast sensitivity). In order to control such factors as size of field, test spot luminance, and luminance distribution in surround, an apparatus called the Visual Sensitometer was constructed and utilized (with the method of just noticeable differences) in a series of experiments (a total of 5 subjects) designed to evaluate the following aspects of luminance discrimination: luminance discrimination as a function of (1) luminance adaptation, (2) test-field luminance, (3) size of surround, and (4) (luminance of subjective black as a function of) visual angle. Specific data are presented for each of these factors.
G. I. R 9

8584

MacAdam, D.L. INFLUENCE OF COLOR OF SURROUND ON HUE AND SATURATION. *Soc. Motion Picture & TV Eng. J.*, Sept. 1951, 57, 197-205. (Eastman Kodak Co., Rochester, N.Y.).

8584

This is a study of the influence of color of surround upon the perception of lines and saturations in projected pictures. Utilizing the chromaticity diagram (to represent color measurements) and a twin colorimeter, an experimental arrangement was designed to obtain data of the following sort: effects of simultaneous contrast, effects of various colors in a picture upon neighboring colors in that picture, designation of colors having constant line under varied conditions of surround lighting, and so forth. These data are discussed in terms of the implications of surround and adaptation factors in the investigation of color perception. A discussion of the article is included.
G. I. R 14

8585

Guth, S.K. SURROUND BRIGHTNESS: KEY FACTOR IN VIEWING PROJECTED PICTURES. *J. SMPTE*, Sept. 1951, 57, 214-224. (General Electric Co., Cleveland, Ohio).

8585

This article presents a general discussion and an exploratory experiment on surround brightness as related to the viewing of projected pictures. Using a 20 foot screen, a group of five observers were presented with a motion picture and asked to adjust the brightness of a transilluminated diffusing glass which bordered the screen. Judgments were made on the basis of viewing comfort and best appearance of the projected pictures. The results are discussed in terms of the influence of surrounding screen brightness upon the selection of border brightness. Results of a similar experiment with a color film are also discussed.
T. G. I. R 5

8586

Logan, H.L. PHOTOMETRIC FACTORS IN THE DESIGN OF MOTION PICTURE AUDITORIUMS. *J. SMPTE*, Sept. 1951, 57, 225-230. (Holograph Company, Inc., New York, N.Y.).

8586

This article presents a detailed discussion of the photometric factors (i.e., screen and surround brightness) important for the visual comfort, enjoyment, and safety of the audience. Some of the factors dealt with are the followings: design of the auditorium in terms of the effect on the viewer when the film is being shown in contrast to the effect when full house lights are on, the effect of brightnesses located off the axis of vision (on-the-axis vs. off-axis brightnesses), the relation of screen surround to screen brightness with regard to the observer, and so forth.
G. I. R 6

8587

Lozier, W.W. (Chm.). REPORT ON SCREEN BRIGHTNESS COMMITTEE THEATRE SURVEY. *J. SMPTE*, Sept. 1951, 57, 238-246. (National Carbon Company, Fosteria, Ohio).

8587

This is a report of a survey of 125 indoor theaters conducted to obtain data on screen illumination practices. To measure brightness a two-cell General Electric combination screen illumination-screen brightness meter was employed. The results of the survey are discussed in terms of the number of theaters found to be functioning within the recommended screen brightness range. Data on seating capacity, screen reflectivity, screen width, and distribution of illumination is compared with similar data of an earlier survey.
G. I. R 2

8588

Kobrak, H.G. AUDITORY PERSPECTIVE - A STUDY OF THE BIOLOGICAL FACTORS RELATED TO DIRECTIONAL HEARING. *Soc. Motion Picture & TV Eng. J.*, Oct. 1951, 57, 328-335. (University of Chicago).

8588

This article presents an elaboration of the biological factors involved in the process of directional hearing (auditory perspective). Among the various aspects discussed are the following: the role of past experience, the nature of the sound stimulus, the process of sound conduction, the role of head movements, the production of the stereophonic effect, and so forth. Conclusions are drawn concerning the genetic development and basic physiological requirements of auditory perspective.
I. R 6

8589

Lozier, W.W. (Chm.). FURTHER REPORT ON SCREEN BRIGHTNESS COMMITTEE THEATRE SURVEY. *J. SMPTE*, Nov. 1951, 57, 489-493. (National Carbon Company, Fosteria, Ohio).

8589

This report presents an additional analysis of the data collected in a survey by the Screen Brightness Committee (see accession number 8587). Side and corner imbalance on individual projectors and a comparison between projectors in each theater provide data which are analyzed in terms of the need for standards of intensity and distribution of screen illumination.
G. R 2

3090

Deppner, C.R. & Goodrich, L.P. A SCIENTIFIC APPROACH TO INFORMATION-EDUCATIONAL FILM PRODUCTION AND DISTRIBUTION. *IN: J. L. SHER, Ed. 1952, 22, 433-437. (University of Oklahoma, Oklahoma City, Okla.).*

3093

This article describes a research program concerned with the effective utilization of instructional films in communication. A discussion of the research methods and experimental variables is presented along with data concerning the use of particular film presentation techniques and certain film devices (e.g., the Tele-Kin, the Film Analyzer Recorder, etc.). An analysis of preliminary data treats such factors as viewing conditions, effects of repetition, teacher participation, color vs. black-and-white films, the effect of knowledge of results, the effects of practice, etc.

.. R 18

3094

Gelbman, T.T. & Whiteland, R. TV TRANSMISSION BY MEANS OF FILM. *IN: Motion Picture of Film, L. J. Aug. 1948, 41, 137-141. (Film R. DeWitt Laboratories Inc., Passaic, N.J.).*

3096

This article presents a description of electronic and optical camera equipment, developed by Eamonn Knox Company, for the purpose of transmitting television picture and sound directly from the face of the cathode-ray tube. The utilization of this technique of television transmission is discussed in terms of its potential application as an aid to the regular motion picture viewing camera, as a documentary record of television transmission, and as a means of providing transmissions for master television.

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3095

Jennings, H.M. & Vance, P. NEW SCREEN-TO-SCREEN PROJECTION SCREEN. *IN: J. L. SHER, Ed. 1952, 22, 21-23.*

3095

This article presents a description of a new direct-vision stereo-projection screen which permits viewing of three-dimensional color motion pictures and slides without the use of polarized viewing glasses. A detailed discussion of the historical and technical development of the stereo-projection screen is presented.

.. R 3

3096

Connerwell, W.R. & Thomas, M.Y. ARMY'S TRAINING FILM PRODUCTION PROGRAM AND A DESCRIPTION OF U.S. NAVAL PHOTOGRAPHIC CENTER FILM REPORTING FACILITIES AVAILABLE TO COMMERCIAL FILM AND TELEVISION AGENCIES. *IN: J. L. SHER, Ed. 1952, 22, 49-57. (Naval Photographic Center, Annapolis Air Station, D.C.).*

3096

This article presents a detailed description of the Army's training film production program. Discussed are such topics as the need for training films and the technique of production, distribution and procurement of such films. Also included is a description of the facilities and services of the Navy Photographic Center which are available to the film and television industries.

3097

Hoban, C.F. & Moses, J.A. GAGE FILM PRODUCTION TECHNIQUE. *IN: J. L. SHER, Ed. 1952, 22, 195-204. (U.S. Photographic Service Div., Washington, D.C.).*

3097

This article describes the application of educational and psychological principles to the production of training films as a means of increasing the effectiveness of the film and at the same time reduce production time and costs. Discussed are such topics as story treatment, preproduction planning, and the Cameo technique (a method of film production). The results of applying these techniques to the production of an experimental film, "How to Operate the Army 16mm Sound Projector Set," are discussed in terms of film effectiveness and audience reaction.

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3098

Allee, E.F. ANNOTATIONS FOR EDUCATIONAL TELEVISION STATIONS. *IN: J. L. SHER, Ed. 1952, 22, 205-209. (University of Oklahoma, Oklahoma City, Okla.).*

3098

This article presents a description of techniques developed to provide quick and inexpensive production of animated films. Effective use of the storyboard, the type of paper and art work best suited for television animation, and the amount of animation necessary for effective stimulation of action, represent the types of problems discussed by the author.

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3099

Allee, E.F. SIGNAL CORPS MOBILE TELEVISION SYSTEM. *IN: J. L. SHER, Ed. 1952, 22, 462-471. (USA Signal Corps Photographic Center, Long Island City, N.Y.).*

3099

This article presents a brief description of the Signal Corps' mobile television system. A complete television unit capable of carrying the training and operational requirements of the Army is described in terms of each of its five components: a transmitter bus, a transmitter power bus, a receiver power bus, and a kinescope recording box. A description of an actual utilization of the unit to telecast a particular program is also included.

.. R 2

3099

Sales Management. ARMY-NAVY TRAINING FILM BOOTH SETS RESULTS. *Sales Mgmt., July 1954, 11, 62-64.*

3099

This article presents a brief description of the utilization of a filmstrip to aid sales of a commercial product. Its effectiveness is evaluated in terms of the increase in product sales following its presentation at sales meetings. The small budget involved in production of the filmstrip is emphasized.

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3099

Sales Management. ARMY-NAVY TRAINING FILM BOOTH SETS RESULTS AND PROFILES TO AID CONVENTION AND MEETING PLANNERS. *Sales Mgmt., April 1956, 10, 37-41.*

3099

The To-Graph, a device for projecting material written on a plastic sheet onto a screen, is described. Its use in displaying questions raised by the audience at large meetings is discussed.

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3099

Sales Management. TATE RECORDS SOLVES MASS TRAINING PROBLEM. *Sales Mgmt., Nov. 1950, 42, p.24.*

3099

The use of a tape recorded lecture, supplemented by diagrams, in instructing garage mechanics on the operation of automobile testing equipment is described.

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3099

Sales Management. NEW TRAINING-FILM TECHNIQUE GETS MEN TO PARTICIPATE AND THINK. *Sales Mgmt., July 1952, 40, 41-43.*

3099

The Quizfilm meeting procedure for the instruction of salesmen, involving discussion of a sales incident presented on film, is described and appraised. The content of a series of six films used at quizfilm meetings is described also.

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8618

Sales Management. VISUAL AIDS: NEW APPROACHES TO SALES AND PROMOTION TO AID DISTRIBUTION AND MARKETING PLANNING. Sales Mgmt. Jan. 1953, 72, 51-52.

8619

The filmograph, a film strip with synchronized commentary on a sound track, is described. Glass color transparencies for use at trade show exhibits and sales meetings are mentioned also.

8621

Sales Management. USE OF FILM. HOW TO SHOW...GIVE TO KITH & KIN. Sales Mgmt. Dec. 1950, 47, 42-43.

8621

This article presents a brief description of the utilization of charts as a technique of solving problems of communication and education in industry. Several illustrations are offered.

8622

McLure, R.F. COLOR INSERTS: THE BASIS FOR ADVERTISING ADVERTISING? Sales Mgmt. Jan. 1951, 46, 52-54.

8622

This article presents a brief description of the utilization of color inserts as a technique of focusing attention to advertisements. The results obtained with various types of color inserts (e.g., black and white vs. color, heavy vs. light paper, etc.) are discussed in terms of increase in readability.

8625

Sales Management. COLOR ADVERTISEMENTS GET WITH RECEPTION. Sales Mgmt. June 1954, 72, p.72.

8626

This is a brief review of a study conducted by National Analysis, Inc., and concerned with the effectiveness of color and black-and-white advertisements in achieving high readership. The effect of the position of the advertisement in a magazine is also discussed.

8628

Fuller, R.S. SLIDES AND FILMS: MULTI-PURPOSE TOOLS FOR MEETING. Sales Mgmt. April 1952, 48, 12-14.

8628

This article presents a brief description of the utilization of visual aids such as slides, filmstrips, and films in promoting commercial sales. Some of the specific effects discussed concern the communication of information about a product, the instruction of salesmen, the indoctrination of personnel, and so forth.

8629

Sales Management. THE RECORDER AND THE MOVIE ARE MODERN SALES TRAINING "EXERCISES". Sales Mgmt. June 1950, 46, 120-121.

8629

This article describes the application of wire recorders and movie films to the salesmanship training course at Rutgers University. The particular effects of each of these devices upon the general training program is briefly discussed in terms of facilitated achievement of training goals.

8631

Sales Management. TOOLS FOR SELLING: VISUAL AIDS GET FIRST AID. Sales Mgmt. Jan. 1954, 72, 62-64.

8631

A conference, attended by representatives of various manufacturing firms, on the improvement of visual aids in selling is described. Examples of benefits to sales provided by the conference are given.

8632

The Maddy Infotrainer. INFOTRAINER: DISTRIBUTION OF NEW YORK CITY SCHOOL. The Maddy Infotrainer, Feb. 1953, 148, p.486 & p.494.

8632

The use of the Infotrainer, a device that provides "behind-the-wheel" training in driving an automobile. In New York schools is discussed. A series of 22 films implement practice in the Infotrainer.

8633

The Maddy Infotrainer. AIDING THE STUDENT WITH SENSORY PERCEPTION. The Maddy Infotrainer, Inc. 1953, 148, p.486.

8633

The advantages of using the Infotrainer, a device for providing "behind-the-wheel" instruction in driving an automobile to 15 pupils simultaneously, are discussed. Training situations to be met by the driver are projected on a motion picture screen.

8634

Kiser, E. AUDIO-VISUAL AIDS AND ADDITIONAL TRAINING. The Maddy Infotrainer, Inc. 1952, 46, 225-232.

8634

The function of audio-visual aids (sound films, slides, sound films, and television) in various fields of vocational training: general education of apprentices, specialized training of adults, mental hygiene is discussed. Principles of use for optimal effect—e.g., verisimilitude, simplification—are delineated.

8635

Archives Forum. SOUND AND MOVIE FEATURES EQUIPMENT HAS A NEW PLACE IN EDUCATION: PROGRESS AT THE CLASSROOM LEVEL. Arch. Forum. Oct. 1949, 51, p.156 & p.234.

8635

The increasing use of audio-visual aids in the classroom is noted, and implications of this trend for the architecture of schools are detailed—e.g., the necessity of providing adequate electrical outlets, containing, central sound systems, ventilation systems.

8639

Moore, G. CURTISS-WRIGHT ELECTRONIC SIMULATOR. Aero Digest, Sept. 1952, 55 (3), 64-66. (Curtiss-Wright Corporation).

8639

The function of simulators in flight training is discussed. The Curtiss-Wright Debnel Flight Simulator is described, and the aircraft characteristics—e.g., attitude, airspeed, altitude—and emergency conditions—e.g., defective oil pumps, carburetor ice—that it duplicates are listed.

8653

Aero Digest. LINK FOR THE JETS. Aero Digest, Feb. 1950, 60, 36-37.

8653

The Linktronic (Link jet aircraft simulator) is described. Examples are given of simulated conditions that may be presented to the student pilot. The navigational aids that are available in the simulator are noted.

8654

Aero Digest. PERISCOPE HOOD FOR INSTRUMENT FLIGHT. Aero Digest, June 1950, 60, p.93.

8654

The Instrument Flight Hood, a device to be worn by a pilot that permits him to view only the instrument panel in a cockpit, is described.

8656
Aero Digest. COORDINATE TRAINER FOR NEW AIRWAYS. Aero Digest, Dec. 1950, 62, p. 46.

8656
An all-weather radio-aid unit that simulates electronically VOR (radio-aid), DME (distance measuring equipment), and ILS (instrument landing system) is described. Special controls and indicators available to the instructor are listed.

8658
Aero Digest. TRAINING C-124A CREWS. Aero Digest, Jan. 1952, 62, 17-19.

8658
The training curricula and entrance qualifications for pilots, flight engineers, and loadmasters at the Heavy Transport Training Unit (which trains aircraft and maintenance personnel for the Douglas C-124 Globemasters) are summarized.

8660
Emerson, C.R. PRONE FLIGHT VISION. Aero Digest, May 1953, 66(5), 98-101. (Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio).

8660
This article describes the results of research on two aspects of prone position flight: physical discomfort and visual limitations. Particular emphasis is placed upon the problems and requirements of prone flight vision. Among the visual aspects, the following are discussed in detail: the extent of direct visual field available under prone flight conditions, the incidence and role of visual fatigue, and the physiological visual capacity of the person in the prone position.

8663
Meln, D.R. SELECTING AND TRAINING FORK-TRUCK OPERATORS. Mech. Engrg., Jan. 1952, 76, 568-572 & 1033-1034. (Myster Company, Portland, Ore.).

8663
This is a discussion of the selection and training of operators of fork trucks (self-powered lift trucks). Visual acuity scores and scores on the American Automobile Association tests as criteria for selection are noted. A five-day training curriculum—including, e.g., instruction in handling of materials, in preventive maintenance, and in basic procedures—is outlined. A list of suggested props—e.g., truck parts, scoring sheets, crates, graduation certificates—is presented.

8673
Wilkinson, G.D. APPLICATION OF STATISTICAL TECHNIQUES IN TIME STUDY. Mech. Engrg., Nov. 1951, 75, 906-909. (George D. Wilkinson and Company, Oceanport, N.J.).

Time study replaces subjective opinion with scientifically determined facts about rates of working. Mathematical methods are, however, neglected in both current methods: leveling and rating, and they lack scientific validity. Statistical techniques have been developed for use in time study. Its advantages are discussed and the application of the method is demonstrated. (MEIAS)

8675
Davis, L.E. HUMAN FACTORS IN DESIGN OF MANUAL MACHINE CONTROLS. Mech. Engrg., Oct. 1949, 71, 811-815, 837. (University of California).

8675
This study reflects an attempt to determine the essential factors relevant to optimum control and speed of usage of handwheels, cranks, and crossbars (under the specific condition of single settings of indicators within close tolerance limits). Data were collected on nine subjects who made settings with constant and accuracy of operation held constant while type of control device (handwheel, crank, or crossbar), size of control device, work load (torque), and control device location (in relation to operator) were varied. Both time and graphic records for each subject were obtained. The results are presented and discussed in terms of the relative accuracy of performance manifested under each of the varied conditions. Conclusions are drawn concerning the requirements of control size, type, etc., for optimal performance. T. O. I. R 7

8676
Bogolis, E.F. LIMITS OF FACTORS OF SAFETY IN THE HUMAN BODY. Mech. Engrg., July 1946, 68(7), 615-627. (Cornell University Medical College, New York, N.Y.).

This paper discusses man's physiological limits relative to the development and design of machines, particularly aircraft. Examples of the effects of speed, rapid pressure changes, forces, G supply and extreme temperatures are considered. (MEIAS)

8677
Randall, F.E. SEAT COMFORT. Mech. Engrg., Dec. 1946, 68, 1056-1058. (Office of the Quartermaster General, Washington, D.C.).

8677
In this article on seat comfort the author presents a discussion of the theory of seating (and its implications for seating design), the primary causes of fatigue, the design factors related to eliminating discomfort, the methods of seating analysis, the implications for seating of cockpit design, and the principles involved in meeting actual seating requirements. The contributions of seating research and the problems as yet not investigated are described in detail. Contemporary methods of research are seen as important factors in the resolution of problems of seating.

8678
Knappe, C.J., & Whitson, L.S. POWER AND VELOCITY DEVELOPED IN MANUAL WORK. *Arch. Engrg.*, May 1943, 62, 383-389. (University of Minnesota, Minneapolis, Minn.)

8695
Mollipise, C.S., & Hood, J.D. THE SPEED OF THE SLOW COMPONENT OF OCULAR NISTAGMUS INDUCED BY ANGULAR ACCELERATION OF THE HEAD. *Proc. Roy. Soc. Lond., Ser. B.*, 1953, 151, 216-230. (Medical Research Council, National Hospital, Queens Sq., London, England).

8678
To determine the types of motions which permit maximal development of velocity and horsepower in manual work, six subjects ranging in age from 21 to 30 years were required to accelerate a series of weights (6, 9, 12, 15, 18 and 21 lb.) with their right hand. Determinations of velocity and horsepower were made along with an analysis of six types of hand motion (e.g., long forehand sweep from right to left with arm extended, etc.). Path and time of travel of weights were recorded electrically. A camera recorded motion paths. The resultant data are treated in terms of velocity and horsepower development as a function of weight accelerated, type of motion, and individual differences.
G. I. R I

8695
This study attempts an experimental determination of the slow component of ocular nystagmus (induced by angular acceleration of the head). Utilizing a revolving chair (of improved design) and the technique of flashing a small light spot (while seated in darkness), data were collected on subjects under varied conditions of acceleration. The experimental results are presented along with theoretical arguments in support of Graybiel's hypothesis, i.e., ocular nystagmus is dependent upon vestibular eye nystagmus. In addition, the data are applied to the physical theory of the cupular mechanism (Steinhausen).
G. R II

8688
Schlanger, B. THEATER AUDITORIUM-SEATING PLANS FRESHLY CONSIDERED. *Arch. Engrg.*, June 1944, 62, 505/6.
Recommendations are made to improve seating plans in the design of new theaters. The deficiencies of current practice are discussed and illustrated. 2 longitudinal aisles are advocated. In addition, the spacing between 2 rows should be changed from 36 to 40 in. Alternate plans are given for cities where code interdictions would apply to the preferred plan. (HICIAS)

8697
Schott, L.O. SIGNAL TRANSLATION IN HEARING. *Bell. Lab. Res.*, Jan. 1953, 32, 2-8.

The hair cells of the inner ear behave like small generators that produce electric pulses when set in motion. The process involves chemical, mechanical and electrical operations. An electrical circuit analog of a single hair-cell unit was designed. It contains a saw-tooth oscillator which pulsates at a rate according to the intensity of the input signal. The adaptation of nerve fibers was simulated by using negative feedback. Having certain information about the general features of the overall pulse patterns sent toward the brain, and using the results of studies with the single analog hair-cell unit, it appeared possible to construct a detailed overall pulse pattern for each sound encountered. The processing employed in the ear evidently puts all of the salient information about a sound in terms of the occurrence positions of the generated uniform pulses. (HICIAS)
R 6

8689
Architectural Record. PROSPECT FOR BETTER BUILDING: COLOR TELEVISION IN MEDICAL EDUCATION. *Architectural Rec.*, Feb. 1963, 112, p.196.

8589
This article presents a brief description of the application of color television to medical education. Both the video and audio aspects of telecasting surgical operations are discussed in terms of their functions as teaching aids.
I.

8696

Keller, A.C. SONAR DETECTION BY SONAR. Bell Lab. Rec., Feb. 1947, 25, 55-56.

The term sonar applies to underwater sound devices for listening, echo ranging, and locating obstacles. Acting as a listening device it can determine the bearing of a source of noise or signal within the frequency range from 10 to 30 KC. In addition, a trained operator, by listening to the sounds, can estimate the type, size, and speed of the source. By echo ranging, it can determine the range and bearing of submerged objects such as submarines. Its telegraph facilities permit it to communicate with nearby vessels provided with suitable equipment. A detailed description is given of an apparatus for the QM system. (M145)

8710

Management Review. FACTORS IN EFFICIENT OFFICE LAYOUT. Manag. Rev., 1951, 42, 458-469.

8710

This article presents a brief description of a series of factors which are considered as important in planning an efficient office layout. Included are such aspects of space utilization as the following: width specifications for aisles or passageways, the utilization of wall partitions, desk placement, file arrangement, and so forth.

8717

Nistley, H.R. IS THERE AN IDEAL FACTORY CHAIR? Management Rev., March 1952, 41, 175-176.

8717

On the basis of a four-year study of various types of factory chairs, the author presents specifications for the ideal factory chair in terms of four primary considerations of chair design: comfort, safety, maintenance, and adjustability. An illustrative example of a chair meeting the requirements of all four factors is presented.

8715

Ryter, E.D. NOISE AND WORK PERFORMANCE: HEAT RESISTANCE HEARLY SECTS. Management Rev., 1950, 41, 511-12.

8718

This article presents a brief summary of the results of the relationship between noise and work performance. Included are the experimental findings concerning with the effect of noise on the following aspects of performance: reaction time, learning, intelligence tests, psychomotor tests, communications, subjective feelings, and physiological changes.

8721

Research Institute of America, Inc., New York, N.Y. APPRENTICE PROGRAM: TODAY'S BEST TRAINING TOOL. Manag. Rev., Feb. 1953, 42, 72-73.

8721

This article presents a brief discussion of the apprenticeship training program used in industry to solve the problem of skilled worker shortage. The advantages of such programs are presented along with incidental information concerning their establishment.

8723

Birren, F. COLOR: SOME FACTS ABOUT CONSUMER PREFERENCES. Management Rev., March 1953, 42, 166-167. (Monsanto Chemical Company).

8723

This article presents a brief discussion of several factors involved in consumer color preferences. Varietal fluidity, amount of sunlight, are some of the factors which are described. The effect of particular colors and the phenomenon of color trends are also discussed.

8730

Davis, L.E. & Josselyn, P.D. HOW FATIGUE AFFECTS PRODUCTIVITY: A STUDY OF MANUAL WORK PATTERNS. Personnel, July 1953, 39, 54-59. (University of California).

8730

To evaluate the effects of fatigue upon productivity, the performance of two experienced operators on a light assembly operation was recorded in terms of average daily production, speed of operation, and types of delays. Changes in these aspects of productivity are analyzed with reference to such aspects of fatigue as time of day, day of the week, introduction of rest period, etc. Three hypotheses concerning the physiological and psychological aspects of extended performance are offered. G. R. 5

8732

Kent, R.F. CONDITIONING EXPERIENCES FOR INCENTIVES. Manag. Rev., Feb. 1950, 39, 66-68. (Western Electric Corporation, Pittsburgh, Penn.).

8732

The author discusses the utilization of incentives in industry in terms of a need to condition employees for such programs. The primary objectives of such a process are presented along with specific recommendations concerning its institution.

8741

Management Review. USE OF COLOR IN CLERICAL WORK. Manag. Rev., Dec. 1950, 39, 703-704.

8741

This article discusses the role of color utilization in clerical work. Color is described as an effective means of reducing strain in perception, aiding retention, and, with specific reference to the clerical task, as a means of document differentiation, form identification, etc. Color is also seen as a technique for increasing legibility. Specific recommendations are presented with regard to the effective use of color outlines in clerical tasks. T

8743

Electronics Journal. STAR SIMULATOR FOR TRAINING NAVIGATORS. Elect. J., July 1956, 152, p.162.

8743

This is a brief description of the British star simulator, a device designed to facilitate the training of navigators. I.

8746

Stevens, S.S. ON THE BRIGHTNESS OF LIGHTS AND THE LOUDNESS OF SOUNDS. Science, Nov. 1952, 118, 576. (Harvard University).

8746

The author presents a brief discussion of the brightness and loudness attributes of visual and auditory sensation in which he describes the techniques and results of experimentation concerned with the nature of these attributes. Similarities between brightness and loudness are noted.

8747

Hardy, J.D., Coocrell, Helen & Wolff, H.G. INFLUENCE OF SKIN TEMPERATURE UPON PAIN THRESHOLD AS EVOKED BY THERMAL RADIATION. *Science*, Aug. 1951, 114, 149-150. (Cornell University Medical College, Ithaca, N.Y.).

This paper summarizes 2 experiments performed to investigate quantitatively the matter of the phenomenon of cutaneous analgesia induced by reduced skin temperature. The first experiment involved 4 Ss and the second involved 2 Ss. The results indicated a linear inverse relationship between skin temperature and pain threshold as evoked by thermal radiation. The close relationship between tissue damage and noxious stimulation can be inferred from the experiments, thus significantly supporting the concept that the adequate stimulus for pain is tissue injury. (HEIAS)

R 11

8748

Turk, A. & Bonnes, K. INADEQUATE STIMULATION OF OLFACTION. *Science*, Aug. 31, 1951, 114, 234-236. (V.B. Connor Engineering Corp., Danbury, Conn.).

Several workers in the field of olfaction have reported difficulties in obtaining test spaces for research purposes with an absolute zero level of odor. Such spaces are needed in olfactory research to serve as control rooms for comparison with test rooms of low odor levels, to act as reservoirs for the introduction of odors near threshold concentrations, and for the operation of odor test panels. The use of activated carbon as an air-cleaning device to remove all sources of olfactory stimulation from a test space can be successfully carried out provided certain precautions, as described, are taken. In the absence of such measures, a test space in which air has been purified by activated carbon sorbents may give rise to an odor variously described as "yeastlike" or "alcoholic", which, though not unpleasant and often even unnoticed by a lay observer, interferes with an olfactory research program. The theoretical implications of this phenomenon are of great interest. We have found that the olfactory stimulation in such cases is related to an inert aerosol, and hence is an "inadequate" stimulation of olfaction in the sense that no gas or vapor is involved. Experimental generation of the odor, examination of carbon for foreign vapors, and aerosol filtration are also discussed.

R 6

8749

Judd, D.B. COLOR BLINDNESS AND THE DETECTION OF CAMOUFLAGE. *Science*, June 18, 1943, 97, 544-546. (National Bureau of Standards).

8749

Detection of camouflage by colorblind (as compared to normal vision) persons is discussed following a description of normal color vision, the two types of colorblindness (deuteranopia and protanopia), and color weakness (deuteranomalous and protanomalous vision). The qualities of colorblind vision are related to the color aspects of camouflage in defining the relative ability of colorblind persons to detect camouflage.

R 2

8750

Cay, L.M. & Carliner, P.E. THE PREVENTION AND TREATMENT OF MOTION SICKNESS: I. SEASICKNESS. *Science*, April 8, 1949, 109, 339. (Johns Hopkins Hospital & University, Baltimore, Md.).

This paper describes briefly several cases wherein the administration of the drug Dramamine proved to be effective in curtailing the symptoms of motion sickness stemming from motion in automobiles and airplanes. (HEIAS)

8751

Strickland, B.A. & Hahn, G.L. THE EFFECTIVENESS OF DRAMAMINE IN PREVENTION OF AIR SICKNESS. *Science*, April 8, 1949, 109, 359-360. (USAF School of Aviation Medicine, Randolph Field, Tex.).

A procedure was devised whereby one-hour flights simulating flight through turbulent air in a C-47 (DC-3) airplane were utilized. Volunteers were obtained from among individuals stationed at Randolph Air Force Base who were not on flying duty. 12 flights of 18 individuals each have been carried out to date. On each flight conditions encountered in flying through gentle and moderately turbulent air were simulated. All variable factors were either controlled or "randomized." Each group of 18 men on a flight was subdivided into a group of 9 who received a 100-mg tablet of Dramamine and another 9 who received a placebo identical in appearance. The drug or the placebo was administered concurrently from 25 to 45 mins. before each flight. Seating arrangement in the airplane was carefully controlled in that an equal number of individuals who received the drug were distributed symmetrically in the forepart and the afterpart of the cabin. The same procedure was used in seating the individuals who received the placebo. Under the conditions described above 28.7% of those given Dramamine became ill as opposed to 55.6% among those given a placebo. Dramamine appears to decrease the incidence of airsickness.

R 3

8752

Davis, H. AUDITION--A PHYSIOLOGICAL SURVEY. *Science*, April 29, 1949, 109(2835), p442. (Central Institute for the Deaf, St. Louis, Mo.).

Current trends in audition are surveyed. Unsolved problems are the gap between nerve impulses and consciousness and the mechanism of excitation of nerve impulses. Hypotheses are required to explain the great discrimination ability of the ear for pitch and loudness. Possibly there are complicated interactions between nervous pathways within the nervous system to account for this, particularly for the fine discrimination of time differences. (HEIAS)

8753

Hanly, D.H. ROBERT RIDGWAY'S COLOR STANDARDS. *Science*, June 17, 1949, 109, 605-608. (University of Toronto, Toronto, Ontario, Canada).

The color standards introduced by Ridgway are popular among biologists. The advantages and limitations of the system are discussed by the author. The development of a permanent system of color description is suggested. (HEIAS)

R 27

8754
Ludvig, E. & Kinsey, V.E. EFFECT OF LONG
ULTRAVIOLET RADIATION ON THE HUMAN EYE.
Science, Sept. 1946, 104, 246-247. (Harvard
University Medical School).

8754
To investigate the effect of long ultra-violet radia-
tion upon the human eye, seven subjects were required to
fixate (with one eye) a 1,000 watt mercury arc (visible
and ultraviolet radiation shorter than 320 mμ removed
by filter) at a distance of 30 cm. Pupil light-dif-
ference sensitivity and critical flicker frequency of
both eyes were measured at five minutes and one hour
following exposure. The results are presented and dis-
cussed in terms of the statistical analysis of differences
between both eyes as indicative of the effect of ultra-
violet exposure.
G. R 2

8755
Eisenhart, C. OPERATIONAL ASPECTS OF INSTRUMENT DESIGN. *Science*, Oct. 7, 1949, 110, 343-
346. (National Bureau of Standards, Washington, D.C.).

If instruments and tools are to serve their purposes fully, both the designer and user
must bear in mind a) the conditions of operation; b) the nature of the measured quantities;
c) the relation of these quantities to the end action; and d) the psychological and physical
characteristics of the operator. (NEIAS)
R 3

8756
Jacobsen, H. THE INFORMATIONAL CAPACITY OF
THE HUMAN EAR. *Science*, August 1950, 112,
143-144. (Hunter College).

8756
In this discussion of the informational capacity of
the human ear, the author describes the technique of
applying informational units ("bits") to express capac-
ity. The use of the "stimulation profile" (graph of
stimulus intensity vs. position on basilar membrane) to
describe the response of the ear is discussed along with
certain deficiencies in this technique.
R 7

8751
Smith, K.U. & Mehrkamp, R. A UNIVERSAL MOTION ANALYZER APPLIED TO PSYCHOMOTOR PERFORMANCE.
Science, March 2, 1951, 113, 242-244. (University of Wisconsin, Madison, Wisc.).

The Universal Motion Analyzer is an apparatus developed for the purposes of a) automatic
registration of elapsed time in the performance of any simple or complex motor task, b) se-
parate automatic registration of the different components of travel time and manipulation,
and c) flexibility and universality of application of the analytic method to different types
of task situations. Various uses are described for the analyzer. (NEIAS)

8762
Jacobsen, H. THE INFORMATIONAL CAPACITY OF
THE HUMAN EYE. *Science*, March 1951, 113,
292-293. (Brooklyn College).

8762
This article presents a formulation of the informa-
tional capacity of the human eye based upon existing
monocular visual acuity data and expressed in standard
informational units ("bits"). The author describes the
theoretical model, the visual acuity measurement method
(Landolt ring), and the technique of analyzing acuity
data to arrive at a statement of informational capacity.
The resultant figures are compared to those obtained for
audition.
G. R 6

8763
Fritze, C. & Simonson, E. NEW ELECTRONIC APPARATUS FOR THE MEASUREMENT OF THE FUSION FRE-
QUENCY OF FLICKER. *Science*, May 11, 1951, 113, 547-549. (University of Minnesota, Minnea-
polis, Minn.).

A new apparatus for the measurement of flicker-fusion frequency is described. The device
is based on the recently developed "glow modulator tube" for facsimile transmission. It can
be built at a cost below the price of commercially available models. Several uses are sug-
gested for the apparatus. (NEIAS)
R 8

8764
Mialak, H. DECREASE OF CRITICAL FLICKER
FREQUENCY WITH AGE. *Science*, May 1951, 113,
551-552. (Fordham University).

8764
To investigate the role of age in critical flicker
frequency, 319 subjects (male and female) ranging in
age from 7 to 89 years were tested for ten days on a
flicker apparatus (with number of readings ranging as
high as 80). The data were analyzed in terms of the
mean and variability of critical flicker frequencies
for the subjects divided into four-year age groups (e.g.,
7-11, 12-16, etc.). Interindividual variability and mean
differences are discussed as a function of the neurologi-
cal process of aging.
T. G. R 10

8766
Miles, W.R. METHODS OF USING BINOCULARS.
Science, 1952, 115, 484.

8766
This article presents a brief description of the
effectiveness of two methods of utilizing binoculars:
1) keeping binoculars constantly at eyes, and 2)
loosening field with naked eye and then utilizing binocu-
lars. Five target areas at distances varying from 1/2
to 2 miles were observed by a group of subjects using
both methods. The relative effectiveness of the methods
is discussed in terms of promptness of judgments and
case of threshold resolution.

8767

Ulett, G.A. & Gleser, G. THE EFFECT OF EXPERIMENTAL STRESS UPON THE PHOTICALLY ACTIVATED EEG. *Science*, 1952, **115**, 678-682. (Neuropsychiatry Dept., Washington University School of Medicine, St. Louis, Mo.).

The study was aimed at investigating changes in the photically stimulated EEG in subjects whose mental state was deliberately altered under laboratory conditions. One group of 30 stable individuals and another group of 25 psychiatric patients (with anxiety as predominant symptom) were placed under an experimental anxiety-producing situation. A control group of 41 Ss were subjected to photic stimulation only. The experiment showed that the occipital rhythms induced by intermittent photic stimulation are disturbed by emotional tension. The 2 groups of experimental Ss did not show a differential decrease of response. (NEIAS)

R 10

8768

Malstead, V.C. CHRONIC INTERMITTENT ANOKIA AND IMPAIRMENT OF PERIPHERAL VISION. *Science*, June 15, 1955, **101**, 615-616. (University of Chicago, Chicago, Ill.).

In this study 20 male Ss were exposed in a low pressure chamber to a simulated altitude of 10,000 feet above sea level for 5 or 6 hours per day, 6 days a week, for a period of 4 to 6 weeks. Peripheral vision was systematically studied. During the third or fourth week of exposure, 13 of the 20 Ss developed a marked and progressive impairment of peripheral vision. The effect was not immediately reversible. Four subjects developed impairment of peripheral vision earlier. The frontal lobe seems to be implicated in this alteration of peripheral vision. (NEIAS)

R 3

8769

Wald, G. ON THE MECHANISM OF THE VISUAL THRESHOLD AND VISUAL ADAPTATION. *Science*, June 1954, **119**, 887-892. (Harvard University, Cambridge, Mass.).

After a review of previous studies dealing with the relationship between visual threshold and the bleaching of rhodopsin, an experiment is reported. The results suggest that a high degree of light adaptation can be achieved with very little bleaching of rhodopsin. Exposure of the eye to millilamberts for 5 sec., in raising the threshold about 8.5 times, bleaches at most 1200 molecules of rhodopsin per rod. A hypothesis is offered for the mechanism of visual adaptation based on the compartmental structure of the rod. (NEIAS)

R 34

8770

Motokawa, K. & Ebe, M. SELECTIVE STIMULATION OF COLOR RECEPTORS WITH ALTERNATING CURRENTS. *Science*, July 1952, **116**, 92-94. (Tohoku University, Sendai, Japan).

A number of experiments are reported relating to threshold strengths of alternating currents as a function of frequencies. The sensation of flickering phosphores aroused by the current was used as an index. The minima of the strength-frequency curves are physiological manifestations of the composite nature of the retina. The relation between the frequencies of alternating currents and the wavelengths of colored lights can be studied more precisely on the basis of the fact that each minimum deepens specifically under the action of characteristic colored light. (NEIAS)

R 8

8773

Wolf, E. EFFECTS OF ULTRA-VIOLET RADIATION ON VISUAL THRESHOLDS. *Science*, April 1947, **105**, p336. (Harvard University, Cambridge, Mass.).

Data are presented to show the changes that take place in the dark adaptation curve for the chick and the human eye due to ultraviolet light. Only the rod part of the curves is affected. Ultraviolet light alone acts in the same manner as visible light to which ultraviolet has been added. (NEIAS)

R 4

8774

Watts, D.T., Monelson, E.S. & Poppen, J.R. LABORATORY TEST OF AVIATOR'S EJECTION SEAT. *Sci.*, May 30, 1947, **105**, 583-585. (USN Air Material Center, Philadelphia, Penn.).

The present study is concerned with establishing safe methods for the ejection of personnel from high-speed aircraft. The investigation was carried out at a 105-foot ejection seat test tower. The S was ejected up guide rails 70° from the horizontal by means of the catapult. The experiments have shown that under laboratory conditions personnel can be safely exposed to high, impact-like accelerations with a minimum of discomfort. (NEIAS)

R 2

8775

Granger, G.W. AREA BALANCE IN COLOR HARMONY: AN EXPERIMENTAL STUDY. *Science*, Jan. 1953, **117**, 59-61. (Maudsley Hospital, London, England).

This experiment was designed to determine whether there is some measure of general agreement between individual preferences for area-balance, and whether it can be accounted for by formulae proposed by Munsell, and Moon and Spencer. 20 Ss adjusted 2 of 64 color patches to give the most pleasing balance. Intercorrelation coefficients of .672 and .732 were found. Munsell's formula can account for the subjects' preferences. It is concluded that preferences show a marked degree of independence of purely personal taste and a dependence on objective stimulus properties. (NEIAS)

R 8

8730

Science News Letter. RED BETTER THAN YELLOW FOR AIR SEA RESCUE GEAR. *Science News Letter*, Aug. 1952, **62**(8), p121. (Library of Congress, Washington, D.C.).

The original color choice for air-sea rescue equipment was a bright yellow. This has been changed to a bright scarlet because it was observed that yellow life rafts were found to blend with the bright reflection of the sun on water.

8787

Barron, C.I. & Poole, F.E. INDUSTRIAL NOISE: ITS EFFECT AND CONTROL. Amer. J. publ. Hlth. 1952, 42, 705-710. (Lockheed Aircraft Corp., Burbank, Calif.).

The undesirable effects of noise are: the effects upon the ear and hearing, changes in organs other than the ear, and interference with speech communication. High intensity noise may rupture the tympanic membrane, or lead to a temporary hearing loss. For every individual a critical level exists beyond which complete recovery will not ensue. The safe level is between 70-90 db for daily exposures of 2-8 hrs. Interrupted noise and one associated with strong vibrations are more harmful. In any given sound field, hearing loss varies directly with the duration of exposure. Tinnitus (ringing of the ear) is an early symptom of hearing loss. General effects of noise include headache, irritability, tremors, nausea, vertigo, insomnia, among others. Loud noise leads to a diminution in working efficiency of up to 50%. Interference with speech communication leads to increased accident rates, impairs cooperation, reduces efficiency, and lowers morale. Solution to the noise problem involves elimination of the source, use of sound-absorbing materials, structural isolation, ear-protectors, detection and transfer of employees with great susceptibility, regular audiograms every 6-12 months, and loudspeakers. (NEIAS)

8788

Yaglou, C.P., Baetjer, Anna K., Machle, W., McConnell, V.J., et al. THERMAL STANDARDS IN INDUSTRY. Amer. Publ. Hlth Yearb. Part II, May 1956, 40, 131-143.

The purpose of this report was to study the effects of temperature, humidity, and air movement on workers, and to recommend thermal standards which will provide a minimum of comfort in operational zones devoid of contaminants. A floor area of 40 sq. ft. per person with an air space of 400 cu. ft., and an operable window area of 10% of the floor area are considered minimum space allotments in workrooms. Temperature should be kept between 68° and 72°F in workrooms (75°-80° in warm weather), humidity should be below 50%. Female workers prefer temperatures about 4° higher. Outside air supply should be not less than 500 cu. ft. per person per hour for light work (1200 cu. ft. for heavy work). An effective temperature of 95° is the ceiling limit for short periods of work in the heat. Engineering and medical methods of heat control are discussed. Exposure to cold should be alternated with recuperation periods in a warmer environment as soon as generalized shivering sets in. Selection and adaptation are essential for controlling cold hazards in industry. Face masks, loose-fitting and multi-layer clothing, and electrically heated garments are available. (NEIAS)

8814

Wright, V.D. MODERN PROBLEMS OF COLORIMETRY. Proc. Phys. Soc., Lond. B. 1951, 64(7), 537-549. (Imperial College, London, England).

The 17th Thomas Young Oration, delivered in London, 23 February, 1951. The developments in colorimetry over the last 25 years are reviewed. The relation of photometry to colorimetry is discussed. Problems of color measurements are discussed, with particular reference to standard color mixture curves. The introduction of CIE standards was of great significance. Subjective color measurements are discussed. Likely trends for future developments are outlined. (NEIAS)

R 11

9316

Mundel, M.E. IMPROVING MACHINE DESIGN THROUGH APPLICATION OF MOTION STUDY PRINCIPLES. Machine Design, March 1950, 22(3), 90-94. (Furdue University).

8816

This article describes a procedure based on motion study principles and developed to improve machine design by taking the human operator into account prior to the construction of such equipment. The technique entails the construction and application of (1) a man-machine operation chart; (2) templates for a scaled representation of a human operator; and (3) a check list to be applied when the templates are positioned on the equipment plan. The check list consists of questions relevant to improvement of equipment design, e.g., elimination of a suboperation, simplifying a movement, etc.

I

8818

Raines, A., & Rosenbloom, J.H. IDEAL TORQUES FOR HANDWHEELS AND KNOBS. Machine Design, 1946, 18(6), 145-148. (Frankford Arsenal, Physicists Fire Control Design Division, Philadelphia, Penn.).

8818

This article presents the results of a series of experiments designed to evaluate the ideal torques for handwheels and knobs. Subjects were required to turn handwheels and knobs at maximum speed under conditions of varied torque and in other experiments to indicate preferred torque. The results are analyzed in terms of average and maximum muscular exertion (preferred), as function of handwheel diameter, torque as a function of speed, and so forth. Force specifications are offered for knobs and handwheels.

G. I

819

avis, L.E. CUSTOM TAILOR YOUR MANUAL CONTROLS. Machine Design, Sept. 1949, 21, (9), 127-130. University of California, Berkeley, Calif.

8819

This study was designed to determine the factors relevant to optimum control and speed of usage of handwheels, cranks, and crossbars (under conditions of single settings of indicators within close tolerance limits). Operators were required to set an indicator with the following factors varied: (1) type of control (handwheel, crank, and crossbar); (2) size of control; (3) work load (frictional torque); and (4) location of control in relation to operator. The results were analyzed in terms of the role of each of the above factors with regard to the specific type of control used. Optimal criteria for each factor (size, torque, and location) are presented.

T. I. R 7

8821

Zwislocki, J. & Pirodda, E. ON THE ADAPTATION, FATIGUE, AND ACOUSTIC TRAUMA OF THE EAR. Experientia, July 1952, 8(7), 279-284. (University of Basel, Switzerland).

8821

Following an extensive review and discussion of research pertinent to adaptation, fatigue, and acoustic trauma of the ear, the author presents the results of several experiments designed to investigate certain discrepancies reported in the literature on the relationship between residual adaptation and intensity of stimulating tone. Data on residual adaptation as a function of intensity of stimulus tone (average curve of 6 subjects) and spread of adaptation to neighboring frequencies are discussed in terms of the process of auditory adaptation and the phenomenon of (transient) acoustic trauma.

G. R 45

8823

Ensley, H.H. SOME NOTES ON SPACE PERCEPTION. *Proc. Phys. Soc. London*, Sept. 1954, 56, 293-304. (Northampton Polytechnic, London, England).

Paper read at a meeting. Experiments are described illustrating the existence in many people of spatial distortions in binocular vision. These are largely ignored in the observation of everyday scenes when vision is aided by perspective and other factors, but may exercise important influence in special visual tasks. The thesis that these spatial distortions are due to the condition called aniseikonia is reviewed.

R 8

8831

Hutchinson, R.C. MEAL HABITS AND THEIR EFFECTS ON PERFORMANCE. *Nutr. Abstr. & Rev.*, Oct. 1952, 22, 283-287. Department of Labour & National Service, Melbourne, Australia.

8831

This article presents a review of experiments dealing with the effects of meal habits upon performance. Among the various aspects treated are the following: effect of size and type of meal upon bodily functions, the phenomena of accessory hunger, physical and mental performance as functions of food intake (and type of food), effects of food intake and diet upon industrial work and athletics, effect of food intake on sleep, the nature of post-prandial lassitude, and so forth.

C. R 98

8832

Walter, L. NEW GRAPHIC PANELS AND CONTROL DESKS. *Chem. Age (Lond.)*, Oct. 20, 1951, 65, 521-523 and Oct. 13, 1951, 65, 489-492.

8832

Two articles are presented on the design and development of graphic panels and control desks. Illustrations and descriptions of the following equipment are presented along with a discussion of the principles inherent in their design: the Elliott Central Control Desk, a new graphic control panel, the Evershed 'Controller' Graphic Control Desk, the Foxboro d p Cell Transmitter (for remote control), and others.

I. R 16

8834

Carr, G.G. TRAINING: STRESS BASIC PRINCIPLES. *The Iron Age*, Nov. 1953, 172, p.57. Electric Regulator Corp., Norwalk, Conn.

8834

This article describes an employee training program in which emphasis was placed on the learning of general basic principles of physics rather than specific skills of electronic equipment production. The outcomes of this approach to training are evaluated along with the more general aspects of the role of training in industry.

I.

8835

The Iron Age. JET TRAINER: PILOTS CAN "BAG" ENEMY PLANE WITHOUT LEAVING GROUND. *The Iron Age*, Dec. 1951, 168, p.220.

8835

This is a brief description of the F-86D Sabre jet fighter simulator. Design aspects and training functions are mentioned along with certain novel features such as the trainer's simulation of two planes—the one being flown and an approaching enemy plane—as an aid to flight gunnery training.

8836

The Iron Age. COMPUTERS: SIMULATOR TRAINS NAVY PILOTS WITH COMPLETE REALISM. *The Iron Age*, June 1953, 171, 180-181.

8836

This article presents a brief description of the Navy P2V-5 flight simulator in terms of its ability to simulate various aspects of flight.

I.

8837

Coleman, R. CONIC FILM HELPS CUT CARELESS HANDLING PRACTICES. *The Iron Age*, May 1954, 172, 125-128. (Bell Aircraft Corp., Fort Worth, Tex.).

8837

In an attempt to eliminate careless material handling practices, Bell Aircraft Corporation developed a training program which utilized a slide film as a training aid. This article describes certain aspects of the training program, the development and utilization of the slide film, and other techniques used to reduce careless damage to materials (e.g., signs, inspection tours, etc.).

I.

The Iron Age, March

8838 Anonymous. SAFETY: ASA COLOR CODE BROADENED TO INCLUDE NEW HAZARDS. *The Iron Age*, March 1954, 173, 153-154.

The new ASA Safety Color Code includes 3 new colors to warn workers against potential dangers. Purple is introduced to warn about radiation perils. A purple signal light may be used to indicate when radiation-producing machines are in operation. Orange will be used to designate dangerous parts on machines that may cut, crush or otherwise injure. Blue will be used to warn employees not to attempt to operate machines while under repair. (HEIAS)

8840

Hill, N.E.G. THE RECOGNITION OF COLOURED LIGHT SIGNALS WHICH ARE NEAR THE LIMIT OF VISIBILITY. *Proc. Phys. Soc. Lond.*, July 1947, 59, 560-574. (Royal Aircraft Establishment, Farnborough, England).

8840

In order to determine the range of colors providing best recognition of aviation signals, nine observers were required to specify the color of seventy-three colors seen as point sources (binocular foveal vision) under illuminations of 1 mile-candle and 2 mile-candles. The tests were repeated over a period of nine months so that each color was seen by each observer 20 times (and for some subjects, 30 times). The data are analyzed in terms of percentage recognitions for each color. Recommendations are offered concerning the application of these results to the design of aviation signals.

T. G. I. R 6

8849
Sauer, A.R. SAFETY ANALYSIS: AN AID TO ON-THE-JOB
INSTRUCTION. Iron & Steel Engrg., Aug. 1952, 23,
133-136. (Bethlehem Steel Co., Sparrows Point, Md.).

8849
Job Safety Analysis is discussed as an aid to on-
the-job instruction in accident prevention. A detailed
description of this technique is presented along with
suggestions for its effective utilization. Included
is a sample analysis of two steel mill departments.
T.

8850
Von Gierke, H.E. SOUND ABSORPTION AT THE SURFACE OF THE BODY OF MAN AND ANIMALS. J. acoust. Soc. Amer., 1949, 21, p55. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

The results of measurements of sound absorption by the body surface of man and fur-bearing animals are reported for the frequency range 100 to 12000 cps. The acoustical impedances and the absorption coefficients of the surfaces were determined from the resonance characteristics of an air-filled tube. The absorption coefficient of the human body surface varies from 10% to 0.1% and decreases at higher frequency. The resistances per cu cm vary between 10^3 and 10^5 ohms and are dependent on the area of application and the pressure on the skin and muscles. The measurements on rats show that up to 1000 cps the absorption coefficient decreases, and then increases up to 6000. The behavior below 1000 cps is determined largely by the tissues beneath the skin while the increased absorption above 1000 cps is the result of the presence of the fur. These absorption coefficients permit the estimation of the sound energy absorbed by the whole animal. (NEIAS)

8851
Knudsen, V.O. ACOUSTICS IN COMFORT AND SAFETY. J. acoust. Soc. Amer., July 1949, 21, 296-301. (University of California, Berkeley, Calif.).

The author makes a plea for quiet surroundings where people live and work. A moderate amount of acoustical designing could reduce traffic noise by 10 db. With such a reduction the problem of constructing rooms so that the noise levels in them would not exceed acceptable values could be solved at reasonable cost. The layout of rooms in an apartment house in Sweden is shown which incorporates many commendable features of acoustical design. More data should be obtained to help communities in formulating sensible standards for the control of noise. (NEIAS)
R 3

8852
Carruthers, W.W. & Loye, D.P. BUILDING TO THE ACOUSTICAL OPTIMUM NEW MUTUAL DON-LEE BROADCASTING STUDIOS. J. acoust. Soc. Amer., July 1949, 21(4), 428-434. (Studio Div., Don Lee Broadcasting System & Electrical Research Products Div., Western Electric Company, Hollywood, Calif.).

The acoustical design and construction of the new Mutual-Don Lee Broadcasting Studios in Hollywood were done under novel and very favorable arrangements. First, a careful check was made of the optimum acoustical characteristics to which it was decided to design the studios. Some of the best auditoriums for broadcasting were measured, and from these data as well as comments regarding the excellence and shortcomings of these auditoriums, the optimum characteristics for the new studios were determined. During the course of construction, acoustical measurements were made several times for the purpose of "tailor-making" the acoustical characteristics of the studios. On the basis of the measurements, it was found that only a few minor modifications in acoustic treatment were necessary, such as changing the mountings of the Acousti-Celotex materials in order to change the low frequency absorption characteristics as desired, and the areas used of these materials. The results are, close agreement between optimum and finally measured acoustical characteristics, and very satisfactory broadcast programs.
R 4

8853
Gruenz, O.O., Jr. & Schott, L.O. EXTRACTION AND PORTRAYAL OF PITCH OF SPEECH SOUNDS. J. acoust. Soc. Amer., Sept. 1949, 21(5), 487-495. (Bell Telephone Laboratories, Murray Hill, N.J.).

An improved method for automatically extracting the pitch information of speech sounds has been devised. It employs a combination of gain control, double detection, voiced sound selection, unvoiced sound exclusion, and a means for counting the fundamental vibrations in the voiced sound intervals. Reliable indications of pitch have been obtained over a range corresponding to frequencies from 100 to 600 cycles for a wide variety of voices. The pitch-indicating signals have been applied, for study purposes, to a number of visual portrayal means for showing pitch changes, and descriptions of several of these systems are included.
R 3

8854
Bolt, R.H. & MacDonald, A.D. THEORY OF SPEECH MASKING BY REVERBERATION. J. acoust. Soc. Amer., Nov. 1949, 21(6), 577-580. (Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.).

A general statistical theory is developed for the masking effect of reverberation on the intelligibility of words. Speech is considered a series of discrete pulses distributed statistically over a 30-db range in sound pressure level in a given frequency band. The articulation index is calculated as a function of reverberation time, using preliminary values of speech pulse lengths and spacings obtained from Visible Speech spectrograms. The percent articulation for words is then calculated from the articulation index and is compared with Knudsen's experimental values. The theoretical values agree precisely with the measured values at reverberation times less than 2 seconds and differ by less than 17% out to 6 seconds. The calculations are extended to include a combination of background noise and reverberation.
R 8

8855

Snow, W.B. & Young, C.J.T. METHOD FOR QUIETING RAM JET MOTOR TEST STATIONS. *J. acoust. Soc. Amer.*, 1949, 21, 626-632. (Kellix Corporation, New York, N.Y.).

This paper gives a brief description of the construction which allowed a ram jet test laboratory to continue operation in the midst of a residential community. Since very large volumes of air and hot gases had to enter and leave the test cells, it was necessary to design a dual system which offered extremely low resistance to gas flow, but high attenuation to sound. During an air blast test it became impossible to tell whether or not a test was in progress with the observer standing beside the stacks outside the building. (MEIAS)

R 2

8857

Morrow, C.T. REACTION OF SMALL ENCLOSURES ON THE HUMAN VOICE. PART II. ANALYSES OF VOWELS. *J. acoust. Soc. Amer.*, July 1948, 20, 487-497. (Harvard University, Cambridge, Mass.).

When an oxygen mask or a gas mask is worn by a talker, the distortion is much greater than would be predicted from the amount of muffling. The reaction on the voice is in part mechanical (obstruction of the flow of breath and constraining of the facial muscles), in part acoustical (addition of a new cavity). An experimental analysis is given in this paper of the distortion produced by small enclosures, as well as an evaluation of present theories of vowel production. The predictions of the theory are compared with the experimental findings. In general, predictions from the present state of the theory of vowels give a useful qualitative picture of the nature of distortion by small enclosures, but are not in quantitative agreement with experiments. The conclusion is that some of the underlying assumptions of the theory need to be modified. (MEIAS)

R 1

8858

Rudnose, H.W., Clark, K.C., Carlson, F.D., Eisenstein, J.C., et al. VOICE MEASUREMENTS WITH AN AUDIOSPECTROMETER. *J. acoust. Soc. Amer.*, July 1948, 20(4), 503-512. (Cruft Lab., Harvard University, Cambridge, Mass.).

The distribution of average power in various speech sounds as a function of frequency has been measured with an integrating audio spectrometer. This instrument divides the electrical signal into 14 frequency bands and simultaneously records the integrated square of the amplitude in each band over a measured time interval, usually 30 seconds. From these data and the known over-all calibration of the spectrometer channels one can compute the spectral distribution of average acoustic power at the location of the input microphone. The operation of the instrument and the procedure of measurement are described. Speech spectra are given which are average results for a trained crew of 7 men, speaking into a condenser microphone in an anechoic chamber.

R 13

8864

Fletcher, H. A METHOD OF CALCULATING HEARING LOSS FOR SPEECH FROM AN AUDIOGRAM. *J. acoust. Soc. Amer.*, Jan. 1950, 22(1), 1-5. (Bell Telephone Laboratories, Murray Hill, N.J.).

In the present paper a formula is developed for calculating the hearing loss for speech from an audiogram showing the hearing loss for each of a series of pure tones. The formula is based upon studies of loudness, including the determination of the relative contributions of different frequency regions to the audibility of speech at or near the threshold level. The formula is tested for each of 165 ears involving a wide variety of hearing losses. In every instance an audiogram is available and also an independent observation of the hearing loss for speech. The formula yields a calculated value which generally is in closer agreement with the observation than is the value calculated by the familiar rule of averaging the losses at 500, 1000, and 2000 cps. The agreement is particularly better when the audiogram is not "flat". A simplified computational rule, indicated by the more complete formula, is found within indicated limits to be almost as reliable as the formula. This simplified rule is to examine the hearing losses measured by means of the audiometer at the 3 frequencies: 500, 1000, and 2000 cps and to take the average of the 2 smallest values of loss.

R 4

8865

Fletcher, H. & Galt, R.H. THE PERCEPTION OF SPEECH AND ITS RELATION TO TELEPHONY. *J. acoust. Soc. Amer.*, March 1950, 22(2), 89-151. (Bell Telephone Laboratories, Murray Hill, N.J.).

The intelligibility of the speech received over a communication system is usually expressed in terms of one or another measure such as the vowel or the consonant articulation, the average speech sound articulation, the syllable articulation, the word articulation, or the sentence intelligibility. The present paper establishes relationships among several of these measures and the articulation index. Relationships based upon statistical considerations are compared with the results of observations. Functions are developed which permit the calculation of articulation index and hence of articulation for communication systems which include a wide variety of response versus frequency characteristics and of noise conditions, as well as several special types of distortion. Although the treatment is predominantly empirical, the functions and processes are closely related to various fundamental properties of speech and hearing. Four principal series of articulation tests are cited in detail.

R 25

8867

Munson, W.A. & Gardner, M.B. LOUDNESS PATTERNS--A NEW APPROACH. *J. acoust. Soc. Amer.*, March 1950, 22(2), 177-190. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

In the past loudness patterns have been based on the masking effect of one sound on another. For complex sounds having distributed energy spectrums this method appears to be valid. For sounds with single frequency components the method is thought to be in error due to the formation of beats and modulation products between the primary tone for which a pattern is desired and the probe tone which is used to determine the pattern details. To avoid these difficulties in the present tests, the probe tone was presented after the primary tone was turned off. The resulting residual masking patterns differ in a number of important respects from patterns based on the simultaneous masking procedure. A comparison between the loudness of a primary tone, as evidenced by the magnitude of its residual masking pattern, with the results of loudness judgment tests was made. This was done by replacing the physical scales of pressure level and frequency by the subjective scales of loudness and position. A reasonably good check of computed and measured loudness values was obtained. Patterns for a 1000-cycle tone were measured to show how the loudness of the standard reference tone is distributed and how this distribution changes as the level of the tone is increased.

R 23

8868

Munier, W.F., Slapmaker, F.M. & Merrill, L.L. THE ACOUSTIC IMPEDANCE OF CLOSED RECTANGULAR SPEAKER ENCLOSURES. *J. acoust. soc. Amer.*, March 1950, 22(2), 266-276. (Research Div., Stromberg-Carlson Company, Rochester, N.Y.).

Direct-radiator loudspeakers are often mounted with the back of the diaphragm working into a completely enclosed space. Conventional theory states that when the maximum linear dimension of such an enclosure is small compared with the wave-length, the pressure is uniform throughout, and the acoustical impedance presented to the loudspeaker is $-j\omega(V/\rho c)$, where V is the enclosed volume. Although it has not been clearly established how small an enclosure must be before it is "small compared with the wave-length," the foregoing expression is generally used, at low audiofrequencies, to calculate the acoustical impedance of closed loudspeaker housings. It is shown here that while the acoustical impedance of a closed rectangular housing is capacitive at very low frequencies, it passes through zero as the frequency increases and becomes that of an inductance as the frequency of the first normal mode is approached. For a typical housing 11 in. X 22 in. X 22 in., the frequency at which the impedance presented to a very small speaker passes through zero is in the vicinity of 70 cps; at this frequency, the maximum linear dimension of the enclosure is less than 1/7 of the wave-length. These results are obtained by using the methods given by Morse for determining the pressure distribution in a room. A point-source loudspeaker is assumed and the pressure at the source is calculated as the summation of the pressures due to the normal modes of the enclosure, losses being neglected. Measurements of the pressure within the enclosure support this analysis. From measurements of the pressure distribution over the surface of the loudspeaker diaphragm, it may be deduced that the magnitude of the acoustical impedance which the enclosure presents to the loudspeaker diaphragm and the frequency at which the impedance becomes zero depend upon the dimensions of the loudspeaker diaphragm as well as the dimensions of the enclosure.

R 11

8869

Rowley, H.E. & Hettler, A.M. THE APPARENT SOURCE OF SPEECH IN THE MOUTH. *J. acoust. soc. Amer.*, May 1950, 22(3), 365-369. (RCA Victor Div., Government Sound Engineering Section, Camden, N.J.).

Investigation of the sound pressure on the axis of the mouth indicates the existence of a point which may be represented as the source of speech sounds. The location of this point is dependent upon the particular speech sound, the intensity with which it is uttered, and upon the frequency components under consideration. Using young, average, male speakers, this apparent source of speech was located for 18 frequency bands covering the portion of the spectrum which contributes to speech intelligibility in each of 36 fundamental speech sounds.

8870

Ranson, V.A. & Wiener, F.M. SOUND MEASUREMENTS FOR PSYCHOPHYSICAL TESTS. *J. acoust. soc. Amer.*, May 1950, 22(3), 382-386. (Bell Telephone Laboratories, Murray Hill, N.J.).

The results of psychophysical tests on the auditory sensory system usually show much more variability than experiments involving only physical measurements of sound waves. This has resulted in the general impression that the variance of measurements of the auditory threshold and other psychoacoustic measurements is largely due to the inability of the observers to give consistent responses. This paper reports the results of a series of threshold measurements made under carefully controlled conditions and accompanied by search tube measurements of the sound pressures in the ear canals of the observers. The small variances obtained under certain conditions suggest that the large variability often times experienced in psychophysical work is partly due to inadequate techniques for measuring the levels of the stimuli that activate the sensory system.

R 1

8871

Schubert, E.O. THE EFFECT OF A THERMAL MASKING NOISE ON THE PITCH OF A PURE TONE. *J. acoust. soc. Amer.*, July 1950, 22(4), 497-499. (University of Michigan, Ann Arbor, Mich.).

When a pure tone and a masking noise are fed into the same ear simultaneously, the pitch of the pure tone is raised. The effect is more pronounced at low loudness levels and is progressively greater as the frequency of the tone rises. Apparently the phenomenon is not present if the pure tone is 20 db or more above its masked threshold. Nineteen graduate music students served as Ss in the experiment. Control measurements were made to estimate the effects of diplacusis and of the difference in intensity between the masked and the unmasked pure tone when they were matched in loudness.

8872

Bolt, R.H. & Doak, P.E. A TENTATIVE CRITERION FOR THE SHORT-TERM TRANSIENT RESPONSE OF AUDITORIUMS. *J. acoust. soc. Amer.*, July 1950, 22(4), 507-509. (Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.).

Studies of the response of an auditorium to a short tone burst have indicated that the character of the first 20 or 30 db of sound decay, the "short-term" response, is closely related to the subjective "hearing quality" of the room. Recently Haas has investigated the effect of a single echo on the subjective hearing of speech. On the basis of some of Haas' results and other information on the hearing of speech in rooms, a tentative criterion for the short-term response has been formulated as curves of amplitude vs. time delay of each reflection relative to the direct sound. The criterion correctly rank-orders subjective quality observations reported by others, and agrees quantitatively with some subjective judgments reported here.

R 3

8873

Greenspan, M. PROPAGATION OF SOUND IN RAREFIED HELIUM. *J. acoust. soc. Amer.*, Sept. 1950, 22(5), 568-571. (National Bureau of Standards, Washington, D.C.).

The velocity and attenuation of sound at 1 mc/sec. were measured in helium at pressures as low as 0.1 mm Hg (sound frequency about twice mean collision rate). The observed dispersions are very large and agree well with those predicted by existing theories except at very low pressures where uncertainties are introduced by lack of gas purity.

R 6

Morris, C.H. & Peshback, W. ON THE ACOUSTICS OF COUPLED ROOMS. *J. ACOUST. SOC. AMER.*, Sept. 1950, **22**(5), 572-578. (Bell Telephone Laboratories, Murray Hill, N.J. & Physics Dept., Massachusetts Institute of Technology, Cambridge, Mass.).

8.13

Martin, D.W. UNIFORM SPEECH-PEAK CLIPPING IN A UNIFORM SIGNAL-TO-NOISE SPECTRUM RATIO. 1-
RESEARCH, INC. Aug., Sept. 1950, 32(5), 614-621. (RCA Victor Div., Government Sound Engineering
Section, Camden, N.J.).

R 11

Stevens, S.S., et al. PROCEEDINGS OF THE SPEECH COMMUNICATION CONFERENCE AT M.I.T. May 31-June 3. J. acoust. Soc. Amer., Nov. 1950, 22, 585-586. (Harvard University, Cambridge, Mass.)

878

Fano, R.M. THE INFORMATION THEORY POINT OF VIEW IN SPEECH COMMUNICATION. J. acoust. Soc. Amer., Nov. 1950, 22, 691-696. (Massachusetts Institute of Technology, Cambridge, Mass.).

14

Menzerath, P. TYPOLGY OF LANGUAGES. J. acoust. soc. Amer., Nov. 1950, 22(6), 658-701.
(Phonetic Institute, Bonn University. Bonn, Germany).

14

Straus, O.H. THE RELATION OF PHONETICS AND LINGUISTICS TO COMMUNICATION THEORY. J. acoust. soc. Amer., Nov. 1950, 22(6), 709-711. (Research Lab. of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.).

84

8882

Loeb, J. SPEECH AND LANGUAGE. J. acoust. Soc. Amer., Nov. 1950, 22, 712-717. (Columbia University, New York, N.Y.).

(Presented at the Speech Communication Conference, MIT, 1950) Speech is a selection out of a code by a source, which results in several bands of information (a ribbon concept rather than a linear concept of speech). This paper concentrates upon a few remarks on the control problems of normal speech under normal circumstances. The author thinks that the thorough knowledge of the normal situation is essential to the correct selection of abnormal cases, such as distortion of frequency and amplitude in speech, hearing in excessive noise, pathological speech, distortion of speech transmission, etc., the investigation of which, on the other hand, has contributed substantially to our knowledge of speech in general. Language exists mainly through speech, and thus only a cooperative effort of the various disciplines, such as communications engineering and physics, medicine and physiology, psychology and linguistics can achieve the solution of the problems of human speech. (MEIAS)

R 6

8883

Lawless, A. COMMUNICATION PATTERNS IN TASK ORIENTED GROUPS. J. acoust. Soc. Amer., 1950, 22, 725-750. (Massachusetts Institute of Technology, Cambridge, Mass.).

(Presented at the Speech Communication Conference, MIT, 1950) When the nature of a task is such that it must be performed by a group rather than by a single individual, the problem of working relationships arises. It may be demonstrated that for entire classes of tasks success depends upon an effective flow of information. Some of the problems with which this paper concerns itself are as follows: on what principles may a pattern of communication be determined that will in fact be a fit one for effective and efficient human effort; how may a fixed communication pattern affect the work and life of a group; do some patterns have structural properties that limit group performance; what effects can patterns, as such, have upon the emergence of leadership, the development of organization, the degree of resistance to group disruption, the ability to adapt successfully to sudden changes in the working environment. (MEIAS)

R 1

8884

Burn, M.C. THE CALCULATION OF VOWEL RESONANCES, AND AN ELECTRICAL VOCAL TRACT. J. acoust. Soc. Amer., Nov. 1950, 22(6), 750-753. (Bell Telephone Laboratories, Murray Hill, N.J.).

Presented at the Speech Communication Conference, MIT, 1950. By treating the vocal tract as a series of cylindrical sections, or acoustic lines, it is possible to use transmission line theory in finding the resonances. With constants uniformly distributed along each section, resonances appear as nodes of vibration of the tract taken as a whole. Thus, the fundamental node of the smaller cavity may be affected considerably by a higher node of the larger; and in addition, higher resonances are found without postulating additional cavities. This is an advantage over the lumped constant treatment, where it is necessary to postulate a different cavity for each resonance, and where the interaction terms in the equation do not include the higher nodes of vibration. Under the distributed treatment, dimensions for each vowel may be taken from x-ray photographs of the vocal tract. The calculations then yield at least 3 resonances which lie in the frequency regions known for the vowel, from analyses of normal speech. Dependence of the different resonances upon the different cavities is discussed in some detail in the paper. An electrical circuit based on the transmission line analogy has been made to produce acceptable vowel sounds. This circuit is useful in confirming the general theory and in research on the phonetic effects of articulation movements. The possibility of using such a circuit as a phonetic standard for vowel sounds is discussed.

R 24

8885

Vilgis, F. AN APPARATUS FOR SPEECH COMPRESSION AND EXPANSION AND FOR PLAYING VISIBLE SPEECH RECORDS. J. acoust. Soc. Amer., Nov. 1950, 22(6), 754-761. (USAF Cambridge Research Labs., Cambridge, Mass.).

Presented at the Speech Communication Conference, MIT, 1950. In speechband compression or expansion all the frequencies of the band are divided or multiplied in a certain ratio, but without changing the time dimension. This last requirement makes the problem very difficult because, if we could neglect the time aspect, we could record speech and simply play it back at slower or faster speeds. I have tried to solve this problem by 3 different methods: a) by transformation of the speech frequencies into an optical spectrum and retransformation by light modulation disk and photo-tube; b) by use of a string filter; and c) by use of an ultrasonic cell as a storage device.

8886

Cooper, F.S. SPECTRUM ANALYSIS. J. acoust. Soc. Amer., Nov. 1950, 22, 761-762. (Haskins Laboratories, New York, N.Y.).

(Presented at the Speech Communication Conference, MIT, 1950.) This paper describes the pros and cons of using spectrum analysis in the study of speech sounds. The technique of spectrum analysis is also described. (MEIAS)

8887

Huggins, W.H. SYSTEM-FUNCTION ANALYSIS OF SPEECH SOUNDS. J. acoust. Soc. Amer., Nov. 1950, 22(6), 765-767. (USAF Cambridge Research Lab., Cambridge, Mass.).

Presented at the Speech Communication Conference, MIT, 1950. The analysis of speech sound is facilitated if the sound is considered to be the response of a slow-time varying linear system to appropriate excitations. The linear system is characterized by one or more system functions which may be represented most naturally as the sum of complex exponential terms having complex frequencies corresponding to the various formants. Thus, a generalized frequency analysis is made not of the speech wave itself but rather of the system function that shaped that wave. On the other hand, the excitation is best analyzed by autocorrelation methods.

R 2

8888

Chung, S.W. PORTRAIT OF SOME ELEMENTARY STATISTICS OF SPEECH SOUNDS. *J. Acoust. Soc. Amer.*, 1950, 22, 768-769. (Northwestern University, Boston, Mass.).

(Presented at the Speech Communication Conference, MIT, 1950.) Recent investigation of pulse-code modulation has enabled the quantification of speech sounds and made discrete numerical representation possible. These schemes are all aimed at a detailed and faithful representation of speech sounds. In many applications, however, such as speech impression and sensory replacement, a much simpler representation is needed. This simple representation should retain intelligibility. It is, indeed, a basic hypothesis that there is redundancy in speech sounds, and that there is such a thing as an essential element for intelligibility. However, the word intelligibility is not clearly definable. In dealing with this problem, a statistical method is preferable because a definite knowledge regarding the mechanism of generation and perception of speech sounds is lacking. This paper discusses statistical methods relevant to the problem. (NEIAS)

8889

Stevens, K.M. AUTOCORRELATION ANALYSIS OF SPEECH SOUNDS. *J. Acoust. Soc. Amer.*, 1950, 22, 769-771. (Northwestern University, Boston, Mass.).

(Presented at the Speech Communication Conference, MIT, 1950.) Interest has grown in the devising of a method of speech analysis that loses or discards speech information that appears to be redundant, yet retains invariances that apparently are necessary for satisfactory intelligibility. One such information-losing transformation is the intensity-frequency-time representation developed by the Bell Laboratories some years ago. The so-called "short-time" autocorrelation function is another such representation. This paper defines the short-time autocorrelation function and indicates the properties that make it potentially useful in speech analysis. The paper describes how it can be employed in speech analysis work, describes experimental techniques and presents some results. (NEIAS)

R 1

8890

Kreyer-Epler, W. REVERSED SPEECH AND REPETITION SYSTEMS AS MEANS OF PHONETIC RESEARCH. *J. Acoust. Soc. Amer.*, 1950, 22, 804-806. (University of Bonn, Bonn, Germany).

(Presented at the Speech Communication Conference, MIT, 1950.) This paper describes phonetic research performed using speech and musical sounds presented in reverse order. Modification in character due to reversal and distortion produced by attention to context are studied. Mathematical expressions for sound reversal are given. (NEIAS)

R 2

8891

Potter, R.K. & Steinberg, J.C. TOWARD THE SPECIFICATION OF SPEECH. *J. Acoust. Soc. Amer.*, Nov. 1950, 22, 807-820. (Bell Telephone Laboratories, Murray Hill, N.J.).

This is an interim report on studies of the specification of speech sounds from acoustical measurements. Methods based upon analysis, synthesis, and vocal tract models are described. Included are the results of preliminary measurements on the vowel sounds of 25 speakers. Some of the problems in specifying the vowel sounds as indicated by these results are discussed. Results of preliminary measurement have reacted upon the formulation of methods by indicating need for shift of emphasis or even different approach. They have tended to magnify the importance of more accurate aural identification of sounds. They have indicated a need for studies of ways in which the ear assigns position or spacings to formants, and how these positions are affected by formant shape, etc. In this work it has been advantageous to synthesize sounds so that the parameters may be independently controlled. Both audible form or relative positions of the formants, and position of the form in the pitch dimension are important in identifying the vowels. But it is believed to be the form and position at the cortical level rather than in the incident sound that is important. (NEIAS)

R 11

8892

Martin, D.W. & Touger, M.L. LOUDNESS BALANCE METHODS FOR EARPHONE RESPONSE MEASUREMENTS. *J. Acoust. Soc. Amer.*, Nov. 1950, 22(6), 833-837. (RCA Victor Div., Government Sound Engineering Section, Camden, N.J.).

Simple procedures are given for the subjective measurement of earphone response by 2 methods. The first method, which is rather widely recognized, requires the S to match the loudness of an earphone tone to the loudness of a free-field reference tone of the same frequency. Interpretation of the data from this method is direct, but the facilities, technique and time required are considerable. A second method, less widely used, involves the loudness balancing of an earphone tone of variable frequency to that of an earphone reference tone of fixed frequency and level. This method is much simpler, and can be used to measure earphone response under circumstances where the first method is virtually impossible. However, the interpretation of the data is less direct. This paper is an analysis of the 2 methods which attempts to develop a correspondence between the data obtained by the 2 methods.

R 7

8893

Corliss, E.L.R. & Snyder, V.F. CALIBRATION OF AUDIOMETER. *J. Acoust. Soc. Amer.*, Nov. 1950, 22(6), 837-842. (National Bureau of Standards, Washington, D.C.).

A general description is given of the procedure developed at the National Bureau of Standards for calibrating audiometers. The sources of calibration standards are presented, and there is a discussion of the physics underlying the present technique. Limitations on the validity of the threshold data are pointed out. A method for determining the calibration of audiometer earphones is described. Data on earphone response can be used to gain some insight into the malfunctioning of an audiometer, and the way in which this can be done is indicated.

R 5

8894

Jones, F. DESCRIPTION OF LANGUAGE DESIGN. *J. acoust. soc. Amer.*, Nov. 1950, 22(5), 701-706 (University of Wisconsin, Madison, Wisc.).

Presented at the Speech Communication Conference, MIT, 1950. Physicists describe speech with continuous mathematics, such as Fourier analysis or the autocorrelation function. Linguists describe language instead, using a discontinuous or discrete mathematics called "linguistics." The nature of this odd calculus is outlined and justified here. It treats speech communication as being a telegraphic structure. (Non-linguists normally fail to orient themselves in this field because they treat speech as analogous to telephony.) The telegraphic code structure of language is examined from top to bottom, and at each of its several levels of complexity (compared to the 2 levels of Morse code) its structure is shown to be defined by possibilities and impossibilities of combination among the units of that level. Above the highest level we find, instead of such absolute restrictions, conditional probabilities of occurrence: this is the semantic field, outside linguistics, where sociologists can work. Below the lowest level we find, instead of such absolute restrictions, conditional probabilities of phonetic quality: this is the phonetic field, outside linguistics, where physicists can work. Thus, linguistics is peculiar among mathematical systems in that it abuts upon reality in 2 places instead of one. This statement is equivalent to defining a language as a symbolic system, that is, as a code.

8895

Brayfus-Graf, J. SONOGRAPH AND SOUND MECHANICS. *J. acoust. Soc. Amer.*, Nov. 1950, 22, 731-739. (University of Geneva, Switzerland).

(Presented at the Speech Communication Conference, MIT, 1950) This paper describes the results of research done with a new class of electroacoustical instruments. Some of the topics of research covered are: what is the aspect of sound in air and resonators; what further physiological aspects of sounds may be noticed; what is the corresponding rhythm between sounds and visual symbols; technical principles of the phonetic steno-sonograph; sonographic self-modulation; oscillograms of self-modulated continuous sounds; steno-sonograms of speech; technical principles of the phonetic type-sonograph. (HE/AS)

R 8

8896

Franch, W.R. & Steinberg, J.C. FACTORS GOVERNING THE INTELLIGIBILITY OF SPEECH SOUNDS. *J. acoust. soc. Amer.*, Jan. 1947, 19(1), 30-119. (Bell Telephone Laboratories, New York, N.Y.)

The characteristics of speech, hearing, and noise are discussed in relation to the recognition of speech sounds by the ear. It is shown that the intelligibility of these sounds is related to a quantity called articulation index which can be computed from the intensities of speech and unwanted sounds received by the ear, both as a function of frequency. Relationships developed for this purpose are presented. Results calculated from these relations are compared with the results of tests of the subjective effects on intelligibility of varying the intensity of the received speech, altering its normal intensity frequency relations and adding noise.

R 15

8897

Carhart, R. MONITORED LIVE-VOICE AS A TEST OF AUDITORY ACUITY. *J. acoust. soc. Amer.*, April 1946, 17(4), 339-349. (Deshan General Hospital, Butler, Penn.).

Statistical comparisons were made of the relation between binaural thresholds for speech reception and "better ear" thresholds for pure tones. Speech reception was tested by monitored live-voice; while pure tone thresholds were obtained with commercial audiometers. Data for the comparisons were gathered during clinical routines at Deshan General Hospital. One group of 129 patients was used to explore the correspondence between hearing impairment as measured by speech reception for the Bell Telephone Intelligibility Lists and as expressed by 8 different scores abstracted from the pure tone audiogram. 4 other groups, totaling 682 patients, were tested with the Harvard bi-syllabic words (spondees). The data for these groups were analyzed to determine the correspondence between hearing impairment as measured by speech reception and as expressed by the "better ear" average for 512-2048 c.p.s. A 5th group of 150 patients underwent a series of tests which allowed the reliability of speech reception (tested with words) to be compared with the reliability of the 512-2048 c.p.s. average. Reliability was also explored for composite scores derived from combining the pure tone and speech reception thresholds. (HE/AS)

R 6

8898

Sabine, H.J. & Wilson, R.A. THE APPLICATION OF SOUND ABSORPTION TO FACTORY NOISE PROBLEMS. *J. acoust. soc. Amer.*, July 1943, 15(1), 27-31. (The Celotax Corporation, Chicago, Ill.).

This paper was presented at the 28th meeting of the Acoustical Society of America, May 14-15, 1943, New York, New York. It deals with the problems created by excessive noise levels in a factory. The range of noise levels found in various factories, reduction of noise level through acoustical treatment, the spreading effect of sound in a non-absorbent room, reduction of noise through proper machine layout were discussed. Observations made are as follows: a) In rooms whose smallest floor dimension is several times the ceiling height, and having a sound absorbent ceiling, the intensity level due to a single source or concentration of sources decreases at a constant rate in db. per foot over the entire area of the room regardless of its size. b) This constant rate of attenuation varies inversely with the ceiling height. c) These attenuation rates are established at a distance from the source somewhat less than the ceiling height. Within this distance the intensity rises much more rapidly at a rate determined partly by the inverse square law and partly by the distribution of the noise source elements. d) The attenuation in the case of untreated ceilings is not only smaller but has a different characteristic, being of the order of 3 db. per distance double. (HE/AS)

R 1

8899

Watson, W.A. & Knudsen, V.O. EAR DEFENDERS. *J. acoust. soc. Amer.*, Jan. 1944, 15, 153-159. (University of California, Los Angeles, Calif.).

A material for ear defenders has been developed which is superior to rubber and which the authors believe is entirely adequate for the purpose. Ear defenders have been developed which provide, for most ears, the greatest insulation consistent with easy insertion, positive retention, comfort, and conditions of use.

R 2

8900

Miller, G.A. & Mitchell, S. EFFECTS OF DISTORTION ON THE INTELLIGIBILITY OF SPEECH AT HIGH ALTITUDES. *J. acoust. Soc. Amer.*, 1946, 18, p256. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

Sounds spoken into the closed cavity of an oxygen mask at high altitudes differ substantially in quality and intensity from normal speech at sea level. The mask imparts a low, "booming" quality to the speech. Tests with a wide variety of frequency response characteristics show that low-frequency attenuation improves the apparent quality without modifying appreciably the intelligibility of the speech. Also, the intensity of the speech signal varies considerably as a function of altitude, and talkers exhibit large individual differences in their ability to compensate for altitude effects. The range of speech levels under all conditions of altitude and talker differences is between 20 and 30 db, and for most installations some form of compression should be used to reduce this range. Sharp, symmetrical limiting ("peak clipping") is the most satisfactory method, since it combines the advantages of compression with the advantages of premodulation peak clipping for AM radio-telephony.

8901

Ruedi, L. S. Furrer, W. PHYSICS AND PHYSIOLOGY OF ACOUSTIC TRAUMA. *J. acoust. Soc. Amer.*, 1946, 18, 409-412. (University of Berne, Switzerland).

Certain instances of acoustic trauma are cited. Audiograms of a number of men working in a noisy factory room (105 phons noise level) showed a dip around 4000 cps. There is a striking discrepancy between the frequency spectrum of the physical excitation and the hearing loss. An audiogram from a case of ear injury following explosion of an anti-aircraft gun showed the same pattern of the "4000 cps dip". When human ears are deafened by pure tones, hearing loss begins just below the excitation frequency, then increases rapidly and reaches its maximum 1-2 octaves higher. When hearing loss is produced by complex tones, the 4000 cps is again observed. These observations seem to confirm the existence of "streamings" of the lymph in the cochlea. The ear defender protects the critical zone in the inner ear against excessive acoustical stimulation, without reducing hearing capacity too much. It gives good protection against explosions. Its range for conversation is at least 50 meters. (HEIAS)

8903

Zwislocki, J. ACOUSTIC FILTERS AS EAR DEFENDERS. *J. acoust. Soc. Amer.*, Jan. 1951, 23(1), 36-40. (University of Basel, Basel, Switzerland).

Ear wardens in form of ear plugs acting as acoustic low pass filters are described. They allow a part of speech frequencies to pass through into the ear and in this way improve the speech intelligibility in comparison with other ear plugs. Nevertheless their protective action against noise was proved to be sufficient.

R 15

8905

Flanagan, J.L. EFFECT OF DELAY DISTORTION UPON THE INTELLIGIBILITY AND QUALITY OF SPEECH. *J. acoust. Soc. Amer.*, May 1951, 23(3), 303-307. (Acoustic Lab., Massachusetts Institute of Technology, Cambridge, Mass.).

Speech articulation and quality tests were made on an all-pass system capable of advancing or delaying one frequency band relative to the rest of the spectrum. Parameters in the investigation were a) width of the advanced or delayed band, b) amount of advance or delay, and c) position in the frequency spectrum of the advanced or delayed band. Data were taken at signal-to-noise ratios of 30 db and 0 db. The results indicate that maximum impairment of speech intelligibility and quality occurs when the delays and advances are of the order of 1/4 second, and when the band that is advanced or delayed is near the center of the speech spectrum and has an articulation index equal to 0.5. These findings are related to data from statistical studies of the timing of speech energy bursts.

R 9

8908

Jacobson, H. INFORMATION AND THE HUMAN EAR. *J. acoust. Soc. Amer.*, July 1951, 23(4), 463-471. (Brookhaven National Laboratory, Upton, N.Y.).

Calculations of the informational capacity of the human ear are made by computing the number of discriminable sound patterns per second, and applying the Shannon information theory. A maximum of 10^4 bits/sec transmission is found. This is compared with the capacity of existing auditory channels and recording media, and with the rate of actual information perception from speech and music. It is shown that a capacity of upwards from 5×10^4 bits/sec, depending on the informational match to the ear, is necessary for high fidelity transmission or recording. It is also shown that the brain can utilize less than 1% of the information transmitted by the ear. Finally, an average capacity of about 0.3 bit/sec, or of 40 tones/sec, is calculated for an individual cochlear fiber.

R 18

8909

Lippert, S. & Miller, M.M. AN ACOUSTICAL COMFORT INDEX FOR AIRCRAFT NOISE. *J. acoust. Soc. Amer.*, July 1951, 23, p478. (Douglas Aircraft Company, Santa Monica, Calif.).

This paper describes a method of obtaining a quick, simple and reliable one-number classification of aircraft acoustical comfort based on octave analyses. Essentially the method consists of defining 3 widely different reference spectra of aircraft noise. A particular noise spectrum is then evaluated by a numerical comparison to the 3 spectra. The method can be extended into a statistical classification of an airplane. (HEIAS)

310

Peterson, E. FREQUENCY DETECTION AND SPEECH FORMANTS. *J. acoust. Soc. Amer.*, Nov. 1951, 23(6), 668-674. (Bell Telephone Laboratories, Murray Hill, N.J.).

This study is aimed primarily at evaluating the utility of axis-crossing detectors in tracking speech formants. Detectors of the usual type are found subject to an error, fundamental in nature. To remove this source of error speech is modulated up in frequency as a single sideband before limiting and detecting processes are applied. Experimental results with this carrier type of detector on a small number of speech samples are presented and compared with spectrograms. Conclusions are that the average axis-crossing rates cannot be trusted in general to follow specific formants, whether the speech is normal or differentiated. But when the formants are sufficiently localized by frequency selectivity, prospects of tracking the lower formants look promising.

R 8

8911

Chang, S.M., Pihl, G.E. & Thirun, J. THE INTERVALGRAM AS A VISUAL REPRESENTATION OF SPEECH SOUNDS. J. acoust. soc. Amer., Nov. 1951, 23(6), 675-679. (Northeastern University, Boston, Mass.).

The points of zero crossing and the points of zero slope of the oscillograms of speech sounds are considered to contain the essential information for intelligibility. The intervals between zero crossings θ_z , and the intervals between zero slopes θ_s , are plotted as points in rectangular coordinates. The ordinate of the dot is a function of θ (θ_z or θ_s), and the abscissa is a function of the time of occurrence t of the particular θ . The resulting intervalgram gives a half-tone picture (consisting of dots) of speech sounds. The patterns may be proportioned to show either a detailed or general representation of the variation of the interval distribution. One type of pattern portrayed at the speech rate on a cathode-ray oscilloscope with a screen of long persistence has been found quite similar in certain respects to the patterns obtained using the sound spectrograph as described in the book Visible Speech by Fetter, Kepp, and Green. The equipment involved in obtaining the intervalgram, however, is much simpler.

R 7

8912

London, J. PRACTICE RECOMMENDED PRACTICE FOR LABORATORY MEASUREMENT OF AIRBORNE SOUND TRANSMISSION LOSS OF BUILDING FLOORS AND WALLS. J. acoust. soc. Amer., Nov. 1951, 23, 686-689. (US National Bureau of Standards, Washington, D.C.).

This recommended practice is intended to cover the random incidence or reverberant sound method for laboratory measurement of airborne-sound transmission loss of large-scale building floors and walls and other elements of building construction such as doors, windows, etc. While generally applicable to large specimens such as building constructions, this recommended practice is also applicable to smaller specimens, such as airplane panels. This recommended practice covers only measurements of airborne-sound transmission loss, where airborne sound refers to sounds which originate within a room, are carried through the air, and then are transmitted through the test specimen as a result of the sound field excitation. It is not applicable for measuring the sound insulation of a test specimen for impact or tapping sounds such as are caused by direct mechanical contact with the specimen. (NEIAS)

8914

Moore, C.R. AN EXPERIMENTAL STUDY OF SUBJECTIVE TONES PRODUCED WITHIN THE HUMAN EAR. J. acoust. soc. Amer., Oct. 1942, 13, 159-166. (Physics Dept., University of Southern California, Los Angeles, Calif.).

Quantitative measurements are reported on the intensities of subjective tones produced within the human ear under single and dual tone excitation. The measurements are made by the exploring tone method. The intensities of the subjective harmonics from each of 2 frequencies, 690 and 950 cycles were determined. The primary tones were presented to each ear of 3 Os. A total of 110 readings was made at each intensity level. The even and odd subjective harmonics show some differences, indicating that the organ, or set of organs, producing non-linearity is not the same as the source of asymmetry. The intensities at which these 2 distorting effects first appear are not the same. The subjective summation tones are, in general, weaker than the corresponding difference tones of the same order. These differences are to be expected if auditory masking is a process occurring within the hearing mechanism.

R 13

8915

Parkinson, J.S. & Jerk, W.A. A RE-EXAMINATION OF THE NOISE REDUCTION COEFFICIENT. J. acoust. soc. Amer., Oct. 1941, 13, 163-169. (Johns-Manville Research Laboratories, Manville, N.J.).

It is the present practice to call the average of the sound absorption coefficients at 256, 512, 1024 and 2048 cycles the noise reduction coefficient, in an effort to assign a single figure to an absorbing material which will be useful in judging its performance in a noise quieting problem. This is recognized as a makeshift, as no single figure can represent correctly the reduction obtained. Typical noise spectra are presented and analyzed for reductions that can be expected in each frequency band. It appears that if a single figure is to be assigned the absorption coefficient at 4096 should also be considered. This is particularly true of office quieting, which is an important field of commercial noise control. In factories where heavy machinery is operating, it appears advisable to give some weighting to 128 cycles.

R 5

8916

Sabine, P.E. BIBLIOGRAPHY ON NOISE. J. acoust. soc. Amer., Jan. 1942, 13, p210. (Riverbank Laboratories, Geneva, Ill.).

This bibliography contains 49 items of studies dealing with noise. (NEIAS)

8917

Rosenblith, W.A. INDUSTRIAL NOISES AND INDUSTRIAL DEAFNESS. J. acoust. soc. Amer., Jan. 1942, 13, 220-225. (University of California, Los Angeles, Calif.).

A survey was conducted in France in 1938 on the effects of industrial noises. In several factories noise levels were measured, noises were analyzed, and several hundred audiograms were taken. In addition various physiological and psychotechnological data were collected. Measurements on the intensity and the frequency distribution of industrial noises and the hearing losses of industrial workers show: a) some degree of correlation between the average noise level and the temporary and permanent hearing losses; b) an almost complete localization of the permanent hearing loss in the region above 1500 cycles (with a maximum of 6000 cycles), while the most important components of industrial noises are practically always below this frequency-limit; c) some correlation between the amount of temporary and permanent hearing losses for high frequencies; d) a very small permanent hearing loss for low frequencies with a very rapid recuperation from temporary loss in this region.

R 8

8918

Ford, A. DYNAMIC AUDITORY LOCALIZATION. I. THE BINAURAL INTENSITY DISPARITY LIPEN. *J. acoust. Soc. Amer.*, April 1952, **22**, 367-372. (Lehigh University, Bethlehem, Penn.).

In order to measure the binaural intensity disparity lipen an apparatus was designed to reproduce an intensity function as the S rotated his head. Changes in phase relations of the 2 receivers were eliminated. The position of intensity equality could be set at any place in a 360° circle. The S was instructed to rotate his head to find this position. Frequencies of 200 and 2000 cycles were used. The angular errors were recorded. Results demonstrated that pure tone localizations on the basis of intensity disparity yielded errors 10 times as high as found under natural conditions. There must be some other cue for localization than pure intensity effect. This conclusion was verified by the introspective evidence of Ss. (HEIAS)

R 6

8919

Fry, W.J. ACTION OF ULTRASOUND ON NERVE TISSUE--A REVIEW. *J. acoust. Soc. Amer.*, 1953, **25**, 1-5. (University of Illinois, Urbana, Ill.).

This review is concerned with a) changes in the tissues of the central nervous system (CNS) caused by high level ultrasound, and b) investigations into the physical mechanisms underlying these changes. The effect of irradiation on the cell bodies of neurons in the CNS is a loss of function which may be reversible or irreversible depending on the dosage; the latter is accompanied by structural changes. Larger neurons are more susceptible than smaller ones. The dose can be adjusted to cause irreversible neuron damage without harming the vascular and supporting tissue elements. This effect is used in neuroanatomy to study intracellular structure and function. Studies were done on the physical basis for the biological effects of ultrasound. The following aspects of temperature have been analyzed and rejected: a) high average (space) level, b) interface heating, c) rapid time rate of change, d) temperature changes resulting from cavitation, and e) heating at gas nuclei. The phenomenon of cavitation was also shown to play no essential direct role in producing the effects. (HEIAS)

R 14

8920

Herrick, J.F. TEMPERATURES PRODUCED IN TISSUES BY ULTRA SOUND: EXPERIMENTAL STUDY USING VARIOUS TECHNIQUES. *J. acoust. Soc. Amer.*, 1953, **25**, 12-16. (Mayo Clinic, Rochester, Minn.).

This paper reports experiments carried out to investigate ultrasound as a possible therapeutic agent. The frequency of the ultrasonic energy employed was either 800 kilocycles or 1 megacycle. Convincing evidence for the selective heating of nerve by ultrasound was derived from histological study of muscle after exposure to ultrasonic energy. Experiments on animals showed that high temperatures could be produced in bones, bone growth was inhibited, and fractures could be produced by ultrasound. The high temperatures produced in bone by a stationary source of continuous ultrasonic waves can be reduced to levels acceptable for therapy by either pulsing the stationary ultrasonic energy or by a to-and-fro movement of the continuous ultrasonic energy over the selected region. Using ultrasound for reversible blocking of nerves is impractical because the margin of safety between conditions for irreversible and reversible block is too narrow. (HEIAS)

R 15

8921

Lehmann, J.F. THE BIOPHYSICAL MODE OF ACTION OF BIOLOGIC AND THERAPEUTIC ULTRA-SONIC RE-ACTIONS. *J. acoust. Soc. Amer.*, Jan. 1953, **25**(1), 17-26. (Mayo Foundation, University of Minnesota, Rochester, Minn.).

A review is presented of numerous biophysical studies concerning the action of ultrasound on living matter, with particular reference to therapeutic applications. On the basis of the experiments described, involving various physical, physiochemical, and chemical effects, it is concluded that selective heating caused by the radiation plays the major role quantitatively under therapeutic conditions. However, ultrasound also produces a mechanical effect. The diffusion layer at an interface is decreased by stirring, and thus exchange of metabolites is augmented.

R 65

8922

House, A.S. & Fairbanks, G. THE INFLUENCE OF CONSONANT ENVIRONMENT UPON THE SECONDARY ACOUSTICAL CHARACTERISTICS OF VOWELS. *J. acoust. Soc. Amer.*, Jan. 1953, **25**(1), 105-113. (Speech Research Lab., University of Illinois, Urbana, Ill.).

The consonant environments of vowels were varied by forming nonmeaningful stimulus syllables consisting of 72 combinations of 6 vowels and 12 consonants. The syllables were spoken by Ss, and the duration, fundamental frequency, and relative power of the vowels were measured. 10 male Ss were selected who showed no aberrations of speech. Each spoke 72 different consonant-vowel-consonant syllables in each of which the vowel was both preceded and followed by the same consonant. All 3 factors varied significantly in response to changes of the consonant environment. The variations were systematically related to the attributes of the consonants, the most powerful attribute being the presence or absence of vocal fold vibration, followed by manner of articulation and place of articulation, in that order.

R 22

8923

Miller, R.L. AUDITORY TESTS WITH SYNTHETIC VOWELS. *J. acoust. Soc. Amer.*, Jan. 1953, **25**(1), 114-121. (Bell Telephone Laboratories, Murray Hill, N.J.).

The results are given for a series of phonetic evaluation tests which were made by means of synthetically produced vowel sounds. By employing synthetically produced sounds, a number of the significant parameters could be varied in an independent and systematic manner without encountering the uncertainties and limitations of the human speech mechanism. The types of parameter changes which were investigated by this means were those of fundamental frequency or pitch, formant frequency and amplitude, and, finally, the number of formants important to a sound. The results of the tests indicate that all of these parameters are important in the evaluation of the sound. In particular, there is a shift in the phonetic evaluation which can be attributed to pitch alone.

R 4

8924.

Twersky, V. AUXILIARY MECHANICAL SOUND SOURCES FOR OBSTACLE PERCEPTION BY AUDIT. Letter in J. acoust. Soc. Amer., 1953, 25, 156-157. (New York University, New York, N.Y.).

Certain devices have been developed to facilitate the perception of obstacles through the avenue of the hearing mechanism. 2 mechanical sources are described together with preliminary results. The first model is a variation of Griffin's "artificial bass". The second type of device employs a whistle transducer. Ss expressed preference for the whistle model in field trials. About 30 people have used the whistle unit indoors, with rare exceptions all mentioned pitch and loudness increases on approaching walls. (MEIAS)
R 3

8925:

Booth, E.W. BRIEF LANDING TRIALS USING THE FLUSH LIGHTING PATTERN IN THE RUNWAY AT THE ROYAL NETHERLANDS AIR FORCE STATION AT SOESTERBERG. Tech. Note BL. 45, March 1957, 20pp. Armament and Instrument Experimental Unit, Royal Aircraft Establishment, Farnborough, Hants, England.

8925

This paper reports the results of brief flight tests made to examine the visual guidance provided by a flush lighting pattern during final approach and landing. A center line and cross bar approach lighting pattern had been installed within the runway flush with the runway surface. The opinions of the pilots who took part in the tests as well as the degree to which the results confirm ground simulator tests are presented.
G. I. R 2

8927

Morton, J.Y. THE IMPEDANCE OF THE HUMAN MASTOID. Letter in J. acoust. Soc. Amer., Jan. 1953, 25(1), p159. (Post Office Engineering Dept., Research Station, Dollis Hill, London, England).

In reference to Mr. Ernst K. Franke's article, "The Impedance of the Human Mastoid," which appeared in the July issue, if the experiments had been continued beyond 1800 cps it would have been found that the skin covering the mastoid process behaved as a series resonant system. Measurements made at this establishment, over the frequency range 400 to 4000 cps, show the average of 13 normal male mastoids to have a compliance of 0.75×10^{-8} cm/dyne, a resistance of 16×10^3 dyne/cm/sec, and a mass of 0.73 g. The measurements were made with a measuring surface of 0.7 in. in diameter, corresponding to the mean area of a number of commercial receivers, and applied with a force of 440 g in weight. The resonance of individual mastoids occurred as low as 1200 cps for fatty flesh covering a flat mastoid and as high as 4000 cps for leathery flesh covering a ridged mastoid. Though we have no experimental proof, it is thought possible that the continued pressure of a receiver on the flesh of a deaf S may permanently reduce its fluid content, causing it to be stiffer and to have less effective mass.

8928

Bolt, R.H. THE AIRCRAFT NOISE PROBLEM. J. acoust. Soc. Amer., May 1953, 25(3), 363-366. (Massachusetts Institute of Technology, Cambridge, Mass.).

Aircraft noise presents a system problem which to date has been attacked mainly at the level of individual components. The system includes: a) aircraft as noise sources; b) atmosphere and terrain as influences on sound propagation; c) people, under several classes and conditions, as responders to noise; d) physical components for controlling noise; e) operating procedures for reducing noise exposure in communities; f) public relations; g) aviation planning policies and economics; and h) many organizations concerned with characteristics and consequences of aircraft noise. The nature of these components is reviewed in a general way, with emphasis on their inherent interrelations. This discussion provides a framework for unifying the several Ss included in the present Aircraft Noise Symposium.
R 18.

8929

Veneklasen, P.S. NOISE CONTROL FOR GROUND OPERATION OF THE F-89 AIRPLANE. J. acoust. Soc. Amer., May 1953, 25(3), 417-422. (Western Electro-Acoustic Laboratory, Los Angeles, Calif.).

A noise control project is described which includes a noise muffler for the ground testing of the F-89 air plane which is powered by 2 turbojet engines. Included are the prediction of performance, acoustical design considerations, correlation of acoustical and thermodynamic requirements, general construction, acoustical tests during construction, noise survey around the exposed airplane, and neighborhood survey around the completed installation. This noise suppressor is comparatively simple and inexpensive, requires no water cooling even for afterburner operation, and has proved adequate in terms of neighborhood relief and protection of operating personnel.
R 9

8930

Benson, R.W. & Hirsh, I.J. SOME VARIABLES IN AUDIO SPECTROMETRY. J. acoust. Soc. Amer., May 1953, 25(3), 499-505. (Central Institute for the Deaf, St. Louis, Mo.).

Measurements of the long-time average spectrum of speech are reported with the purpose of pointing out the roles of several variables. 3 different sampling times of 3 different types of speech material are analyzed with several band-width intervals. The speech of 5 young men and 5 young women contributes to the averaged results. No significant differences are found among the 3 types of speech material nor among the 3 different sampling times of 30, 60, and 90 secs. Octave, half-octave and equal-mel intervals appear to yield the same results. The only important difference between male and female speech appears in the octave 75-150 cps. The shape of the long time spectrum remains fairly constant from person to person while the over-all level contributes most to interpersonal variability. A discussion of the meaning of "over-all level" in this and previous reports is given. A relatively simple system for obtaining these measurements is described.
R 4

8931

Meyer, M.F. IS LISTENING TO A TELEPHONE A PSYCHOLOGICALLY NORMAL WAY OF HEARING? Letter in J. acoust. Soc. Amer., May 1953, 25(3), p575.

In reporting his experiments on pitch discrimination J. Donald Harris (J. Acoust. Soc. Am., 24, 754 (1952)) expresses a surprise in the following words: "The incredibly precise sensitivity as early reported by...Meyer...is not corroborated. On the other hand, much of Meyer's testing of the ability of Professor Stumpf may be valid." The surprise can be lifted. Stumpf was comfortably seated with his back to the variable fork and free from all head contact. He then intentionally assumed his most favorable attitude. If a speaking telephone had been pressing on 1 of his ears and a dummy telephone on the other, and the tests had proceeded machine-like as described by Harris on page 751, Stumpf's attention would have been greatly disturbed. The question raised is answered simply and negatively: Listening to a telephone is not a psychologically normal procedure for a highly sensitive musical observer of phenomena of hearing. Consequently, physiological conclusions drawn therefrom are unreliable.

8932

Bogert, B.P. ON THE BAND WIDTH OF VOWEL FORMANTS. Letter in J. acoust. Soc. Amer., 1953, 25, 791-792. (Bell Telephone Laboratories, Murray Hill, N.J.).

A study on the band widths of the speech formants is reported. Each of 33 male speakers uttered each of the 10 vowels once, making 330 utterances. 100 of them were selected for investigation picked at random. The spectrograph sections of the vowels chosen were obtained, and the envelopes of the formants were drawn over the sections. The band widths 3 db down from the peak were recorded, as well as the center frequency and the relative level of the maxima. The results show that the band widths of the formants are relatively invariant and independent of the particular vowel. (HEIAS)

R 7

8933

Harris, C.M. A STUDY OF THE BUILDING BLOCKS IN SPEECH. J. acoust. Soc. Amer., Sept. 1953, 25(5), 962-969. (Acoustics Lab., Columbia University, New York, N.Y.).

Identification of the information-bearing elements of speech is important in applying recent thinking on information theory to speech communication. One way to study this problem is to select groups of building blocks and use them to form standardized speech which then may be evaluated; a method having the advantage of simplicity is described. Individual recordings of the building blocks were made on magnetic tape and then various pieces of tape were joined together to form words. Experiments indicated that speech based upon one building block for each vowel and consonant not only sounds unnatural but is mostly unintelligible because the influences on vowel and consonants are missing which ordinarily occur between adjacent speech sounds. To synthesize speech with reasonable naturalness, the influence factor should be included. Here these influences can be approximated by employing more than one building block to represent each linguistic element and by selecting these blocks properly, taking into account the spectral characteristics of adjacent sounds so as to approximate the time pattern of the formant structure occurring in ordinary speech. There is no a priori method of determining how many building blocks are required to produce intelligible standardized speech. This can only be determined from experiments involving listening tests. Such tests are described.

R 2

8934

Harris, C.M. A SPEECH SYNTHESIZER. J. acoust. Soc. Amer., Sept. 1953, 25(5), 970-975. (Acoustics Lab., Columbia University, New York, N.Y.).

"Standardized speech" constructed from building blocks called speech modules has been described; it was synthesized by piecing together bits of magnetic tape containing recorded speech sounds. An electromagnetic device, a "speech module synthesizer", is described here which performs the synthesis automatically. When buttons on a keyboard are pressed, a sequence of corresponding speech modules are automatically recorded on tape exactly in tandem. The modules are selected from a group "stored" on a rotating magnetic drum. The pressing of a button causes an electrical signal corresponding to a module to be reproduced - the electrical switching is so arranged that only 1 complete module is reproduced for a single button-pressing. This electrical signal is amplified, biased, and then fed into a constantly rotating head which makes contact with stationary magnetic tape and records the signal on it. A 10-kc signal superposed on each stored speech module controls an electromagnet clutch which a) measures the length of the recording accurately, and b) advances the tape at the completion of the recording by the correct amount so that the next recording forms a connected sequence with it. The same module may be used any number of times and in combination with different stored modules, thereby introducing wider experimental control in standardized speech studies. The principle of this type of device could be applied to other classes of problems involving communication of information, as the conversion into speech of typing or of electronically-read printed matter.

R 2

8935

Corliss, Edith L. & Burkhard, M.D. A PROBE TUBE METHOD FOR THE TRANSFER OF THRESHOLD STANDARDS BETWEEN AUDIOMETER EARPHONES. J. acoust. Soc. Amer., Sept. 1953, 25(5), 990-993. (US National Bureau of Standards, Washington, D.C.).

To establish threshold standards for various types of earphones, from a set of threshold standards that has been determined for one particular type of earphone by a hearing survey, an empirical relationship must be found giving the sound pressures in the calibrating coupler corresponding to equal sound pressures in the ear. This has previously been accomplished by means of loudness balancing between earphones. The method described in this paper makes use of a direct probe measurement of the sound pressure developed by an earphone at the entrance to the ear canal. The experimental process is described and the results of tests to establish the equivalence of the probe method and loudness balancing are given. In addition, several of the conditions under which loudness balancing is carried out were investigated by the probe method. Equal loudness sensation was found to correspond to equal sound pressures at the ear, within the limits of experimental error.

R 4

8936

Bellows, S. THE INFLUENCE OF FORCE OF ARTICULATION OF CONSONANTS ON VOWEL DURATION. *Letter to the Editor, Soc. Amer.*, 1953, 25, 1305-1306. (University of Pennsylvania, Philadelphia, Penn.).

A practical method was devised to determine objectively the force of articulation of consonants. The experiment was performed with French sounds. Accented [a] was followed by 15 different consonants. The duration of the vowel was measured and found to vary inversely as the degree of physiological energy required to pronounce the consonant. These findings seem to apply to American-English vowel sounds too; the duration of the vowel varies inversely as the force of articulation of the following consonant. (JELIAS)

R 8

8937

Shaw, Lucian L. S. and Hubel, Adelaide. RECOGNITION OF RED AND GREEN POINT SOURCES BY COLOR-DEFICIENT OBSERVERS. *Rep. 55-145*, May 1955, Sup. *USAF School of Aviation Medicine*, Randolph AFB, Tex.

8957

This study investigates the possibility that a two-color system (red and green) might be usable by color deficient observers as well as by normal observers in the identification of distant signals such as aviation beacons and other traffic controls. 24 red-green color deficient subjects were tested in order to determine the intensities and chromaticities required to permit differentiation of red and green "point" sources falling within or just outside the chromaticity limits proposed by Judd. The relationship between minimal illuminance (in milicandles) required for recognition of the red and green point sources and scores on two color vision tests, the AF Color Threshold Test and MRA Test developed by Hardy, Rand, and Rittler, are reported.

G. T. R 5

8943
Michels, V.C. AN INTERPRETATION OF THE BRILL SCALE OF SUBJECTIVE BRIGHTNESS. *J. Opt. Soc. Amer.*, Jan. 1954, 44(1), 70-74. (Bryn Mawr College, Bryn Mawr, Penn.).

The Brill scale, obtained from extensive experimental data by Hanes, represents an attempt to establish a subjective scale of brightness by the determination of particular luminances which produce specific ratios of brightness. This scale, like other scales obtained from fractionation data, necessarily assumes a one-to-one correspondence between intensity of stimulus and magnitude of response - an assumption in conflict with known facts regarding adaptation. It is shown that the reformulation of the Fechner law proposed several years ago, aided by results obtained from rating-scale techniques, can predict quantitatively all of the data used for the construction of the Brill scale. Since this theoretical treatment takes explicit account of adaptation, it follows that each of the ratios determined by fractionation techniques has meaning by itself, but that the combination of these ratios into a scale of wide range is not justified. The fallacy involved in such combination is the assumption that a given stimulus is psychologically equivalent to itself when it is presented under different conditions, and, therefore, under different states of adaptation.

R 9

8946
Sumbly, V.H. & Pollack, I. VISUAL CONTRIBUTION TO SPEECH INTELLIGIBILITY IN NOISE. *J. Acoust. Soc. Amer.*, March 1954, 26(2), 212-215. (Human Factors Operations Research Labs., Washington, D.C.).

Oral speech intelligibility tests were conducted with, and without, supplementary visual observation of the speaker's facial and lip movements. The difference between these two conditions was examined as a function of the speech-to-noise ratio and of the size of the vocabulary under test. The visual contribution to oral speech intelligibility (relative to its possible contribution) is, to a first approximation, independent of the speech-to-noise ratio under test. However, since there is a much greater opportunity for the visual contribution at low speech-to-noise ratios, its absolute contribution can be exploited most profitably under these conditions.

R 3

8945
Pollack, I. & Ficks, L. INFORMATION OF ELEMENTARY MULTIDIMENSIONAL AUDITORY DISPLAYS. *J. Acoust. Soc. Amer.*, 1954, 26, 155-158. (Human Factors Operations Research Laboratories, Washington, D.C.).

The purpose of the study was to explore the potentiality of informational transmission with elementary auditory displays of high-order dimensionality. The task of the study was to identify the conditions, or state, of each stimulus aspect of a multivariable display. Transmissions were averaged over individuals. The most striking finding was that the amount of information transmitted with these multidimensional elementary displays greatly exceeded that obtained with unidimensional displays. There was proportionately little improvement in information transmission as each dimension was subdivided more finely; this improvement depended on the proficiency of the Ss. A further increase in the number of stimulus dimensions produced a still further gain in information transmission. (JELIAS)

R 6

894C

Collins, D.A. & Hall, H.J. LABORATORY EVALUATION OF FIELD MEASUREMENTS OF THE LOUDNESS OF TRUCK ENGINE NOISE. *J. Acoust. Soc. Amer.*, March 1954, 26(2), 215-220. (Arner Research Foundation of Illinois Institute of Technology, Chicago, Ill.).

Simple loudness judgment tests were performed by a jury of 15 observers on the recorded noises of approximately 100 highway trucks. The loudness of the noises calculated by a modification of the equivalent tone method proposed by Beranek and co-workers ranges from about 20 to 200 sones. Observers were instructed to rank the noise in 6 loudness classes and were allowed to listen to a sample of class 1 and class 6 after each 20 recordings. The calculated loudnesses were then divided into 6 classes with class limits set by a 4dB loudness increase per class. Although the subjective tests were conducted with no elaborate controls, a correlation coefficient of 0.94 was found between the average judgment of the group and the calculated loudness class. The correlation coefficient between average judgment and total sound pressure level was 0.70, whereas the correlation coefficient between the average judgment and the level on the A-network of the sound level meter was 0.83. Experimental techniques and the capabilities and limitations of the loudness-calculation methods are discussed.

R 2

894D

Rays, J.A.H. & Cuthbert, A.L. A WINDSCREEN FOR THE EAR. *Letter in J. Acoust. Soc. Amer.*, March 1954, 26, 254-255. (Massachusetts Institute of Technology, Cambridge, Mass.).

Whenever human beings must hear faint sounds in windy places, the masking effect of the noise caused by air turbulence in the ear canal can be a serious problem. A windscreen consisting of 2 circular cups was tested on 2 Ss. Hearing measurements the S set in a windtunnel. Pure tone thresholds were determined by the method of constant stimuli. The windscreen was found to reduce masking due to wind by as much as 20 db for Ss facing into the wind. In addition, it keeps the listener's ears warm. (RE145)

894E

Spilach, M., Curtis, J.F. & Webster, J.C. RESPONDING TO ONE OF TWO SIMULTANEOUS MESSAGES. *J. Acoust. Soc. Amer.*, May 1954, 26(3), 391-396. (USN Electronics Lab., San Diego, Calif.).

20 operators were given a task which required answering 1 of 2 simultaneous voice messages. The task was performed under a variety of conditions produced by combinations of 4 experimental "aid" variables: horizontal spatial separation of the sound sources, aural shaping filters which made the tone quality different in each channel, visual cues which indicated the channel about to call the operator, and facilities to "pull down" a desired message from the initial source into a headphone or a loudspeaker near the operator's ear. It was found that the use of horizontal separation and/or the filtered messages greatly improved the operator's performance. Visual cues had no apparent effect on ability to answer the message except when used with pull down facilities. The pull down facilities aided the operator to some extent. Some speculations are advanced about the nature of recognizing and attending to a message in the presence of another message.

R 6

895A

Webster, J.C. & Thompson, P.O. RESPONDING TO BOTH OF TWO OVERLAPPING MESSAGES. *J. Acoust. Soc. Amer.*, May 1954, 26(3), 396-402. (USN Electronics Lab., San Diego, Calif.).

Air control tower operators listened to test transmissions, consisting of speech intelligibility tests couched in airplane-tower phraseology, over 4 channels. Part of the time the messages of 2 channels overlapped each other and the degree of overlap was systematically varied. The task was to respond to all messages. The results showed a decrement in performance related directly to the amount of overlap, the leading message being understood better (unless it was considerably lower in intensity). For those parts of the message which had low informational content, the messages of the overlapping channel increased the total assimilated information per unit time above the total assimilated in the absence of the competing channel messages.

R 12

8951

Biddulph, R. SHORT-TERM AUTOCORRELATION ANALYSIS AND CORRELATOGRAMS OF SPOKEN DIGITS. *J. Acoust. Soc. Amer.*, July 1954, 26(4), 539-541. (Bell Telephone Laboratories, Murray Hill, N.J.).

Autocorrelation techniques provide a method of displaying speech sounds in a form which differs significantly from conventional sound spectrograms. The autocorrelation function $\phi_{11}(r)$, of a signal $i(t)$ is defined by $\phi_{11}(r) = \lim_{T \rightarrow \infty} \frac{1}{T} \int_0^T i(t)i(t-r)dt$. Delay r introduced.

In the speech signal appears as ordinate in these displays, time t as abscissa, and magnitude of the resulting correlation function $\phi_{11}(r)$ is shown by the density of the pattern. Characteristic features of the displays are discussed and evaluated in terms of the mechanism of the correlation process. Data considered are limited to the 10 spoken digits 1, 2, ..., 9, "oh".

R 5

8952

Munson, W.A. & Karlin, J.E. THE MEASUREMENT OF HUMAN CHANNEL TRANSMISSION CHARACTERISTICS. *J. Acoust. Soc. Amer.*, July 1954, 26(4), 542-553. (Bell Telephone Laboratories, Murray Hill, N.J.).

This paper uses concepts in information theory and psychophysics to provide a basis for the quantitative measurement of certain communication properties of the human being. Part 1 of the paper discusses testing techniques in which binary signals were used for measuring information transmitted over a human communication channel. Part 2 proposes a model of this channel for investigating the factors which influence this information rate. The model involves 3 parameters: the signal level, the noise level of the human circuits, and the discriminant level of the human circuits. Some illustrative experimental measurements of these parameters are included.

R 6

8953

Cherry, E.C. & Taylor, W.K. SOME FURTHER EXPERIMENTS UPON THE RECOGNITION OF SPEECH WITH ONE EAR AND WITH TWO EARS. *J. acoust. Soc. Amer.*, July 1954, 25(4), 554-559. (Electrical Engineering Dept., Imperial College of Science and Technology, London, England).

The experiments described here continue a series reported in this Journal earlier. A number of objective tests are described, directed towards the general problem concerning the faculty we possess of perceiving only 1 acoustic world under normal conditions (in spite of having 2 ears) and yet, if our ears be stimulated by different signals, artificially, we can attend to 1 or the other of them. The tests have been made with continuous speech (readings from light fiction) and the results assessed statistically. The first tests aim at measuring the reaction time t required to "switch the attention" from 1 ear to the other, as assessed by perception of the words of the message. A second set of tests show that we perceive only 1 speaker, as a "gestalt", when the ears are stimulated by similar messages but with a delay between them exceeding 20 times that ever experienced in real life by virtue of binaural directivity.

R 3

8954

Beranek, L.L. SOUND SYSTEMS FOR LARGE AUDITORIUMS. *J. acoust. Soc. Amer.*, Sept. 1954, 26(5), 651-675. (Bolt Beranek and Newman, Inc., Cambridge, Mass.).

This paper gives a comprehensive review of the design of sound systems for large auditoriums. It covers the following: a) When is a sound system necessary? b) Ambient noise effects; c) Reverberation effects; d) Classification of sound systems; e) Behavior of direct-radiator, multi-cellular, acoustic lens and "column" types of loudspeakers; f) Psycho-acoustic considerations; g) Naturalness; h) Loudspeaker arrangements; i) Sound system in the large hall of the University City in Caracas, Venezuela; j) Sound system in Plenary Hall of the United Nations Headquarters, New York City; k) Stereophonic sound system in a municipal theatre; l) Distributed "column" sound system in the Holy Cross Cathedral; and n) Tests for evaluating sound systems.

R 5

8955

Burkhard, H.D. & Corliss, Edith L.B. THE RESPONSE OF EARPHONES IN EARS AND COUPLERS. *J. acoust. Soc. Amer.*, Sept. 1954, 26(5), 679-685. (US National Bureau of Standards, Washington, D.C.).

Applied voltage responses of 7 earphones on both ears of 14 people were obtained with the aid of a probe tube microphone inserted into the volume enclosed by the earphone. Treatment of the response data by the method of analysis of variance allowed separation of variation effects due to error in repeated measurement, dissimilarity between a given person's ears, and differences among individuals. The latter are found to be the most important effects to contend with in audiometric practice. Effects of application force on sound pressure output of an earphone are examined. Comparisons between the average response on ears and on 3 superficially different couplers are presented. Responses on ears were substantially different from responses on couplers over parts of the frequency range. Recommendations are given for improving the reliability of audiometric measurements by instrumental refinements.

R 12

8959

Korn, T.S. EFFECT OF PSYCHOLOGICAL FEEDBACK ON CONVERSATIONAL NOISE REDUCTION IN ROOMS. *J. acoust. Soc. Amer.*, Sept. 1954, 26(5), 793-794. (Acoustics Lab., University of Brussels, Brussels, Belgium).

In many cases when sound absorptive treatment has been applied to rooms, the effective noise reduction has been found larger than that predicted by the conventional formula. It is shown that this discrepancy appears in cases where conversational noise is predominant, and that it is the result of a phenomenon which may be termed "psychological feedback," which increases the conversational noise reduction (expressed in decibels) by a factor of about 1.6.

R 4

8960

Stevens, K.W. FREQUENCY DISCRIMINATION FOR DAMPED WAVES. *J. acoust. Soc. Amer.*, Jan. 1952, 24(1), 76-79. (Massachusetts Institute of Technology, Cambridge, Mass.).

Measurements of frequency discrimination for single damped waves are reported for frequencies between 200 and 5000 cps, and for values of the damping σ between 0 and 500 sec^{-1} (σ is the reciprocal of the time constant of the envelope of the damped wave). There is an increase in the difference limen for frequency as the damping increases, or as the effective duration decreases. The increase in the difference limen is accompanied by a loss in the pitch character of the stimulus, and there is usually a sharp deterioration in discrimination above a certain value of damping, i.e., above a certain band width of the stimulus. The results are related to existing data on the perception of short sinusoidal stimuli.

R 3

8961

Mintz, F. & Tyzzer, F.G. A LOUDNESS CHART FOR OCTAVE-BAND DATA ON COMPLEX SOUNDS. *J. acoust. Soc. Amer.*, Jan. 1952, 24(1), 80-82. (Armour Research Foundation of Illinois, Institute of Technology, Chicago, Ill.).

The equivalent-tone method of Beranek, Marshall, Cudworth, and Peterson has been used as a basis for developing a loudness chart for octave-band data on noise. The loudness chart consists of contours of equal pressure level in octave bands which are superimposed on a loudness grid. The procedure is based on octave-band data, since octave-band filter sets are readily available commercially and are being widely used in noise measurement. Good agreement is shown with loudness values for various noises determined by Beranek et al., using 300 and 600-mel bands, and there is, therefore, good agreement with existing psychological data. The loudness chart not only facilitates the calculation of loudness but provides graphical loudness curves for comparison of noise and for the evaluation of various noise reduction measures.

R 2

8963

Stanfield, R.L. USAF REPORTS REARWARD SEATING SAFER. *Aviation Week*, Feb. 1957, 66(5), p.91.

8963

This article reports the results of an Air Force study of injuries in USAF transport aircraft accidents in relation to seating. Data were collected over a period of two and a half years and are presented in terms of number and degree of injury incurred under the following seating conditions: facing front, facing rear, facing sides, seating unknown, and standing. Approximately 3500 passengers provide the basis for the assessment. Passenger tie downs are discussed along with the general problem of determining relevant factors in accidents. Conclusions are drawn concerning the optimal seating arrangement.

T.

8965

Pollack, I. COMFORTABLE LISTENING LEVELS FOR PURE TONES IN QUIET AND NOISE. *J. acoust. Soc. Amer.*, March 1952, 24(2), 158-162. (USN Electronic Lab., San Diego, Calif.).

The most comfortable listening level and the range of comfortable listening levels for pure tones were determined for a group of normal (nonclinical) listeners in the quiet and against various levels of background noise. In general, the most comfortable listening level contour has the general shape of the equal-loudness contour at intermediate loudness levels - lowest intensity at the middle frequencies and highest intensity at the lower frequencies. The range of listening levels considered "comfortable" against a quiet background varies from about 20 db at the lowest frequencies to about 35 db at the middle frequencies. The variability of the mcl is larger at high frequencies than at low frequencies and it is about the same magnitude as the variability of heterophonic equal-loudness matches. The effect of noise is primarily to raise the lower limit of the range of comfortable listening levels and only secondarily to raise the upper limit. As a result, the range of comfortable listening levels is decreased in noise. The possible use of the comfortable listening level test as a gross diagnostic tool in the detection of nerve-type deafness is discussed.

R 5

8966

Gierke, H.E. von, Parrack, H.O., Gannon, W.J., & Hansen, R.G. THE NOISE FIELD OF A TURBO-JET ENGINE. *J. acoust. Soc. Amer.*, March 1952, 24(2), 169-174. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

The noise fields generated by a standard turbo-jet aircraft engine have been measured for 3 different power settings. Measurements were made at points on circles around the engine having radii of 25 and 50 ft. For the 50-ft. distance the directional characteristic is presented for the over-all sound pressure and for the noise in the different octave bands starting at 37.5 cps. From these measurements the total acoustic power radiated from the engine is calculated to be approximately 69 kw at full engine power. The distribution of this power over the different frequency bands and space angles is shown. The highest total energy per cycle and the highest sound levels are found at frequencies near 100 cps for the higher power settings of the engine. Above that frequency range the total energy per cycle drops approximately as the reciprocal of the square of the frequency. The data should help us understand qualitatively the jet engine as a sound source and are therefore discussed in that respect. On the other hand, the data have practical significance with respect to the design of test facilities for adequate protection of personnel. They are equally important with respect to problems of noise control on an airport.

R 8

8967

Guelke, R. & Helm, H. THE ANOMALOUS BEHAVIOR OF THE THRESHOLD OF HEARING IN RELATION TO THE EQUAL LOUDNESS CONTOURS. *J. acoust. Soc. Amer.*, May 1952, 24(3), 317-322. (University of Capetown, Union of South Africa).

It is shown that for a 100-cycle note the well-known compression of the loudness contours at low frequencies is no longer valid near threshold. Measurements are carried out on 38 Ss in a free field test, and on 10 Ss in a monaural test to show that the intensity jump from threshold to 10 phons is greater at 100 cycles per sec than at 1000 cycles per sec. This is contrary to experience at higher intensities where the intensity jump is smaller at 100 cycles than at 1000 cycles. A possible explanation for the effect is put forward involving the middle ear muscles.

R 8

8968

Robbins, J.G. THE ACOUSTIC SIGNIFICANCE OF THE AMPLITUDE AND PHASE OF HARMONICS PRESENT IN A SOURCE OF SOUND IN A ROOM. *J. acoust. Soc. Amer.*, July 1952, 24(4), 380-383. (Hendrix College, Conway, Ark.).

In order to obtain some further measure of the acoustic properties of a rectangular room, a brief subjective study is made of listener response to sounds having various degrees of modulation on their decay curves and to alternate sounds which differ only in the phase relation of a harmonic in the source with respect to the fundamental frequency. The data show that the average listener finds the decay of sounds pleasant in inverse proportion to the amount of modulation on the decay curves, and that a large majority of listeners cannot distinguish between 2 steady-state sounds, alike except that in 1 sound the phase of a harmonic is changed with respect to that of the fundamental frequency. Also, an objective study is made of the modulation on decay curves. A switching device is used to insure a smooth cutoff at any predetermined phase of the fundamental frequency. The data show that, if the source includes the fundamental frequency and a harmonic at equal amplitudes, the modulation of the decay curve consists of 2 superposed modulations. The phase relations and amplitudes of these modulations are dependent on the phase relations and amplitudes of the driving frequencies which produce them.

R 1

8969

Lewis, C. BLIND FLYING UNIT DESIGNED FOR HELICOPTER. *Aviation Week*, April 29, 1957, 66(17) 26-27.

8969

This article describes the development by Bell Helicopter Corporation and Bendix Aviation Corporation of a unit of instruments designed to permit blind flying with helicopters. Take-off and landing capabilities are described along with the various component aspects of the unit. The system is said to be applicable to remote landing areas where no ground aids would be available.

8970
 Aviation Week. TWO NEW ESCAPE SEATS DEVELOPED. *Aviation Week*, April 1952, 44(17), p.37.

8970
 This article briefly describes the development by the Industry Crew Escape System Committee of two new escape seats, the B-seat and the A-seat. Brief reference is made to the deceleration and stability characteristics of each of the seats. Also mentioned is the B-seat developed by Lockheed Aircraft Corporation.

8971
 Bennett, G.S. A NEW METHOD FOR THE VISUALIZATION AND MEASUREMENT OF ULTRASONIC FIELDS. *J. Acoust. Soc. Amer.*, Sept. 1952, 24(5), 479-474. (Michigan State College, East Lansing, Mich.)

A new method for the observation of ultrasonic field distributions is described, utilizing a starch plate in a dilute solution of iodine in a manner analogous to the use of photographic emulsions. Near-field diffraction patterns are shown as illustrative of results, which appear to be superior to those of other methods, and the advantages of the new method over previous techniques are described.
 R 22

8973
 Fletcher, H. THE PERCEPTION OF SPEECH SOUNDS BY DEAFENED PERSONS. *J. Acoust. Soc. Amer.*, Sept. 1952, 24(5), 490-497. (Columbia University, New York, N.Y.)

In a previous paper by Fletcher and Galt (*J. Acoust. Soc. Am.* 22, 89 (1950)) a method was described for measuring experimentally and also for calculating the interpretation aspect of the perception of speech. The listeners were considered to have normal hearing. In the present paper the same principles are applied to persons having abnormal hearing.
 R 1

8974
 Munson, W.A. & Wiener, F.M. IN SEARCH OF THE MISSING 6 DB. *J. Acoust. Soc. Amer.*, Sept. 1952, 24(5), 498-501. (Bell Telephone Laboratories, Murray Hill, N.J.)

The unexplained difference in sound pressure in the ear canal which appears to exist when equally loud low frequency tones are presented alternately from an earphone and from a loudspeaker has bedeviled acousticians for many years and, unfortunately, still continues to do so. There are presented here the results of some of the measurements carried out at the Bell Telephone Laboratories which show the magnitude of the effect and various attempts at explaining it. While no satisfactory explanation has been found, it is hoped that publication of these results will stimulate interest in the problem.
 R 8

8975
 DeVries, G.L. BROWNIAN MOTION AND THE TRANSMISSION OF ENERGY IN THE COCHLEA. *J. Acoust. Soc. Amer.*, Sept. 1952, 24(5), 527-533. (Rijks University, Groningen, The Netherlands.)

It is shown that Brownian motion at the eardrum is only partly due to noise of the air. (This part has been calculated by Sivian and White.) The main part is due to Brownian motion of the eardrum itself. The apparent flow of energy is close to the absolute threshold of the ear; it is reduced to one-half when the ear is provided with an exponential horn. The discussion of the Brownian noise in the inner ear reveals a serious discrepancy; considering 1-individual cell it proves to be very difficult to reconcile the low threshold with the thermal agitation. A mechanism is suggested for the excitation of the sense cells by which the disturbances by Brownian motion are appreciably suppressed; in this model the microphonic activity plays an important part. The model is based on some recent measurements of the microphonic activity of the lateral line organs of fishes, which are shortly summarized. It follows from these measurements that the microphonic potentials are related with the tension of the hairs on the sense cells.
 R 12

8976
 Pollack, I. ON THE EFFECT OF FREQUENCY AND AMPLITUDE DISTORTION ON THE INTELLIGIBILITY OF SPEECH IN NOISE. *J. Acoust. Soc. Amer.*, Sept. 1952, 24(5), 538-540. (Harvard University, Cambridge, Mass.)

The effect upon the intelligibility of speech in noise of the interaction of sharp frequency limiting and severe peak clipping was studied. The results are compared with previously reported results of similar tests with frequency-limited speech signals that were not subjected to amplitude distortion. The intelligibility of unclipped speech, relative to that of the peak-clipped signal under corresponding experimental conditions, is a function of the signal-to-noise (S/N) ratio under test and is, to a rough approximation, independent of the frequency range of the speech signal passed. At high S/N ratios, the intelligibility of the unclipped speech signal is higher than that of the severely peak-clipped signal. Under low S/N ratios, however, the intelligibility of the latter is considerably higher than that of the unclipped signal.
 R 15 (approx.)

8977
 Huggins, W.H. A PHASE PRINCIPLE FOR COMPLEX FREQUENCY ANALYSIS AND ITS IMPLICATIONS IN AUDITORY THEORY. *J. Acoust. Soc. Amer.*, Nov. 1952, 24(6), 582-589. (USAF Cambridge Research Center, Cambridge, Mass. & Research Lab. of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.)

A filtering scheme that utilizes the phase-frequency characteristic of a filter is shown to have certain advantages for analyzing signals, such as speech, which are produced by shock or noise excitation of a physical system having one or more resonances. The phase principle is shown to be particularly well suited to neural mechanisms of inhibition and facilitation, and evidence is presented that such a principle may be used by the ear to achieve its analysis of the sound that it receives.
 R 5

8978

Tendell, W.F. PHONES AND ALLOPHONES IN SPEECH ANALYSIS. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 607-611. (Brown University, Providence, R.I.).

Phones are quite abstract units. The criteria for establishing them are primarily distributional and articulatory, not acoustic. A unit intermediate between a single speech event-segment and a phone is the allophone. An allophone is a statistical average, with constant, identifiable acoustic characterization. For many purposes of engineering, psychology, pedagogy, and information theory, the allophone may be a more suitable unit than the phone.

R 2

8979

Fischer-Jorgensen, E. THE PHONETIC BASIS FOR IDENTIFICATION OF PHONEMIC ELEMENTS. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 611-617. (University of Copenhagen, Denmark).

Phonemic analysis must be based to a large extent on considerations of phonetic similarity and difference. For this purpose various stages of the speech event may be chosen, in particular the articulatory, the acoustic, and the auditory stage. It does not seem irrelevant which stage is chosen, for the analysis may give different results in each of the 3 stages. However, it is usually not possible to state general reasons for preferring 1 stage over another. In a given language functional reasons may in some cases decide the choice.

R 15

8980

Pike, K.L. OPERATIONAL PHONEMICS: IN REFERENCE TO LINGUISTIC RELATIVITY. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 618-625. (University of Michigan, East Lansing, Mich.).

The phonemes of a language are neither absolutes nor bundles of absolute characteristics but rather are fluctuating bundles of features identified a) relative to each other in sequences, b) relative to a system of fluctuating bundles of characteristics, and c) relative to structural position in a sequence of such relative elements. Detection techniques if paralleling phonemic analysis, would need to be able to work with fluctuating relative elements rather than with absolute physical characteristics only.

R 12

8981

Kock, V.E. THE PROBLEM OF SELECTED VOICE CONTROL. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 625-628. (Bell Telephone Laboratories, Murray Hill, N.J.).

The development of devices which can be operated automatically from the phonetic content of speech may be viewed in terms of the more general problem of the reduction of channel capacity in communications systems. Significance has been observed in formant positions and movements as regard the identification of speech sound. The basic problems in the derivation of phonemes from the formant patterns are reviewed.

R 3

8982

Peterson, G.E. THE INFORMATION BEARING ELEMENTS OF SPEECH. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 629-637. (Bell Telephone Laboratories, Murray Hill, N.J.).

This study deals with those aspects of speech which are phonetically significant. A technique has been developed with which phonetically equivalent speech samples may be obtained in different phonetic contexts and from different speakers. Data on 2 front vowels by different types of speakers are presented. The technique has also been applied to the evaluation of words containing these 2 vowels.

R 8

8983

Davis, K.H., Biddulph, R. & Balashek, S. AUTOMATIC RECOGNITION OF SPOKEN DIGITS. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 637-642. (Bell Telephone Laboratories, Murray Hill, N.J.).

The recognizer discussed will automatically recognize telephone-quality digits spoken at normal speech rates by a single individual, with an accuracy varying between 97 and 99%. After some preliminary analysis of the speech of any individual, the circuit can be adjusted to deliver a similar accuracy on the speech of that individual. The circuit is not, however, in its present configuration, capable of performing equally well on the speech of a series of talkers without recourse to such adjustment. Circuitry involves division of the speech spectrum into 2 frequency bands, 1 below and the other above 900 cps. Axis-crossing counts are then individually made of both band energies to determine the frequency of the maximum syllabic rate energy within each band. Simultaneous two-dimensional frequency portrayal is found to possess recognition significance. Standards are then determined, 1 for each digit of the 10-digit series, and are built into the recognizer as a form of elemental memory. By means of a series of calculations performed automatically on the spoken input digit, a best match type comparison is made with each of the 10 standard digit patterns and the digit of best match selected.

R 2

8984

Hardy, H.C. TENTATIVE ESTIMATE OF A HEARING DAMAGE RISK CRITERION FOR STEADY-STATE NOISE. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 756-761. (Illinois Institute of Technology, Armour Research Foundation, Chicago, Ill.).

The probable shape of a limiting spectrum for noise in a working environment where there is long daily exposure is determined by reasoning from previously determined data of the hearing mechanism. It is assumed that hearing loss is due to a progressive fatigue phenomenon, the fatigue being a direct function of the energy stimulus in the inner ear. From the characteristics of this stimulus as a function of frequency, it is shown that the most sensitive region for loss is around 3000 cps, the low frequencies being as much as 20 db less sensitive than this region. The 4000 cps "notch" in audiograms of industrial workers is thereby explained. The limiting spectra are essentially equal-loudness contours for broad-band noise when the noise spectrum is plotted in octave bands. 2 limiting loudness curves and their corresponding spectra are tentatively suggested as damage risk criteria.

R 23

8985

Moople, G.B. UNSOLVED PROBLEMS RELATING TO HEARING LOSS IN INDUSTRY. *J. acoust. Soc. Amer.*, 1952, 24, 765-766.

2 generally accepted facts are: a) noise can cause hearing loss, b) the noise which will cause a hearing loss in one individual may not be the cause of a hearing loss in another. This suggests 2 problems: a) Why does a noise cause hearing loss in one person and none in another? b) How much noise will cause a hearing loss. This paper discusses these problems with an aim toward stimulating interest in their solution. (MEIAS)

8986

Beranek, L.L. UNSOLVED MILITARY NOISE PROBLEMS. *J. acoust. Soc. Amer.*, Nov. 1952, 24(6), 767-772. (Massachusetts Institute of Technology, Cambridge, Mass.).

This paper describes noise problems encountered by the military. They are: reduction of aircraft noise, reduction of structure-borne noise, micrometeorological techniques to determine acoustic propagation conditions. Studies are suggested which may lead to solutions to some of these problems. (MEIAS)

R 6

8987

Kock, E.W. & Miller, R.L. DYNAMIC SPECTROGRAMS OF SPEECH. *J. acoust. Soc. Amer.*, 1952, 24, 783-784. (Bell Telephone Laboratories, Murray Hill, N.J.).

In studies of speech which are undertaken to determine in what factors the information is contained, one is soon impressed with the fact that a large number of the phonemes are intimately associated with rapid changes in the spectrum content of the sound. This is particularly true of the diphthongs, plosives, glides, and influence regions. Also pointing to the suggestion that perhaps these changes in spectrum are important is the observed fact that steady sounds tend to lose their meaning if they are prolonged. A means of portraying these changes has recently been developed, which involves minor changes in a conventional sound spectrograph. In essence this involves the differentiation of the time-amplitude pattern for different points in the spectrum, rather than the use of the time-amplitude function directly. This method is described in the paper. (MEIAS)

R 1

8988

Ballard, J.W. & Messinger, R.W. HUMAN-ENGINEERED ELECTROMECHANICAL TACTUAL SENSORY CONTROL SYSTEM. *Elect. Manuf.*, Oct. 1954, 54(4), 118-121. (Commonwealth Engineering Company of Ohio, Dayton, Ohio).

The principles, design and operation of equipment for a new method of aircraft guidance are discussed. It has been designated as the Tactual Sensory Guidance System. The system has been designed and built as a research tool for the study of the psychological feasibility of providing the pilot with a substitute for visual and aural flight information. An all-electronic system, including power supply, instructor control station, 2 electronic signal units and the thumb actuators are described briefly and the system operation is explained.

R 9

8989

MacNeil, R.P. DESIGNING FOR OPERATOR SIZE AND SHAPE. *Elect. Manuf.*, March 1954, 53(3), 110-111.

8989

This article presents illustrations and a brief discussion of a technique of appraising human space needs (size and shape) in the design of equipment. The technique involves the utilization of drawings of three different sized figures presented on translucent paper. The figures may be traced or transposed upon drawings of equipment. The use of such drawings is recommended as an effective aid in determining design requirements.

I

8990

Javitz, A.E. INTRODUCTION TO HUMAN ENGINEERING IN PRODUCT DESIGN. *Elect. Manuf.*, March 1952, 49 (3), 90-95, 258-74.

8990

This paper is a didactic discussion of the field of human engineering oriented toward the practicing engineer. The philosophy of human engineering is discussed and examples of human engineering solutions advanced. An outline of the major factors that are often involved in an analysis of a man-machine system is elaborated, e.g., anthropometry, vision (discussion of dial displays), audition, skin senses, proprioception and motor response (discussion of knob design), and climatic environment.

T. F. R 15

8991 Javitz, A.E. A PRACTICAL APPROACH TO COLOR IN DESIGN. *Elect. Manuf.*, July 1951, 48(7), 82-87 & 222-236.

Case histories are presented to show product-design-engineering staff actually at work with color. First a color is selected, taking functional and psychological factors into account. Once the basic color for a particular machine has been selected, several color samples are made up showing the basic hue with possible modifications in lightness and saturation. The final selection is made after considering a number of factors. Examples of the process are described for color-redesigned accounting machines, color-coding for critical control knobs, color selection in a high-intensity X-ray unit, and integral color in electric calculators.

R 4

8992

Brunetti, C., Morrin, T.H. & Dawson, J.W. UTILIZED ELECTRONIC DESIGN AND CONSTRUCTION TECHNIQUES. *Elect. Manuf.*, Feb. 1951, 47, 78-83 & 200-208. (Stanford Research Institute, Stanford, Calif.).

There is a great need for improvements in the techniques of mechanized production in order to meet the impending requirements for reliable equipment. The ultimate objective is the mechanized production of complete electronic circuits including resistors, capacitors, and other simple components manufacturable to close tolerances and with good performance characteristics. New body materials having light weight, good strength, high heat conductivity and low electrical losses are needed to form the base for the circuits. The following items also require careful consideration: temperature problems, connectors, hermetic sealed containers, liquid sealed units, component leads, front panel control, causes of faults.

8993

Balinkin, I.A. A FUNDAMENTAL APPROACH TO COLOR IN DESIGN. Elect. Manuf., Oct. 1950, 46(10), 105-110 & 242-250. (University of Cincinnati, Cincinnati, Ohio).

The trend to use color is steadily growing in industry. Esthetic considerations are important for the design engineer. He is also concerned with the use of colors to improve the visibility of the product or to increase safety. A discussion is given on the physics of color vision. The Munsell Color System is presented. It is based on the 3 visual color attributes: hue, lightness, and saturation. The chemistry, physiology, and psychology of color are briefly discussed. The ICI color standards are of great importance in commerce and in research. (HL:45)

R-10

8997

French, J.J. VEHICLE LIGHTING: APPLICATION OF THE FLUORESCENT LAMP. Elect. Rev., May 16, 1951, 148, 1041-1045.

The amount of light required depends on the particular type of vehicle and on the public service involved. The 2 ratings of lamp suitable for traction lighting are the 15W and 20W sizes; they require 110% to allow an adequate margin for stabilization. For road vehicles a motor-alternator or rotary inverter with an output large enough to supply 18 20W or 23 15W fluorescent lamps are common forms of conversion equipment. Trials on a vibrator inverter are described. High frequency rotary converters and special lightweight fittings have been designed for passenger aircraft and trial installations have been carried out. (NEIAS)

8998

Collard, J. A THEORETICAL STUDY OF THE ARTICULATION AND INTELLIGIBILITY OF A TELEPHONE CIRCUIT. Elect. Commun., 1928, 7, 168-186. (International Standard Electric Corporation).

8998

This is a theoretical study of the quantities which may be utilized as a measure of the transmission quality of a telephone circuit. The functional efficiency of a telephone circuit is described and formulae for evaluating five specific quantities (time efficiency, intelligibility, syllable articulation, word articulation, and sound articulation) are described in terms of development and application. Results of applications to problems such as the following are presented: comparison of calculated with measured results, development of a testing technique, comparison of different languages, and so forth.

T. G. P 6

9005

Baker, G.T. THE REPLACEMENT OF THE HUMAN OPERATOR BY NON-SPECIALIZED PROGRAMMED MACHINES. J. Brit. Inst. Radio Engrs., 1955, 14, 242.

9005

This is an abstract of an oral paper on the design principles of equipment to replace human operators in their functions as assemblers of components and feeders of processing machines.

9008

Brittain, F.H. LOUDSPEAKERS: RELATIONS BETWEEN SUBJECTIVE AND OBJECTIVE TESTS. J. Brit. Inst. Radio Engrs., 1953, 12, 105-109. (Research Laboratories, The General Electric Co., Ltd., Wembley, England).

The advantages and disadvantages of both subjective and objective tests are discussed. It is shown that both types of test are necessary. In order to devise an objective test which bears some relation to the subjective test, it is necessary to take cognizance of both the physiological and the psychological processes involved in the latter. Some common acoustic tests are then considered in detail, and it is shown that, for simple, single attribute tests, fair agreement is possible between the subjective and the objective results. Where a multiplicity of attributes are tested simultaneously, the subjective form of test is the only one possible.

9009

Goldmark, P.C. FLICKER AND COLOUR FRINGING PHENOMENA IN COLOUR TELEVISION. J. Brit. Inst. Radio Engrs., 1950, 10, 208-217. (Columbia Broadcasting System Inc., New York, N.Y.).

In a sequential color television system, flicker becomes an important factor when the color changes occur after each field period. Scarcity of space in the radio spectrum makes it desirable to reduce to an absolute minimum the bandwidth required for color television. This is possible by operating the field sequential color television system with a color frame frequency of 48 per sec., rather than 60. The implications of the Ferry-Porter Law, which states that the critical fusion frequency is proportional to the logarithm of the apparent luminosity, are discussed. Investigations are described on threshold flicker and maximum tolerable flicker. Color fringing is discussed. It is the intensity of leading and trailing color fringes which determine the subjective effect of color fringing. A large variety of tests with the field sequential color television system have proved that color fringing is a rare phenomenon and occurs far less frequently than stroboscopic effects in motion pictures. (NEIAS)

R 6

9010 Goldmark, P.C. BRIGHTNESS AND CONTRAST IN TELEVISION. J. Brit. Inst. Radio Engrs., 1950, 10, 219-225. (Columbia Broadcasting System Inc., New York, N.Y.).

The American Standard Association recommends a motion picture screen brightness of 10 ft-L without film, and 8 ft-L with clear film. Many present day black-and-white receivers should not be viewed in rooms where the surrounding illumination is much in excess of 1 ft-L. Examples are cited to show that for adequate image recognition, contrast range is more important than mere brilliance. The capacity for visual acuity varies with brightness. Other factors, such as contrast discrimination, flicker recognition and color discrimination, also grow with brightness. Solutions are proposed for producing adequate contrast range in television pictures. (NEIAS)

R-1

9014

Westheimer, J. THE SIMULATION OF RADAR PRESENTATIONS FOR BRIEFING PURPOSES. J. SUPP., June 1947, 48(6), 586-590. (Eagle-Lion Studios, Hollywood, Calif.).

9014

This paper describes simulation of the radarscope on a motion picture screen. A detailed description of the difficulties and the process by which radarscope simulation was achieved is given. Also included is a discussion of the use and effectiveness of motion pictures in the briefing procedure.

I.

9022

Smedley, C.A. SPECIFICATION OF COLOR IN FINISHES. Machine Design, Oct. 1953, 25(10), 187-192. (Glidden Company, Cleveland, Ohio).

Designers who wish to utilize the advantages of color must keep the basic factors governing color selection well in mind. They might be summarized as: a) choosing a color that is acceptable in the normal environment of the machine; b) making the machine striking and appealing in sales areas by use of color; c) considering the effect of service conditions, such as wear, disfiguring conditions or heat, on the color; and d) weighing the importance of covering surface defects or blemishes with a finish. Relative importance of each of these factors differs with each product. It is up to the designer to consider each carefully and choose the finish that meets all the fundamental criteria successfully.

9023

Malcolm, D.G., & Marshall, G.L. HUMAN FACTORS IN MACHINE INDEXING. Machine Design, Nov. 1953, 25 (11), 143-145.

9023

To determine the optimum speed (index rate) for a machine fed at intervals by a human operator, 12 untrained subjects dropped two 11/16 inch balls into holes in a plate during a momentary pause (the dwell time) in its rotation. The index rate was varied from 40 to 100 per minute and the dwell time from 1/3 to 2/3. The results are discussed in terms of the effects of practice and the optimum index rates and dwell times for maximum production.

F. I

9024

Machine Design. NAVY PILOTS FLY HIGH WITHOUT LEAVING GROUND. Machine Design, Aug. 1953, 25, p.194.

9024

This article discusses the PZ-5 Flightronic simulator. The unique advantage of coupling to a tactics trainer, the flight phenomena simulated, and its physical appearance are described.

I.

9028

Callaway, D.B. REDUCING NOISE IN MACHINES - HOW TO MEASURE AND ANALYZE SOURCES TO EFFECT QUIET OPERATION. Machine Design, Dec. 1951, 23 (12), 122-129. (Armour Research Foundation, Chicago, Ill.).

9028

The reduction of noise from industrial machinery is discussed. The physics of the generation of noise and the psychophysics of subjective loudness are explained in an elementary way. Practical methods of determining noise level and spectrum are discussed.

G. F.

9029

Boyden, R.E., & Oldenburg, K.F. DESIGNING FOR SPEED IN ADDING MACHINES. Machine Design, June 1951, 23(6), 110-115. (Clary Multiplier Corporation, San Gabriel, Calif.).

This paper reports developments in operator facility and mechanical design of adding machines. Highest operator speed could be attained with the system of entering groups of numbers simultaneously into the keyboard. To provide an easy means of "add" function control, an add bar was provided along the front of the machine. Design will have to consider overthrow protection at higher speeds. Positive transfer assures correct sequence. The increased wear in operating parts resulting from higher speeds is reduced by heat treating any parts having friction surfaces, either by carburizing or by the use of cyanide. (HEIAS)

9031

Rudorf, S.K. DESIGN FOR SAFETY - HOW MACHINE DESIGNERS CAN IMPROVE CONTROLS AND REDUCE COSTS WHILE PROMOTING SAFE OPERATION. Machine Design, 1950, 22 (12), 112-118. (Allis-Chalmers Manufacturing Co., Milwaukee, Wisc.).

9031

Design principles for promoting safe operation of industrial machinery are discussed primarily by example. Topics covered are: movement compatibility, overtravel and overload cut-outs or warnings, "fail safe" switches, automatically locking covers and shields, and coding of controls.

F

9035

Corcoran, N. TRAINING ILLUMINATING ENGINEERS. ENGINEERING AND ECONOMIC FACTORS. Elec. Eng., Jan. 1954, 154, 52-53. (Technical College, Radcliffe, England).

9035

The training of illumination engineers is considered and suggestions made for a systematic training procedure whereby the engineer can gain the necessary all-around experience. Information he should possess with regard to street lighting, choice of lamp type, principles of electric current, mounting height of lamps, and color theory are covered. The examination organized by the City and Guilds of London Institute is discussed.

9037

Public Works. SAFETY TRAINING PROCEDURES FOR FOREMEN. Publ. Works, Oct. 1952, 83, 127-128.

9037

This article discusses the role of the foreman in insuring safe operating procedures when instructing new employees. The foreman's duties are considered in terms of: starting the employee, explaining the job, the employee's doing the job, and continued supervision.

9040

The Engineer. MOBILE INSTRUCTION UNITS FOR RAILWAY STAFF. The Engineer, Sept. 1953, 196, 301-302.

9040

A mobile instruction unit to inform railway staffs at out-depots of new developments and equipment is discussed. The appearance of the coach, and teaching devices, such as a full-scale working model of an automatic vacuum brake and full size vacuum brake cylinder, are discussed.

I.

9050
 Perry, Scott, Ruby. THE VISIBILITY OF SMALL ECHOES ON RADAR PPI DISPLAYS. *Proc. I.R.E.*, Feb. 1948, 36, 180-196. (Council for Scientific and Industrial Research, Chippendale, N.S.W., Australia).

A theory of visibility on an intensity-modulated display is developed. From it is derived a mathematical formula for visibility on a PPI display, and this formula is confirmed by experimental investigations. It is shown that, under favorable conditions, received signals whose power is 15 db below noise level can be observed. Replacement of a linear detector in the receiver by a square-law detector will, under some conditions, produce a further improvement of 3 db. In the visibility formula all the system variables have been grouped into 4 parameters, and thus it has been possible to provide nomograms enabling the rapid calculation of the minimum visible signal under any set of conditions.
 R 7

9051
 Hoeff, A.V. MINIMUM DETECTABLE SIGNAL AND ITS DEPENDENCE UPON PARAMETERS OF RADAR SYSTEMS. *Proc. I.R.E.*, 1946, 34, 857-861. (USN Research Lab., Washington, D.C.).

This paper presents results of an early study of the influence of parameters of a pulse radar system on its sensitivity. More specifically, it describes an experimental determination of the absolute value of minimum pulse signal visually detectable through random noise with a probability of 50% for a wide range of the following parameters: pulse-repetition rate r , pulse length t , intermediate-frequency bandwidth B , and video bandwidth b . The following empirical formula expresses the results of the investigation with considerable accuracy: $V_{min} = \frac{1}{2} E_n \sqrt{1 + \frac{1}{Bb}} \left(\frac{1670}{r} \right)^{1/5}$ where V_{min} is the minimum detectable pulse voltage and E_n is the noise voltage per unit intermediate-frequency bandwidth of the receiver. The application of the results to the design of search radar systems is briefly discussed.
 R 1

9052
 Levenenz, H.W. PHOSPHORS VERSUS THE PERIODIC SYSTEM OF THE ELEMENTS. *Proc. I.R.E.*, May 1944, 32, 256-263. (RCA Laboratories, Princeton, N.J.).

The properties of a number of well-known inorganic luminescent materials (phosphors) are described as a function of variations of their constituents. Chemical substitutions made according to the ordered series in the periodic system of the elements are shown to produce many anomalous energy changes which appear as shifts in the spectral emission colors of phosphors. The anomalous energy changes indicate that the mechanisms of luminescence in solids cannot be given a single interpretation. The relative cathodoluminescences of 45 phosphors are collated and presented in tabular form for the convenience of cathode-ray tube engineers.
 R 7

9055
 Lawton, F., Jr. SCREEN COMMUNICATION IN BUSINESS MANAGEMENT. *Advanced Management*, April 1952, 17, 10-15.

9055
 This article describes the utilization of Screen Communication (by motion pictures, slide films, etc.) in the following areas of business management: administration, production (e.g., manual training, and marketing. In discussing the various aspects of communication by screen, the author also speaks of the role of television, the types of screen communication equipment, and the advantages of this form over other forms of communication. Included is a checklist designed to pinpoint particular film needs and opportunities.

9058
 Davis, L.E. & Josselyn, P.D. AN ANALYSIS OF WORK DECREMENT FACTORS IN A REPETITIVE INDUSTRIAL OPERATION. *Advanced Mgmt.*, 1953, 18(4), 5-9.

9058
 In this study of work decrement factors, two subjects were observed for approximately one month as they performed a repetitive industrial task (preparation of motor armatures). Production data were collected both by human observers and a micro-motion camera. The data were analyzed in terms of diurnal variations in production, in characteristics of operations, and in nonproductive activity. Magnitude and type of delays are illustrated graphically. The roles of such factors as fatigue and motivation in productivity are discussed.
 T. G. R 17

9064
 Heese, K.W. A GENERAL FACTOR IN IMPROVEMENT WITH PRACTICE. *Psychometrika*, 1942, 7, 213-223. (University of Stellenbosch, South Africa).

9064
 This study is concerned with determining the extent to which a general factor is involved in the phenomenon of improvement with practice. Fifty Ss were given ten trials on the following tests: addition, mirror-drawing, maze, sorting, Double Handle Test, and tapping or masking. The results were analyzed by the centroid method and by an application of a formula designed to determine factor loadings for practice scores. A discussion of the role of a general factor is presented along with interpretations of the factors found by the centroid method.
 T. R 9

9069
 Meredith, G.P. THE TRANSFER OF TRAINING. *Occid. Psychol.*, 1941, 13(2), 61-76.

9069
 The author presents a general discussion concerning the problem of transfer of training. In examining the historical treatment, he notes that at least seven different problems have been investigated under the title of transfer of training. A review of the experimental evidence and the theoretical issues involved in transfer is included along with a discussion of its implications for education.
 R. 5

9073
 Bartlett, F.C. MEN, MACHINES AND PRODUCTIVITY. *Occid. Psychol.*, 1948, 22(4), 190-198.

9073
 In this discussion of man-machine relationships within the context of human skill and productivity, the author describes the requirements placed by the machine upon its operator, the design aspects of display-control systems and the problems these present to the operator, and the general problem of worker efficiency.

9074
Marriott, R. SIZE OF WORKING GROUP
AND OUTPUT. Occup. Psychol., 1949, 23(1),
47-57.

9075
To study the relationship between group size and output, the efficiency ratings and piece-work earnings of some 251 groups of varied size (in two factories) were computed over periods of relatively stable industrial conditions (15 months in one factory and 6 months in the other). Group size varied from 3 to 50 or more male workers. Output measures were correlated with the sizes of the groups. The results are discussed in terms of the relation of group size to productivity.
T. G. R 6

9082
Murrell, K.P.H. FITTING THE JOB TO THE SAILOR.
Occup. Psychol., Lond., 1953, 27, 30-37.
(Tube Investment Limited, Department of Ergonomics, Great Britain).

9082
This article describes the development of the Naval Motion Study Unit and its work on the problem of "fitting the job to the sailor." The author briefly reviews experiments conducted by the Unit on such problems as the accuracy of information transmission over telephone lines, the design and layout of information controls, the layout of ships' bathrooms, the design of scales and dials, and so forth. Recommendations are offered with regard to the formation and operation of research units such as this one.
R 5

9091
Smith, H.P.R. HUMAN FACTORS IN THE DESIGN OF AIRCRAFT COCKPITS. Occup. Psychol., 1950, 24, 120-123. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

9091
In this general discussion of the role of human factors in the design of aircraft cockpits, the author is primarily concerned with the following aspects of the aircraft work space: dimensions, view out, controls, information, crash protection, and escape. A study is cited in which integrated information concerning human physiology and psychology led to specific design recommendations.

9092
Mace, C.A. THE ANALYSIS OF HUMAN SKILLS.
Occup. Psychol., 1950, 24(3), 125-140.

9092
The author assesses the state of our knowledge concerning human skills (physical, intellectual, and social), and discusses the utilization of these skills in the manipulation and control of interpersonal relations and man-machine systems. The conditions necessary for effective utilization of such skills are analyzed.
R 5

9093
Frisby, C.B. HUMAN FACTORS IN THE DESIGN OF MACHINERY AND WORKING METHODS. Occup. Psychol., 1950, 24(3), 168-173.

9093
In this discussion of the human factors relevant to working methods and the design of machinery, the author is concerned with, among other aspects, the physical requirements of the task, the deficits of motion study evaluative techniques, the effect of motivational factors, and so forth. Emphasis is placed upon directing investigations toward the task situation and only following this, toward the human implications.

9117
Printers Ink. HOTTEST SPOT IN AD IS CAPTION. Printers Ink., Aug. 1955, 252, p.37.

9117
This article presents a brief report of the relative readership of the picture caption and body copy aspects of an advertisement. The results of a survey of the readership of 1024 ads are presented in terms of the percent of readership of caption vs. picture.

9118
Stebbins, N. TINY TITANS. Printers Ink., Aug. 1955, 252, p.42.

9118
This article describes the successful utilization of a small amount of advertising space to attain high readership. Illustrations of the ads are presented to reflect the principle of production believed to be responsible for the success of the ads: namely, per caption of the layout as a miniature poster with copy and art simple, yet significant.
I.

9119
Jackson, K.F. PREFERRED LOADS FOR A FIRING HANDLE.
FPAC Memo 87, July 1957, 2pp. RAF Institute of Aviation Medicine, FPRC, Farnborough, Hants, England.

9119
This study was designed to determine the suitable loads for restraining a firing handle (used to jettison an aircraft canopy). Six subjects were strapped into a seat and given a series of trials during which a D-shaped handle was pulled under varied conditions of load (i.e., catch weights of 25, 35, and 45 lb. and dead weights of 4.4, 11, 22, and 44 lb). Subjects were asked to evaluate the various loads and on the basis of these non-quantitative evaluations, zones of difficulty were computed for the composite loads. A range of useable loads is specified.
G.

9120
Partlett, F. THE MAN AND THE WEAPONS AND ATTACK AND DEFENCE. (Two special University lectures given before the University of London Board of Military Studies). FPRC 1008, May 1955, 11pp. Flying Personnel Research Committee, London, England.

9120
Two lectures are presented: The first offers an account of the development of weapon design and effective weapon utilization as problems requiring scientific endeavor. Two specific principles are emphasized: (1) the attempt to use weapons in such a manner as to enhance the element of surprise, and (2) the use of weapons in massed concentration ("shock tactics"). The second lecture is concerned with the implications which belligerent attack have for the establishment of adequate defenses. In both lectures emphasis is placed upon human factors.

9121
Printers Ink. ARE NEWSPAPER ADS IN COLOR BETTER READ? Printers Ink., Sept. 1956, 252, 38-39.

9121
The author presents a brief discussion of the role of color in advertisement readership. He cites a study which compared color versus black-and-white readership in newspaper ads and discusses the results in terms of percent of readership as indicative of the effectiveness of color as an attention-getting device.

9122
Bulmer, M.G. & Howarth, C.I. A MODEL OF NON-RANDOMNESS IN THRESHOLD EXPERIMENTS. FPRC 974(A), June 1957, 13pp. Flying Personnel Research Committee, London, England. (Unit of Biometry & Institute of Experimental Psychology, Oxford University, Oxford, England).

9122
A model is proposed as a means of quantitatively evaluating the tendency toward repetition of responses in visual threshold experiments. Six subjects were utilized to test the model in a series of experiments which consisted of eliciting a series of successive responses to a (visual) stimulus of constant intensity. Predictions afforded by this model are compared with experimental results obtained in previous research. The model is discussed in terms of its accuracy in describing visual threshold data and also in terms of its intrinsic plausibility.
T. G. R 7

9123

Dunke, P.R., Himmelfarb, Sylvia & Whittenberger, J.L.
THE EFFECT OF THE RESISTANCE TO INSPIRATION IMPOSED BY
THE COMBAT GAS MASK CANISTER ON THE ABILITY OF SOLDIERS
TO DO EXHAUSTIVE WORK IN TEMPERATE AND IN SIMULATED TROP-
ICAL CONDITIONS. Medical Div. Rep. 9, Nov. 1944, 15pp.
USA Chemical Warfare Service, Edgewood Arsenal. M.

9123

This study was designed to determine "the effect of
the resistance to inspiration imposed by the combat gas
mask canister on the ability of soldiers to do exhaustive
work in temperate and in simulated tropical conditions".
Thirty subjects were trained to ride the bicycle ergo-
meter while wearing the combat gas mask under the follow-
ing conditions: (1) daily for three weeks with 70 degrees
Fahrenheit temperature and 50 per cent relative humidity;
(2) exercised to exhaustion with valve and canister pres-
sures varied; and (3) graded exercises at 95 degrees
Fahrenheit and 87 per cent relative humidity. Heart
rate, pulse rates and volume of respiration were measured.
Results are discussed in terms of the specific and
general effects of wearing gas mask canister upon ability
to perform normal and exhaustive work. T. R. 6

9125

Lewis, R.E.F. & Humphries, M. MEASUREMENT OF PILOT BE-
HAVIOR: COMPARISON OF DAY AND NIGHT APPROACH AND LANDING
TECHNIQUES. DRML Proj. 206, Rep. 206 2, Nov. 1956, 12pp.
Defence Research Medical Labs., Toronto, Ontario, Canada.

9125

This study makes an initial attempt to obtain objec-
tive pilot performance measures with regard to general
pilot behavior and the specific behavior in day and night
approach and landing procedures. Eight pilots made a
series of day and night landings (ten of each). A spe-
cial apparatus, the M2 Recorder, was employed to record
airspeed, altitude, longitudinal and vertical accelera-
tions, and several time measures. Results are presented
in terms of the simple averages of each of the variables
under day and night conditions, the average as a function
of certain variables, and the relative consistencies of
differences between day and night flying behavior. Rec-
ommendations for further studies are offered.
T. G. R. 1

9127
Edgerton, H.A. SHOULD THEORY PRECEDE OR FOLLOW A "HOW-TO-DO-IT" PHASE OF TRAINING. Contract
NORR 1722(00), Dec. 1956, 49pp. Richardson, Bellows, Henry & Co., Inc., New York, N.Y.

This study was undertaken to determine whether theory should precede or follow a "how-to-
do-it" phase of training. The experimental design of the study was as follows: the subject
matter of a selected course or school was presented in 2 different ways. The presentations
differed in the sequence of presentations of the "how-to" aspect of the course and the "ex-
planation" aspect. All trainees in the experiment were given the Chicago Test of Primary
Mental Abilities as a basis for identifying them by aptitude. Learning was measured by the
scores on the course examination. There were 139 trainees in the "how-to" class and 112 in
the "explanation" class. It was concluded that: a) the sequence of presentations has some
effect on the learning of trainees; b) the aptitude pattern of a trainee seems to govern the
effect of the sequence of presentations on learning; c) those who learned their theory before
their "how-to", learned their theory better; d) those who learned their "how-to" before their
explanation did better on the more routine parts of the course. (HEIAS)

9180
Hopkinson, R.G. & Longmore, J. ATTENTION AND DISTRACTION IN THE LIGHTING OF WORK-PLACES.
Ergonomics, Aug. 1959, 2(4), 321-334. (Scientific & Industrial Research Dept., Building
Research Station, Garston, Watford, Hertfordshire, England).

General lighting with a uniform level of illumination over the working plane was intro-
duced and adopted in the inter-war period. Before this, local lighting over the work itself
had been customary. It was found, however, that general lighting was not always satisfactory
for work which demanded high degrees of visual skill and attention, and in many cases a re-
turn to local lighting, together with some general lighting was favoured. It is generally
accepted that the attention is held by objects which contrast strongly with their environ-
ment, either by their brightness, colour, texture or form. Equally the attention can be dis-
tracted by a bright or highly coloured object in the field of view a little away from the ob-
ject of regard. Experiments have been made in 'human phototropism', employing apparatus
which enabled a simultaneous cine-photographic record to be made of the visual scene together
with the eye movements of an unsuspecting observer viewing the scene. A count of the number
and duration of these eye movements revealed that sharp, intensely bright points of light dis-
tracted the attention in a series of jerky eye movements, whereas less bright but larger areas
caused more eye movements of longer duration. Different behaviour patterns of different ob-
servers were noticed, 2 rather distinct groups being recognized which bear many striking al-
liances to the 'postural-clue' and the 'visual-clue' personality groups recognized by
Witkin (1950). Some applications of the results to the lighting of work-places are suggested.
The results argue in favour of preferential lighting of the work, possibly by local lighting.
R. 4

9129

Aviation Week. TREND TOWARD LESS TIME INDICATES DE-
CREASING POSSIBILITY OF ESCAPE. Aviation Week, Feb.
1957, 66(6), 92-95.

9129

This article discusses the decreasing possibilities
of safe escape from high performance aircraft. The
limiting conditions of successful escape are briefly
outlined along with the problems pertinent to successful
seat ejection. Pilot opinion data are also briefly dis-
cussed with regard to possible techniques for assessing
and interpreting such data.

908

Rosenberg, S. A LABORATORY APPROACH TO INTERPERSONAL ASPECTS OF TEAM PERFORMANCE. *Ergonomics*, Aug. 1959, 2(4), 335-348. (Bell Telephone Laboratories, Murray Hill, N.J.).

This paper brings together and re-appraises a number of studies, mostly already published elsewhere, from a laboratory research programme to deal in an experimental fashion with certain problems of team performance. An attempt has been made to be sufficiently comprehensive to anticipate a variety of team performance problems observed in the Air Force and other work-group settings. Research to date in this programme has dealt primarily with team training, although one may also note implications in this work for the problems of the distribution of displays and controls among team members. The conceptual approach adopted is traceable to contemporary stimulus-response theories in psychology. Basic concepts and methods are briefly described followed by an analysis of stimulus-response arrangements in dyads. Feedback (reinforcing) stimuli in social settings are first given social attention when they seem central to almost any training problem. Experiments are summarized which deal with parameters relevant to socially affected feedback. A number of task parameters are also given experimental consideration. Finally, initial studies of discrimination learning within a team context, and the effects of individuals' past histories on a discrimination task, on these determining team outputs, are also described.

R 12

909

Davis, B.L. & Cooley, Patricia A. ACCIDENT-PRONENESS IN MOTOR VEHICLE DRIVERS. *Ergonomics*, May 1959, 2(3), 239-246. (Medical Psychology Lab., University of Cambridge, Cambridge, England).

Motor-vehicle drivers were examined at interview and on visual tests. Each was classified as 'accident-prone' or 'safe' on the basis of his known accident record and the distance he said he had driven, those with a rate of 3 or more accidents per 100,000 miles being classified as 'accident-prone', those with a lower rate as 'safe'. On this criterion there were 74 'accident-prone' drivers to be compared with 74 'safe'. All those who gave a history of definite nervous or mental illness were 'safe'. Those who had had grammar-school education or its equivalent tended to be 'safe'. The unmarried men tended to be 'accident-prone'. A larger proportion of the 'accident-prone' had been convicted of traffic or other offences. No differences were found between the 'accident-prone' and the 'safe' in the incidence of physical disabilities, eye or ear defects or psychosomatic complaints, or in personal qualities so far as these could be rated. Plans for further research into accident-proneness are briefly discussed.

R 2

9083

Hodgkiss, A. PHYSIOLOGICAL BASES OF TRAINING. *Ergonomics*, Feb. 1959, 2(2), 133-142. (Physiology Dept., School of Medicine, University of Leeds, England).

(Presented at a symposium on training.) The paper reviews the problem of athletic training in terms of the physiological background. The aim of training is to increase skill, endurance and strength. Attention to such factors as length of stride, speed of movements, lead and posture can lead to more economical use of the body. Often the most economical rate of performance is that naturally chosen. Improvements in the efficiency of the body often result from training by repetition, or from the use of auxiliary movements. Strength and endurance are developed only by exercises at or close to the limit of performance. In development training the scheme of training is progressively adjusted to the maximum performance attainable at the different stages of training. Some examples of this are cited in the paper. In regard to oxygen uptake and heart output, recent work shows that the difference between the trained and untrained man is that the former is able to increase his heart output and transport oxygen to his muscles at a higher rate than the latter. In modern training schemes, economy of effort and strengthening of the heart are achieved by progressive and long continued training. An example is given, based on training for a 4-min. mile.

R 22

9104

King, S.D.M. THE OPERATOR AS A SET-REGULATING SYSTEM: A FACTORY EXPERIMENT. *Ergonomics*, Feb. 1959, 2(2), 171-179. (Organization & Training (Consultants) Limited, London, England).

In industry it is not unusual for the performance of ex-training of ex-trainees to fall after entering the production department. During training the trainee is treated, from a cybernetic viewpoint, as a self-regulating system. In the normal production department, however, the operator finds his role restricted to performing tasks, the control of which is largely vested in the supervisor. In the experiment described here the setting up of a training department was combined with the re-organization of the associated production department. This re-organization provided the conditions in which the operators, after re-training could continue to act as self-regulating systems. It coincided with a marked improvement in performance.

R 9

9185

Kuoronen, M.J. PROBLEMS OF TRAINING OF THE CARDIOVASCULAR SYSTEM. *Ergonomics*, Feb. 1959, 2(2), 207-215. (Institute of Occupational Health, Helsinki, Finland).

(Presented at a symposium on training.) Training of the cardiovascular system may effect several structural, chemical and functional changes. Some of the functional changes become manifest only during exercise, others are observable also at rest. To some extent changes due to training are independent of each other, and depend on the type of training. For example, a decrease of the pulse rate during standard exercise is obtained only by training at high pulse rate levels. Training may reduce the mechanical work of the heart at rest. It increases the performance capacity of strenuous exercise. In submaximal work it may reduce the effort needed. Training of the cardiovascular system is not known to produce detrimental effects on health. The longevity of trained athletes is equal to or even longer than that of other comparable groups. The serum cholesterol level of athletes in training may be lower than that of the general population. In women, signs of a trained cardiovascular system are associated with reduced incidence of premature births. Training of the cardiovascular system has much to recommend it because of its effects on performance capacity and health.

R 22

9190

Cooper, A.M. ONLY TRAINED WORKERS ARE SAFE WORKERS. *Mill & Factory*, April 1951, 28, 123-124.

9190

The need for an accident prevention training program based on the trainee's ability to develop safety practices is discussed as a means of effective accident reduction in industry. The author outlines such a program and presents results in terms of decrease in accident frequency rate over a 10-year period.

I.

9191

Kissley, H.R. FILMS TO HELP EASE YOUR TRAINING PROBLEMS. *Mill & Factory*, Sept. 1950, 47, 113-116.

9191

The author presents a list of training films dealing with employee relations, supervision, and industrial safety. The list includes title, film data such as running time, sound or silent, etc., and name of sponsor and producer.

R 3

9193

Allen, L.A. CASE DISCUSSIONS AND ROLE PLAYING PER UP SUPERVISOR TRAINING. *Mill & Factory*, Dec. 1952, 31, 97-100.

9193

This article discusses the advantages of employing case discussion and role playing techniques in supervisor training programs. Case discussions are described as enabling the supervisor to learn from his own experience, become aware of other's viewpoints, and gain experience in solving problems on the basis of the facts presented in a particular case. Role playing is seen essentially as a technique which enables the supervisor to implement and practice the attitudes and skills pertinent to human relations problems.

I.

9194

Clement, E.J. TRAINING APPRENTICES IN THE SMALL PLANT. *Mill & Factory*, Aug. 1954, 55, 102-103.

9194

This article offers a brief description of an apprentice training program for tool-and-die-makers. An outline of the training schedule is presented in terms of the number of hours devoted to instruction on particular machines and processes. Integration of classroom instruction with the apprentice program is another aspect of the training schedule which is discussed by the author.

I.

9196

Hahn, J.M. PRACTICAL TRAINING OF AERONAUTICAL ENGINEERS. *J. Royal Aero. Soc.*, Feb. 1950, 54, 117-120. (The Bristol Aeroplane Co., Ltd., Bristol, England).

9196

The goals of a practical training program for aeronautical engineers are defined. They are primarily oriented around the concern for supplementing the students' theoretical background with practical experience of the following sort: familiarization with manufacturing processes, with the structure of industrial organization, with problems of the workmen, and so forth.

R 1

9197

Rattle, A.C.W. EXPERIMENTS IN FLYING TRAINING. *Royal Aero. Soc.*, May 1950, 54, 314-316.

9197

This article presents an experimental comparison of two approaches to basic flying training: 1) following reasonable proficiency in daytime flying, instruction on instrument flight; and 2) instrument-flight instruction at the outset of basic flying training. Serving as the experimental pupil, the author undertook a night flying program. The results are discussed in terms of the experiences encountered in night flying as compared to those reported in daytime flying as initial training approaches and in terms of the relative advantages of conversion from night or instrument to daytime training as compared to conversion from daytime to instrument training.

I.

9200

Newton, J.A. THE HUMAN FACTORS IN AIRCRAFT ACCIDENTS. *J. Roy. Aero. Soc.*, 1951, 55, 110-115. (International Civil Aviation Organization, Accident Investigation Unit, Montreal, Canada).

9200

In this discussion of the human factor in aircraft accidents the author places specific emphasis upon the fallibility of the human organism ("pilot error") as a primary factor in accidents. Basic and contributory cause factors are enumerated and discussed, e.g., error of judgment, poor technique, carelessness, etc.

9205

American Helicopter. INSTRUMENT PHASE FOR USAF HELICOPTER PILOT COURSE. *Amer. Helicopter*, Dec. 1950, 21 (1), 6-8, 20-21.

9205

This article presents a description of the instrument flight training aspect of the Air Force Helicopter Pilot Training Course. Some general data on the practicality of instrument flying in the helicopter is presented along with an elaboration of the difficulties encountered by students in the training program. Also included is a detailed outline of each phase of the program.

9207

Williams, C. FLIGHT SIMULATORS TO EXPEDITE USAF JET TRAINING. *Amer. Helicopter*, May 1951, 22(6), 15 & 18.

9207

This article presents a brief description of the potential role of flight simulators in training US Air Force jet pilots. Evaluations of the following simulators are discussed: Link Jet Trainer (F-80 Shooting Star), F-86-D simulator and Pan American simulator (Dehmel).

I.

9209

Steier, H.P. NON-LINEAR POTENTIOMETERS PRODUCE NEW STANDARDS OF FIDELITY IN FLIGHT SIMULATORS. *Aero Digest*, Feb. 1955, 70, 68-73.

9209

This article describes some of the electronic devices designed to increase the training efficiency of flight simulators. Specifically mentioned are the following: engine computers, Radio Aids, Facilities Console, and the Trouble Console. A brief discussion of the value of simulators as training devices is also presented.

I.

9212

Smith, E.A. NOISE IN AIRCRAFT. *Aeronautics*, March 1952, 26(2), 69-72.

9212

Aircraft noise is discussed in terms of the quality and quantity of noise and the various sources of sound in aircraft. The psychology of sound is analyzed with regard to the subjective aspects of noise tolerance. Techniques of noise reduction are described.

G.

9213

Savely, H.E. HUMAN PROBLEMS IN ESCAPE FROM HIGH-SPEED AIRCRAFT. *Air Univ. Quart. Rev.*, 1952, 5(2), 65-67.

9213

This article presents a detailed analysis of the human problems in escape from high-speed aircraft. Three general types of problem areas are described: (1) bailout, (2) acceleration, and (3) wind blast. Human tolerance measures are evaluated along with certain equipments (e.g., elastic vests, high-pressure masks, breathing helmets) in this attempt to specify the requirements and problems of safe escape from high-speed aircraft.

R 10

9215
American Aviation. TESTS SHOW AIRSICKNESS CAN BE STOPPED. Amer. Aviat., Aug., 1954, 15, 26-27.

9215

This article presents a brief description of the results of investigations with Amnomet in airsickness. The specific effects of this drug are discussed in terms of airsickness prevention and relief. Some causal features of airsickness are discussed (e.g., seat location) along with the phenomena of higher susceptibility of women to airsickness.
G. I.

9222

Perreault, W.D. PICTORIAL INSTRUMENTS EASE PILOT ORIENTATION PROBLEMS. Amer. Aviation, Jan. 22, 1951, 14, 25-7.

9222

This article discusses the utilization of pictorial instruments to facilitate solution of pilot orientation problems. Descriptions and illustrations of graphic indicators are presented along with a comparison between symbolic and pictorial instruments. The contemporary research on pictorial instruments is described in terms of the kinds of information it has provided concerning pilot performance.
I.

9223

Perreault, W.D. AIRLINE PILOTS SPEAK UP ON COCKPIT VISIBILITY. Amer. Aviation, April 2, 1951, 14, 23-4.

9223

This article presents some of the results obtained by the Civil Aeronautics Administration's assessment of the problem of cockpit visibility. A questionnaire sent to approximately six thousand commercial pilots provided the basis for a survey of the factors operant in visibility problems. The cut-off angle (defined by the edges of the window), the role of obstructions to vision, and the distance between pilot seat and windshield, are some of the factors elaborated in this discussion.
G. I.

9226

Mayo, A.M. DESIGNING THE COCKPIT TO THE MAN. Amer. Aviation, July 6, 1953, 17, 23-6; July 20, 1953, 48-53.

9226

The author discusses the problem of adequate cockpit design in terms of the limitations of the human pilot and the special factors of high speed flight. Included are such topics as the optimal control system, person equipment, protective clothing, environmental factors: radiation, escape systems, etc. Reference is made to research data relevant to these aspects of cockpit design.
G. I.

9227
Crozier, W.J., & Wolf, E. THEORY AND MEASUREMENT OF VISUAL MECHANISMS. IV. CRITICAL INTENSITIES FOR VISUAL FLICKER, MONOCULAR, AND BINOCULAR. J. gen. Physiol., 1941, 24, 505-534. (Harvard University, Cambridge, Mass.).

Comparison of monocular and binocular critical flash intensities for recognition of flicker, using a centrally fixated square image subtending ca. 6.13° on a side (white light) shows that for the cone segment of the response contour the inflection point of the probability integral correlating flash frequency F (for symmetrical flicker) and log mean critical flash intensity I_m is with the binocular measurements exactly intermediate between those for each eye separately. For the measurements in the predominantly rod region the binocular data are more or less intermediate. The rod curves result, however, from the integrative interplay of rod and cone effects for which the intrinsic curves overlap. For binocular, as for unocular excitation, the normal probability summation provides an efficient general description, under diverse conditions of size and location of retinal image, wave-length composition of light, light-time cycle-fraction, and kind of animal. It is pointed out that this is the only function abstractly likely to exhibit this kind of efficiency. That a summation of veritable effects independently generated by simultaneous, symmetrical unocular excitation does occur in the recognition of flicker is specifically demonstrated by the fact that for a given mean critical flash intensity the associated variation is lower for binocular than for either or the average of the single-eyed presentations, and in the ratio not statistically different from 1:1.4; the relative scatter of the binocular indices of dispersion is also reduced below the unocular.
R 10

9228
Crozier, W.J., & Wolf, E. THEORY AND MEASUREMENT OF VISUAL MECHANISMS. V. FLASH DURATION AND CRITICAL INTENSITY FOR RESPONSE TO FLICKER. J. gen. Physiol., 1941, 24, 635-654. (Harvard University, Cambridge, Mass.).

The relation between flash duration and mean critical intensity (white light) for threshold recognition of visual flicker, as a function of flash frequency, was investigated by means of measurements at 5 values of the light-time fraction: 0.10, 0.25, 0.50, 0.75, 0.90, with flash frequencies of the interrupted beam ranging from 2 to 60 per sec. A square area, 6.1 x 6.1°, centrally fixated, was viewed monocularly; the discriminator used provided automatically an artificial pupil 1.8 mm. in diameter. Except for the slight day-to-day fluctuation in the magnitudes of the parameters, the data for the observer used are shown to form an essentially homogeneous group. As for other animals tested, the $F - \log I_m$ curve is enlarged and moved toward lower flash intensities as the light-time fraction is decreased. The low intensity segments are composites, their shapes determined by the summation of the lower part of the high intensity curve with an overlapping low intensity population of effects. Both the rising and the declining branches of this latter assemblage suffer competitive partial suppression by the effects in the high intensity population. The detailed analysis shows that these results are consistent with the theory of the central, rather than peripheral, location of the dynamically recognizable elements in the determination of flicker.
R 21

9229

Haig, C. THE COURSE OF ROD DARK ADAPTATION AS INFLUENCED BY THE INTENSITY AND DURATION OF PRE-ADAPTATION TO LIGHT. *J. gen. Physiol.*, 1940-1941, 24, 735-751. (Medicine Dept., College of Physicians and Surgeons, Columbia University, New York, N.Y.).

An increase in the degree of light adaptation causes a decrease in the slope of the subsequent rod dark adaptation function and a displacement of the function to the right on the time axis. Over a wide range, these changes occur to the same extent whether the increase in the degree of light adaptation is produced by raising the intensity or by prolonging the exposure. Within these limits, the Bunsen-Roscoe reciprocity law applies to the intensity and duration of pre-exposure. Over a still wider range, dark adaptation has the same course following brief exposure to a bright light as it has following prolonged exposure to a dim light, provided the degree of light adaptation is the same in both instances (as indicated by identical initial dark adaptation thresholds).

R 25

9230

Crozier, W.J. ON THE VISIBILITY OF RADIATION AT THE HUMAN FOVEA. *J. gen. Physiol.*, 1950, 34(1), 87-136. (Harvard University, Cambridge, Mass.).

Seeing-frequency functions determined unocularly for small brief images at the thoroughly dark-adapted human central fovea take the form of log-Gaussian integrals for intensity or for exposure-time as the independent variable. The properties of r' , the abscissa of inflection in the log-Gaussian integrals, and of the SD are discussed in relation to customary determinations of spectral visibilities and agreements and certain necessary divergencies are considered. A preliminary test of photosensitization has been made by the use of mixed monochromatic lights. The total energy is empirically the significant quantity, although the separate effects of the wavelengths are sharply exhibited. For the central fovea, where resistance to anoxia is at a maximum, the presence of an enzyme system, consisting mainly of cytochromes, is a reasonable assumption. (NEIAS)

R 81

9231

Mueller, C.G. FREQUENCY OF SEEING FUNCTIONS FOR INTENSITY DISCRIMINATION AT VARIOUS LEVELS OF ADAPTING INTENSITY. *J. gen. Physiol.*, 1950, 34(4), 463-474. (Columbia University, New York, N.Y.).

9231

In a study of the relation of the frequency of seeing function to the intensity of the adapting stimulus, two subjects were tested in a series of twenty-three experimental sessions. Each session involved testing the subject's perception of stimulus differences at two levels of adapting intensity. Detection of the increment in intensity was determined as a function of magnitude of increment and magnitude of stimulus (to which increment is added). Five frequency of seeing curves were obtained at each level of adapting intensity (ranging from -1.45 to 4.45 log photons). The results are discussed in terms of the relation between the frequency of seeing curve and the intensity of the adapting stimulus.

T. G. I. R 12

9232
Neeb, F.A. & Poppel, A.J. THE EFFECT OF VARYING THE INTENSITY AND THE DURATION OF PRE-EXPOSURE UPON FOVEAL DARK ADAPTATION IN THE HUMAN EYE. *J. gen. Physiol.*, 1951, 34(5), 657-674. (Emory University, Atlanta, Ga.).

The course of foveal dark adaptation was studied as a function of the intensity and duration of pre-exposure. 4 intensities (11,300, 5,650, 1,130, and 565 m μ) and 4 durations (100, 150, 30, and 15 secs.) were used in all combinations of intensity and duration. The threshold-measuring instrument was a monocular Meeht-Schlaer adaptometer and the threshold measurements were recorded in log micromicrolamberts. There were 2 Ss and each went through the complete series of intensities and durations 5 times. The 5 logarithmic values obtained for each threshold were converted into a geometric mean and these means were the data used in the analysis of the results. The chief results were as follows: a) For each S the final steady threshold value was in the region of 7.0 log μ l. b) As the intensity, or duration, or both, were increased the initial foveal dark adaptation threshold rose, the slope of the curve decreased, and the time to reach a final steady threshold value increased. c) For those values of pre-exposure intensity and time for which the product, $I \times t$, is a constant it was found that for the 2 higher intensities and 2 longer durations and also for the 2 lower intensities and 2 shorter durations, dark adaptation curves were the same. For other values of $I \times t = C$ the curves were generally not the same.

R 13

9235

McFarland, R.A. & Halperin, H.H. THE RELATION BETWEEN FOVEAL VISUAL ACUITY AND ILLUMINATION UNDER REDUCED OXYGEN TENSION. *J. gen. Physiol.*, 1950-1951, 23, 613-630. (Fatigue Lab., Harvard University, Boston, Mass. & Ophthalmology Dept., Long Island College of Medicine, Brooklyn, N.Y.).

The foveal visual acuity of 11 Ss was studied in relation to illumination under normal atmospheric conditions and at simulated altitudes of 10,000 ft. (14.3% O $_2$) and 18,000 ft. (10.5% O $_2$). A mask was used to administer the desired mixtures of oxygen and nitrogen. At the end of each experiment, measurements were made while inhaling 100% oxygen from a cylinder. A red filter (No. 70 Wratten) was used so as to study only the behavior of the cones of the retina. The logarithm of illumination was plotted horizontally (abscissa) and the logarithm of visual acuity vertically (ordinate). The reduced oxygen tensions resulted in a shift of the curve to the right, along the intensity axis, the extent of the change being 0.24 of a log unit at 14.3% O $_2$ and 0.47% of a log unit at 10.5% O $_2$. These effects were completely counteracted within a few minutes by inhaling oxygen. As a consequence of the shape of the curve, such a shift to the right resulted in a relatively large decrease of visual acuity at low illuminations. At increasing light intensities anoxia produced less and less change, until at very high illuminations the decrease was negligible. Thus with 10.5% O $_2$ the visual acuity at 0.144 photons decreased an average of 0.344 of a log unit, to 45% of its normal value. At 1320 photons, however, it decreased only 0.026 of a log unit, to 94% of its normal value for that intensity.

R 34

9236

Wald, G., Harper, P.V., Jr., Goodman, M.C. & Krieger, H.P. RESPIRATORY EFFECTS UPON THE VISUAL THRESHOLD. *J. gen. Physiol.*, 1942, 25, 891-903. (Harvard University; Cambridge, Mass.).

Measurements are reported of the effects of respiratory stresses upon the absolute threshold of peripheral (rod) vision. Some Ss were kept wholly dark adapted and the photochemical system of the rods therefore stationary, the changes recorded may be assumed to have originated more centrally. To this degree the measurements provide a quantitative index of central nervous imbalance. Breathing room in a 32-36% oxygen at about double the normal rate causes the visual threshold to fall to approximately 1/2 the normal value within 5-10 min. This change is due primarily to alkalosis induced by the hyperventilation, and can be abolished or reversed by adding CO₂ to the inspired mixtures. Normal or rapid breathing of 2% CO₂ causes no change in threshold, with 5% CO₂ the threshold is approximately doubled. Breathing 10% O₂ at the normal rate also approximately doubles the threshold. This effect is compensated in part by rapid breathing. When 10% O₂ is breathed at twice the normal rate, the threshold usually falls at first, then slowly rises to supernormal levels. Due primarily to variations in their breathing patterns, Ss yield characteristically different responses on sudden exposure to low O₂ tensions with breathing uncontrolled. The threshold may either rise or fall to normal or subnormal levels. The threshold adjusts to anoxia rapidly; exposures lasting 5 to 6 hrs. do not produce greater or more persistent changes than those of much shorter duration.

R 9

9246

Hecht, S., Hendley, C.D., Frank, S.R. & Haig, C. ANOXIA AND BRIGHTNESS DISCRIMINATION. *J. gen. Physiol.*, 1946, 29, 335-351. (Biophysics Lab., Columbia University, New York, N.Y.)

Brightness discrimination was studied in 8 individuals breathing O₂ concentrations of 7 different altitudes between sea level and 17,000 ft. The brightnesses were 0.1, 0.01, and 0.001 m. Involving only daylight (cone) vision. Findings: a) Brightness discrimination begins to deteriorate at fairly low altitudes, and becomes obvious at 8,000 ft.; b) Impairment of brightness discrimination varies inversely with the light intensity; c) The thresholds of night (rod) vision and day (cone) vision are affected equally by anoxia; d) The quantitative form of the relation between brightness discrimination $\Delta I/I$ and the prevailing brightness I remains the same at all O₂ concentrations; and e) In the retina the conversion of photochemical change into visual function is impaired in such a way that the conversion factor varies as the 4th power of the arterial O₂ saturation. (HEIAS)

R 22

9249

Glaser, E.M. & Hervey, G.R. FURTHER EXPERIMENTS ON THE PREVENTION OF MOTION SICKNESS. *Lancet* (London), March 1952, 1(10), 490-492. (University of Cambridge, Cambridge, England).

2 groups of a total of 150 soldiers were placed on a rubber raft, exposed to artificial waves (6 days, for 1 hr. every 48 hrs.) in a large swimming pool, and given a number of drugs as well as inactive substances for comparison. Nausea, vomiting, and other symptoms were recorded. Chi-square tests showed that hyoscine hydrobromide (1 mg.), or hyoscine hydrobromide (0.6 mg.) mixed with promethazine (15 mg.) were more effective in preventing seasickness than promethazine hydrochloride (Phenergan, 35 mg.). Dry mouth was a common symptom, even after taking the dummy pill. Glyceryl trinitrate did not prevent vomiting. Given 5-10 min. before the motion started, hyoscine (1 mg.) was still effective but less so than 1-1 1/4 hr. beforehand. (HEIAS)

R 7

9254

Kruglak, H. EXPERIMENTAL OUTCOMES OF LABORATORY INSTRUCTION IN ELEMENTARY COLLEGE PHYSICS. *Amer. J. Physics*, 1952, 20, 136-141. (University of Minnesota, Minneapolis, Minn.).

9254

To compare the relative effectiveness of the conventional and demonstration teaching methods in a physics laboratory, 108 male undergraduates in a general physics course were administered five pretests to determine their status on relevant variables. Achievement criteria were scores on four tests measuring course objectives given at the end of the quarter. Analysis of variance and co-variance techniques were utilized. The efficiency of each method, differential effectiveness of instructors, and the interaction of instructor and method are presented in the results. A pilot study which preceded the investigation is also described.

T. R 4

9259

Dexter, L.A. & Thornton, R.A. O THE ANALYSIS OF TRANSFER OF TRAINING. *Amer. J. sci.*, 1951, 12, 538-545. (Brandeis University, Waltham, Mass.).

9258

Shirley, J.W. THE HARVARD CASE HISTORIES IN EXPERIMENTAL SCIENCE: THE EVOLUTION OF AN IDEA. *Amer. J. Physics*, 1951, 19, 419-423. (North Carolina State College, Raleigh, N.C.).

9258

This is a discussion of the fundamental ideas behind the use of case histories in a general education course at Harvard. The objective of the case histories is a greater degree of understanding by close study of a few historical examples. The use of student questionnaires to determine student reaction, limitations of the method, the integration of natural sciences with humanities, and the use of case histories in other courses and education levels are covered.

R 5

9259

This article analyzes transfer of training and discusses factors which determine its significance. The role of generalized intellectual processes in transfer and their identification and teaching are considered. Teaching procedures which affect transfer are described such as selection of curricular material, emphasis on conceptual features of the material, and analysis of methodology. Also discussed are important transferable skills such as statistical analysis and inference, questioning of evidence, and randomization. Illustrations from the physical and social sciences are given.

R 12

9261

Kinsler, L.E. IMAGING OF UNDERWATER OBJECTS. *Amer. J. of Physics*, Aug. 1945, 13, 255-257 (US Naval Academy, Annapolis, Md.).

This paper discusses experimental and theoretical proofs relating to the position of underwater objects when viewed from the surface. The refracted rays are not homocentric. The new center of the refracted rays is above the source by such an amount that the ratio of the true depth to the apparent depth equals the refractive index of the water. The mathematical treatment of the problem is illustrated. It is shown that a serious error is made if the incorrect apparent position is used in drawing conclusions as to the true location of underwater objects. (MEIAS)

R 2

9268

Alter, F. FILMS AS SALESMANSHIP AND INDUSTRIAL RELATIONS. *Special Libraries*, Oct. 1955, 45, 361-362. (Film Council of America, Evanston, Ill.).

9268

This article presents a bibliography of films on salesmanship and industrial relations which is available from the Film Council of America. Also included are descriptions of publications which contain industrial film bibliographies.

9269

Cooper, Elizabeth W. VISUAL INSTRUCTION IN THE USE OF A MEDICAL AND DENTAL LIBRARY. *Special Libraries*, May-June 1954, 43, 195-198. (University of Alabama, University, Ala.).

9269

This article describes methods of visual instruction in the orientation of newcomers to a medical and dental library. The problems of library orientation and the use of visual aids to solve the difficulties are discussed. Such aids as lantern slides, motion pictures, and booklets are covered. The use of booklets as a permanent reference aid for the card catalog, index, and historical collections is described, and the advantages of this type of aid are presented.

R 12

9278

Zeleny, L.D. EXPERIMENTAL APPRAISAL OF A GROUP LEARNING PLAN. *J. educ. Res.*, Sept. 1940, 34(1), 37-42. (State Teachers College, St. Cloud, Minn.).

9278

This investigation compares the traditional class-recitation teaching method and a group discussion method for the following criteria: knowledge attained, attitude change, personality change, and group phenomena, such as cooperation and leadership. College students were paired on relevant variables, such as intelligence and social status. Four experimental procedures using matched pairs, and one rotation experiment were conducted. Results include statistical analysis of score changes evidenced on the Bernreuter Personality Inventory, an attitude scale, and an achievement test. Student ratings of each method are also considered. Implications of the group discussion plan for personality growth are discussed.

T. R 15

9283

Rostker, L.E. THE MEASUREMENT OF TEACHING ABILITY. STUDY NUMBER ONE. *J. exp. Educ.*, Sept. 1945, 14(1), 6-51.

9283

This study determines the relationship between teacher characteristics, such as personality and intelligence, and measurable pupil changes. Also studied are characteristics giving the highest correlation with teaching ability. Pupil performance was measured at the start and close of the school year, and before and after the teaching of two three-week units of work. Data was obtained from 28 seventh and eighth grade classes. Several tests and rating scales were administered to the teachers. Results include relationship of teacher characteristics to teaching ability, regression equations for the prediction of teaching ability, and validity of the measures applied to the teachers.

T. G. R many

9284

Rolfe, J.F. THE MEASUREMENT OF TEACHING ABILITY. STUDY NUMBER TWO. *J. exp. Educ.*, Sept. 1945, 14(1), 52-74. (La Crosse State Teachers College, La Crosse, Wisc.).

9284

This study determines the validity of measures of teaching ability, such as the Michigan Rating Scale. The procedure was as follows: administration of tests measuring course objectives to pupils at the start and close of the year, and also at the start and close of a three-week citizenship course; application of an intelligence and reading test to equate pupils; and application of measures to teachers. Data was obtained from the seventh and eighth grades of one- and two-room rural schools. Results are expressed in terms of correlation coefficients for each measure and combinations of measures with pupil change.

9285

Hellfritzsch, A.G. A FACTOR ANALYSIS OF TEACHER ABILITIES. *J. exp. Educ.*, Sept. 1945, 14(1), 166-199.

9285

This study presents a factor analysis of 25 measures of teacher characteristics to determine correlates of teaching ability. Two samples of rural school teachers were selected and a battery of measures obtained for each sample. Results are expressed in terms of the number and identification of common factors present, factors related to pupil growth, and factors related to supervisory ratings of teachers.

T. R 28

9289

Karp, M. AN EVALUATION OF AN INDIVIDUAL METHOD AND A GROUP METHOD OF TEACHING COLLEGE FRESHMEN THE MECHANICS OF ENGLISH COMPOSITION. *J. exp. Educ.*, Sept. 1942, 11(1), 9-15. (State Teachers College, Paterson, N.J.).

9289

This article presents an evaluation of the relative effectiveness of an individual method and a group method of teaching the mechanics of English composition on a college level. Two instructors each taught a control and experimental group representing a total of 92 subjects. The control groups received group instruction for a total of 1350 minutes, and the experimental groups received a program of individual instruction for a total of 70 minutes for each subject. All of the subjects were tested on a battery of English tests and an intelligence test prior to and following the course of instruction. The results are treated in terms of the relative gains in knowledge of English exhibited by each group.

T. R 1

9291

Mech, E.V. PERFORMANCE IN A VERBAL ADDITION TASK RELATED TO PRE-EXPERIMENTAL "SET" AND VERBAL NOISE. *J. exp. Educ.*, Sept. 1953, 22(1), 1-17. (Indiana University, Bloomington, Ind.).

9291

To investigate the relationship of pre-experimental set and verbal noise to performance of a verbal addition task, 4 groups of 15 subjects were given a verbal adding task to perform under varied conditions of noise. Prior to performance, one group was shown faked evidence indicating that performance under noise was better than quiet, another that quiet produced better performance, another that performance at first was better under quiet but later improved under noise, and finally, one group was just told that the research concerned effects of noise on work. The results are discussed in terms of comparisons among the groups with regard to performance under conditions of noise and quiet.

T. G. R 2

9298

Stampolis, A. EFFECTIVENESS OF FILM STRIPS IN TEACHING ECONOMICS. *Education*, Oct. 1953, 74(2), 115-120. (Boston University, Boston, Mass.).

9298

To evaluate the effectiveness of film strips in teaching economics, the McGraw-Hill film strips were used with equated groups of subjects in two experiments. Groups experiencing both film strips and lectures were compared with groups experiencing only lectures. The results are discussed in terms of the effect of the filmstrip upon learning and psychological satisfaction of the participants. In addition, a survey of the literature pertinent to the use of visual and, to a lesser extent, audio-visual aids is presented.

R 14

9300

Davis, R.A. HELPING THE LEARNER TO HELP HIMSELF. *Education*, Dec. 1951, 72(4), 252-256. (George Peabody College for Teachers, Nashville, Tenn.).

9300

This is a general discussion concerned with the problem of the learner's function in the learning situation. The author critically evaluates those orientations toward the learner which overlook the role of the learner and presents an analysis of the learning process in terms of the potential contribution the learner may make in the learning situation. Suggestions are offered concerning the general problems of direction and guidance of learning, transfer of training, the role of obstacles in learning, and so forth.

9301

Musial, J.W. EDU-GRAFS: NEW VITAMINS FOR THE SCHOOLS. *Education*, Dec. 1949, 70(4), 228-233. (King Features, New York, N.Y.).

9301

The author evaluates the potential contribution of EDU-GRAFS, comic cartoons, as teaching aids in education. He discusses the techniques and possible applications of visual animation of this sort in terms of the attractiveness to the reader, the communicative, and motivational values, and so forth.

9302

Fox, L.H. TEACHING TEACHERS TO USE NEW DEVICES. *Education*, Dec. 1949, 70(4), 244-248. (State Teachers College, Montclair, N.J.).

9302

The author offers suggestions concerning the introduction of teaching aids and devices to teachers and instructors. Pointing out the necessity for arousing interest in training aids as a means of increasing teaching effectiveness, several methods of approaching this problem are offered. Included is a description of the facilities and function of the New Tools for Learning Bureau.

9303

Garber, Ethel. THE OTHER SIDE OF "SENSORY AIDS" TO EDUCATION. *Education*, Dec. 1949, 70(4), 253-254.

9303

In a critical evaluation of the role of sensory aids in education, the author cautions awareness of individual differences, overdependence on, and overuse of sensory aids, and purposeless utilization of such aids.

9322

Grether, W.F. OBTAINING READABILITY IN INSTRUMENT DIALS. *Prod. Engng.*, April 1950, 21(4), 109-112. (Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio).

9322

In this discussion of the problem of obtaining readability in instrument dials, the author notes the types and causes of dial reading errors (e.g., comprehension and precision errors, reading difficulty as a function of design), and presents specific recommendations concerning scale numbering, zero point location, and changes in scale values. In addition, he discusses the design of dials for check reading and multi-revolution instruments and the requirements for dial visibility and lighting.

G. I

9328

Product Engineering. FITTING MACHINES TO MEN. *Prod. Engng.*, March 1952, 23(3), 164-167.

9328

This article describes the human engineering approach to the problem of fitting the machine to the operator. Analysis of the particular operation and objectives of a man-machine relationship is discussed in terms of the utilization of one of the general methods of human engineering, i.e., activity analysis, model analysis, and controlled experimentation. Also discussed are the problems of selection of relevant factors to be studied and the integration of equipment into systems.

I

9342

Mackworth, N.H. THE BREAKDOWN OF VIGILANCE DURING PROLONGED VISUAL SEARCH. *Quart. J. exp. Psychol.*, 1948, 1, 6-21. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

9342

This is a study of the breakdown of vigilance during prolonged visual search. The Clock test was devised to present the subject with a visual search situation of the following sort: a black pointer moved clockwise on a white background once every second (100 movements completed the circle). Approximately 150 subjects were instructed to observe the pointer and mark the double-length movements (twice the usual distance) by pressing a key. The subjects were divided into groups of two-hour, one-hour, and half-hour watches; and two-hour watches while receiving a telephone message. The results are discussed in terms of the average error scores for each of the different groups.

T. G. R 25

9343

Vince, M.A. CORRECTIVE MOVEMENTS IN A PURSUIT TASK. *Quart. J. exp. Psychol.*, 1948, 1, 85-103. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

9343

Five experiments are reported on the role of corrective movements in a pursuit task. Subjects were tested with a pursuit apparatus under conditions designed to investigate the following aspects of corrective movements: (1) hand reaction time to kinesthetic stimulus (joint and muscle); (2) effect of duration of large corrective movement upon its accuracy; (3) definition of the least duration of a movement which can be guided by visual cues; (4) the role of the kinesthetic sense in checking a movement (ballistic hypothesis); (5) effect of removal of visual stimulus upon accuracy; and (6) definition of minimal stimulus exposure (without accuracy impairment). The results are discussed in terms of the role of such factors as those investigated in speed and accuracy of tracking movement. T. G. I. R 9

9344

Carpenter, A. A COMPARISON OF THE INFLUENCE OF HANDLE LOAD AND OF UNFAVORABLE ATMOSPHERIC CONDITIONS ON A TRACKING TASK. *Quart. J. exp. Psychol.*, 1950, 2, 1-6. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

9344

To investigate the relative influence of handle load and unfavorable atmospheric conditions upon performance of a tracking task, twelve subjects were tested on a pursuitmeter under varied conditions of handle load (2, 8, 16, 24, 32, and 40 lb.) and environmental temperature (85°/75°, 90°/80°, 95°/85°, 100°/90°--F. dry bulb/F. wet bulb). An analysis of variance of the data was utilized to evaluate the relative effect and interaction of handle load and temperature upon tracking efficiency. Additional data are presented on the subjective appraisals of the experimental conditions by the subjects and the physiological changes (body temperature and weight) incurred during the experiment.

G. H. L. M.

9345

Fraser, D.C. THE RELATION BETWEEN ANGLE OF DISPLAY AND PERFORMANCE IN A PROLONGED VISUAL TASK. *Quart. J. exp. Psychol.*, 1950, 2, Part 4, 176-181. (Psychological Laboratory, Cambridge, England).

9345

To evaluate the relation between angle of display and performance in prolonged visual tasks, seventeen subjects were given the Clock Test with the test presented in display surface positions (vertical, angle of 45° to horizontal, and horizontal). Each subject was tested in each of the three conditions of clock position for a period of one hour (following 5 minutes of practice). The data were treated by analysis of variance and the results are presented in terms of the average number of errors occurring with each condition of position and also in terms of number of errors committed during first half-hour as compared to number occurring during second half-hour at each position.

T. R 1

9346

Mitchell, M.J.H., & Vince, M.A. THE DIRECTION OF MOVEMENT OF MACHINE CONTROLS. *Quart. J. exp. Psychol.*, 1951, 3, 24-35. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

9346

A series of experiments is described in which direction of movement of a control and display was varied to determine the most efficient relationships for the operator. A continuous pursuit task and a task utilizing intermittent stimuli were used in these experiments. The utilization of one vs. both hands, preferred vs. non-preferred hand, expected vs. unexpected directional relationship, and so forth, were evaluated along with the role of awareness of response. The results are compared with those in the literature and conclusions are drawn concerning optimal display control relationships.

T. G. R 14

9347

Gibbs, C.B. TRANSFER OF TRAINING AND SKILL ASSUMPTIONS IN TRACKING TASKS. *Quart. J. exp. Psychol.*, Aug. 1951, III(Part 3), 99-110. (Applied Psychology Research Unit, MRC, Cambridge, England).

9347

Transfer of training was studied using a compensatory tracking and a serial pursuit task. For the first task, 70 Ss divided into groups learned to track on the standard and one of four modified arrangements of the handle-winding apparatus. These modifications were: pointer direction, pointer size, winding direction, and handwheel size. For the second task, ten females and ten males learned to track on both an easy and difficult course. Learning scores on all pairs of task conditions and sequences were compared by t-tests. The results were considered in terms of task difficulty, expectations based on previous experience, and different levels of required ability.

T. R 14

9348

Poulton, E.C. & Gregory, R.L. BLINKING DURING VISUAL TRACKING. *Quart. J. exp. Psychol.*, 1952, 4, 57-65. (Applied Psychology Research Unit, Cambridge, England).

In order to determine the incidence of blinks during visual tracking, their effect, and the nature of this effect, 2 experimental arrangements were used. In one the S had to keep a pen upon a moving line, his blinks being recorded without his knowledge both electronically and by 2 observers. In the second he had to keep 2 pointers in line using a positional control, the display being occluded intermittently in one part by a wheel tachistoscope. In another by his own voluntary blinks. It was found that the blink rate was raised when the S expected the tracking to start, and again after tracking. During tracking it was reduced, particularly initially. The lowest blink rates were recorded during or immediately before the difficult periods of the course. It was not possible to predict the blink rate while tracking from a knowledge of the true "resting" blink rate. Although blinks were infrequent when the course was difficult, it was here that they caused the largest errors, especially when anticipation was not possible. This effect was due partly to interference with vision, but only temporary inattention could account for the delayed deterioration following blinking. It has been suggested that the blink rate might serve as an index of attention, blinking being one of the earliest signs of inattention.

R 6

9356 Chesman, G.H. & Hayne, Stella. THE INFLUENCE OF ADAPTATION ON ABSOLUTE THRESHOLD MEASUREMENTS FOR OLFACTORY STIMULI. *Quart. J. exp. Psychol.*, 1953, 5, 22-30. (Reading University, Reading, England).

A simple group test method of determining the absolute olfactory threshold for a test stimulus is described. Probit analysis is used to calculate the threshold concentration corresponding to 50% positive responses. This method of threshold measurement is used to determine the change in sensitivity to the test stimulus due to different concentrations of the masking stimulus. When the results for a pair of stimuli are plotted on a graph whose axes represent the log10(A) (log10 masking stimulus concentration) and log10(M) (log10 threshold concentration), the experimental points lie on a straight line. In the 3 cases examined where the test and masking stimuli are identical -- homogeneous pairs -- the slope of this line is -0.7. For the 6 heterogeneous pairs investigated, i.e. test and masking stimuli different, the slope of the line varies from -0.2 to -1.0. This slope may be considered as a measure of a degree of community of odour-property between the pair of substances.

R 6

9357

Fraser, D.C. THE RELATION OF AN ENVIRONMENTAL VARIABLE TO PERFORMANCE IN A PROLONGED VISUAL TASK. *Quart. J. exp. Psychol.*, 1953, 5, 31-32. (University of Cambridge).

9357

In order to evaluate the role of the presence or absence of the experimenter in the performance of a prolonged visual task, 18 subjects were required to turn a crank upon perceiving a large hole presented among a series of small holes (2 mm diameter), cut in a film and projected by a cine camera. Each subject was tested for one hour under each of two conditions: (1) alone in experimental room, and (2) with experimenter present but out of sight of subject. The results are presented in terms of the numbers of errors made under each of the two conditions. Questions are raised concerning the general applicability and reliability of these results.

T. R 4

9358 Jackson, C.V. VISUAL FACTORS IN AUDITORY LOCALIZATION. *Quart. J. exp. Psychol.*, 1953, 5, 52-65. (University of Oxford).

9359

Two experiments are reported on the role of visual factors in auditory localization. In the initial experiment, eleven subjects were first required to indicate (while blindfolded) which of five bells had been rung and then (with blindfold removed) make the same indication when the bell was presented with one of five lights which he was told might or might not correspond to the bell being rung. In the second experiment, 21 subjects made judgments of whistling bottles with a puff of steam varied in terms of its actual occurrence with the particular whistling bottle. The results of the experiments are presented in terms of correctness of response prior to visual stimulus as compared to that following the addition of the visual stimulus. T. I. R 20

9359

McPherson, A., & Renfrew, S. ASYMMETRY OF PERCEPTION OF SIZE BETWEEN THE RIGHT AND LEFT HANDS IN NORMAL SUBJECTS. *Quart. J. exp. Psychol.*, 1953, 5, 66-74. (National Hospital for Nervous Disease, London, England).

9359

In an investigation of the nature of perception of size between the right and left hands, 40 right-handed and 40 left-handed normal subjects made a series of comparative judgments of the size of discs of equal weight but ranging in diameter from 25/16 to 28/16 inch. The discs were presented simultaneously to both hands. The data were scored to reflect the influence of hand dominance and to assess the role of asymmetry in size perception. The results are related to previous findings in the literature and some reference is made to the examination of this function with pathological subjects. T. G. I. R 5

9364

Grindley, G.C., & Wilkinon, R.T. THE AFTER EFFECT OF SEEN MOVEMENT ON A PLAIN FIELD. *Quart. J. exp. Psychol.*, 1953, 5, 183-184. (University of Cambridge).

9364

To investigate the phenomenon of after-effect of seen movement on a plain field, 20 subjects were required to fixate the center of a rotating spiral disc through a low-powered telescope. Upon stopping the disc each subject experienced the illusion of apparent expansion outwards. In this experiment a completely uniform white field was introduced after a 15 second exposure to the moving disc. The results are presented in terms of the nature of the after-effect experienced with the plain field. R 3

9377

Wells, G.L. THE BASIS OF NIGHT VISION. *J. Illum. Engng. Soc.*, 1944, 29, 93-111. (Bausch & Lomb Optical Company, Rochester, N.Y.).

Dark adaptation is a process during which a photoresponsive system automatically increases its sensitivity to light when the illumination is lowered. In vision the photochemical substances are brought back to maximal concentration from some lower level to which a higher illumination has pushed them. The changes which occur in the rods and cones of the retina are described. The role of rhodopsin is discussed. The photopic and scotopic curves are compared and the Purkinje shift explained. The effects of avitaminosis A and hyperventilation are described. (HEIAS)

R 42

9380

Breckenridge, F.C., & Douglas, C.A. DEVELOPMENT OF APPROACH- AND CONTACT-LIGHT SYSTEMS. *J. Illum. Engng. Soc.*, 1945, 40, 785-829. (US National Bureau of Standards, Washington, D.C.)

This paper presents the results obtained in a succession of development projects relating to approach- and contact-light systems. The early history is outlined, followed by a description of the development of neon approach lights. The Barlow Approach-Light system is discussed. An appraisal is given of all units and systems tested. Field tests showed that approach lights can be built which will indicate the location of the approachway and the ground level adequately to enable a pilot to complete his landing provided radio aids are available. A description is given of more recent types of approach- and contact-lights. Future programs and testing procedures are outlined. (HEIAS)

R 9

9383 Luckiesh, M., & Taylor, A.H. A SUMMARY OF RESEARCHES IN SEEING AT LOW BRIGHTNESS LEVELS. *J. Illum. Engng. Soc.*, 1943, 38, 189-207. (General Electric Company, Cleveland, Ohio).

This paper summarizes 2 years of research on vision and seeing at extremely low brightness levels. A low-brightness meter was developed to measure brightness in the range from 5 to 100,000 microlamberts. The following problems are dealt with: a) relative luminous efficiency of radiant energy, b) rate of adaptation to energy of different wavelengths, c) dark adaptation, d) influence of low brightness areas upon state of dark adaptation, e) the Purkinje effect, f) visual acuity in colored light at low brightnesses, and g) relative merits of red and blue light at low brightnesses. (HEIAS)

R 6

9384

Lash, J.D., & Prideaux, G.F. VISIBILITY OF SIGNAL LIGHTS. *J. Illum. Engng. Soc.*, 1943, 38, 481-492. (General Electric Company, Cleveland, Ohio).

Data are presented which relate to specific signal visibility problems. The following problem areas are considered: a) the effect of size of the light source; b) background brightness; c) minimum recommended candlepower of colored signals; d) atmospheric transmission; e) threshold candlepower of colored signal lights; f) flashing light versus steady light; g) heating and cooling time of gas-filled incandescent lamps; h) height of observer and signal; and i) suggested candlepower values for signaling. (HEIAS)

R 6

9398

Comery, E.W. STUDIES OF ILLUMINATION AND BRIGHTNESS IN RESIDENTIAL INTERIORS. *J. Illum. Engng. Soc.*, Sept. 1947, 42, 87-107. (General Electric Company, Cleveland, Ohio).

This paper discusses the problems in the relationships of illumination and brightness in residential interiors and contains related installation and experimental data and observational comments. When the general adaptive brightness level is low, quite high brightness ratios are acceptable. As the adaptive level is raised, the brightness-ratios must be reduced to retain a comparable sense of acceptability. The optimal brightness values for homes, libraries, and offices are discussed in detail. Problems in reading different materials and selection among reading lamps are outlined. (NEIAS)
R 2

9399

Luckiesh, M. & Eastman, A.A. FOOTCANDLES FOR CRITICAL SEEING. *J. Illum. Engng. Soc.*, 1946, 41, 826-846. (General Electric Company).

This paper investigates certain aspects of light control to improve vision. Various practices in illumination are discussed along with the specific lighting needs for various tasks which require good vision. Considerations of brightness-contrast ratio to visibility, diffuse reflection factors, thresholds for visibility, tables derived therefrom and their use with respect to both normal and subnormal vision are also discussed.
R 10

9428

Bald, L., Berrien, F.K., Price, J.B. & Sprague, R.C. ERRORS IN PERCEIVING THE TEMPORAL ORDER OF AUDITORY AND VISUAL STIMULI. *J. appl. Psychol.*, 1942, 26, 382-388. (Psychological Lab., Colgate University, Hamilton, N.Y.).

The present experiment has been designed to answer 3 questions: a) Is there a predisposition to judge either light or sound as appearing first when the 2 stimuli follow each other in rapid succession? b) What effect has the observer's position on his ability to make such judgements? c) What is the effect of obscuring the sound source from view? The judgments were made by a class in elementary psychology consisting of 30 to 32 college men in a large acoustically treated room. The data for the total group indicate: a) that more errors of judgment occur when the order is sound-flash, than when the order is flash-sound at short intervals of time; b) that obscuring the sound source from view increases the errors at the time intervals examined; c) the best situated group made more errors when the order was flash-sound than when the order was sound-flash, while the poorly situated group conformed in general with the total group results. The practical implications of this experiment have been developed.
R 3

9429

Peters, H.B. CHANGES IN COLOR FIELDS OCCASIONED BY EXPERIMENTALLY INDUCED ALCOHOL INTOXICATION. *J. appl. Psychol.*, 1942, 26, 692-701. (University of Nebraska, Lincoln, Neb.).

A male college student acted as S. The color fields for each eye were determined at the start of the experiment and were found to be normal in size and relation. Every half hour 12 ozs. of beer were consumed and the fields measured for a total of 7 cans of beer. 24 hrs after the start of the experiment final measurements were made. Results furnish evidence that alcohol is a depressant. The stimulating stage of exogenous toxemia was not attained. The fields showed normal relations until the depressive stage was manifested. As in other exogenous toxemias when the toxic agent is eliminated for a period of about 24 hrs., the color fields are restored to normal relations. (NEIAS)
R 3

9430

Berger, C. STROKE-WIDTH, FORM AND HORIZONTAL SPACING OF NUMERALS AS DETERMINANTS OF THE THRESHOLD OF RECOGNITION, I & II. *J. appl. Psychol.*, 1944, 28, 208-231, 336-348. (Cornell University).

9430

A series of experiments are reported on the influence of stroke-width, form, and horizontal spacing of numerals upon the threshold of recognition. The experiments were conducted under daylight and night conditions. The method of investigation employed the establishment of thresholds of legibility for each subject in terms of the particular relationship being investigated (form, stroke-width, etc.). Both black and white numerals were used. The results are presented and discussed in terms of the relative effect of each of the stimulus factors upon recognition thresholds. The findings are related to theoretical concepts of human visual function.
T. G. I. R many

9431 Zerbe, J.E. JOB ANALYSIS: A RESUME AND BIBLIOGRAPHY. *J. appl. Psychol.*, 1943, 27, 249-267. (Social Security Board, Bureau of Employment Security, Washington, D.C.).

Job analysis helps to cope with labor shortage in industry. Job analysis is a method of gathering pertinent facts about the worker and his work. The methods of job analysis are described. The role of the U.S. Employment Service is pointed out. Finally, 20 uses are listed for job analysis information. A bibliography of 401 is included covering the period 1911-1941 and dealing with job analysis literature. (NEIAS)

9433 Tinker, H.A. EFFECT OF VISUAL ADAPTATION UPON INTENSITY OF ILLUMINATION: PREFERRED FOR READING WITH DIRECT LIGHTING. *J. appl. Psychol.*, 1945, 29, 471-476. (University of Minnesota, Rochester, Minn.).

The purpose of the experiment was to determine the effect of visual adaptation upon illumination intensities preferred for reading under direct lighting that is strictly local. 60 Ss adapted to 20 foot-candle at one sitting, to 50 foot-candle at the second sitting. After adaptation, each S chose between the standard to which he was adapted and each of 5 other intensities on the basis of the intensity preferred for easy and comfortable reading. Findings: a) Visual adaptation at time of choice influenced the choice only moderately. b) There was a marked tendency to prefer intensities at and above the brightness to which the S was adapted. This resulted in frequent choice of high intensities. c) Since, in direct lighting such as used here, bright intensities make a bad situation worse from the viewpoint of hygienic vision, preferences for illumination intensities for reading yield unsatisfactory data for prescribing lighting for the individual. (NEIAS)
R 7

9447

Seltz, C.P. & Rosenthal, C.H. THE EFFECT OF OXYGEN DEPRIVATION AND STRYCHNINE ON THE RELATIVE BLIND AREAS OF THE EYE. Psychol. Bull., 1940, 37, p462. (University of Alabama, University, Ala.).

This study was concerned with the changes in the relative blind areas of the eye under conditions of oxygen deprivation when strychnine was administered directly to the conjunctive. The control visual fields (35°) of the 4 Ss were mapped at frequent intervals. A definite decrease in the blind area was noted in the eye treated with 1% strychnine, while the eye which had not been treated showed widening of the blind areas, the usual effect of oxygen deprivation. The results clearly demonstrate the effectiveness of a small local application of strychnine in counteracting the effect of oxygen deprivation equivalent to an altitude of 17,500 ft. (MEIAS)

9448

Spreng, S.D.S. THE EFFECTS OF CERTAIN DRUGS ON MENTAL AND MOTOR EFFICIENCY. Psychol. Bull., 1941, 38, 354-363. (Queens College, Flushing, N.Y.).

The paper assembles those studies dealing with drug effects which have a bearing on the problem of mental and motor efficiency. The studies are grouped under the following headings: alcohol, barbiturates (with aspirin and bromides), benzacrine sulfate, caffeine, cannabis, mescal, metrazol and insulin, morphine and other opium derivatives, tobacco smoke, and war gases. The bibliography runs to 80 items mostly from the period 1930-40. (MEIAS)

9449

Lovell, G.D. PHYSIOLOGICAL AND MOTOR RESPONSES TO A REGULARLY RECURRING SOUND. Psychol. Bull., 1941, 38, p715. (Northwestern University, Evanston, Ill.).

Physiological and motor responses to a recurring tone of 60 cycles indicated relaxation (rise in palmar skin resistance above basal), tendency of breathing rate to approach that of the tone, and presence of motor rhythms simultaneous with the tone rate. These objective results were checked by a control group and questionnaire.

9465

Birron, J.E. STATIC EQUILIBRIUM AND VESTIBULAR FUNCTION. J. exp. Psychol., 1945, 35, 127-133. (USN Medical Research Institute, Bethesda, Md.).

Observations of body-sway and rail-walking tests were made on a 19-year old male who had lost all VIIIth nerve functions (vestibular). This S manifested marked body-sway during the first trial period, but improved greatly so that after one month his record could not be classed as pathological. During neither session could he score above zero on the rail-walking test. Postrotational nystagmus time and body-sway measurements were made on 45 male Ss. None of the correlation coefficients differed significantly from zero. The findings indicate that man may maintain stable posture despite loss of vestibular function, and that measurements of body-sway cannot be used to detect vestibular defects. (MEIAS)

R 16

9467

Forbes, G. THE EFFECT OF CERTAIN VARIABLES ON VISUAL AND AUDITORY REACTION TIME. J. exp. Psychol., 1945, 35, 153-162. (University of Sheffield, Sheffield, England).

9467

The auditory and visual reaction times of 178 male subjects varying in age from 17 to 53 were obtained under conditions designed to evaluate the role of each of the following factors: age, proximity to a meal, practice, and fatigue. Each subject was measured by an apparatus specifically designed to generate either a visual or auditory signal at the operator's request. The d'Arcenval clock was used to record reaction time. Data were computed with regard to the correlation of each of the specific factors to reaction time. The results are presented and discussed in terms of the relative effect of each of the factors on visual and auditory reaction time.

T. G. I. R 17

9468

Hebb, D.O. & Foord, E.M. ERRORS OF VISUAL RECOGNITION AND THE NATURE OF THE TRACE. J. exp. Psychol., Oct. 1945, 35(5), 335-348. (Yerkes Laboratories of Primate Biology, Yale University, New Haven, Conn. & Queen's University).

2 experiments, using a total of 405 Ss, were carried out as a test of the Gestalt hypothesis of dynamic activities within the trace. The methods of reproduction and of repeated testing of the same Ss were avoided in favor of recognition tests with different groups for different time intervals. Results failed to support the theory, and a review of the literature shows that the progressive, directed increase of error required by it has been found only in experiments using the invalid test method of repeated reproductions. It is concluded that there is a complete lack of factual support for the Gestalt hypothesis of spontaneous activity within the trace.

R 12

9469

Sharp, L.H. EFFECTS OF RESIDUAL TENSION ON OUTPUT AND ENERGY EXPENDITURE IN MUSCULAR WORK. J. exp. Psychol., July 1941, 29(1), 1-22. (University of Illinois, Urbana, Ill.).

The course of residual tensions in the resting but previously reacting arm is cyclical in character. A rather sharp initial loss in muscular tension is followed by a gradual rise to a much higher level at 15 minutes, then a subsequent slow decline to the pre-work level at 30 minutes. There are indications that the course of residual tensions provides a unitary basis for predicting the direction and relative magnitude of so-called "rest-pause" effect in muscular work. Optimally spaced double work periods show significantly greater output with significantly less energy expenditure in the second work period. It seems likely that the facilitative effects of increased proprioception are involved in simultaneously induced tension effects. (MEIAS)

R 44

9471
 Simonson, E., Enzer, M. & Blackstein, S.S. THE INFLUENCE OF AGE ON THE FUSION FREQUENCY OF FLICKER. *J. exp. Psychol.*, 1941, 29, 252-255. (Mt. Sinai Hospital, Milwaukee, Wisc.).

This study shows that there is a general definite decrease of fusion frequency with age as demonstrated by the average and maximum values. The high values found in about half of the Ss between 10 and 29 years cannot be obtained in the older age groups, but on the other hand, in the young as low values may be obtained as in the older age groups. These results show a decrease of a fundamental sensory function of the central nervous system with age.
 R 8

9472
 Foley, J.P., Jr., Winnik, B.F. & Tyrrell, W.J., Jr. COMPOSITE STEREOGRAPHY: A TECHNIQUE FOR PRODUCING BINOCULAR DEPTH PERCEPTION WITHOUT PAIRED STEREOGRAMS OR VIEWING APPARATUS. *J. exp. Psychol.*, Sept. 1941, 29, 256-262. (George Washington University, Washington, D.C.).

A film is presented which represents an extension of the moving camera technique for obtaining a parallax panoramagram. The resulting film, or 'composite stereograph', thus dispenses with the pair of stereographic pictures and viewing apparatus. It finds application primarily in the biological sciences, but also in aerial photography and radiography. (NEIAS)

9473
 Simonson, E. & Enzer, M. THE EFFECT OF AMPHETAMINE (BENZEDRINE) SULFATE ON THE STATE OF MOTOR CENTERS. *J. exp. Psychol.*, 1941, 29, 517-523. (Mt. Sinai Hospital, Milwaukee, Wisc.).

27 Amphetamine experiments and 29 control experiments were performed on 8 Ss. Amphetamine sulfate increased the maximum frequency of motor impulses, while no consistent results in regard to the fatigability of motor centers (endurance) could be obtained.
 R 16

9474
 Hermans, T.G. THE PERCEPTION OF SIZE IN BINOCULAR, MONOCULAR, AND PIN-HOLE VISION. *J. exp. Psychol.*, Aug. 1940, 27(2), 203-207. (University of Washington, Seattle, Wash.).

A study was performed which compared the perceived sizes in pinhole vision to those with monocular and with binocular vision. 100 Ss each made 30 size estimation judgments using a device by means of which they could reproduce the apparent size of an illuminated square presented to them. The results indicate that in pinhole vision the perceived size is significantly smaller than in binocular vision. They also show a significant difference between the estimates of size in binocular vision and the estimates of size in monocular vision. The estimates of size in monocular vision as compared with pinhole vision are even more significant; the significance of the difference in means of binocular estimates and pinhole estimates is very great. (NEIAS)
 R 2

9476
 Holway, A.H., Staton, R.C. & Zigler, M.H. THE NEUROPHYSIOLOGY OF HEARING. I. THE MAGNITUDE OF THRESHOLD-STIMULI DURING RECOVERY FROM STIMULATION-DEAFNESS. *J. exp. Psychol.*, 1940, 27, 669-676. (Wellesley College).

9476
 On the basis of a neurophysiological theory of audition, the authors derive certain predictions concerning the character of threshold-stimuli following exposure to intense auditory stimulation (productive of stimulation-deafness). To experimentally evaluate this relationship, threshold-stimuli were measured following exposure to tones of different loudness (intensities of 42, 82, and 102 db). Exposure time and frequency were parameters. Results are presented and discussed in terms of threshold-stimulus as a function of post-exposure time and exposure-intensity. Total recovery-period duration is treated as a function of exposure-intensity.
 T. G. R 22

9478
 Grant, V.W. ACCOMMODATION AND CONVERGENCE IN VISUAL SPACE PERCEPTION. *J. exp. Psychol.*, Aug. 1942, 31(2), 89-104. (Northwestern University, Evanston, Ill.).

The effect of accommodation and convergence on distance perception, exclusive of the operation of other visual factors, was studied by means of an optical system providing unified control of image size and of the surface detail of the test target. Changes in the apparent distance of the target were measured and found to correlate in a systematic way with variations in the accommodative and convergent adjustments of the eyes. The differences between the mean distance judgments of 30 Ss were statistically reliable. When the apparent distance of the target was varied by increasing and decreasing accommodation and convergence, a group of 34 Ss gave correct perceptions ranging from 73% to 80% as compared with 33% correct by chance. Reports on apparent size changes of the target showed that increasing accommodation and convergence not only reduces the distance but diminishes the size of the visual image. (NEIAS)
 R 8

9486
 Read, L.C. THE INFLUENCE OF SIZE OF TEST STIMULI, INTERPUPILLARY DISTANCE AND AGE ON STEREOSCOPIC DEPTH PERCEPTION. *J. exp. Psychol.*, 1943, 31, 148-158. (Tufts University, Medford, Mass.).

23 stereograms, with 3 rows of 10 characters on each card, were viewed by 57 male Ss whose average age was 19.9 years and whose average interocular distance was 65.2 mm. The stereopsis angle and the size of numbers and letters were varied. Stereopsis scores were obtained by recording the number of correct responses; these were correlated with the other variables. For a given degree of binocular retinal disparity, the percentage of correct "nearer" judgments was directly related to the size of the test object; but the largest stimuli elicited a disproportionately greater number of incorrect "nearer" judgments than the smaller sizes of stimuli. No significant intercorrelations were found between number of incorrect responses, age, and interocular distance. The correlation between age and stereopsis score was reliable but not large. The perception of apparent depth in a test of this type is considered to be a highly specific and unique type of response, and only partially related to the natural type of depth and distance perception in free visual space. (MEIAS)

R 19

9487
 Ferrus, C.E. & Read, C. A COMMENT AND PRACTICAL MEANS FOR STUDYING LIGHT AND COLOR MINIMA IN ANY PART OF THE RETINA. *J. exp. Psychol.*, 1940, 26, 28-52. (Research Laboratory of Physiological Optics, Baltimore, Md.).

The purpose of the paper was to describe an attachment to the Ferrus-Read Perimeter for determining light and color minima in any part of the field of vision. The limitations of the method of limits and the usefulness of the method of minima are discussed. The use of the attachment is described. It has particular value when a detailed study is needed, when great sensitivity is required. When quantitative knowledge is wanted of the relationship of the sensitivity in the central retina to the sensitivity at any point in the peripheral retina, where knowledge is wanted under different intensities of illumination. In eye diseases it is a means of showing what parts of the retina are apt to be affected. (MEIAS)

R 9

9488
 Smith, F.O. A STUDY TO DETERMINE THE RELATIVE EFFECTIVENESS (VISIBILITY) OF RED, ORANGE, YELLOW, GREEN AND BLUE UNDER CERTAIN SPECIFIED CONDITIONS. *J. exp. Psychol.*, 1940, 26, 124-129. (Marshall State University).

To determine the relative effectiveness (visibility) of red, orange, yellow, green, and blue under conditions of distance of illumination, 22 subjects were required to make 30 comparisons of having colored paper with illumination reduced to .25 foot candle. To evaluate the effect of contrast, strips of black, white, and orange were pasted across each of the original five colors. The results are presented and discussed in terms of the relative effectiveness of each of the colors under conditions of distance of illumination and with and without contrast effect. Implications are presented for the utilization of the data for the design of road signs. T. R

9489
 Andrews, T.G. THE EFFECT OF BENZEDRINE SULFATE ON SYLLOGISTIC REASONING. *J. exp. Psychol.*, 1940, 26, 423-431. (University of Nebraska, Lincoln, Neb.).

20 Ss were given a syllogistic reasoning test at 4 different experimental sittings. At two of the sittings, the Ss were under the influence of 10 mg of benzedrine sulfate; the other two sittings involved a placebo capsule of lactose. Accuracy, time, power scores, physiological indices were taken on the tests at each sitting. Conclusions: a) The drug had no statistically significant effect on reasoning scores, although slight changes occurred in favor of benzedrine--(women being more affected than men); b) The Ss who were lighter in weight obtained a slight increase toward significance due to the benzedrine; c) There was a significant rise in systolic blood pressure due to the effects of benzedrine. In general, all scores were improved by benzedrine. This "summation effect" indicates that benzedrine tends to increase the scores on a syllogistic reasoning test. Higher dose is suggested for a future experiment. (MEIAS)

R 15

9492
 Broadbent, D.E. THE ROLE OF AUDITORY LOCALIZATION IN ATTENTION AND MEMORY SPAN. I. *J. exp. Psychol.*, 1954, 47, 191-196. (University of Cambridge).

Two experiments are reported in this study of the role of auditory localization in attention and memory span. To determine the relative efficiency of different types of localization, 76 subjects were divided into six groups with each group required to answer verbal messages presented under various conditions (e.g., two simultaneous messages, fused vs. localized recording, differing speaker location, etc.). Data are treated in terms of accuracy of answers as a function of condition of message transmission. The second experiment examined the limits of immediate memory on two separate channels. Utilizing the two-channel ferrograph, 24 subjects were tested for memory span with a list of digits presented simultaneously. The results are treated in terms of the type of order of response imposed by the subject under conditions of binaural presentation. T. G. R 13

9493
 Bilodeau, E.A. ACCURACY OF RESPONSE AS A FUNCTION OF TARGET WIDTH. *J. exp. Psychol.*, 1954, 47, 201-207. (Human Resources Research Center).

To determine the role of target width in accuracy of psychomotor response, 400 subjects were presented with a lever pressing task (similar to the Manual Lever Test) under conditions varying in terms of target size as defined by the amount of response permitted to the subject in attaining the goal (controlled by the experimenter). The results are treated in terms of amount of learning as a function of target size. Ballistic principles are utilized in discussing these results. T. G. R 8

9435
 Hochberg, J.E. & Beck, J. APPARENT SPATIAL ARRANGEMENT AND PERCEIVED BRIGHTNESS. *J. exp. Psychol.*, 1955, 57(4), 263-266. (Cornell University, Ithaca, N.Y.).

In order to determine whether perceived brightnesses can be brought into one-to-one correspondence with stimulus illumination relationships any more than with absolute illumination intensities, Ss made judgments of the brightness of a target which, under constant or controlled conditions of illumination, was made to appear to be either perpendicular or parallel to the apparent direction of illumination. Since substantially the same illumination distributions produced different perceived brightnesses, analyses of brightness constancy in terms of stimulus illuminations cannot at present be considered complete explanations.
 R 7

9496
 Falk, J.L., & Bindra, D. JUDGMENT OF TIME AS A FUNCTION OF SERIAL POSITION AND STRESS. *J. exp. Psychol.*, 1954, 47, 279-282. (McGill University, Montreal, Canada).

9497
 To evaluate the function of serial position and stress in judgment of time, 40 subjects were required to judge a 15-sec. interval by the production method (5 marks interval by pressing and releasing a key). Half of the subjects (experimental group) were told of and received mild shock at the end of certain trials while the other subjects (control group) were unaware of and did not receive shock. The results are treated in terms of the relative effects of stress and the nature of the serial position gradients. Time-order error and improvement in ability to judge time are discussed with regard to their role in the production of serial position gradients.
 T. C. R 9

9498
 Black, J.W. LOUDNESS OF SPEAKING: THE EFFECT OF HEARD STIMULI ON SPOKEN RESPONSES. *J. exp. Psychol.*, 1949, 39, 311-315. (Kenyon College).

9499
 Three studies are reported in this investigation of the effect of speaker's signal strength upon listener-speaker's responses. A total of 41 subjects were presented with stimuli of two kinds: words (to be repeated) and interrogatory sentences (to be answered). Level of intensity of heard stimuli was varied. The results are presented and discussed in terms of the relative effect of heard stimuli level of intensity upon the intensity demonstrated both in repeating words and answering questions.
 G. T

9501
 Graybiel, A., Clark, B., & MacCorquodale, K. THE ILLUSORY PERCEPTION OF MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT. *J. exp. Psychol.*, 1947, 37, 170-177. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.).

9501
 This article describes the method and results of preliminary investigations of the autokinetic, oculogyral, and oculogyric illusions caused by angular acceleration and centrifugal force during flight. Apparatus designed to evaluate the degree of apparent displacement and rotation was mounted in a training plane along with an object (i.e., a collimated star) to be fixated. The results of performance of three subjects are presented and discussed in terms of the relation between degree and type of apparent displacement and movement and the particular maneuvers of the plane (i.e., acceleration and centrifugal force).
 I. R 5

9502
 Shaw, W.A., Newman, E.B., & Hirsch, I.J. THE DIFFERENCE BETWEEN MONAURAL AND BINAURAL THRESHOLDS. *J. exp. Psychol.*, 1947, 37, 229-242. (University of Pennsylvania).

9502
 The authors present a critical review of the experimental research concerned with the difference between monaural and binaural thresholds and three experiments designed to evaluate the relation between monaural and binaural thresholds. Subjects were tested for (1) absolute threshold under conditions of simultaneous vs. individual stimulation; (2) amount of summation following arbitrary equation of the two ears by determining the threshold for each and decreasing the tone below each threshold; and (3) the binaural threshold for speech intelligibility. The results are presented and discussed in terms of their implications for the definition of the difference between monaural and binaural thresholds.
 T. I. R 6

9503
 Hisslak, H. AGE AND SEX DIFFERENCES IN CRITICAL FLICKER FREQUENCY. *J. exp. Psychol.*, 1947, 37, 318-332. (Fordham University, New York, N.Y.).

The foveal critical flicker frequency (cff) for both eyes was determined for 100 Ss on 3 consecutive days. Half the Ss were 19-30 years old, the other half from 61-87 years. The sexes were equally represented. Conclusions: a) There is a significant decrease in the cff in old age for both eyes, dominant and non-dominant. It is probably due to the degeneration of the optic nerve and cerebrum; b) There are no sex differences; and c) The range of cff values is greater in old age. The cff test can be useful in gerontological studies. (MEAS)
 R 28

9504
 Doughty, J.V., & Garner, W.R. PITCH CHARACTERISTICS OF SHORT TONES. I. TWO KINDS OF PITCH THRESHOLD. *J. exp. Psychol.*, 1947, 37, 351-365. (Johns Hopkins University).

9504
 In a study of the relationship between pitch and the duration of a tone, two experimental subjects, selected for accuracy in threshold judgments from an original group of six, were asked to make a series of judgments of click-pitch (tone heard as click with some pitch character) and true pitch (definite pitch character) thresholds under conditions of varied tone duration and frequency (125 to 8000 cps) and under conditions of varied tone duration and intensity (90 to 30 db). A vernier setting was made by the subject when he felt he had determined the threshold. The results are presented and discussed in terms of the degree of variation of the click-pitch and tone-pitch thresholds as a function of frequency and intensity and in terms of pitch discrimination as a function of tone duration.
 T. G. I. R 5

9505

Nance, R.B. THE EFFECTS OF PACING AND DISTRIBUTION ON INTERCORRELATIONS OF MOTOR ABILITIES. *J. exp. Psychol.*, Dec. 1947, **32**(6), 459-472. (Milwaukee State Teachers College, Milwaukee, Wisc.).

The study was concerned with the effects of pacing and distribution of practice when using the S.A.M. rotary pursuit test. The rotary pursuit test and a complex coordination test were given to 400 male Ss. With both tests pacing produced lower initial scores. The distributed-paced group alone showed rapid improvement which did not level off at the end of 4 minutes. The hypothesis concerning an increase in the correlations between the 2 tests was not supported. It is concluded that equating the pacing and distribution variables for 2 motor tests carries, under the experimental conditions, no implications for a general motor ability. (NEIAS)

R 17

9506

Birren, J.E., Fisher, M.B., Vollmer, E. & King, B.G. EFFECTS OF ANOXIA ON PERFORMANCE AT SEVERAL SIMULATED ALTITUDES. *J. exp. Psychol.*, 1946, **36**, 35-49. (USN Medical Research Institute, Bethesda, Md.).

29 Ss were given 'flights' at simulated altitudes of 10,000, 14,000, 15,500, and 18,000 feet, in a low pressure chamber. Critical flicker frequency, perimetry, and body sway were tested before, during, and immediately after the procedure. Conclusions: a) Critical flicker frequency and perimetry can be used to detect changes in performance under anoxic conditions; b) Body sway may be used as a test for acute anoxia; c) The lack of correlation among performance decrements suggest considerable variation in the underlying physiological adjustments to anoxia.

R 24

9509

Riker, B.L. THE ABILITY TO JUDGE PITCH. *J. exp. Psychol.*, 1946, **36**, 331-346. (University of Vermont).

9509

To evaluate individual differences in pitch-judging ability, 37 subjects, classified as either musical or unmusical, were required to identify a series of piano notes by note-name and octave position. Another group of 119 subjects, similarly classified in terms of musical vs. unmusical, was required to identify pure tones of the same pitch-frequency as the piano notes. The results are presented and discussed in terms of the relative accuracy of judgment of the musical vs. the unmusical subjects when presented with piano notes vs. pure tones. An analysis of the scale position of the most and least accurate judgments is presented along with a general evaluation of the incorrect judgments.

G. I. R 8

9510

Smith, S. ESSENTIAL STIMULI IN STEREOSCOPIC DEPTH PERCEPTION. *J. exp. Psychol.*, Dec. 1946, **36**, 518-521. (University of Washington).

9510

In a study of the role of directional image sweep across the retina and the presence of fixation points as factors in stereoscopic depth perception, 16 subjects each were given 150 stimulations with fixation figures to be adjudged in terms of the illuminating flash being nearer, further away, or at the same distance as the fixation plane. With a flash of light of 1/60 sec. occurring in each monocular field, the horizontal distance between the lights was systematically varied. The results are presented and discussed in terms of the occurrence of stereoscopic depth perception as a function of availability of fixation points and retinal image sweep.

T. I. R 3

9513

Baker, R.A. & Osgood, S. DISCRIMINATION TRANSFER ALONG A PITCH CONTINUUM. *J. exp. Psychol.*, 1954, **48**(4), 241-246. (Massachusetts Institute of Technology, Cambridge, Mass.).

4 groups of 10 Ss were trained on pairs of tones differing only in frequency. All groups received an equal number of reinforced training trials on a given discrimination and were subsequently tested on a difficult series. 1 group was trained throughout on the test series; a second was trained on an easy discrimination and then shifted to the test; a third approached the test discrimination through a series of graduated steps; a fourth group received no practice and served as a control. All groups were administered the difficult discrimination test prior to training. When these groups were compared in terms of improvement on the difficult discrimination test, it was found: a) the only significant evidence of learning was obtained for Ss who approached the test discrimination through a series of graduated steps; b) performance on the test discrimination appeared to deteriorate for those Ss trained on the very easy discrimination and abruptly shifted to the test discrimination. The decrement in performance was not, however, statistically significant. (NEIAS)

R 10

9514
Corathewahl, S.J. CONSPICUITY OF FLASHING LIGHT SIGNALS OF DIFFERENT FREQUENCY AND DURATION. *J. exp. Psychol.*, Oct. 1954, **48**(4), 247-251. (USAF School of Aviation Medicine, Randolph Field, Tex.).

The experiments reported here have produced evidence that when S is engaged in a very complex psychomotor task, and does not know when and where a light signal may appear, its efficacy as a warning or indicator is determined not by the luminance of a single flash alone, but by the conspicuity of a series of flashes. The results suggest that, if the brightness contrast is 1.00 or 7/16, i.e., according to our previous findings, close to or larger than 1.00, S will respond to a series of light flashes in a complex situation with about the same speed whether the flash becomes visible only once each second for 1/2 sec., 2 times for 1/4 sec., or whether it occurs 4 times per second only for 1/8 sec. At the low contrast, however, the fast flashing light of short duration seems to be more conspicuous than the slow flashing signal of a longer duration.

R 9

9515

Motokawa, K. RETINAL TRACES AND VISUAL PERCEPTION OF MOVEMENT. *J. exp. Psychol.*, June 1953, 45(6), 369-377. (Physiology Dept., Tohoku University, Tohoku, Japan).

A physiological aftereffect of a moving retinal image was investigated by the method of electrostimulation. Aftereffects at a series of points in the retinal pathway were measured and plotted against distances to obtain the "trace-curve". The trace-curve increases in height with increases in distance from the start, giving rise to a gradient in the direction of motion. The higher the velocity, the higher the trace-curve, and its initial gradient is greater. A trace-curve for a large figure is low and its initial gradient small. A trace-curve for a horizontal line moving in the horizontal direction is higher than that for the one oriented at right angles to it. The apparent velocity is little changed by reducing the linear dimensions of the moving field and the objective velocity to one-half of the original ones; but the retinal gradient becomes steeper. The physiological mechanisms of retinal traces is discussed in terms of the known properties of retinal induction. (HEIAS)

R 17

9516

Motokawa, K., & Ebe, M. THE PHYSIOLOGICAL MECHANISM OF APPARENT MOVEMENT. *J. exp. Psychol.*, 1953, 45(6), 378-385. (Physiology Dept., Tohoku University, Tohoku, Japan).

Retinal induction caused by stroboscopic stimuli was measured by the method of electrostimulation. The retinal induction caused by a first stimulus is changed in character and magnitude by the action of a second successive stimulus. With an adequate interval between two stimuli, the induction lying in the field between the retinal areas exposed to the stimuli acquires the same quality as the induction at the site of stimulation so that the two stimuli become fused as retinal processes. A gradient of retinal induction directed from the first stimulus to the second is established by conversion. The interval for optimal conversion decreases with increasing stimulus intensities, and increases as the distance between 2 stimuli increases. These relations correspond to Torte's laws of apparent movement. (HEIAS)

R 17

9517

Keller, Margaret. THE RELATION BETWEEN THE CRITICAL DURATION AND INTENSITY IN BRIGHTNESS DISCRIMINATION. *J. exp. Psychol.*, 1941, 28, 407-418. (Butler Hospital, Providence, R.I.).

A method is described for examining the influence on foveal intensity discrimination of variations in the duration (r) of ΔI , the increment added to the basic intensity I . In foveal intensity discrimination the Bunsen-Roscoe law ($\Delta I \cdot r = \text{constant}$) holds for exposures of ΔI up to the limit of a critical duration (r_c) at all levels of the basic intensity, I . Beyond the critical duration, intensity discrimination is independent of duration and $\Delta I = \text{Constant}$. The critical duration decreases as the basic intensity increases according to an empirical relation of the form $r_c = kI^{-p}$, where k and p are constants. A further analysis shows that, with durations of ΔI greater than r_c , failure to consider the influence of the critical duration may alter the form of the intensity discrimination function in such a way as to produce a rise at high intensities. This observation may partially resolve some disagreements in the work of earlier investigators.

R 10

9518

Grether, W.F. SPECTRAL SATURATION CURVES FOR CHIMPANZEE AND MAN. *J. exp. Psychol.*, 1941, 28, 419-427. (Yale University, New Haven, Conn.).

Saturation thresholds were measured at 17 spectral points by finding the proportion of spectral color mixed with white needed to produce a discriminable hue. Complete curves of spectral saturation as a function of wave-length were obtained for 2 chimpanzees and 2 human beings. Measurements in the central spectral region were obtained for three additional human Ss: a) The saturation curves for both chimpanzees and men conformed very closely to similar curves for humans reported by earlier investigators; b) Coincident with the point of lowest spectral saturation there was a radical change in primary hue. The results are interpreted in terms of the Young-Helmholtz color vision theory. (HEIAS)

R 14

9519

Yacorzynski, G.K., & Brown, M. STUDIES OF THE SENSATION OF VIBRATION. I. VARIABILITY OF THE VIBRATORY THRESHOLD AS A FUNCTION OF AMPLITUDE AND FREQUENCY OF MECHANICAL VIBRATION. *J. exp. Psychol.*, 1941, 28, 509-516. (Northwestern University Medical School).

9519

This study is concerned with the elaboration of two specific aspects of vibratory threshold: (1) specification of the number of threshold determinations necessary for acquisition of a stable threshold measure; and (2) determination of degree of fluctuation of such a threshold over time. Utilizing an apparatus to produce and record vibratory sensations, the thresholds of the right index finger-tip were determined for 20 subjects. Stability of threshold was measured by computing Pearson correlation coefficients between the initial five and the last five threshold determinations. Thresholds were determined at each of four frequencies (200, 400, 600, and 800 d.v.). The results are presented and discussed in terms of number of determinations necessary for a stable measure and the variability of individual thresholds over time. T. G. I. R 8

9520

Hecht, R. & Sargent, S.S. EFFECTS OF BENZEDRINE SULFATE ON PERFORMANCE IN TWO TESTS OF HIGHER MENTAL FUNCTIONS. *J. exp. Psychol.*, 1941, 28, 528-533. (Bernard College, New York, N.Y.).

Benzadrine sulfate was given to a group of 38 Ss. They took a reasoning test and a problem on disarranged words before and after the administration of the drug. A placebo group and a control group were also run. None of the changes in score from the first to the second test was statistically significant, nor were any noticeable differences in speed or efficiency encountered. It seems clear that benzedrine sulfate has no reliable or consistent facilitative or inhibitory effects upon higher mental functions. (HEIAS)

R 6

9525

Conroy, A.L. GROUP PERFORMANCE IN A MANUAL DEXTERITY TASK. *J. appl. Psychol.*, 1953, 37, 207-210. (University of California at Los Angeles, Calif.)

9523

In a study of group performance in a manual dexterity task two experimental questions are posed: (1) degree of predictability of a two person group performance on the basis of knowledge of individual dexterity scores; and (2) the relation of level of group performance to level of performance of individuals composing that group. Sixty-five pairs of subjects were given six trials on the Purdue Pegboard, Assembly Task and six trials on the Assembly Task with each pair working cooperatively. Individual assembly scores were determined. The results are presented and discussed in terms of the relation between group performance level and level of individual performance and accuracy of predictability of group performance on the basis of individual performance scores.

T

9526

Ford, A. TYPES OF ERRORS IN LOCATION JUDGMENTS ON SCALED SURFACES. I. ERRORS OF CONFIGURATION. *J. appl. Psychol.*, 1949, 33, 373-381. (Lehigh University).

9526

This is a study of the role of errors of configuration in making location judgments of a signal presented on a scaled surface. Utilizing three different types of scaling assistance on a rectangular and a sector radar scope, untrained subjects were compared with partially trained subjects with regard to the accuracy of their location judgments. In addition, a group experiment was conducted in which the same problems were presented on a large screen to a group of subjects. The results are presented and discussed in terms of degree of susceptibility to overestimations with specific reference to radar scope design and individual differences in location judgment performance.

T. I. R 2

9527

Ford, A. TYPES OF ERRORS IN LOCATION JUDGMENTS ON SCALED SURFACES. II. RANDOM AND SYSTEMATIC ERRORS. *J. appl. Psychol.*, 1949, 33, 382-394. (Lehigh University).

9527

This study attempts to evaluate the number and type of random and systematic errors in making location judgments of a signal presented on a scaled surface. Utilizing three types of scaling assistance on a rectangular and a sector radar scope, subjects were tested in individual and group experiments under varied experimental conditions (e.g., trained vs. untrained, rectangular vs. sector presentation, etc.). The results are treated in terms of the effect of degree of scaling on random errors and confusion errors, the effect of task alternation on such errors, and the general character of individual differences in the production of location judgment errors.

T. G. R 2

9528

Edwards, A.S. THE EFFECT OF SMOKING ON TREMOR. *J. appl. Psychol.*, 1948, 32, 150-158. (University of Georgia).

9528

In a study of the effects of smoking upon finger tremor, a series of experiments were conducted, in each of which approximately 100 subjects (both smokers and non-smokers) were tested on a finger tremometer under the following conditions: after smoking one-half a cigarette, after eight puffs on a cigarette, inhaling vs. not inhaling, after withdrawal of smoking with habitual smokers, after smoking denicotinized cigarettes, after smoking corn silk, and after simply breathing cigarette smoke in a smoke-filled room. The results are presented and discussed in terms of the relative effect of the various conditions of smoking upon the incidence and degree of finger tremor.

T. R 3

9529 Tiffin, J. & Asher, E.J. THE PURDUE PEGBOARD: NORMS AND STUDIES OF RELIABILITY AND VALIDITY. *J. appl. Psychol.*, 1948, 32, 234-247. (Purdue University, Lafayette, Ind.).

Extensive Purdue Pegboard norms on several male and female populations were obtained from various industrial users. Whenever possible the data were combined, and tables of percentile norms were set up. Intercorrelations of the several Pegboard tests were computed from scores of 434 college men and women. The intercorrelations ranged from .50 to .69. The coefficients obtained from 14 validity studies ranged from .07 to .76. The variation of these validity coefficients among industrial jobs serves to re-emphasize the fact that the validity of the Pegboard should be separately determined for each job for which its use is contemplated. (HEIAS)

R 5

9530

Sleight, R.B., & Tiffin, J. INDUSTRIAL NOISE AND HEARING. *J. appl. Psychol.*, 1948, 32, 476-489. (Purdue University).

9530

In this discussion of the relation of industrial noise to impairment of hearing, the authors present a review and summary of the experimental literature pertinent to this problem. Among the aspects treated are the following: the relation of noise to productivity, the relation of noise to hearing loss, the physiology of deafness, auditory fatigue, harmful noise levels, hearing loss compensation, control of industrial noise, and so forth. Certain conclusions are drawn concerning the advantages for industry in planning audiometric programs.

T. G. R 50

9531

Hoffman, A.C. LUCKIESH AND MOSS ON READING ILLUMINATION. *J. appl. Psychol.*, 1947, 31, 44-53 (Tufts University, Medford, Mass.).

The author reviews the justification for the recommendations of Luckiesh and Moss relating to level of intensity of illumination required for efficient reading. Their results were re-interpreted and, where possible, a statistical re-analysis of the data was done. The author concurs with Tinker that "the experiments of Luckiesh and Moss have led them to recommend what seem to be excessively high-light intensities for visual tasks". He recommends about 15 foot-candles for the ordinary studying and reading situation. (HEIAS)
R 19

9532

Winslow, C.E.A. HOW MANY FOOT-CANDLES? *J. appl. Psychol.*, 1947, 31, 140-142. (Yale University School of Medicine, New Haven, Conn.).

In this editorial Dr. Winslow reviews the various recommendations for level of intensity of illumination by workers in the field. He emphasizes Tinker's work which pointed out the deficiencies in the work of Luckiesh and his associates who recommended excessively high levels. Satisfactory results can only be attained by coordinating the work of engineers, physiologists, and psychologists. (HEIAS)
R 1

9533

Feinberg, R. & Vint, S.E. VISUAL ACUITY IN RELATION TO ILLUMINATION IN THE ORTHO-RATER. *J. appl. Psychol.*, 1947, 31, 406-412. (Purdue University, Lafayette, Ind.).

Visual acuity, right eye, of 100 college students was measured in the Ortho-Rater with different levels of illumination over a range of about 33" to 1 for the far tests and 25 to 1 for the near tests. There was no apparent learning or fatigue factor to bias the results, and the sequence of tests was varied systematically to neutralize any constant error. Mean visual acuity decreased approximately 16% (far) and 22% (near) for reduction in brightness in the ratio of about 2 to 1 from standard brightness. Intercorrelations of acuity at different levels of brightness over a range of 10 to 1 are .80 to .90 for the far tests and .70 to .80 for the near tests -- not much lower than the test-retest reliability. These relations were demonstrated only for photopic levels of illumination in the Ortho-Rater with the checkerboard test object. Similar relations may be true also for other types of acuity tests with standardized illumination, but for letter tests, or other shape characters, they would need to be demonstrated independently. (HEIAS)
R 2

9534

Giese, W.J. THE INTERRELATIONSHIP OF VISUAL ACUITY AT DIFFERENT DISTANCES. *J. Appl. Psychol.*, 1946, 30, 91-106. (Purdue University).

9534

In a study of visual acuity at different distances, 409 subjects were tested with a multiple choice checker test for visual acuity at varied distances ranging from .20 to 10.00 meters. The results are presented in terms of test-retest reliability, intercorrelations of visual acuity at various distances, visual acuity as a function of amount of distance and amount of diopter change, and so forth. Conclusions are drawn concerning the accuracy of acuity measures taken at various focal distances.
T. G. I. R 8

9535

Paterson, D.G. & Tinker, M.A. READABILITY OF NEWSPAPER HEADLINES PRINTED IN CAPITALS AND IN LOWER CASE. *J. appl. Psychol.*, 1946, 30, 161-168. (University of Minnesota, Minneapolis, Minn.).

3 studies were carried out relating to the problem of relative legibility of headlines. The first study dealt with 5-word single-column headlines set in 24 point bold face, half in upper case and half in lower case, to be read by tachistoscopic exposure at the normal reading distance of 15 inches. The results disclosed an 18.9% difference in favor of the lower case headlines. The second study used the same single-column headlines but exposed them at a distance of 5 1/2 ft. This time both kinds of headlines were shown to be equally legible. The third study used multi-column or banner headlines set in 60 point bold face. At 6 ft. the legibility of the lower case was 5.3% greater, at distances from 10 ft. to 14 ft. both were equally legible, at 17 ft. the upper case headlines proved more legible. The writers recommend that headline writers should abandon the use of upper case headlines. (HEIAS)
R 10

9536

Fisher, M.B. & Birren, J.E. STANDARDIZATION OF A TEST OF HAND STRENGTH. *J. appl. Psychol.*, 1946, 30, 380-387. (Fresno State College, Fresno, Calif. & Northwestern University, Evanston, Ill.).

The paper deals with a test procedure for the hand dynamometer which is satisfactory for inclusion in a battery of performance tests. S squeezes the dynamometer every 3 sec., starting with a grip of 27 kg., and increasing his grip 3 kg. with each attempt. The split-half reliability coefficients, preferred vs. non-preferred hand, were 0.91 and 0.92 for the first and second tests, respectively (N=72). The retest reliability of the test, administered twice within 2 days, was 0.87 (N=72). Mean improvement in the early periods of practice for 40 Ss was 0.31 kg. per-period. Several groups of data involving various stress conditions indicate that the test has some degree of validity, in that test scores parallel the cardiovascular and respiratory responses and reported general fatigue of Ss under such conditions. (HEIAS)
R 10

9537

Peterson, G.G. & Tinker, M.A. THE RELATIVE READABILITY OF NEWSPRINT AND BOOK PRINT. J. appl. Psychol., 1946, 30, 454-459. (University of Minnesota, Minneapolis, Minn.).

The purpose of this investigation was to compare the readability of newsprint and book print. Speed of reading 10 point Cheltenham book type was compared with speed of reading 8 point Opticon newsprint and with 7 point Ionic No. 5 newsprint. Both kinds of newsprint were read significantly more slowly than the book print. The slower rate of reading newsprint is apparently due to the greater difficulty of discriminating the printed characters in comparison with the book type which is larger and which involves greater brightness contrast between print and paper. The 10 point book print and the 8 point newsprint are judged to be about equally legible, but the 7 point newsprint is considered to be far less legible. The book print is judged to be most pleasing, the 8 point newsprint next most pleasing, and the 7 point newsprint least pleasing.

R 10

9538

Peterson, G.G. & Tinker, M.A. INFLUENCE OF LEADING UPON READABILITY OF NEWSPAPER TYPE. J. appl. Psychol., 1947, 31, 160-163. (University of Minnesota, Minneapolis, Minn.).

The purpose of this investigation is to determine the influence of leading on the readability of newsprint. Speed of reading 7 point Ionic No. 5 newsprint in a 12 1/2 pica line width set solid was compared with speed of reading text typographically identical except for leading which varied in the different comparisons as follows: set solid (control group), 1, 2, 3, 4, 5, 7, and 9 points. All material with leading was read faster than text set solid. In comparison with set solid material, the 4 and 5 point leading produced differences with the highest significance (beyond the 1% level). One point leading is as effective in improving readability as larger amounts of leading except for 4 and 5 points. 9 point leading is less effective than most of the lesser amounts of leading. Text with 4 and 5 point leading is judged to be most legible. This agrees with the speed of reading results. Material set solid is judged to be least legible. In view of practical considerations, readability and readers' judgments, 1 point leading is indicated for 7 point newspaper type in a 12 1/2 pica line width. This would also hold for a 12 pica line width since unpublished data of the writers show that variations in line width from 12 to 12 1/2 to 13 picas do not significantly affect readability of newspaper type.

R 4

9541

Attneave, F. SOME INFORMATIONAL ASPECTS OF VISUAL PERCEPTION. Psychol. Rev., 1954, 61, 183-193. (USAF Perceptual and Motor Skills Research Lab., Lackland AFB, Tex.).

In this paper the author indicates some of the ways in which the concepts and techniques of information theory may clarify the understanding of visual perception. Sections are devoted to the nature of redundancy in visual stimulation, to the abstraction of statistical parameters and to perception as economical description. (NEIAS)

R 20

9543

Cohen, J. COLOR ADAPTATION TO 1945. Psychol. Bull., 1946, 42, 121-140. (Cornell University, Ithaca, N.Y.).

The paper presents a critical history of the phenomenon known to workers in color as color adaptation, color fatigue, or color minuthesis. A bibliography of 47 items is included. (NEIAS)

9544

Jones, L.V. TEST OF HYPOTHESES: ONE-SIDED VS. TWO SIDED ALTERNATIVES. Psychol. Bull., 1952, 49, 43-46. (University of Chicago, Chicago, Ill.).

This article deals with the advantages of utilizing one-tailed statistical tests. A concise comparison of the hypotheses and assumptions involved in using directional and non-directional hypotheses is statistical analyses. For illustrative purposes the student's "t" test was chosen as the model to be examined. The power of a test which tests the null hypothesis against a one-sided alternative is emphasized and its use is strongly recommended. (NEIAS)

R 2

9550

Barker, M.E. WARM CLOTHES. Sci. Amer., March 1951, 184, 56-60. (University of Arkansas).

9552

Kleitman, N. SLEEP. Sci. Amer., 1952, 187, (5), 34-38. University of Chicago.

9550

In an attempt to evaluate the role of various fabrics in the design of adequate insulating clothing, a series of experiments was conducted in which various fabrics and combinations of fabrics were evaluated under conditions of varied humidity and moving air. The results are presented and discussed in terms of amount of heat loss for each type of cloth as a function of wind velocity and amount of water saturation. Thermal insulating values are presented for various types of clothing.

T. G. I.

9552

In this discussion of the nature of sleep, the author cites the results of several experiments dealing primarily with the physiological definition of this function. Among the various aspects discussed, the following are included: the role of the cerebral cortex and subcortical neural mechanisms, the physiological and psychological effects of sleep deprivation, internal and external temperature factors, the social aspects of the diurnal rhythm of sleeping-wakefulness, etc.

G. I.

9559

Isaacs, C.G. & Lloyd, V.T. STEREOSCOPIC ACUITY FOR VARIOUS LEVELS OF ILLUMINATION. *Proc. Nat. Acad. Sci.*, 1948, 34, 223-227. Columbia University.

9559

To evaluate the influence of intensity of "white" light upon stereoscopic acuity, two subjects were required to make 20 stereoscopic settings at each of ten intensity levels (ranging from -4.04 to 2.27 log millilamberts). The data were analyzed in terms of acuity as a function of field brightness. Results are discussed in terms of implications for brightness discrimination and visual acuity.

C. R. 7

9560

Wolf, E. EFFECTS OF EXPOSURE TO ULTRA-VIOLET LIGHT ON HUMAN DARK ADAPTATION. *Proc. Nat. Acad. Sci.*, 1946, 32, 219-226. (Harvard University).

9560

This study is concerned with the process of dark adaptation following exposure to ultra-violet light. Utilizing a visual discriminator to assess dark adaptation, data were obtained on six observers under conditions of exposure to varied degrees of ultra-violet light and exposure to light free from ultra-violet. The course of dark adaptation under each condition is presented. The results are discussed in terms of level of dark adaptation as a function of extent of ultra-violet spectrum.

T. G. R. 7

9563

Hardy, J.D., & DuBois, E.P. DIFFERENCES IN MEN AND WOMEN IN THEIR RESPONSE TO HEAT AND COLD. *Proc. Nat. Acad. Sci.*, 1940, 26, 389-398. (Cornell University, Medical College).

9563

This is a study of male-female differences in response to heat and cold. Seven women and two men were measured by means of a respiration calorimeter and a Hardy radiometer in terms of rectal and skin temperatures, heat production and loss, body surface area, and skin and lung water vaporization. Calorimeter temperature was varied from 22° to 35° C. The results are treated in terms of the type of thermal adjustment evidenced by the women as compared to that evidenced by the men. The quantitative differentiations between males and females with regard to thermal factors are discussed in detail.

G. R. 12

9568

DuBois, E.P. PHYSIOLOGICAL EFFECTS OF HEATING AND VENTILATION. *Heating-Piping*, April 1951, 23, 134-136.

9568

In a discussion of the physiological aspects of heating and ventilating, data are presented concerning heat production in relation to the activities of members of a typical family, the relation between heat loss factors and environmental temperature, and man's heat loss and production when studied in a calorimeter. Problems of heating and ventilation are discussed in terms of the process of body temperature regulation.

G. R. 5

9569

Leopold, C.S. ENGINEERING ASPECTS OF COMFORT DATA. *Heating-Piping*, April 1951, 23, 136-140.

9569

Having defined thermal comfort as the "absence of discomfort or annoyance due to temperature and atmosphere effect indoors", a series of experiments was conducted to evaluate optimal winter and summer comfort zones for individuals involved in various activities. This article presents the results of such experiments in the form of graphs and charts of comfort zones under varied conditions of temperature, humidity, activity, etc.

G

9573

Guth, S.K. COMFORTABLE BRIGHTNESS RELATIONSHIPS FOR CRITICAL AND CASUAL SEEING. *Illum. Engng.*, 1951, 46, 65-75. (General Electric Co., Cleveland, Ohio).

9573

This article presents a series of investigations concerned with the relation between comfortable brightness relationships and critical and casual seeing. Utilizing both a simulated visual environment and an experimental one, it was possible to determine the relation between the brightness of a particular source sufficient to produce a feeling of distraction and the position of such a source in the visual field. In addition, data were determined with regard to the particular role of such factors as size, brightness, position, number of sources, etc., in the production of feelings of discomfort or comfort with a lighting installation. A discussion of the article is included.

T. G. I. R. 2

9574

Cottrell, C.L. VISIBILITY: A MEASURABLE QUALITY OF A SEEING TASK. *Illum. Engng.*, 1951, 46, 95-103. (Cornell University).

9574

Following a brief review of methods used to measure visibility thresholds, the author describes a contrast-brightness threshold meter designed to obviate the potential inaccuracies obtained with an instrument such as the Luckiesh-Moss Visibility Meter (e.g., the effect of change in apparent brightness upon brightness adaptation, etc.). Measurements on a variety of visual targets were made and compared on the same targets. The relative advantages of the contrast-brightness threshold meter as compared to the Luckiesh-Moss meter in obtaining threshold curves are discussed. A discussion of the article is included.

T. G. I. R. 12

9575

Allphin, W. MUSCLE ACTION POTENTIALS AS RELATED TO VISUAL TASKS IN INDUSTRY. *Illum. Engng.*, N.Y., 1951, 46, 188-196. (Sylvania Electric Products, Inc., Ipswich, Mass.).

9575

This study represents an attempt to investigate in an actual industrial situation the relationships found in the laboratory between level of illumination and tension level (as reflected in muscle action potentials). Muscle action potentials from the frontalis muscles were recorded (by means of the Tufts-Navy Alertness Indicator) with subjects performing the following tasks: stenography, feeding an automatic machine with filament wires, and assembling fluorescent starter sockets. Illumination level was varied as the particular task was performed. The results are presented and discussed in terms of the relation between tension level and illumination level for each type of task. A discussion of the article is included.

G. T

9577

Brown, W.C. (Chm.). INDUSTRIAL LIGHTING PRACTICE REVISED. *Illum. Engng.*, May 1951, 46, 225-243. (Committee on Industrial Lighting, Illuminating Engineering Society, New York, N.Y.).

9577

This article represents parts of a proposed revision of the "American Recommended Practice of Industrial Lighting" prepared by the Committee on Industrial Lighting. Among the general aspects included are the following: factors affecting seeing tasks, factors of good illumination, influence of environmental factors, artificial lighting systems, and lighting methods for industry.

T. G. I.

9578

Illuminating Engineering. AREA PROTECTION LIGHTING FOR INDUSTRY. *Illum. Engng.*, May 1951, 46, 244-248.

9578

This article presents a series of recommendations concerning area protection lighting (for industry). The following types of protective lighting equipment are discussed: street lighting luminaires, floodlights, Fresnel lanterns, and searchlights. Charts and illustrative layouts for adequate protective lighting practices are presented.

T. I

9581
Marion, W.B. (Ch.). LIGHTING OF CONTROL ROOMS.
Illum. Engng., June 1951, 318-328. (Subcommittee
on Control Room Lighting, Illuminating Engineering
Society, New York, N.Y.).

9581
This article presents a series of recommendations
concerning the lighting of control rooms. Lighting
procedures, visual factors, equipment, and workplace
design are discussed under the major topics of seeing
tasks, corollary factors (e.g., size of scales and
lettering, non-glare glass, etc.), control room arrange-
ments, recommended illumination levels, effective
lighting designs, and design for daylight illumination.
T. I. R 19

9582
Garbell, M.A. RECENT DEVELOPMENTS IN VISUAL
LOW-APPROACH AND LANDING AIDS FOR AIRCRAFT.
Illum. Engng., July 1951, 46, 353-358. Dis-
cussion in Oct. 1951, 46, suppl. 26A.

9582
This is a digest of a report by Dr. Maurice A. Gar-
bell on "Recent Developments in Visual Low-Approach and
Landing Aids for Aircraft." Following a summary of the
function and performance requirements of such aids, the
testing procedure and method of evaluation are described.
Data are presented on the role of various approach light
systems and conclusions are drawn concerning the most
effective type of system.
T. I. R 1

9586
Solandt, D.Y. & White, R.E. THE EFFECT OF SPECTRAL COMPOSITION OF ILLUMINATION ON VISUAL
PERFORMANCE. Illum. Engng., N.Y., 1951, 46, 467-468. (University of Toronto, Toronto,
Canada).

The present work was undertaken to assess separately and compare the visual effectiveness
of white light produced by a source with a continuous spectrum and white light produced by
mixing complementary spectral colors of narrow band width with their relative intensities
adjusted to yield white light. Visual acuity was measured using 2 mixtures of monochromatic
lights adjusted to give the sensation of white light and the results were compared with those
obtained using the white light from a concentrated (zirconium) arc lamp, and from a fluores-
cent (white or daylight) lamp. The spectral distribution curve for the zirconium arc lamp
is continuous, and that for the fluorescent lamp shows peaks of the mercury spectrum super-
imposed on the relatively continuous spectrum of the various fluorescent materials in the
phosphor. That of the dichromatic illumination showed 2 peaks and the trichromatic three,
in accordance with the filters used.

9588
Putnam, R.C., & Fausett, R.E. THE THRESHOLD
OF DISCOMFORT GLARE AT LOW ADAPTATION LEVELS.
Illum. Engng., N.Y., 1951, 46, 505-510.
(Case Institute of Technology).

9588
To determine the threshold of discomfort glare,
fifteen subjects were given momentary exposures to a
glare source and were required to adjust a variac con-
trolling the brightness until in their judgment the com-
fort-discomfort borderline was attained. Eye position
was fixed and the brightness of the adaptation field was
held constant by the experimenter. A total of 3139 ap-
praisals was recorded. The results are compared to those
obtained by other researchers using similar and different
techniques. Conclusions are drawn concerning the tolera-
bility of brightness as a function of the source (i.e.,
small vs. large light sources).
G. I. R 15

9589
Illuminating Engineering. LIGHTING A WALL MAP.
Illum. Engng., Oct. 1951, 46, p.529.

9589
This article presents a brief description and an
illustration of a lighting technique designed to provide
supplementary illumination for a wall map. Details of
lighting installation are presented along with evaluation
of resultant average brightnesses.
I

9590
Beggs, E.W. (Ch.). TRANSPORTATION LIGHTING INCLUDING
BUSES, STREET CARS, RAPID TRANSIT, AND RAILWAY TRAINS.
Illum. Engng., Oct. 1951, 46, 537-542. (Committee on
Interior Lighting for Public Conveyances, Illuminating
Engineering Society, New York, N.Y.).

9590
This report on transportation lighting is concerned
with the problems resulting from the necessary use of
direct current power supplies. Problems of illumination,
lighting system design, equipment, etc. are noted in
the description of lighting systems in buses, street
cars, rapid transit, and railway trains. Recommendations
are offered with regard to solution of problems of
adequate illumination and also with regard to the most
effective utilization of direct current power supplies.
T. I. R 7

9591
Sharp, H.V. & Parsons, J.P. LOSS OF VISI-
BILITY DUE TO REFLECTIONS OF BRIGHT AREAS.
Illum. Engng., N.Y., 46, 581-583.

9591
In a study of loss of visibility due to reflection
of bright areas, the contrast and visibility factors
for printed letters on 24 types of paper stock were
computed. The results are presented and discussed in
terms of visibility as a function of degree of illumina-
tion and amount of light source brightness.
T. G. R. 7

9593
Jones, J.R. & Weidhart, J.J. COEFFICIENTS OF UTILIZATION FOR LUMINAIRES WITH CONCENTRATING
DISTRIBUTIONS. Illum. Engng., N.Y., Dec. 1951, 46, 601-609. (Westinghouse Electric Corp.,
Bloomfield, N.J.).

The currently used Lumen Method of calculating interior illumination was developed by
Harrison and Anderson during the period between 1915 and 1920. It is an empirical method
based upon the results of experiments with typical luminaires of that time in rooms of vari-
ous sizes and surface reflectances. The need for additional accurate data has long been re-
cognized and other studies have been initiated to provide information that is applicable for
all distributions. One of these has resulted in the Interreflection Method, which has been
used as the basis for computing the data for the reflected components presented in this paper.
The real need is for a method of calculating coefficients of utilization that more fully re-
cognizes differences in distribution of light flux from present day equipment. It would then
be possible to provide more accurate coefficients of utilization for use in the familiar
Lumen Method formulas. To satisfy this need the authors are proposing a method of calculat-
ing coefficients of utilization that considers the ultimate disposition of the flux from
every 10° zone instead of using an arbitrary wide zone of 40° as a criterion. The flux in
each 10° zone (0°-10°, 10°-20°, etc.) that strikes the work plane directly is determined, and
to that is added the flux that reaches the work plane by interreflection. The ratio of the
total flux reaching the work plane to the lamp lumens is the coefficient of utilization.
R 5

9594

Kavern, G.M. EFFECT OF SOURCE SIZE UPON APPROACH LIGHT PERFORMANCE. Illum. Engng., N.Y., 1950, 45, 96-98. (Wright Air Development Center, Dayton, Ohio).

An investigation was initiated to determine the most practical solution to the following problems, utilizing presently available information: a) Determination of the effect of apparent source size upon the visual range of lamp assemblies used as approach and runway lights during low visibility conditions; b) Determination of suitable source size requirements for inclusion in specifications covering high intensity approach and runway lamp assemblies. It is evident that when runway and approach lighting systems are being designed, the effect of source size can no longer be ignored. A simple and convenient method of evaluating lamp assemblies with respect to effective source size has been developed and is presented. This method is admittedly approximate, but more exact methods are not feasible until more information is obtained by basic research on the following points: a) Background brightnesses during daylight fogs; b) Correlation of laboratory and practical pilot visual thresholds; c) Effect of non-circular shapes; d) Effect of non-uniform brightnesses; e) Effect of grouping 2 or more small sources.

R 3

9596

Buck, G. B., II. COLOR PREFERENCE STUDIES WITH FLUORESCENT LAMPS. Illum. Engng., N.Y., 1950, 45, 165-173. (General Electric Co., Cleveland, Ohio).

9596

The author presents summaries of a series of studies dealing with color preference under conditions of fluorescent lamp lighting. The data include results on lamp preferences for complexions, foods, and materials of design. The particular effects of specific colors on various objects are discussed along with the effects of the new halophosphate phosphors on lamp design. A discussion of the article by other individuals concerned with color preference is also presented.

T. G. I. R 4

9601

Finch, D.M. LIGHTING DESIGN FOR NIGHT DRIVING. Illum. Engng., N.Y., June 1950, 45, 371-386. (University of California).

9601

The author presents a detailed review and discussion of the basic requirements for seeing under conditions of night driving with specific emphasis upon the engineering problems such conditions present. Some of the specific aspects treated include definition of minimum perceptible contrast and visual acuity in terms of roadway illumination, object background, etc., the effect of luminosity of the surround, the role of glare in visibility, the function of attention in night visibility, the effect of fatigue, and the implications of such factors for effective highway lighting design. A discussion of this paper is included.

T. G. I. R 9

9605

Bieseke, R.L., Jr. EFFECT OF TASK-TO-SURROUND BRIGHTNESS RATIOS ON VISUAL PERFORMANCE. Illum. Engng., N.Y., Dec. 1950, 45, 733-740. (Southern Methodist University).

9603

In a pilot study of the effect of task-to-surround brightness ratios on visual performance, subjects were presented with the visual task of distinguishing the orientation of gaps in a pattern of Landolt rings. The test conditions were as follows: (1) presentation of task at one brightness ratio and tested for one minute, followed by a three-minute eye rest period and a retest at another brightness ratio; (2) a one-hour test under conditions inducing fatigue; (3) a four-hour test under conditions inducing fatigue, and (4) conditions similar to the first procedure but with brightness ratio held constant and brightness level varied. The results are presented and discussed in terms of the relative importance of task-to-surround brightness ratio in visual performance. G. I. R some

9608

Cohen, J. MULTICHROMATIC COLORIMETERS. Illum. Engng., Jan. 1954, 49(1), 50-58. (University of Illinois, Urbana, Ill.).

A general theory of physical colors, and their instrument analogues, has been developed. Apparatus characteristics are derived for a) a multichromatic colorimeter which will produce a color whose radiation content will correspond to any predetermined spectroradiometric curve including a monochromator, a trichromatic colorimeter, a monochromatic-plus-white colorimeter for b) a recording spectrophotometer and for c) an integrator for the tristimulus values for any set of primaries which will give the numbers even before the recording pen begins its trace. Descriptions and calibration data of the multichromatic colorimeters are given in this paper.

R 42

9609

Weston, H.C. VISUAL FATIGUE. Illum. Engng., N.Y., 1954, 49, 63-74. (University of London).

9609

In this discussion of visual fatigue, the author considers the general genesis of tiredness of sight and the specific lighting conditions which induce such a visual state. The following factors receive primary attention: the role of muscular exertion in vision, the function of retinal stimulation and fatigue, fatigue of convergence and accommodation, the subjective aspects of the feeling of eyestrain, the role of muscles other than those determining convergence and accommodation, the role of head and eye posture, and such aspects as muscular reaction to glare, frowning, and so forth.

G. I. R

9610

Stiles, W.S. VISUAL FACTORS IN LIGHTING. Illum. Engng., N.Y., Feb. 1954, 49, 77-92. (National Physical Laboratory, Teddington, England)

9610

In this discussion of the visual factors involved in interior lighting considerations, the author reviews the role of the following visual concepts and properties: the relation between retinal illumination and external field brightness, C.I.E. brightness (the luminance value of the source), the rod and cone mechanisms of vision, brightness in the peripheral field, brightness and color at high luminance intensity, color adaptation, matching, etc., formulae for discomfort glare, and the role of surround brightness in visual performance. A discussion of this article is included.

T. G. I. R 29

9611
Fry, G.A. RE-EVALUATION OF THE SCATTERING THEORY OF GLARE. *Illum. Engng.*, N.Y., Feb. 1954, 42, 98-102. (Ohio State University, Columbus, Ohio).

This paper states and mathematically defines the scattering theory of glare. It discusses the experimental determination of (R), heterochromatic glare sources, the attenuation coefficient (c) of the media of the eye, transmission of the ocular media, agreement between the theoretical and empirical curves for (B), computation of stray light in the eye for a distribution in luminance in the field of view.

R 5

9613
Allen, C.J. SUGGESTED DESIGN FOR CHALKBOARD LIGHTING. *Illum. Engng.*, N.Y., Jan. 1952, 47, 13-14. (General Electric Co., Cleveland, Ohio).

9613
Following a brief enumeration of the adverse factors involved in chalkboard visibility, the author describes an experimental fluorescent unit designed to improve chalkboard visibility. The advantages of such an illuminating unit are discussed in terms of the resultant level of chalkboard illumination, the uniformity of illumination, maintenance requirements, and so forth.

I

9615
Brown, P.R., & Alsher, D. VISUAL PROBLEMS IN AIRCRAFT LIGHTING. *Illum. Engng.*, N.Y., Feb. 1952, 47, 69-81. (Naval Air Experimental Station, Philadelphia, Penn.)

9615
The author presents a detailed enumeration and discussion of the visual problems inherent in aircraft lighting design. Included are problems of cockpit lighting, instrument lighting, control panel lighting, arrangement of markings on control panels, the effects of floodlighting, problems of exterior lighting of aircraft, interior cockpit lighting, carrier landing approach lighting, and the utilization of aircraft lighting to facilitate formation flying. A discussion of this article is also included.

T. G. I

9616
Middleton, W.E.K. STUDY OF THE CONSPICUITY OF ORANGE SURFACE COLORS. *Illum. Engng.*, Feb. 1952, 47, 95-98. (National Research Council of Canada, Optic Section, Ottawa, Canada).

9616
In order to evaluate the conspicuity of orange surface colors, a variety of orange colors ranging from bright yellow to deep reddish orange were presented in the form of painted panels to a series of observers. Judgments of conspicuity were made at varied distances with the panels regularly interchanged and viewed against different backgrounds for a period of approximately one year. The results are presented and discussed in terms of the relative distribution of conspicuity among the colors for each particular type of background (e.g., forest, snow, grass) and under conditions of sun shining and sun not shining on the panels. Recommendations are offered with regard to choice and treatment of color for optimal conspicuity.

T. I. R some

9617
Roper, V., & Meese, G.E. SEEING AGAINST HEADLAMP GLARE. *Illum. Engng.*, N.Y., March 1952, 47, 129-134. (General Electric Co., Cleveland, Ohio).

9617
In an investigation of the problem of providing sufficient headlamp intensity to ensure a seeing distance in excess of a stopping distance and at the same time account for the problem of veiling glare from approaching vehicles, a series of tests was run to evaluate driver behavior with regard to headlight dimming and perception of obstacles. Utilizing a Taylor-Pracejus illumination recorder, two cars were operated from opposite ends of a highway on which obstacles had been placed. The results are presented and discussed in terms of the seeing-distance curves under four conditions of headlighting, seeing-distance of regular vs. experimental low beam headlamps, the role of attention in obstacle perception, and so forth.

G. R 9

9618
Reid, K.M., & Toenjes, D.A. APPRAISAL OF DISCOMFORT GLARE ON LIGHTED STREETS. *Illum. Engng.*, N.Y., March 1952, 47, 143-148. (General Electric Co., Cleveland, Ohio).

9618
This article presents the results of a series of field studies concerned with the problem of appraising the role of discomfort glare caused by lighted streets in the motorist's visual function. Evaluations were made while driving under 31 diversified lighting installations. The conclusions are discussed in terms of the amount of glare evidenced in all of the lighting installations, the relation between comfort-discomfort appraisals and the vertical foot candles on the motorist's eye, the relation of comfort-discomfort appraisals to veiling glare, and the outlook for dealing with the factors involved in street lighting discomfort glare.

T. G. R 10

9620
Logan, H.L., & Lange, A.W. THE EVALUATION OF VISUAL COMFORT DATA. *Illum. Engng.*, N.Y., June 1952, 47, 195-205 and 331-332. (Holo-plane Co., N.Y.)

9620
This article presents a critical discussion concerning the evaluation of visual comfort data. A critique of a previous paper is presented in terms of difficulties seen inherent in glare rating systems and the general meaningfulness of such investigations. Answers to these questions are presented by the authors of the original paper on visual comfort data.

R 2

9621
Simonson, E. & Brozek, J. WORK, VISION, AND ILLUMINATION. *Illum. Engng.*, June 1952, 47, 335-349. (University of Minnesota, Minneapolis, Minn.).

9621
The authors present a review and discussion of the research concerned with problems of visual work and illumination. Among the topics treated are the following: the provision of adequate illumination codes (levels of illumination), the efficiency of tests of visual functions (e.g., Lockie-Moss visibilometer, Landolt rings recognition tests, etc.), the measurement and evaluation of fatigue in visual and non-visual functions, and the implications of industrial and laboratory studies on work performance. A detailed discussion of this article is included.

T. I. R 57

9627
Blackwell, R.R. BRIGHTNESS DISCRIMINATION DATA FOR THE SPECIFICATION OF QUANTITY OF ILLUMINATION. *Illum. Engng.*, N.Y., 1952, 47, 602-609. (University of Michigan).

9627
This article presents experimental data concerning the quantity of illumination necessary for the most adequate discrimination of brightness differences. Two subjects were presented the task of detecting a disc target produced by adding a brightness increment to a screen of uniform brightness. A total of 162 experimental sessions were conducted with each session consisting of 250 target presentations at various levels of target brightness increment and under varied conditions of target size, target duration, and background illumination. The results are presented in terms of optimal performance as a function of quantity of illumination. A discussion of this article is included.

G. R 5

9528
Kahler, M.M. (Chm.). RECOMMENDED PRACTICE FOR SUPPLEMENTARY LIGHTING. Illum. Engng., Nov. 1952, 47, 623-635. (Subcommittee on Supplementary Lighting, Illuminating Engineering Society, New York, N.Y.)-

9628
This is a report prepared by the Subcommittee on Supplementary Lighting of Committee on Lighting Study Projects in Industry of the Illuminating Engineering Society and designed as a guide to solution of lighting problems requiring supplementary lighting illumination. The following aspects of supplementary lighting practice are included: the definition of supplementary lighting, analysis of the seeing task (e.g., factors in visual perception, fundamentals of visibility such as size, contrast, etc.), description and definition of supplementary lighting equipment (e.g., directional type, uniform brightness type, etc.), and a detailed classification of visual tasks and corresponding lighting techniques.
T. G. I

9631
Eeck, H.E. POSITIONING OF DIRECTIONALLY ADJUSTABLE LUMINAIRES. Illum. Engng., 1953, 48, 175-181. (Westinghouse Electric Corp., Cleveland, Ohio).

9631
Following a brief description of the various types of adjustable luminaires (e.g., searchlights, industrial concentrators, etc.) the author discusses the problem of positioning such luminaires in order to obtain a desired result. The principles of light pattern formation are presented along with an application of these principles to a specific problem, thus demonstrating a method of achieving desired lighting results with adjustable luminaires. A discussion of this article is included.
G. I. R 1

9632
Guth, S.K., Eastman, A.A., & Rodgers, R.C. BRIGHTNESS DIFFERENCE: A BASIC FACTOR IN SUPRATHRESHOLD SEEING. Illum. Engng., N.Y., 1953, 48, 233-239. (General Electric Co., Cleveland, Ohio.)

9632
This article presents a discussion of the role of brightness difference in suprathreshold seeing. Utilizing a test composed of a standard E at four contrasts, data were collected concerning visibility and thresholds with eleven subjects who made a series of observations of the threshold illumination. The results are treated in terms of the relationships among contrast, brightness difference, and threshold and suprathreshold visibility. A discussion of this article is included.
T. G. I. R 3

9635
Hopkinson, R.G. VISUAL REQUIREMENTS FOR CHALKBOARD LIGHTING. Illum. Engng., N.Y.; June 1953, 48, 325-333. (Department of Scientific and Industrial Research, Building Research Station, Hertfordshire, England).

9635
This article is concerned with the problem of defining adequate chalkboard lighting on the basis of the visual requirements inherent in the school environment. Data is presented on the visual acuity of some one hundred school children under chalkboard conditions with varied levels of chalkboard illumination. A subsequent study with young adults on the effect of contrast on visual acuity and ease of reading is presented along with data on the effect of color on visual acuity. The results are discussed in terms of the specific effects of each of the factors upon visual acuity and reading ease. Conclusions are drawn concerning the implications for chalkboard lighting.
T. G. I. R 4

9638
White, C.E. HOW LOUD IS SILENCE. Audio Engng., 1956, 40 (3), 17-19, 68.

9638
This article reviews physical, physiological, and psychophysical research findings and inferences from theory regarding minimum sound fields which might be distinguished by the human ear. Topics discussed include calculations of Brownian Motion, threshold of audibility, detectability of Brownian Motion, and the role of normal bodily noises which tend to mask minimal auditory stimuli. The author concludes that the probability of aural detection of Brownian Movement is remote.
C. R 15

9639
Villchur, E.M. ROOM ENVIRONMENT. Audio Engng., 1956, 40 (7), 22-23, 44-45.

9639
This article, one of a series pertaining to the design and utilization of high-fidelity sound reproducing systems, concerns itself with various aspects of the acoustics of rooms as they affect fidelity and efficiency of such systems. Among the topics discussed are: position of the speaker system, compensation of speaker placement, room "liveness", absorption coefficients of materials commonly found in rooms, treble dispersion, and acoustical resonances of listening rooms.
T. G. R 2

9640
White, C.E. NOISE--ENEMY OF NORMAL HEARING. Audio Engng., 1956, 40 (11), 18-21, 85-88.

9640
This article reviews information applicable to problems of noise measurement and the effects of noise on hearing. Topics discussed include: descriptions and use of commercially available sound level meters, working area noise limits, ear protection recovery after noise exposure, noise limits in audiometric testing areas, noise spectra, design and treatment of audiometric test areas, etc.
T. G. I. R 15

9641
Stordehl, K.E., & Christensen, C.M. THE EFFECTS OF STUDY TECHNIQUES ON COMPREHENSION AND RETENTION. J. educ. Res., 1956, 49 (8), 561-570. (University of Illinois, Ill.).

9641
To determine the effect of four study techniques (underlining, outlining, summarizing, reading and re-reading) four groups of AAF Trainees (Total N = 200) were given immediate and delayed tests of retention on training material learned under one of the four study procedures. Discussion of the obtained data are related to the effectiveness of the four study procedures and the importance of practice in the use of such techniques if they are to be used more effectively.
T. R 8

9642
Standlee, L.S., & Fattu, N.A. NAVY VOCABULARY. J. educ. Res., 1956, 49 (7), 551-554. (Indiana University, Bloomington, Ind.).

9642
Recognizing the need for relevant basic word lists for use in Navy Illiteracy Training Programs, the authors prepared word frequency lists from four basic Navy Training Publications. Using a total of 121,931 counted words the authors prepared lists of the 500 most frequently used words and total frequency indexes for each of the four publications. Discussion relates the findings to Large-Thordike and Marine word lists and the utility of the desired list of 500 most frequently used "Navy words" to Navy Training programs and training materials.
R 7

9643
Scandee, L.S., & Feste, R.A. READABILITY OF NAVY PUBLICATIONS. *J. Educ. Res.*, 1956, 50 (6), 471-473. (Indiana University, Bloomington, Ind.).

9643
To determine if fourth-grade reading ability (minimum criterion of "functional" literacy) is sufficient to enable Navy enlisted men to read normally encountered Navy publications, Flesch reading ease and Hunter Interest analyses were made of eight Navy publications. The obtained results specify the differential readability of the analyzed publications from which the authors infer that fourth-grade reading ability "... is not functional in the sense that it will enable an enlisted man who has achieved only this level of ability to read these eight Navy publications with ease...."
T. R 2

9644
Davis, S.W. STRESS IN COMBAT. *Sci. Amer.*, 1956, 154 (3), 31-35. (Operations Research Office, Johns Hopkins University, Baltimore, Md.).

9644
This article describes a study of human behavior under actual conditions of combat stress. Three groups of men, an attacking company, a defending company, and a control group assigned a rear guard function, were given a series of psychological and physiological tests prior to and following combat. The results are discussed in terms of the function of stress in human behavior as reflected in pre- and post-combat measures. The relative accuracy of the measures and the effect of testing conditions are also discussed.
T. R 2

9645
Keilly, J.B. HEAT, COLD, AND CLOTHING. *Sci. Amer.*, 1956, 154 (2), 109-115.

9645
This article deals with the role of clothing in body temperature maintenance. The author briefly reviews the phenomenon of "normal" temperature maintenance and presents data concerning the amount of body heat lost as a function of type of clothing and environment. The results of several experimental studies are presented in the discussion of the protective value of various types of clothing in both hot and cold climates.
T. R 2

9646
Miller, G.A. INFORMATION AND MEMORY. *Sci. Amer.*, 1956, 155 (2), 42-45. (Harvard University, Cambridge, Mass.).

9646
The acquisition and retention of information by both man and computers is discussed in terms of methods of problem solution, the relation between memory and the ability to reason, the characteristics of memory span, and methods of measuring the amount of information presented to the learner. Experimental research on the relation between amount of information per item and the number of items which may be memorized, is discussed along with the role of language in a definition of the potential development of maximal retentive ability.
T. R 2

9648
Blumenfeld, A.M. DESIGN RECOMMENDATIONS FOR AIRCRAFT INSTRUMENT LIGHTING. *Aero Dig.*, 1956, 73 (2), 38-41. (Rohm & Haas Co., Philadelphia, Penn.).

9648
The author presents thirteen general requirements for effective aircraft instrument lighting systems. Noting that none of the present lighting systems meet all of these requirements, he discusses the results of recent experiments in this area in terms of their application to instrument lighting problems. Included in this discussion are the following topics: the behavior of light rays, adaptation of acrylic plastic in a lighting system, utilization of the instrument panel board as the light source, and two lighting techniques, namely, lighting behind cover glass and lighting with an acrylic sheet.
T. R 2

9652
Noble, Rosalie. EFFECT OF NOISE ENVIRONMENT OF AN ENGINE TEST LABORATORY ON AUDITORY ACUITY. *J. Aviat. Med.*, 1956, 27 (5), 482-485. (Air Crew Equipment Laboratory, Naval Air Experimental Station, NASC, Philadelphia, Penn.).

9652
In order to determine the effect of a high intensity noise environment, such as that of an engine test laboratory, upon auditory acuity, the audiograms of twenty-six men are compared. Each subject was tested prior to, at various intervals during, and following exposure for a period of approximately eight years to varying amounts of high intensity noise. The results are presented and discussed in terms of the degree of change in auditory acuity manifested by this group as compared to acuity changes evidenced in a normal population. The data are treated primarily in a qualitative rather than a quantitative fashion.
T. C. R 4

9653
Lawrence, D.E., & Leberge, D.L. RELATIONSHIP BETWEEN RECOGNITION ACCURACY AND ORDER OF REPORTING STIMULUS DIMENSIONS. *J. exp. Psychol.*, 1956, 51 (1), 12-18. (Stanford University).

9653
To investigate the effect of instructions on accuracy of reporting stimulus dimensions, four groups of subjects (20 each) observed stimulus objects (differing in color, form, and number) by tachistoscopic presentation. Instructions for observing and reporting were to give (1) equal attention to and record all dimensions, (2) primary attention to one dimension but record all, (3) primary attention to and record one dimension, and (4) none as first concept. Order of recording was specified immediately after observation. Accuracy of report scores was computed and statistical significance determined by analysis of variance. The results are discussed in terms of selective effect of instructions on perceptual factors versus memory and response factors.
T. R 4

9654
Green, B.F., & Anderson, Lois K. COLOR CODING IN A VISUAL SEARCH TASK. *J. exp. Psychol.*, 1956, 51 (1), 19-24. (Lincoln Laboratory, MIT).

9654
To investigate the effectiveness of color coding in a visual search task, two experiments were run using twenty U. S. Air Force enlisted men each. The display (matrix of ten rows and six columns of two-digit numbers) was varied as to number of relative symbols of each color (0 to 60) and number of colors (1, 2, or 4.) Conditions of search: 1. target number and color were announced, and 2. target number only was given. Average search time was analyzed as a function of the relative number of symbols (density) of each color and of the number of different colors used. Differences due to conditions of search are discussed in terms of redundancy of information.
T. C. R 7

9655
Zuidema, O.D., Cohen, S.I., Silverman, A.J., & Riley, M.B. HUMAN TOLERANCE TO PROLONGED ACCELERATION. *J. Aviat. Med.*, 1956, 27 (6), 469-481. (Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio).

9655
This study was designed to investigate human tolerance to prolonged acceleration stress such as that which will be imposed by high speed aircraft of the future. Five subjects were given nine runs at various g levels (2.5, 4, and 0.4 g below blackout level) for various time durations. Physiological and psychological effects were recorded. The results are presented and discussed in terms of the effects of stress as reflected in visual symptoms, pulse rate, blood pressure, electrocardiogram changes, subjective feeling, performance of continuous and discontinuous tasks, and subjective judgment of each task performance.
G. R 6

9656

Haymaker, W., Johnston, A.D., & Downey, V.W. FATAL DECOMPRESSION SICKNESS DURING JET AIRCRAFT FLIGHT. *J. Aviat. Med.*, 1956, 27 (2), 2-17.

9656

This article presents a detailed investigation of two nearly identical cases of fatal decompression sickness in flight. Complete case reports are presented along with the results of post-mortem examination. The similarity in the clinical features of both cases is discussed in an effort to establish an explanation of the fatalities in terms of the environmental and jet flight characteristics. Included in this discussion are some of the physiological factors which appear to play a role in decompression sickness, e.g., obesity.
I. R 20

9657

Mayo, A.M. ENVIRONMENTAL CONSIDERATIONS OF SPACE TRAVEL FROM THE ENGINEERING VIEWPOINT. *J. Aviat. Med.*, 1956, 27(5), 377-387. (Douglas Aircraft Company, El Segundo, Calif.).

9657

In a general discussion of the environmental considerations of space travel the author considers the following aspects from an engineering point of view: (1) the design of crew space; (2) the problem of visual function under conditions of increased speed, distance, etc.; (3) the time-distance problem; (4) design problems relevant to temperature control, pressure, and acceleration; (5) problems of noise and vibration; (6) the potential role of radiation; (7) passenger safety; and other aspects such as motor-collision, effect of stress, and economic considerations.
O. I. R 20

9658

Shaw, W.A. FACILITATING EFFECTS OF INDUCED TENSION UPON THE PERCEPTION SPAN FOR DIGITS. *J. exp. Psychol.*, 1956, 51 (2), 113-117. (University of Pennsylvania).

9658

To investigate the effects of different amounts of induced muscle tension upon the perception span for digits, thirty subjects repeated series of digits (5, 6, 7, and 8) exposed tachistoscopically while pulling weights adjusted to zero, $1/4$, $1/2$, and $3/4$ of their maximum pull. The experiment was repeated after a two-month interval. Number of digits correctly reproduced was recorded and the variances attributable to tension, task difficulty, individuals, and replication were evaluated. The optimal tension as related to task difficulty and ability of subjects (performance under zero weight conditions) was further analyzed. These results are discussed in relation to previous studies of performance under induced tension.
T. G. R. 6

9659

Rodahl, K. EMERGENCY SURVIVAL IN THE ARCTIC. *J. Aviat. Med.*, 1956, 27 (4), 368-372. (USAF Arctic Aeromedical Laboratory, Ladd AFB, Alaska).

9659

In a general discussion of emergency survival in the Arctic, the author deals with such aspects as survival capability in an environment such as that of the North Polar Basin, problems peculiar to the Polar Basin, factors in psychological and physiological adjustment to such an environment, and the role of physical fitness in cold acclimatization. Some reference is made to the research efforts of the Arctic Aeromedical Laboratory.
R 13

9580

Ammons, R.B., & Willig, I. ACQUISITION OF MOTOR SKILL: IV. EFFECTS OF REPEATED PERIODS OF MASSED PRACTICE. *J. exp. Psychol.*, 1956, 51 (2), 118-126. (University of Louisville).

9660

To determine the effects of repeated periods of highly massed practice of rotary pursuit on work decrement 104 subjects (four groups of 26) practiced on a pursuit rotor for 90 minutes (training period) followed by 20 minutes (test period) under two basic conditions: (1) 10-minute practice, 20-minute rest, and (2) 1-minute practice, 2-minute rest. These conditions were reversed for the test period for one half of the subjects thus creating four conditions. Performance data (percent of time on target) were analyzed in terms of warm-up decrement, temporary work decrement, and permanent work decrement for each of the four practice-test conditions. These results are related to theoretical formulations of motor skill learning.
T. G. R 23

9661

Corvin, V. INDIVIDUAL BEHAVIOR IN SOCIAL SITUATIONS: ITS RELATION TO ANXIETY, NEUROTICISM, AND GROUP SOLIDARITY. *J. exp. Psychol.*, 1956, 51 (2), 161-166. (University of Toronto).

9661

To investigate the relation of social behavior and three variables--anxiety, neuroticism, and group solidarity--an experiment was designed and predictions derived from a generalized behavior theory based on Hull and Pavlov. Subjects (64) were selected on the basis of extreme (high and low) anxiety ratings. Two basic situations were experienced by all subjects in groups of three (one subject and two assistants): (1) solidarity or social approval, and (2) dissolidarity or social disapproval. Response latency, degree of participation, and shift of opinion were analyzed to find differences due to the variables. The usefulness of this procedure for experimental study of social situations is discussed.
T. R 15

9662

Edelberg, R., Henry, J.P., Maciolek, J.A., Salzman, E.W., & Zaldema, G.D. COMPARISON OF HUMAN TOLERANCE TO ACCELERATIONS OF SLOW AND RAPID ONSET. *J. Aviat. Med.*, 1956, 27 (6), 482-489. (Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio).

9662

In an investigation of human tolerance to high speed acceleration of slow and rapid onset, thirty-two subjects were given a total of eighty series (usually three or four runs) of centrifuge rides under conditions of gradual and rapid approach to peak accelerations. In order to evaluate the role of the g-suit, experimental runs were conducted with and without the use of the suit and under varied conditions of suit inflation. The results were assessed in terms of comparisons of physiological indicators of g-tolerance under conditions of rapid versus gradual acceleration and g-suit versus non-g-suit protection.
G. R 14

9663

Bolles, R.C., & Bailey, D.E. IMPORTANCE OF OBJECT RECOGNITION IN SIZE CONSTANCY. *J. exp. Psychol.*, 1956, 51 (3), 222-225. (University of California).

9663

To investigate the role of object recognition in size estimation, five subjects made two sets of size judgments of a representative sample of familiar objects: non-visual, based on verbal description, and visual based on free-field observation. Each S made a Q sort for the objects on basis of manipulative familiarity; the experiments sorted on the basis of homogeneity of size of stimulus object in relation to its class. The data (size, judgments, errors of judgment) are analyzed in terms of relations between visual and non-visual judgments estimated and actual size, and degrees of familiarity. Discussion related the results to size constancy.
T. G. R 3

9665
Kurtz, K.H., & Novland, C.I. CONCEPT LEARNING WITH DIFFERING SEQUENCES OF INSTANCES. *J. exp. Psychol.*, 1956, 51 (4), 239-243. (Yale University).

9665
To study the effect of order of presentation upon rate of concept learning, two groups of subjects (13 each) performed twice under two conditions: 1. all instances of a given concept were presented in succession, and 2. instances of all concepts were presented in an intermixed order with no one appearing twice in succession. Concept materials were geometric designs varied in color, size, shape, and position with each concept defined by a combination of two properties and identified by nonsense names; eight instances of four concepts comprised the training lists, two instances in a test list. The data (correct identifications on test and scores on verbal description test) are analyzed for differences in learning due to order of presentation.
I. T. R 7

9666
Arnoult, M.D. FAMILIARITY AND RECOGNITION OF NONSENSE SHAPES. *J. exp. Psychol.*, 1956, 51 (4), 268-276. (Skills Components Research Laboratory, Air Force Personnel and Training Research Center).

9666
To study the quantitative relationship between familiarity of an object and frequency of stimulation, nonsense shapes were presented with varied frequencies (0 to 25) to subjects (seven groups of 100 each) who later rated the stimuli on a five-point scale of familiarity. Delay periods (0, 1, 2, 3 or 5 hours) were interposed between familiarization and rating. Recognition was measured by a further rating of stimuli into familiar and unfamiliar categories. Judgments of familiarity are analyzed as a function of frequency of experience and the effects of delay on familiarity and recognition are studied. These results are related to the larger problem of the role of past experience in perception.
I. T. G. R 16

9667
Leibowitz, H., & Bourne, L.E. Jr. TIME AND INTENSITY AS DETERMINERS OF PERCEIVED SLOPE. *J. exp. Psychol.*, 1956, 51 (4), 277-281. (University of Wisconsin).

9667
To analyze the role of exposure duration and luminance as determiners of the extent to which shape constancy occurs, the subjects (49) viewed a disc at various angles to line of vision and matched it with one of 22 comparison shapes. Exposure durations were varied from .01 to 1.00 seconds and luminance values from .005 to 10 mls. Eye-movement records were made to determine duration of viewing disc. Average axis ratios of matched ellipses are analyzed as functions of duration of exposure and luminance. Discussion relates the results to theoretical considerations of shape perception.
I. T. G. R 16

9668
Katchmar, L.T., Ross, S., & Andrews, T.G. DIRECTION AND MAGNITUDE OF RESPONSE ERRORS IN A HORIZONTAL DISPLAY-CONTROL PATTERN. *J. exp. Psychol.*, 1956, 51 (4), 282-286. (University of Maryland).

9668
To investigate the direction and magnitude of response errors in a display-control pattern, subjects (36) observed a horizontal panel of lights (varied as to number, 5, 9, or 11, and space between lights, 3, 5, and 7 inches) and identified the position of a signal flash either verbally or by pressing a key corresponding to the position of the signal light. The data (number of errors made to each signal position, direction of errors to left or right, and magnitude of direction errors) were analyzed as functions of number of lights on the display, distance between lights, and type of response made (verbal or motor).
T. G. R 15

9669
Vallé, L.D., Andrews, T.G., & Ross, S. PERCEPTUAL THRESHOLDS OF CURVILINEARITY AND ANGULARITY AS FUNCTIONS OF LINE LENGTH. *J. exp. Psychol.*, 1956, 51 (5), 343-347. (University of Maryland).

9669
To determine the minimum directional change (either curvilinear or angular) of horizontal lines which can be perceived, ten subjects judged a series of lines as "straight" or "not straight." The stimulus lines were curved (diopter values of 0, .37, .75, 1.12, 1.5 and chord lengths of 30, 40, 50, 70, 90, 1.10 millimeters) or angular (area above angle approximated area above curve for base length equaling chord length); distance of presentation was 10.5 feet; level of illumination 4.5 foot-candles. Thresholds were computed using diopters, length of radius, length of sagitta, and length of "adjusted" sagitta. These data are analyzed in terms of the functional relationship between base length (chord length) and the discrimination of curvature or angle.
T. G. R 5

9670
Conrad, R. THE TIMING OF SIGNALS IN SKILL. *J. exp. Psychol.*, 1956, 51 (6), 365-370. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

9670
To observe whether timing (temporal "layout") of a series of responses in a complex sensori-motor task as controlled by the operator changes the temporal structure of a random series of signals in an advantageous fashion, 18 subjects were tested under two conditions on a multifidial display which presented signals at approximately random time intervals. Condition 1, a control for changing intervals between signals was used; condition 2, control eliminated and signal-interval presented at rate determined in (1) with inherent temporal structure remaining random. The two distributions of the interval between signals and of the performance scores were compared. Discussion stresses the role of timing in skilled performance.
G. R 9

9671
Battig, W.F. TRANSFER FROM VERBAL PRE-TRAINING TO MOTOR PERFORMANCE AS A FUNCTION OF MOTOR TASK COMPLEXITY. *J. exp. Psychol.*, 1956, 51 (6), 371-378. (University of Wisconsin).

9671
To study the effect of complexity of a motor task on amount of transfer from verbal pretraining, twelve groups of subjects (20 each) received 20 one-minute trials on a finger-positioning task at one of four levels of complexity (one to four fingers) following training conditions of (1) relevant-S, pronouncing nonsense words formed from letters corresponding to stimulus lights, (2) relevant S-R, describing verbally the correct finger positions, or (3) control, no training. Performance scores (mean number of matches per trial) were studied by analysis of variance for effects and interactions of task complexity and type of pretraining. Percent transfer scores were computed and analyzed. Possible applications to training situations are discussed.
I. T. G. R 16

9672
Noble, M.E., & Bahrick, H.P. RESPONSE GENERALIZATION AS A FUNCTION OF INTRATASK SIMILARITY. *J. exp. Psychol.*, 1956, 51 (6), 405-412. (Ohio State University (Noble); Ohio Wesleyan University (Bahrick)).

9672
To investigate the effects of intratask response similarity upon response generalization, a psychophysical scale of force similarity was constructed. The subjects (50) were then trained to exert different amounts of force on a semirigid control in response to number stimuli. Two versions of the task were used differing in the degree of separation between required adjacent force responses (intratask similarity). Responses were measured on a continuous scale for seven response points (interpreted as empirical gradients of response generalization) and discussed in terms of learning theory. The average amount of information transmitted per response was computed and related to problems of response coding.
I. T. G. R 14

9674-
Beaumont, C.A. SAMPLED-DATA TRACKING: SAMPLING OF THE OPERATORS OUTPUT. *J. exp. Psychol.*, 1956, 51 (6), 429-436. (Human Factors Group, International Business Machines Corporation).

9674

To study tracking performance in the situation where an operator closes a control loop by his tracking behavior, the usual analog loop was altered by sampling the operator's output in three experiments (7 subjects each) using a non-aided compensatory tracking task (hand-controlled joystick; display--small spot on cathode ray oscilloscope provided with cross hairs and three concentric markers). Variables were: (1) sampling rates (2 to 8 cps plus a continuous condition), (2) delay and no delay between response and presentation on display, (3) control display ratios (from 1.0 to 4.0), and (4) tracking task (discretely displaced target and continuously displaced target). Recovery times and fifty per cent limits were analyzed to determine the importance of the variables on performance. I. T. G. R 8

9675

Davidson, W.Z., Andrews, T.G., & Ross, S. EFFECTS OF STRESS AND ANXIETY ON CONTINUOUS HIGH-SPEED COLOR NAMING. *J. exp. Psychol.*, 1956, 52 (1), 13-17. (University of Maryland).

9676

To determine effects of stress and anxiety on performance, 54 subjects were selected on basis of high and low scores on a modified Taylor Anxiety Scale. The task, high speed color naming, was performed under conditions varied to give three levels of failure stress (verbal instructions and electric shock), and three levels of task-induced stress (speed of presentation--75, 85, and 100 per minute). Errors of omission were used as measures of performance and were studied for two portions of the data: 1. after warning of potential failure, and 2. after shock indicating failure. Differential effects of anxiety, failure stress, task-induced stress and their interactions on performance are noted with attention given to individual differences. T. R 17

9678

Mandler, G., & Heinemann, Shirley H. EFFECT OF OVERLEARNING OF A VERBAL RESPONSE ON TRANSFER OF TRAINING. *J. exp. Psychol.*, 1956, 52 (1), 39-46. (Harvard University).

9678

To investigate transfer of training as a function of overlearning, sixty subjects learned three-place consonant combinations in response to single number integers in both a training and a transfer task. Five degrees of training (from 0 to 100 errorless trials) were used (12 Ss in each group). Four conditions of learning were tested in the transfer task: 1. new response to old stimulus, 2. old response to new stimulus, 3. old response to old stimulus, not previously paired, and 4. new response to new stimulus (control for warm-up). Transfer data (frequency of correct responses during first twenty trials and logarithm of ratio of transfer to control in terms of trial on which first correct response occurred) are analyzed in terms of degree of original training. T. G. R 13

9679

Gewirtz, J.L., Jones, L.V., Waerneryd, K.-E. STIMULUS UNITS AND RANGE OF EXPERIENCED STIMULI AS DETERMINANTS OF GENERALIZATION-DISCRIMINATION GRADIENTS. *J. exp. Psychol.*, 1956, 52 (1), 51-57. (University of Chicago).

9679

To investigate the effect of psychological versus physical stimulus units and central tendency (determined by earlier experience with stimulus dimension) upon generalization-discrimination gradients, forty subjects were trained to respond "same" or "different" to a stimulus dimension of visual angle followed by a test for response to stimuli symmetrically positioned about training stimulus. Two tasks were used: (1) response to zero-angle dimension and (2) response to non-zero angle dimension either to left or right of zero. The data (mean number of "same" responses) are analyzed as functions of stimulus position and order of experience. T. G. R 12

9681

Liberman, A.W., Delattre, P.C., Gerstman, L.J. & Cooper, F.S. TEMPO OF FREQUENCY CHANGES AS A CUE FOR DISTINGUISHING CLASSES OF SPEECH SOUNDS. *J. exp. Psychol.*, 1956, 52 (2), 127-137. (Haskins Laboratories, New York City).

9681

To investigate tempo of frequency change as a cue for perceived differences among speech sounds (stop consonants, semivowels, and vowels of changing color), two experiments were performed using synthetic speech-like sounds which subjects (168, 38) were asked to identify by first letter of sound. The stimuli represented transitions from stop consonants to semivowels to vowels of changing color, and were varied in duration of transition (ten to 300 milliseconds) and rate or frequency (500 to 2500 cycles per second). The judgments data were analyzed as functions of transition duration and transition rate. Results are related to other dimensions that have been found to be of importance for the discrimination and identification of individual speech sounds. I. G. R 8

9682

Edwards, W. REWARD PROBABILITY, AMOUNT, AND INFORMATION AS DETERMINERS OF SEQUENTIAL TWO-ALTERNATIVE DECISIONS. *J. exp. Psychol.*, 1956, 52 (3), 177-188. (Operator Laboratory, AFTRC, Lackland AFB, San Antonio, Tex.).

9682

To investigate probability of reward, amount of reward, and nature of information available about reward patterns as factors in probability learning, subjects operated a two-alternative slot machine for real money. The three factors were varied systematically in two experiments using seven groups of six subjects each, on nine and eight days, 150 trials per day. The data are studied by analysis of variance and by information-theory techniques to determine the relative influence of the three factors of reward in this type of decision-making wherein the learner must decide about the situation by observing the result of his decisions. Generalizations are derived from the data and related to learning theory. T. G. R 20

9683

Slack, C.W. FAMILIAR SIZE AS A CUE TO SIZE IN THE PRESENCE OF CONFLICTING CUES. *J. exp. Psychol.*, 1956, 52 (3), 194-198. (Princeton University).

9683

To investigate the effect of familiar size upon apparent size in a situation where many other size cues are present, an experiment was conducted in which chairs of varying sizes (small, normal, and large) and three sticks of comparable heights were presented at 20, 30, and 40 yards. The subjects (1) made size judgments by the method of reproduction with a steel tape manipulated by the experimenter. The experiment was conducted outdoors in an open field with binocular vision. The apparent-size judgments were analyzed and related to theories of size constancy and the role played by past experience. T. R 6

9684

Squires, P.C. STEREOPSIS PRODUCED WITHOUT HORIZONTALLY DISPARATE STIMULUS LOCI. *J. exp. Psychol.*, 1956, 52 (3), 199-203. (U.S.N. Medical Research Laboratory, Naval Submarine Base, New London, Conn.).

9684

To determine whether stereoscopic depth can be evoked by stimulus configurations phenomenally disparate, four pairs of targets (an illusion pattern--Hofler, Zollner, Poggendorf, Muller-Lyer--with a corresponding pattern of its chief lines only) were viewed through a troposcope (five subjects). The illusory figure was presented to one eye and the nonillusory figure to the other. Judgments were made of the character of the depth experience accompanying fusion--immediacy, compellingness, and tendency to disintegrate under prolonged fixation. The results are discussed in terms of necessary conditions for the production of stereo-depth and related to earlier studies of Gestalt disparation. I. R 6

9685
Adams, J.A. VIGILANCE IN THE DETECTION OF LOW-INTENSITY VISUAL STIMULI. *J. exp. Psychol.*, 1956, 52(3), 204-208. (Operator Laboratory, AFTRC, Lackland AFB, San Antonio, Tex.).

9685
To study vigilant or attentive behavior, 61 subjects were required to flick a toggle switch whenever they detected a blip of light appearing aperiodically in the center of a five-inch screen (Vigilance Test). Conditions of testing were: (1) brightness levels of stimulus (.029 and .015 apparent foot-candles), (2) duration of stimulus (1.0 and 2.0 seconds), (3) 11 trials, each a presentation of ten stimuli over a ten-minute period; a ten-minute rest followed by one trial. Correct detection was scored if target was noted within five seconds after onset. Detection scores are analyzed to evaluate the effects of stimulus brightness, stimulus duration, and rest. The results are discussed in relation to theoretical concepts. T. G. R 6

9686
Mabe, H.W., & Eriksen, C.W. ROLE OF RESPONSE VARIABLES IN RECOGNITION AND IDENTIFICATION OF COMPLEX VISUAL FORMS. *J. exp. Psychol.*, 1956, 52(4), 235-243. (Johns Hopkins University).

9686
To study the role of response variables in recognition and identification of visual forms, subjects (eight experimental groups) were given practice in using alphabet letters (labels) as discriminating responses to geometric forms or photographs prior to learning to associate them with a standard set of unfamiliar visual forms (both experimental and four control groups). All groups were then required to identify the standard forms when mixed with unfamiliar forms. Number of labels used varied from two to 12; 120 trials of practice, 120 trials of learning and six trials for identification. Correct labeling responses and number of recognitions are analyzed as functions of prior practice in use of responses and of number of responses practiced. I. T. G. R 9

9687
Zimny, G.H. EFFECT OF VARIOUS MOTIVATIONAL TECHNIQUES UPON LEARNING AND PERFORMANCE TASKS. *J. exp. Psychol.*, 1956, 52(4), 261-257. (University of Minnesota).

9687
To study some aspects of motivation and its effect upon human performance, two experiments were performed. In the first, four groups of subjects (25) learned a list of 12 nonsense syllables under conditions of (1) incentive of an excused classroom assignment, (2) threat of electric shock, (3) statement that task was a measure of intelligence, or (4) statement that task afforded additional practice (control group). In the second part, two groups (20) sorted ten decks of cards, one under control and one under incentive conditions. Performance scores (number of trials to criterion; sorting time, and number sorted in a two-minute interval) were studied for differences attributable to motivational technique and to type of task. T. R 10

9688
Surwillo, W.W. PSYCHOLOGICAL FACTORS IN MUSCLE-ACTION POTENTIALS: EMG GRADIENTS. *J. exp. Psychol.*, 1956, 52(4), 263-272. (Allan Memorial Institute and McGill University).

9688
To investigate the effect of incentives on EMG gradients (progressive increase of electrical activity in muscles from beginning to end of a task), 16 subjects performed two tracking tasks--compensatory and pursuit. The factors of incentive, difficulty, and goal structuring were used to weight one task "high" and one "low"; both required almost identical forces and patterns of muscular response. Muscle-action potentials were recorded from four muscle groups and EMG gradients were derived from the records. The data were analyzed for slope gradients attributable to the factors varied. The study was repeated with a new group of subjects, a third doubly-rewarded task, reduced muscular effort, and reduced goal structuring. Similar analysis were made of the data. G. R 27

9689
Solley, C.M. REDUCTION OF ERROR WITH PRACTICE IN PERCEPTION OF THE POSTURAL-VERTICAL. *J. exp. Psychol.*, 1956, 52(5), 329-333. (The Hummer Foundation).

9689
To investigate the effect of practice on perception of the postural vertical, two groups of subjects (9 each) were used, one group was tilted 30 degrees laterally to the right and the other to the left. The task was to return to point of perceived vertical; thirty trials were given. Visual cues were eliminated by blindfolding and use of darkened room; somesthetic cues were controlled by use of a biteboard, constant amount of tilt and by returning S to vertical by a series of random movements. The average number of degrees perceived vertical was off true vertical and time required to make adjustments were analyzed as functions of practice. The results are discussed in relation to procedures in like perceptual experiments. T. G. R 10

9690
Poulton, E.C. LISTENING TO OVERLAPPING CALLS. *J. exp. Psychol.*, 1956, 52(5), 334-339. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

9690
To determine the effect of two competing messages, presented simultaneously from different loud speakers, on accuracy of listening performance, subjects were required to write down all three figure numbers preceded by their particular call signal. In one experiment, pairs of calls were given (two or four loudspeakers) either in synchrony or overlapping and responses were called for by both or only one message. In another experiment, conditions were similar except that conversation concerning aircraft was broadcast between calls and subjects were required in one subgroup to track the planes. Error scores (omissions and wrong numbers) were analyzed for effects of masking by competing messages, and by conversation, distraction of irrelevant task, and number of channels monitored. T. R 2

9691
Newman, S.E. EFFECTS OF CONTIGUITY AND SIMILARITY ON THE LEARNING OF CONCEPTS. *J. exp. Psychol.*, 1956, 52(6), 349-353. (Northwestern University, Evanston, Ill.).

9691
To investigate the effect of temporal contiguity and similarity on concept learning, six groups (twenty subjects each) learned a practice list (combinations of sizes and shades in simple geometric figures) and one of six experimental lists (line and dot combinations identified by azimuth and position of dots; distractors were color of lines and number of dots). Three variations in similarity (azimuth differences) and two in contiguity (dot cluster differences) were employed. Number of concepts learned and number of intrusions during learning were analyzed and discussed with regard to the generalization hypothesis in learning. T. R 5

9692
Riopelle, A.J., & Rogers, J.P. TRANSFER OF TRAINING TO ORTHOGONAL DIMENSIONS. *J. exp. Psychol.*, 1956, 52(6), 367-369. (Emory University).

9692
To determine whether the range of stimuli in one dimension to which S responds can be increased or decreased by training in another dimension, twelve experimental groups were trained to respond by releasing a telegraph key to any one of seven lights (half of the groups responded to lights appearing in the horizontal and half to the vertical dimension) and then were tested on their responses to lights appearing in the opposite dimension. Control groups (twelve) were trained to respond only to a center light and half were tested along the vertical and half along the horizontal dimension. Speed of response was analyzed for differences due to training and related to the concept of generalization. G. R 5

9693

Schipper, L.M. PREDICTION OF CRITICAL EVENTS IN CONTEXTS OF DIFFERENT NUMBERS OF ALTERNATIVE EVENTS. *J. exp. Psychol.*, 1956, 52 (6), 377-390. (Ohio State University).

9693

To study some factors influencing prediction of critical events, nine groups (14 subjects each) predicted the occurrence of the left-most light in a horizontal row of two, four or six event lights. Probability of occurrence was varied ($1/2$, $1/4$ or $1/6$); also the number of alternative event lights (one, three or five). The rate of omission of positive responses (predictions) was analyzed as a function of the relative occurrence of the critical event and the number of alternative noncritical events. Frequencies of correct predictions are discussed in relation to expectations based on statistical learning theory.

T. G. R 5

9694

Batteraby, W.S., Kahn, R.L., Pollack, M., & Bender, M.B. EFFECTS OF VISUAL, VESTIBULAR, AND SOMATOSENSORY-MOTOR DEFICIT ON AUTO-KINETIC PERCEPTION. *J. exp. Psychol.*, 1956, 52 (6), 398-410. (Mt. Sinai Hospital).

9694

To study the effects of visual, vestibular, and somatosensory-motor deficit upon autokinetic movement, subjects were chosen from hospital patients who exhibited one or the other of these deficiencies and control subjects from a normal population exhibiting no deficiencies. The conditions of stimulation were: (a) control, (b) head alone turned to one side, (c) trunk alone turned to one side, (d) both head and trunk deviated to same side, (e) Barany rotation. The extent and direction of autokinetic movement (apparent movement of stationary light in dark surroundings) were recorded and analyzed for differential effects of the various deficits.

I. T. G. R 36

9695

Dumas, P. THE RADIAL ILLUSION. *Amer. J. Psychol.*, 1956, 69 (1), 118-121. (Montana State University).

9695

This note describes a perceptual effect that occurs when the observer is in motion relative to discrete, moving stimuli, e.g. riding in a car on a dark night through the rain, the raindrops appear to be radiating from a center rather than falling vertically. Changes in illusory effects with different speeds are described and illustrated. Observations were made to verify the perception as illusory rather than being a direct observation of physical factors.

F.

9696

Gaydos, H.P. INTERSENSORY TRANSFER IN THE DISCRIMINATION OF FORM. *Amer. J. Psychol.*, 1956, 69 (1), 107-110. (Quartermaster Research and Development Center).

9696

To study intersensory transfer of form discrimination two groups of subjects (86) learned to associate a series of stimulus shapes with names either through visual presentation or by handling them (with names given orally) to two errorless trials and then attempted to identify the same shapes through the other sense modality. Transfer test was carried to one errorless trial. Performance was recorded in number of trials and errors with transfer calculation as percent savings (trials and errors) on the relearning task. Qualitative factors involved in the learning process are noted in addition to most effective order of learning and relearning.

F. T.

9697

Ryan, T.A., & Schwartz, Carol B. SPEED OF PERCEPTION AS A FUNCTION OF MODE OF REPRESENTATION. *Amer. J. Psychol.*, 1956, 69 (1), 90-98. (Cornell University).

9697

To study the comparative effectiveness of different methods of representing critical characteristics of three-dimensional objects, three objects (hand, group of electrical knife switches, and steam engine valve) each in four different positions were represented by photographs, shaded line drawings, line drawings, and cartoons. Each illustration was projected on a screen, in a series of increasing exposure durations, until the subject could identify the crucial relationship. Threshold data (in seconds) were obtained from 15 subjects and studied for significant differences for time of perception due to mode of representation. The methodology of this study is discussed and evaluated.

F. T.

9698

Wallach, H., Weiss, A., & Adams, Pauline Austin. CIRCLES AND DERIVED FIGURES IN ROTATION. *Amer. J. Psychol.*, 1956, 69 (1), 48-59. (Swarthmore College (Wallach); Tufts University (Weiss); University of California (Adams)).

9698

To study perceptual changes in the appearance of figures as they change in spatial orientation, a series of observations was made of rotating circles, spirals, and ellipses. An explanation was formulated in terms of subjectively identical points along the contours arising in relation to absolute directions of visual space. Stereo-kinetic phenomena resulting from monocular observation of these illusions were compared with the kinetic depth-effect (obtained when the shadow of a solid object in rotation is observed) for occurrence without suggestion and irrespective of set.

F.

9699

Crosbie, R.J. DIRECTIONAL CONTROL OF ACCELERATIVE FORCES IN CENTRIFUGE BY SYSTEM OF GIMBALS. *J. Aviat. Med.*, 1956, 27 (6), 506-511. (U.S.N. Aviation Medical Acceleration Laboratory, HADC, Johnsville, Penn.).

9699

This article describes the utilization of a two-gimbal system in centrifuge as a means of controlling the direction of acceleration with regard to the subject. The use of this system is compared to that of the freely swinging platform in terms of control of tangential acceleration, subjective effects of oculogyral illusions, degree of equipment flexibility, the type of acceleration simulation afforded, and so forth. Human reactions to gimbals movements are reported on the basis of a series of experimental runs in the equipment by a number of subjects under varied conditions of acceleration patterns.

I. R 5.

9701

Postman, L., & Rosenzweig, M.R. PRACTICE AND TRANSFER IN THE VISUAL AND AUDITORY RECOGNITION OF VERBAL STIMULI. *Amer. J. Psychol.*, 1956, 69 (2), 209-226. (University of California).

9701

To investigate the effects of preliminary training on visual and auditory discrimination of verbal stimuli, a series of nonsense syllables was chosen for initial ease of discrimination (half of high and half of low usage frequency). Different syllables received varying frequencies of exercise (from zero to 15). Two groups of subjects had visual training followed by either visual or auditory testing and two had conditions in reverse order. A control group had no training. Testing consisted of recognition-thresholds: (1) tachistoscopic presentation of syllables under varying intensities of illumination, or (2) in conjunction with varying degrees of masking noise. Analyses were made for effects of frequencies of past exercise, of sensory modality, and of transfer

9702

Thompson, R.F., Voss, J.F., & Brogden, W.J. THE EFFECT OF TARGET-VELOCITY UPON THE TRIGONOMETRIC RELATIONSHIP OF PRECISION AND ANGLE OF LINEAR PURSUIT MOVEMENTS. *Amer. J. Psychol.*, 1956, 69 (2), 258-263. (University of Wisconsin).

9702

To investigate the effect of target velocity and angle of movement from the body upon precision of linear pursuit movements, 80 subjects, with styles in right hand, tracked a target moving at velocities of 2.5, 3.0, 3.5, 4.0 and 4.5 centimeters per second at angles from the body of 0, 30, 45, 60, 90, 120, 135, and 150 degrees. Each subject tracked all eight angles but at only one velocity. Analysis of variance of the standard error scores and adjusted scores (divided by trial duration) was made for differences due to angle of movement and target velocity. The trigonometric relationships are shown and discussed.

T. G. R 7

9703

Thomas, G.J. EFFECT OF CONTOURS ON BINOCULAR CFF OBTAINED WITH SYNCHRONOUS AND ALTERNATE FLASHES. *Amer. J. Psychol.*, 1956, 69 (3), 369-377. (University of Illinois).

9703

To test a hypothesis that addition of contours to the stimulus-patches which fall on corresponding retinal areas would enhance the Sherrington effect (superiority of flicker-sensitivity when flashes are delivered synchronously to the two eyes as compared to that obtained with alternate flashes), two observers made binocular threshold determinations (flicker) with both in- and out-of-phase flashes in the two eyes over a range of six log-units of flash luminance. In one condition the stimulus patch for both eyes was identical; the second used stimulus-patches perpendicular to each other. Threshold data were analyzed for effect of arrangement of contours, and synchronous versus alternate flashes on critical flicker frequency. Results from an earlier study with larger contours are compared with these results. T.G.R 22

9704

Day, W.P. SERIAL NON-RANDOMNESS IN AUDITORY DIFFERENTIAL-THRESHOLDS AS A FUNCTION OF INTER-STIMULUS INTERVAL. *Amer. J. Psychol.*, 1956, 69 (3), 387-394. (Johns Hopkins University).

9704

To study non-randomness of responses to long series of threshold stimuli, the length of time between successive members of the stimulus series was varied under conditions generally associated with this effect. A continuous 1000 cycle per second tone was presented non-audibly to five subjects who responded to detection of increment by pressing a key. Increments in intensity (from 300 to 600, each 0.1-second duration, of differential threshold magnitude) were added to continuous tone at five interstimulus intervals, 1.6-10.6 seconds. Responses (yes or no) were analyzed for non-randomness as a function of inter-stimulus interval. In discussion of results, emphasis is placed upon probability of a number of factors underlying the "serial effect."

T. G. R 8

9705

Bilodeau, Ina McD. ACCURACY OF A SIMPLE POSITIONING RESPONSE WITH VARIATION IN THE NUMBER OF TRIALS BY WHICH KNOWLEDGE OF RESULTS IS DELAYED. *Amer. J. Psychol.*, 1956, 69 (3), 434-437. Proj. 7707, Task 77130, Res. Rep. AFPTTC-TN-57-49, April 1957, Skill Components Laboratory, AFPTTC, Lackland AFB, San Antonio, Tex.

9705

To determine the effect of temporal delay in knowledge of results (KR) on accuracy of a simple positioning response, two experiments were designed to make such a delay analogous to lag in a continuous tracking task by delaying KR over a number of trials (0, 1, 2, 3, and 0, 2, and 5). The task was to learn to make a lever-displacement of 33.57 degrees of arc; one pull on the lever constituted a trial; number of KR trials (trials preceded by KR) were held constant for each delay group (16 and 30); KR was given on a visual display with pointer indicating score. Positioning errors in degrees of arc are analyzed as a function of number of KR trials and lag or delay in knowledge of results.

G. R 3

9706

Chiselli, E.E. DIMENSIONAL PROBLEMS OF CRITERIA. *J. appl. Psychol.*, 1956, 40 (1), 1-4. (University of California).

9706

This paper examines problems connected with the dimensionality of the criteria used for describing worker's performance quantitatively. Three types of dimensionality are discussed--static, dynamic, and individual. Static dimensionality includes the problem of how to handle criteria that are multidimensional; dynamic dimensionality deals with types of change in job performance with time and the resultant effect on prediction; and individual dimensionality concerns different criteria, all of which lead to successful job performance by different individuals. It is suggested that these problems must be solved before criterion validity can be established.

R 12

9707

Mahinsky, I.D. THE INFLUENCE OF CERTAIN TYPOGRAPHICAL ARRANGEMENTS UPON SPAN OF VISUAL COMPREHENSION. *J. appl. Psychol.*, 1956, 40 (1), 37-39. (University of Minnesota).

9707

To investigate the relationship between span of comprehension and typographical arrangement, 30 subjects (six groups, five each) were presented, tachistoscopically, with three arrangements of words (conventional, spaced-unit, and square-span or double-line blocks) in counter-balanced order. Words perceived were reported immediately after a 100-millisecond exposure; the score was the number of words correctly reported. The comprehension score in words per sentence was analyzed for differences due to typographical style. Over-lap scores are studied for additional comparisons. Implications for advertising are discussed in addition to "straight" reading situations.

T. R 1

9708

Hauty, G.T., & Payne, R.B. FATIGUE AND THE PERCEPTUAL FIELD OF WORK. *J. appl. Psychol.*, 1956, 40 (1), 40-46. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

9708

To determine if attending to a perceptual field of work for a prolonged period would induce differential decline in the proficiency with which marginally and centrally located components were attended, performance scores in the control of several simulated aircraft instruments (USAF SAM Multidimensional Pursuit Test) were taken throughout the course of seven hours of work (168 subjects). Variables introduced to modify work decrement were (1) administration of drugs, (2) use of devices to give knowledge of successful performance, and (3) different goal proximity sets. Performance decrements were analyzed for dissociative changes in a field of visual displays due to fatigue.

T. G. R 9

9709

Chernikoff, R., Birmingham, H.P. & Taylor, F.V. A COMPARISON OF PURSUIT AND COMPENSATORY TRACKING IN A SIMULATED AIRCRAFT CONTROL LOOP. *J. appl. Psychol.*, 1956, 40(1), 47-52. (USN Research Lab., Washington, D.C.).

9709

To compare the relative effectiveness of a pursuit and a compensatory tracking display in a simulated one-coordinate aircraft control loop, two experiments were conducted differing only in ranges of course frequencies of the tracking problem. In each experiment five subjects tracked a target (with spring-centered joystick) on both types of displays for six one-minute trials on twelve days. Four courses, each a complex of three sine waves, were made to vary in difficulty by increasing the frequencies of recurring cycles. Integrated error scores (total cumulative error integrated overtime) are analyzed as functions of type of display and difficulty of course. Implications for engineering design are discussed.

T. G. R 4

9710
Schubert, R.G., & Jenkins, W.L. THE EFFECT OF TRAINING ON LINEAR INTERPOLATION. *J. appl. Psychol.*, 1956, 40 (1), 53-54. (Continental Can Co. & Lehigh University).

9710
To investigate the effect of brief training on linear interpolation, 27 subjects set a movable marker at positions estimated to be one-tenth, two-tenths...to nine-tenths of the distance between two fixed markers. Two sessions of 135 settings with no knowledge of results preceded three training sessions having the same number of settings but with knowledge of numerical value given and the correct position demonstrated. A post test was given after from 32 to 81 days without knowledge of results. The data are analyzed in terms of effect of training in reducing or changing biases of subjective scales and in reducing variability.
G. R 3

9711
Hall, M.S. INTERNAL RELATIONS OF ELEMENTAL MOTIONS WITHIN A TASK. *J. appl. Psychol.*, 1956, 40 (2), 91-95. (Dunlap and Associates, Inc., Stamford, Conn.).

9711
To study the extent of interaction of work elements in an actual factory operation, micro-motion samples of an industrial operation were taken eight times during the work day, Monday through Friday. A frame-by-frame analysis was made by the customary micro-motion techniques and a simo-motion chart of work elements (therbligs) constructed. Average times of individual elements within a sample (15 cycles) were paired and analyzed by correlational methods to study internal relationships among work elements. Productions records (average pieces produced per minute) for all samples were compiled and compared with variations in time of individual elements of work cycle. Discussion stresses an atomistic versus an integrated concept of human behavior.
T. G. R 4

9712
Fleishman, E.A. & Hempel, W.E. FACTORIAL ANALYSIS OF COMPLEX PSYCHOMOTOR PERFORMANCE AND RELATED SKILLS. *J. appl. Psychol.*, 1956, 40 (2), 96-104. (USAF Personnel and Training Research Center, Lackland AFB, Tex.).

9712
To provide additional insight and possible leads about the organization of abilities in perceptual-motor skills, a factorial analysis of data from the wartime Air Force classification research program (published in 1952) was made. Included were 23 test variables of which 16 were apparatus psychomotor tests and seven were printed tests; the criterion of pilot success was added. All data were based on over 1000 Navy pilot candidates. Brief descriptions of each test are given. Ten factors were extracted from the inter-correlations and factor loadings were obtained. The rotated factors were interpreted for psychological meaningfulness and discussed in relation to motor skills. Areas for further investigation are indicated.
T. R 15

9713
Dorman, P.J., & Lawton, R.W. EFFECT ON G TOLERANCE OF PARTIAL SUPINATION COMBINED WITH THE ANTI-G SUIT. *J. Aviat. Med.*, 1956, 27 (6), 490-496. (U.S.N. Aviation Medical Acceleration Laboratory, NADC, Johnsville, Penn.).

9713
In order to evaluate the effect of partial supination combined with the utilization of the anti-g-suit upon human g-tolerance, twenty-four Navy pilots were compared with nine experienced laboratory centrifuge subjects following 233 and 305 centrifuge runs for each respective group. Utilizing a prototype partially supinated seat (65° tilt) the subjects were tested for degree of tolerance under varied conditions of g-protection, i.e., supination, antiblackout suit (Navy Z-2), and a combination of both. The results are presented and discussed in terms of the most effective condition for maximal g-tolerance.
T. G. I. R 10

9714
Stoudobar, F.T., & Smith, R.O. THE CONTRIBUTION OF LECTURE SUPPLEMENTS TO THE EFFECTIVENESS OF AN ATTITUDINAL FILM. *J. Psychol.*, 1956, 40 (2), 109-111. (Air Force Personnel and Training Research Center, Lackland AFB).

9714
To evaluate a method of making attitudinal films more effective in accomplishment of training objectives, a commercial picture generally relevant to development of favorable attitudes was shown either with or without supplementary lectures designed to point out significant sequences stressing need for military discipline. Three comparable lectures were given (1) prior to film, (2) after film, and (3) part before and part after. An attitude questionnaire was given to all subjects after the film (16 basic training groups averaging 55 men per group). The results were analyzed for differences between groups attributable to the supplementary lectures and for position of the lectures in relation to the film.
T. R 13

9715
Churchill, A.V. COMPARISON OF TWO VISUAL DISPLAY PRESENTATIONS. *J. appl. Psychol.*, 1956, 40 (2), 135. (Defense Research Medical Laboratories, Toronto, Canada).

9715
To establish the comparability of two modes of presented dial displays (actual dials and slide projection), 50 subjects reported dial settings presented by both types of display. Two panels, containing six dials, three inches in diameter, black on white were presented in a vertical frame and viewed through an aperture fitted with a shutter operated by the subject. Slides were made from photographs of the panels and projected on a screen with exposures regulated by the subject. Illumination for both displays was equal. The time and error scores were analyzed for differences due to method of presenting the display.
T. R 1

9716
Anderson, W.H., Grant, D.A., & Wylstrom, C.O. THE INFLUENCE OF THE SPATIAL POSITIONING OF STIMULUS AND RESPONSE COMPONENTS ON PERFORMANCE OF A REPETITIVE KEY-PRESSING TASK. *J. appl. Psychol.*, 1956, 40 (3), 137-41. (University of Wisconsin).

9716
To investigate operator efficiency in a key pressing test as a function of spatial positioning, nine possible combinations of stimulus panel and response keyboard (left, right or in front of operator) were used with two modes of stimulus presentation (red lights on panel matched by green lights activated by pressing key): (1) self-pacing, stimulus patterns succeeding each other as fast as they were matched, and (2) automatic pacing, presentation at six-second intervals. The data were response times; number of key presses (error index); and latencies (in automatic pacing) for the last 15 stimulus patterns out of a block of 25. Analyses of results stressed performance as a function of angle between display and control units for both modes of presentation.
T. G. R 10

9717
Taylor, Jean G., & Smith, Patricia C. AN INVESTIGATION OF THE SHAPE OF LEARNING CURVES FOR INDUSTRIAL MOTOR TASKS. *J. appl. Psychol.*, 1956, 40 (3), 142-49. (Johns Hopkins University & Cornell University).

9717
To determine whether there is a "typical" learning curve for industrial motor tasks of varying degrees of complexity, seventy learning curves from operators on twelve power sewing-machine operations were obtained. Incentive conditions were the same for all operators--piece-rate system plus minimum guaranteed wage. The twelve operations increased in complexity from tasks of fixed motor sequence to those requiring continuous and varied adjustments. Using the period of initial plateau as a criterion of learning, modified Vincent curves were established for each job, and separate composite curves for each of two groups including half the jobs. Suggestions concerning change in requirements of task during learning are made to account for the shape of the curves.
T. G. R 16

9718

Poley, P.J. EVALUATION OF ANGULAR DIGITS AND COMPARISONS WITH A CONVENTIONAL SET. *J. Appl. Psychol.*, 1956, 40 (3), 178-180. (Defence Research Medical Laboratory, Toronto, Canada).

9718

To evaluate a new set of digits (Lansdell) designed to make maximum use of easily discriminated forms, and to compare them with conventional design (Machworth), four experiments were conducted. Procedures common to all: digits presented singly by slide projection; viewing distance, 20 feet; recognition task. Experiments: (1) 300 presentations Lansdell digits for .6 second; rate one every three seconds; illumination, ten foot candles. Confusion errors given. (2) Lansdell digits, black on white and white on black; illumination of 10-50 foot candles. Errors analyzed for effect of contrast. (3) and (4) Lansdell and Machworth digits, black and white; illumination of 10-50 foot candles; viewing angles varied. Comparisons of legibility were made. I. R 7

9719

Baishamp, Janet, Swander, R.C., & Smith, K.U. DIMENSIONAL ANALYSIS OF MOTION: II. COMPARISON OF VISUAL AND NONVISUAL CONTROL OF COMPONENT MOVEMENTS. *J. Appl. Psychol.*, 1956, 40 (3), 181-186. (University of Wisconsin).

9719

To determine the role of perceptual factors in the determination of component movements in a skilled pattern of motion, two groups (24 subjects) were matched on pre trials of a panel control knob-turning task, then given ten days of practice (12 trials per day) with vision or blindfolded, followed by one practice period of reversed conditions. Durations of manipulation and travel components of movements were measured electronically. Differences between the visual and blind groups are analyzed and discussed in relation to 1. skilled performance on the final day of practice, 2. acquisition of skill as a function of practice, and 3. transfer effects. Implications of the results for motion analysis studies in industry are pointed out. T. C. R 4

9720

Lookman, R.F. A NOTE ON MEASURING UNDERSTANDABILITY. *J. Appl. Psychol.*, 1956, 40, 195-196. (Bureau of Naval Personnel).

9720

To assess prose intelligibility or "understandability" an experimental rating scale of seven categories (very easy to very difficult) was devised. The uses for such data are illustrated by an experiment in which Naval Aviation Cadets rated a series of test directions for understandability. Comparisons were made with Flesch Reading Ease style descriptions by using rank correlations. The discussion points up the need for an "understandability" score in addition to ease of reading. R 3

9721

Hecker, D., Green, D., & Smith, K.U. DIMENSIONAL ANALYSIS OF MOTION: X. EXPERIMENTAL EVALUATION OF A TIME-STUDY PROBLEM. *J. Appl. Psychol.*, 1956, 40 (4), 220-227. (University of Wisconsin).

9721

To investigate the extent to which component movements (or therbligs) in patterned motion are interdependent, 48 subjects manipulated a series of controls, each control being separated by a constant distance of 24 inches. Eight different types of manipulations were practiced for four different periods. Travel times and manipulation times were measured electronically. Variations in duration of travel of a movement of constant length were analyzed as a function of the type of manipulation associated with it. The effect of learning upon travel time was further studied. These results are related to industrial time-and-motion study and to the general problem of integrating component movements in skilled motion. T. C. R 8

9722

Graham, Morah E. THE SPEED AND ACCURACY OF READING HORIZONTAL, VERTICAL, AND CIRCULAR SCALES. *J. Appl. Psychol.*, 1956, 40 (4), 228-232. (The Huxfield Department of Industrial Health, University of Durham).

9722

To study the speed and accuracy of reading comparable horizontal, vertical, and circular scales, 50 subjects were given practice and then tested on their ability to make readings (30) from pictures of the scale settings flashed on a screen at ten-second intervals, exposure time 1/2 second. Error scores were by analysis of variance techniques for differences attributable to scale shape, to segment of scale in which error occurred, and to subjects. These results are discussed in relation to previous studies and interpreted in terms of a physiological basis. T. I. R 6

9723

Kurke, M.I. EVALUATION OF A DISPLAY INCORPORATING QUANTITATIVE AND CHECK-READING CHARACTERISTICS. *J. Appl. Psychol.*, 1956, 40 (4), 233-236. (U.S. Army Ordnance Human Engineering Laboratory, Aberdeen Proving Ground).

9723

To evaluate the design of a dial incorporating quantitative and check-reading characteristics, the speed and accuracy of check-reading three different designs were measured by use of a card sorting experiment. Dials were alike in size, numbering, and pointer but varied in representation of danger: (1) reading alone, (2) red line marking danger area, and (3) contrasting colored wedge exposed for danger conditions. Speed scores were corrected for practice and motor activity effects by scores of an initial and final card sort on basis of color discrimination alone whereas the experimental sorts were on the basis of "safe and normal" and "danger conditions." The analysis was made in terms of the most effective design and the validity of the design principle used. I. C. R 5

9724

Webb, W.E., & Wallon, E.J. COMPREHENSION BY READING VERSUS HEARING. *J. Appl. Psychol.*, 1956, 40, 237-240. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.).

9724

To compare comprehension of narrative prose by reading and by hearing, two comparable sets of materials were developed using tales from Greek mythology. True and false questions were used for testing comprehension following (1) auditory, (2) read through once, (3) read-study during time equal to verbal presentation, or (4) simultaneous auditory and reading conditions. Testing was repeated after 24 and 43 hour intervals. Comprehension scores were analyzed for differences due to methods of presentation and the results discussed in terms of practical usage. T. R 2

9725

Merrill, W.J. Jr., & Bennett, C.A. THE APPLICATION OF TEMPORAL CORRELATION TECHNIQUES IN PSYCHOLOGY. *J. Appl. Psychol.*, 1956, 40 (4), 272-280. (International Business Machines Corporation, Endicott, N.Y.).

9725

This paper defines and gives computation procedures for various temporal correlation techniques. Serial correlations for discrete data and correlation functions for continuous data are examples of these techniques. Specific descriptions of computational procedures for autocorrelations for temporal relatedness within one series of data and crosscorrelations for such relatedness between two series are given. Through such procedures both cyclical and noncyclical temporal phenomena may be discovered. Applications of temporal correlation techniques to psychological data are discussed. G. R 29

9726
Stoll, Alice M. HUMAN TOLERANCE TO POSITIVE G AS DETERMINED BY THE PHYSIOLOGICAL END POINTS. *J. Aviat. Med.*, 1956, 27 (4), 356-367. (U.S.N. Aviation Medical Acceleration Laboratory, MADC, Johnsville, Penn.).

9726
This article describes a new method of analysis of human tolerance to positive g. Essentially the method consists of plotting the data of reaction to positive g as a strength-duration curve of maximum g versus total time of exposure to g. To evaluate this technique, comparisons were made with comparable independent data. The effectiveness of the technique is appraised on the basis of the amount of agreement with independent data. Potential applications of this technique are also discussed.
T. G. I. R 12

9727
Shepherd, R.J. A NULL-POINT DISCONTINUOUS ELECTRICAL PURSUIT METER. *J. appl. Psychol.*, 1956, 40 (5), 287-294. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

9727
A null-balance electrical pursuit meter based on a Wheatstone bridge circuit is described. The task is one of producing settings in a voltmeter (by use of a control knob) which correspond to readings in a second voltmeter in rear panel. Two evaluation studies are reported: (1) Six subjects operated the machine under normal rest conditions for five-minute periods on six days. Initial and total response times were analyzed for reliability of measurements; and (2) nine subjects operated the machine under stress of high-pressure breathing and under normal rest (control). The data are analyzed for changes due to stress. Possible uses of the meter in psychomotor research are discussed.
I. T. R 10

9728
Simon, J.R. THE DURATION OF MOVEMENT COMPONENTS IN A REPETITIVE TASK AS A FUNCTION OF THE LOCUS OF A PERCEPTUAL CUE. *J. appl. Psychol.*, 1956, 40 (5), 295-301. (University of Wisconsin).

9728
To study the inter-relation of perceptual processes and work movements, an assembly task consisting of inserting forty metal pins into an assembly plate was used. Locus of the perceptual cue was varied by special techniques to appear in each component of the work cycle (unloaded travel, grasp, loaded travel, and assembly). Two control conditions involving no perceptual cues were used. Thirty subjects performed under all conditions with latin-square design for control of individual differences and order of condition; 5 days of testing. Durations of the four component movements were measured by electronic methods and were analyzed for effect of locus of cue. Implications for time-and-motion studies are discussed in terms of the role of perceptual processes in human motion. I. T. G. R 13

9729
Baker, C.A., & Vanderplas, J.M. SPEED AND ACCURACY OF SCALE READING AS A FUNCTION OF THE NUMBER OF REFERENCE MARKERS. *J. appl. Psychol.*, 1956, 40 (5), 307-311. (Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio).

9729
To investigate the speed and accuracy of determining target position on a polar coordinate display as a function of the number of scale rings, twelve subjects observed a series of displays projected on a screen and made estimates of target range to the nearest ten yards. The displays varied in number of scale rings (0, 2, 4, 9, 19, and 39) and size (5, 7, 9, and 11 inches diameter). The data were time scores and yards of range reports converted into error scores: (1) gross errors (misidentification of scale rings), (2) interpolation errors (in percentage of total range of display), (3) and constant errors. Analysis was in terms of effect of number of rings, size of display, and position of target on speed and accuracy. Practice effects are noted
I. G. R 10

9730
Churchill, A.V. THE EFFECT OF SCALE INTERVAL LENGTH AND POINTER CLEARANCE ON SPEED AND ACCURACY OF INTERPOLATION. *J. appl. Psychol.*, 1956, 40 (6), 352-361. (Defence Research Medical Laboratories, Toronto, Canada).

9730
To study some factors affecting speed and accuracy of interpolation between scale marks, single-scale intervals were prepared in six sizes: (from 0.25 to 2.0 inches) with pointers of varying clearances (from 0.0 to 2.0 inches) between tip and scale reference line. Ten subjects read pointer positions for two conditions of exposure: (1) self-paced and (2) at 0.3 second exposures. Error frequencies and time scores were analyzed as a function of scale interval length and pointer clearance. Trends in directional errors are discussed.
T. G. R 10

9731
Hinchcliffe, R. AN APPRAISAL OF THE PRESENT METHOD OF ASSESSING HEARING IN AIRCREWS. *J. Aviat. Med.*, 1956, 27(3), 230-245. (Acoustics Laboratory, Central Medical Establishment, RAF, London, England).

9731
The author presents a critical evaluation of two methods of assessing aircrew hearing efficiency: (1) the pure tone audiogram, and (2) the forced whisper test. Examples of test results are demonstrated to be incompatible with actual hearing efficiency. Assessment of auditory function adequacy under various environmental conditions is also discussed. The author concludes his critique with a suggested plan for more adequate auditory assessment.
G. R 14

9732
Simon, J.R., & Smith, K.U. THEORY AND ANALYSIS OF COMPONENT ERRORS IN AIDED PURSUIT TRACKING IN RELATION TO TARGET SPEED AND AIDED-TRACKING TIME CONSTANT. *J. appl. Psychol.*, 1956, 40 (6), 367-370. (University of Wisconsin).

9732
To determine how variations in target speed and aided-tracking time constant (rate of cursor movement automatically generated by a motor system as operator adjusts hand control) affect type of errors made, an aided pursuit tracking task (aligning cursor with moving target by means of handwheel control) was used. Variables were target speed (23, 30 and 37 r.p.m.) and aided-tracking time constant (.25, 0.5, and 1.0 seconds). The data consist of tracking records for 27 practiced subjects on each of the nine combinations of variables. Errors are classified on basis of duration and extent as short, intermediate, and long wavelength and are analyzed as functions of target speed and time constant. Results are discussed in relation to applied problems of tracking aid and to tracking theory. T. G. R 8

9733
Bridgman, G.S., & Wade, E.A. OPTIMUM LETTER SIZE FOR A GIVEN DISPLAY AREA. *J. appl. Psychol.*, 1956, 40 (6), 378-380. (University of Wisconsin).

9733
To investigate the maximally visible size of letters inscribed in space limited by high-contrast borders, visual acuity determinations were made using single lines of block capital letters. Three ratios of letter size to field size (vertical dimension of background)--1.0, 1.4, and 5.5--were used at two luminance levels--8.45 and 0.084 ml.--observation distance 20 feet, 40 subjects. Criterion was "ease of reading" as size was increased. Threshold data were analyzed as functions of the surround or field to letter size ratios. Further study of the data in terms of the over-all size of the field required to provide threshold letters was made. Discussion relates the results to practical considerations of letter sizes when display space is a consideration.

9734

Briggs, G.E., Fitts, P.M., & Sahrlick, W.P. TRANSFER EFFECTS FROM A SINGLE TO A DOUBLE INTEGRAL TRACKING SYSTEM. Contract AF 18(600)-1201, Proj. 7716, Tasks 77292 & 57050, AFTRC-TN-56-135, Dec. 1956, 17pp. Operator Laboratory, AFTRC, Randolph AFB, Tex.

9734

To investigate the effect of training on a single integration to performance with a double integration tracking system, four groups (53 subjects) practiced on a two-dimensional compensatory tracking task simulating fire-control system of an aircraft. Amount of practice on the single integration was varied from 0 (control group), 10, 30, 50 trials of 40 seconds each before transferring to the double integration system (total of 90 trials). Performance (time on target for final three seconds of each trial) on the transfer task was evaluated by comparing initial levels, levels at time of transfer, and number of trials required to attain a given proficiency level for the experimental and control groups. Implications of the findings for training programs and for learning studies are discussed. T. G. I. R 11

9735

Luft, U.C., & Bancroft, R.W. TRANSTHORACIC PRESSURE IN MAN DURING RAPID DECOMPRESSION. *J. Aviat. Med.*, 1956, 27 (3), 208-220. (Lovelace Foundation, Albuquerque, N.M.).

9735

In a study of the dynamics of rapid decompression as reflected in transthoracic pressure, experiments were conducted with a rigid model (a bottle) and man. The effect of pressure upon the rigid model is reported as a function of the absolute pressure differential (of the decompression cabin) and the fractional differential of decompression. Human subjects placed in the decompression cabin under various degrees of decompression (150 mm. Hg to 502 mm. Hg) were measured for transthoracic pressure peaks. The results are discussed in terms of transthoracic pressure as a function of the fractional differential and the absolute differential of decompression. T. G. I. R 24

9736

Johnson, W.H. HEAD MOVEMENT MEASUREMENTS IN RELATION TO SPATIAL DISORIENTATION AND VESTIBULAR STIMULATION. *J. Aviat. Med.*, 1956, 27 (2), 148-152. (Defence Research Medical Laboratories, Toronto, Canada).

9736

This article reports an investigation of head movements in which 500 flight cadets were tested on a turntable device simulating aircraft flight movements. The direction and magnitude of resultant vestibular sensations were measured by attaching miniature rate gyroscopes to the subject's head. In addition, airsick vs. non-airsick crews were evaluated. The results are discussed in terms of the relation between time for recovery from laboratory-induced vestibular stimulation and the incidence of incapacitating airsickness among flight crews. G. I. R 4

9737

Webb, W.B. THE PREDICTION OF AIRCRAFT ACCIDENTS FROM PILOT-CENTERED MEASURES. *J. Aviat. Med.*, 1956, 27 (2), 141-147. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.).

9737

This article reviews several studies pertinent to the problem of selection and elimination of individuals who are highly likely to have aircraft accidents. Utilization of such criteria as aptitude, performance measures, and accident histories, is evaluated along with criteria of a more transitory nature, i.e., the individual's mood, attentiveness, temporary physiological state, level of training, etc. On the basis of these studies, conclusions are drawn concerning the general problem of predictability and the particular problem of prediction of pilot error accidents. R 8

9738

Hendler, E., & Wurzel, E.M. THE DESIGN AND EVALUATION OF AVIATION PROTECTIVE HELMETS. *J. Aviat. Med.*, 1956, 27 (1), 64-70. (U.S. Naval Aeronautical Medical Equipment Laboratory, Philadelphia, Penn.).

9738

The authors present a detailed discussion of the research methods employed in the design and evaluation of aviation protective helmets. The design of such helmets is discussed in terms of the physiological factors which must be taken into consideration, e.g., the amount of load, force distribution, and so forth. The authors also describe a new rebound test device designed to provide more accurate measurements of location of force application to helmets, overall pressure distribution, pressure variation, etc. G. R 12

9739

Kitses, G. CABIN AIR CONTAMINATION PROBLEMS IN JET AIRCRAFT. *J. Aviat. Med.*, 1956, 27 (1), 53-58. (Aero-Medical Laboratory, WADC, Wright-Patterson AFB, Ohio).

9739

The incidence of air pollution problems in turbo-jet aircraft has led to a series of investigations to determine the cause and effects of cabin air contamination. An experimental evaluation of non-toxic engine oil is reported by the author. The toxic effects of the decomposition products of this oil upon laboratory animals are discussed in terms of rate of decomposition, exposure time, and temperature of decomposition. The implications for human performance in high speed aircraft are discussed in terms of the potential health hazard and performance decrement. T. G. I. R 6

9740

Strughold, H. THE US AIR FORCE EXPERIMENTAL SEALED CABIN. *J. Aviat. Med.*, 1956, 27 (1), 50-52. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

9740

Technical, thermodynamical, and toxicological difficulties reflect the unsuitability of the conventional pressurized cabin for high altitude flight. This article presents a brief description of the U.S. Air Force experimental sealed cabin, a cabin designed to replace the conventional pressurized cabin. The two primary problems being investigated with this sealed cabin are: (1) the effect of cabin occupants upon various climatic factors, and (2) the extent to which such changes may be counteracted by physical, technical, and biological means. I. R 20

9741

Brown, J.L. & Lechner, M. ACCELERATION AND HUMAN PERFORMANCE. *J. Aviat. Med.*, 1956, 27(1), 32-49. (USN Aviation Medical Acceleration Lab., Johnsville, Penn.).

9741

The authors present a detailed discussion and review of experiments concerned with the effect of acceleration on human performance. The effects of acceleration are discussed in terms of the following aspects of performance: vision, vestibular senses (spatial orientation), kinesthetic senses, audition, simple motor behavior such as the exertion of force, rapidity of movement and distance of movement, the performance of complex tasks, e.g., seat ejection, the effects upon cognitive processes, e.g., discrimination reactions, and the psychological effects of acceleration (e.g., subject's attitudes). The article concludes with a statement of the problems which merit further investigation.

R 98

9742
Taylor, F.V., & Birmingham, H.P. SIMPLIFYING
THE PILOT'S TASK THROUGH DISPLAY QUICKENING.
J. Aviat. Med., 1956, 27 (1), 27-31. (NRL,
Washington, D.C.).

9742
The authors present a detailed definition and discussion of the function and process of quickening as provided by such aircraft instruments as the Sperry Zero Reader. Illustrations are offered of the role of the quickening instrument in the display-control relationship along with the results of a demonstration study in which performance of a four co-ordinate tracking test is compared under conditions of tracking with and without quickening. The implications of quickening in the man-machine system are elaborated in terms of the enhancement of the operator's performance.
G. I. R 2

9744
Dempsey, C.A., Greiner, T.H., Burch, N.R., Chiles, D., & Steel, J. THE HUMAN FACTORS IN LONG RANGE FLIGHT. J. Aviat. Med., 1956, 27 (1), 13-22. (Aero Medical Laboratory, Wright-Patterson AFB, Ohio).

9744
In an investigation of the human factors in long-range flight, subjects were confined to a grounded F-84 aircraft for a period of fifty-six continuous hours. The total time was divided into three phases of relative activity or performance; low performance, continuous performance, low performance. Such measures as heart rate, brain wave, blood samples, skin resistance, etc., were recorded along with a reaction time test and an alertness measure (British clock test). Cockpit noise level was controlled along with food intake and repeated subjective evaluations of clothing and seat discomfort were made. The results are discussed in terms of the qualitative and quantitative aspects of performance deterioration and cockpit habitability under simulated conditions of long-range flight. G. R 7

9745
Hilding, A.C. LABYRINTHINE STIMULATION. Amer. J. Ophthalm., 1956, 42 (4), Part 1, 621-629. (St. Luke's Hospital, Duluth, Minn.).

9745
The author reports two studies pertinent to the role of labyrinthine stimulation in visual axes deviation. In the first study, nine subjects were used to study the effects of prismatic lenses on vertigo. A series of seven tests (e.g., line-walking test, Hallpike test, Barany test, etc.) were used to measure the effect of the prism. In the second study, a group of subjects was used to evaluate the degree of deviation of the visual axes following vestibular stimulation by means of the Barany turning tests. The results of both studies are discussed in terms of the relative effect of prism upon vertigo and the effects of vestibular stimulation upon visual axes deviation. Also included are the results of experimental destruction of one labyrinth in cats. T. R 13

9746
Schmidt, T. EQUIPMENT FOR OBJECTIVE DETERMINATION OF VISUAL ACUITY ACCORDING TO GOLDMANN. Amer. J. Ophthalm., 1956, 42 (1), 123-126. (Freiburgstrasse 8, Bern, Switzerland).

9746
The author presents a description of a testing device to be employed with the Goldmann method of determining visual acuity. The primary characteristic of this method is the utilization of an involuntary physical reaction by the subject as the criterion of acuity. Such physical reactions may be eye movements, optokinetic nystagmus, or optokinetic pendular movements. The latter are employed in the Goldmann technique. The new apparatus presented induces such movements by utilizing a testing board with a checkered stripe on a uniform background. The ability to perceive the checkered stripe as a checkered stripe under variable conditions of stripe size, illumination, etc., reflects visual acuity.
G. I. R 4

9747
Berk, M.W. A LIGHTING SYSTEM FOR A TWO-METER TANGENT SCREEN. Amer. J. Ophthalm., 1956, 42 (3), 456-487. (University of Pittsburgh School of Medicine).

9747
The author describes a new fluorescent lighting system for a two-meter tangent screen which was developed to facilitate greater accuracy in central field examinations. The system utilizes two F96T12 Slim-Line fluorescent bulbs placed within two aluminum tubes. Simple rotation of a tube presents one of three color filters (red, green, and blue). Some of the additional advantages noted are the even distribution of light over the entire screen, the possibility of varying intensity without changing the quality of the light, and the fact that such a system requires the use of only white test objects (since the color is built into the system).
I. R 1

9749
Fox, M.S. OCCUPATIONAL DEAFNESS. J. Amer. med. Ass., 1956, 162 (14), 1273-1276.

9749
Following an operational definition of "occupational deafness", the author presents a general discussion on the causes of its occurrence, symptomatology, and the medicolegal aspects concerning the evaluation and treatment of this disorder. Emphasis is given to the design and function of hearing conservation programs in terms of the personnel requirements, methods of hearing loss evaluation, methods of decreasing noise levels, and so forth.
R 6

9750
Van Itallie, T.B., Sinisterra, L., & Stare, F.J. NUTRITION AND ATHLETIC PERFORMANCE. J. Amer. med. Ass., 1956, 162 (12), 1120-1126. (Harvard School of Public Health).

9750
This article presents a general discussion of the role of nutrition in athletic performance in terms of the psychological, physiological, and metabolic considerations. Among the psychological factors, motivation is treated as a function of subjective reaction to the tests of the diet and reaction to pre-performance dietary supplement. Sources of energy required during athletic performance, the rate of digestion, and the influence of particular aspects of diet (e.g., carbohydrates, fat, etc.) are topics which receive discussion. General conclusions are drawn in terms of the "best" diet for the athlete.
R (omitted in this publication)

9751
Karpovich, P.V., & Hale, C.J. EFFECT OF WARMING-UP UPON PHYSICAL PERFORMANCE. J. Amer. med. Ass., 1956, 162 (12), 1117-1119. (Springfield College).

9751
Three experiments are reported in this study of the effects of warming-up upon physical performance. In the first experiment, seven track athletes were required to run a total of 60 test runs of 440 yd. each following three types of warm-up: 20 runs following deep massage, 20 following preliminary exercise, and 20 following digital stroking (as a control for psychological effect). In the second experiment, five subjects ran the same distance following conditions of no warm-up and digital stroking. In the final experiment, performance on the bicycle ergometer was compared under conditions of no warm-up and preliminary exercise. The results are discussed in terms of the general effectiveness of warm-up in improving performance and the specific effect of each of the pre-trial conditions upon performance. T. R 6

9752
Learner, R.B., & Allard, R.I. COMPARISON OF FOUR METHODS OF EXPOSING SUBJECTS TO NOISE WITH CONYX LINE-EXPOSITION SHIELD. Summary AF 33(64)-3012, Proj. 7182, Tech. Note 34-685, Nov. 1954, 11pp. WAC, Wright-Patterson AFB, Ohio. (Ohio State University).

9753
To investigate the psychological feasibility of employing coding systems based on conyex line-detection signals for conveying information that might require as many as 70 unique signal categories, four groups (20 subjects each) decoded elevation information that had been encoded by the use of four different codes. Binary, decimal, and clock codes were based on eight lines radiating at 45-degree angular separation from the left, whereas the clock code consisted of a circle and two lines each of which could be positioned like the hands of a clock. The speed and accuracy with which 50 symbols in each test were decoded were studied for differences attributable to the type of code. Findings are discussed in terms of stimulus-response compatibility. T. G. I. R. H.

9754
Allphin, W. HOW TO FIX EXHAUSTION CRACKS. Factory Maintenance and Maintenance, 1956, 114 (5), 75-76. (Cynthia Electric Products, Inc., Salem, Mass.).

9755
The author presents specific suggestions for the most effective selection of colors with regard to workplace design. The role of lighting, work atmosphere, color preferences, is discussed along with such techniques as color coding, color selection systems, and the utilization of the color wheel. T.

9756
Fodolsky, E. USING COLOR TO BOOST OUTPUT IN FIVE PLANTS. Factory Maintenance and Maintenance, 1956, 114 (7), 124-125.

9757
The author presents a general discussion of the utilization of color to increase worker efficiency. Two primary aspects are presented: (1) the psychological effect of various colors, and (2) the most appropriate objects for which color is applicable. Under the latter heading the author suggests techniques for color application with tools, equipment, work being processed, and workplace environment.

9758
Wilkins, R. MAXIMIZING HEARING PROTECTION? Noise Control, 1956, 2 (4), 71, 68. (North American Aviation, Inc.).

9759
Following a brief presentation of the historical background of North American Aviation's hearing conservation program, the author describes the techniques used to deal with the specific problems encountered in one manufacturing building. A booklet on noise and hearing problem was issued to the employees along with a questionnaire designed to evaluate employee attitudes toward a hearing conservation program. A summary of results is presented together with the company's plans for utilizing these results in the formulation of a conservation program.

9760
Mass, R.B. A GUIDE FOR AN INDUSTRIAL AUDIO-METRIC MEASUREMENT PROGRAM. Noise Control, 1956, 2 (4), 64-67, 38. (Employers Mutual Liability Insurance Company).

9761
In discussing the development of a hearing conservation program the author cites four primary factors: "(1) pre-employment hearing measurements; (2) medical control; (3) ear protection program; (4) noise-level surveys; and (5) engineering control." Among the considerations concerning audiometric testing, the author includes the utilization of trained personnel, the location and design of the testing room, and the type of equipment and audiometric methods to be utilized in evaluating hearing thresholds. I.

9762
Wheeler, D.L. SOME FACTORS IN THE SELECTION OF HEARING INDUSTRIAL AUDIOMETRIC INSTRUMENTS. Noise Control, 1956, 2 (4), 61-63, 57.

9763
The author discusses the primary role of noise in the location of an industrial audiometric site and in audiometric evaluation. Acoustical, electrical, noise, and sufficient site are presented as determinants in the selection of an audiometric testing area. Also discussed are the techniques and objectives of ambient noise measurement and a method of noise control treatment, i.e., the probabilistic method. C.

9764
Stratynski, S. PLANT PLANNING FOR NOISE CONTROL. Noise Control, 1956, 2 (4), 37-44, 55.

9765
The author presents a detailed description of his approach to the task of evaluating the various sound-control requirements of two turbo-jet engines (Pratt and Whitney J40J-7) and J40J-7A). The general approach of analysis includes the calculation of sound-control criteria, analysis of the noise source, development of data obtained in noise source analysis, formulation of noise source criteria, and the development of specifications for muffler attenuation. Among the subjects covered are the following: body reaction to sound, noise annoyance factor in human behavior, noise effects on performance, etc. T. G. I. R. 32

9766
Brogan, P.A. AN AUTOMATIC AUDIOMETER FOR AIR FORCE CLASSIFICATION TESTS. Noise Control, 1956, 2 (3), 57, 67. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

9767
A quick method of automatic audiometry is described. Thresholds are determined at discrete frequencies by recording the first rise response after a threshold crossing on an IBM punched card.

9768
von Gierke, E.E. PERSONAL PROTECTION. Noise Control, 1956, 2 (3), 37-44. (WAC, Wright-Patterson AFB, Ohio).

9769
Devices for protecting individuals who must work in excessively noisy industrial or military environments, from noise-induced deafness are discussed. The theoretical limitations of earplugs, earmuffs and sound-proof helmets are outlined, and the actual performance of commercially available ear defenders is described. The criteria for determining when a noise is hazardous are reviewed, and the deficiencies of the available information pointed out. Practical problems of fitting earplugs and of instructing personnel to use them correctly are discussed.

9770
McMurray, R.P., & Rumsos, W. AN AUTOMATIC AUDIOMETER FOR INDUSTRIAL MEDICINE. Noise Control, 1956, 2 (1), 33-36. (Southern Methodist University).

9771
The design of an automatic audiometer for use in determining hearing loss among industrial employees is described. Its principal features are: the subject controls the level of the test tone; the operator may override the subject's control; hearing loss is measured at the discrete frequencies (500, 1000, 2000, 3000, 4000 and 6000 cps) customarily used in assessing industrial deafness; and a permanent record card is made of the threshold.

9763

Sells, S.B., Barry, J.R., Triton, D.L., & Chace, H.I. A TEST OF THE EFFECTS OF PRE-NEUROLOGICAL MEDICAL EXAM ON SUBJECTIVE PERCEPTIONS OF B-29 CREW AFTER A TWELVE-HOUR MISSION. *J. appl. Psychol.*, 1956, 42 (6), 363-367. (USAF School of Aviation Medicine, Randolph, AFB, Tex.).

9765

To determine the effects of propofol on methyl ether (ME) upon subjective feelings in normal healthy crew personnel under realistic operational flying conditions, tests were arranged in conjunction with a 15 to 18 hour training exercise, 12 in actual flight. A battery of tests measuring subjective feelings of anxiety, irritability, and fatigue were given to 100 crew members and instructors immediately upon landing. The drug or a placebo was then given and crew finished their mission after which testing was repeated. A follow-up questionnaire was given the following morning. A comparison of pre- and post-test scores was made for changes attributable to sedation, and of experimental and control groups on follow-up questionnaire.

T. R. 5

9766

Steinberg, Hannah. AIRCRAFT BEHAVIOR DURING HYPERGROSS CLIMB. *Brit. J. Psychol.*, 1956, 47, 183-185. (University of Cambridge).

9767

Fifty students, 35 male and 15 female, isolated situations of 300 different words (100) in support for 1/2 hour while taking a set of mental tests. A control group of 50 subjects matched for age and sex carried out the same procedure except that they isolated air. The test scores, the experimenters' observations, prior ratings of the subjects' emotional stability, and the subjects' introspective reports are compared and discussed.

9768

Clark, W.C., Smith, A.H., & Babo, A. THE INTERACTION OF SURFACE TEXTURE, OUTLINE GRADIENT AND GROUND IN THE PERCEPTION OF SLANT. *Canad. J. Psychol.*, 1956, 10 (1), 1-8. (Queen's University, Canada).

9769

Twelve observers viewed monocularly 6 stimuli varying in outline, surface texture and ground, and made judgments of their shape and slant. The importance of different cues for the accurate perception of slant is indicated and their implications for the theory of perceptual constancy are discussed.

9770

Clark, W.C., Smith, A.H., & Babo, A. RETINAL GRADIENTS OF OUTLINE DISTORTION AND BINOCULAR DISPARITY AS STIMULI FOR SLANT. *Canad. J. Psychol.*, 1956, 10 (2), 77-81. (Queen's University, Canada).

9771

Sixteen college students viewed monocularly and binocularly a film field, a film form, a textured surface field and a textured surface form, all inclined 40° from the frontal-parallel plane. The stimuli were seen through a reduction screen. The effects of shape, texture and binocular cues on the accuracy of the perception of slant are discussed.

9772

Morah, J.E., Burgess, G.G., & Smith, P.N. STUDENT ACHIEVEMENT AS A MEASURE OF INSTRUCTOR EFFECTIVENESS. *J. educ. Psychol.*, 1956, 47 (2), 79-83. (Personnel Research Laboratory, Air Force Personnel and Training Research Center).

9773

A course in hydraulics, which was a part of Aircraft Mechanics training, was taught by 120 instructors, each of whom had two successive classes of about 18 students for a period of eight days. The gain in student knowledge in each class was measured by before and after achievement tests and compared to ratings of the instructors by their supervisors, colleagues, and students, as well as to their scores on tests of intelligence, verbal facility and subject matter proficiency.

9769

Weise, W., & Pine, B.J. STIMULUS FAMILIARIZATION AS A FACTOR IN IDEATIONAL LEARNING. *J. exp. Psychol.*, 1956, 47 (2), 115-124. (Boston University).

9769

Approximately 700 high school students were shown a 15-minute strip on the organization of the United Nations. The group was exposed to the film strip and recorded answers only once, another group once after an equal period of familiarization with the organization, and a third group twice without any familiarization. The scores of the groups on a multiple choice questionnaire administered after the film are compared to evaluate the contribution to the instruction of preliminary familiarization and repetition of the same film.

9770

Ogilvie, J.C. EFFECTS OF STRUCTURE PATTERN ON THE VISUAL CRITICAL FINDER FREQUENCY. *Canad. J. Psychol.*, 1956, 10 (2), 61-68. (University of Toronto).

9770

The visual critical finder frequency was measured on eight young adults under four conditions; in the absence of noise, in the presence of continuous noise, in the presence of noise modulated in phase with the light and in the presence of noise modulated out of phase with the light. Measurements under each condition were made at three levels of brightness and two levels of noise. The implications of the changes found in the critical finder frequency for intersensory interaction are discussed.

9771

Clark, J.W., & Sindra, D. INDIVIDUAL DIFFERENCES IN PAIN THRESHOLDS. *Canad. J. Psychol.*, 1956, 10 (2), 69-76.

9771

The pain thresholds and tolerance levels of 16 adult males were measured with electrical (60 cycle current) between the radial and ulnar surfaces of the forearm, mechanical (pressure of hard blunt rubber spines against the forearm), and thermal (indirect heat on the ulnar surface of the forearm) stimulation. The role of attitudinal variables in producing large individual differences is discussed.

9772

Tuning, E.J. EFFECT OF REPETITION ON ARTICULATION SCORES FOR 10 WORDS. *J. acoust. Soc. Amer.*, 1956, 28 (2), 302-303. (Hearing and Communication Laboratory, Indiana University).

9772

To determine the effects of excessive repetition of the test words on articulation of scores, a tape recorded list of phonetically balanced words was played to each of three groups of subjects (total N=30) at signal-to-noise ratios of 4, 10, and 15 db respectively. Each group was tested once with each of 1, 2, 3, or 4 successive repetitions of each test word. Half of each group were tested in the 1, 2, 3, 4 order and the other half in the 4, 3, 2, 1 order. The results are analyzed in terms of the contribution to the articulation score of each additional repetition.

G. R. 4

9773

Zajackowska, A. EXPERIMENTAL DETERMINATION OF LUNEBERG'S CONSTANTS σ AND K . *Quart. J. exp. Psychol.*, 1956, 9 (2), 66-73. (University College).

9773

According to Luneberg's theory, subjective visual space is hyperbolic with a constant negative curvature. The subjective visual space of any observer is determined by two personal constants— σ indicating the degree of depth perception, and K indicating the degree of curvature characteristic of that individual. These constants were determined for 30 observers, children or untrained adults, by Luneberg's 3- and 4-point method. The implications of the results for the validity of this geometric model of visual space are discussed.

9774
Jeffress, L.A., Blodgett, H.C., Sidel, T.T., & Wood, C.L. MASKING OF TONAL SIGNALS. *J. Acoust. Soc. Amer.*, 1956, 28, 416-426. (Defense Research Laboratory, University of Toronto).

9775
The principal facts of monaural and binaural masking are reviewed in relation to two proposed theoretical models: the model for monaural listening is a narrow band-pass filter followed by a detector sensitive to changes in level; the model for binaural listening is a series of coincidence detectors associated with a delay network capable of matching an interaural stimulus delay with a contralateral neural delay. Original data from three listeners employing a variety of methods in alternative interaural phase relations are presented in support of the utility of these models. The prediction of many of the phenomena of masking from the properties of these two models is illustrated.
T. F. R 25

9776
Rutlinger, G. THE FLICKER FREQUENCY OF FLICKER IN THE CENTRAL AND PERIPHERAL FIELD WITH VARIOUS LEVELS OF BACKGROUND ILLUMINATION. *Quart. J. exp. Psychol.*, 1956, 8 (4), 185-191. (Psychological Laboratory, Institute of Neurology, Queen's Sq., London, England).

9777
Critical flicker frequencies in central and peripheral retinal positions (15° and 75° in each quadrant) were determined on 47 subjects for photopic and scotopic levels of background luminance. The test stimulus was varied in size from 1/2° to 3.6°. The background illumination, stimulus size, and the eccentricity of stimulation are discussed as they influence the critical flicker frequency.
T. F. R 11

9778
Broadbent, D.E. SUPPRESSIVE RESPONSES TO SEMIINTEGRAL STIMULI. *Quart. J. exp. Psychol.*, 1956, 8 (4), 145-152. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

9779
This study is a part of a group of investigations of simultaneous listening to multiple messages. Two series of 3 digits each were presented simultaneously to one eye and to one ear. The subject was required to reproduce both series in their correct order. In the control group all six digits were presented successively to one eye or to one ear. In another experiment two sets of three digits each were presented simultaneously either binaurally or dichotically. The voice speaking one set of digits was high-pass filtered with a cut-off frequency of 225 or 1200 cps and either mixed with the other voice or presented to the opposite ear only. The experimental groups were composed of 12 subjects in each case. The implications of the results for a theory of attention are discussed. R 6

9778
Jeeves, M.A., & Bruner, J.J. DIRECTIONAL INFORMATION AND APPARENT MOVEMENT. *Quart. J. exp. Psychol.*, 1956, 8 (3), 107-113. (Psychol. Lab., Cambridge University and Dept. of Social Relations, Harvard University).

9778
The threshold for the difference between apparent movement and apparent successivity was measured when only two directions of movement were possible, and also when 16 directions of movement were possible. The stimuli were tachistoscopically presented pinpoints of light presented at any one of the eight points of the compass and separated by 1/2 inch. The implications of the results are discussed in terms of information theory and compared to the classical approach to the phenomenon.

9779
Smith, A.M. GRADIENTS OF OUTLINE CONVERGENCE AND DISTORTION AS STIMULI FOR SLANT. *Quart. J. Psychol.*, 1956, 10 (4), 211-218. (Queen's University).

9779
The perception of slant in the presentation of four film forms, a white circle or rectangle on a black ground and a black circle or rectangle on a white ground, was measured as a function of the actual slant. The effects of the stimulus shape and the figure-ground relation on the shape of the error curve are discussed.

9780
Ogilvie, J.C. THE INTERACTION OF AUDITORY PATTERN AND CFF: THE EFFECT OF BRIGHTNESS. *Canad. J. Psychol.*, 1956, 10 (4), 237-240. (Defense Research Medical Laboratories, Toronto, Canada).

9780
The effect of auditory flutter on the critical flicker frequency was determined as a function of the luminance of the visual stimulus and the phase relation between it and the fluttering notes.

9781
Riley, P.J. EFFECT OF BACKGROUND ON THE CRITICAL FLICKER FREQUENCY. *Canad. J. Psychol.*, 1956, 10 (4), 230-236.

9781
The effects of the size and brightness of background illumination on the critical flicker frequency were determined for three background brightnesses and six background sizes. The implications of the results for the theory of retinal interaction are discussed.

9782
Kooner, C.M. CLOSURE WITH NEGATIVE AFTER IMAGES UNDER FLICKERING LIGHT. *Canad. J. Psychol.*, 1956, 10 (4), 191-199. (Defense Research Medical Laboratories, Toronto, Canada).

9782
Perceptual closure of incomplete pictures of human heads was studied under a condition permitting a long viewing period with only one fixation point. This condition was secured by inducing a negative after-image of a photographic negative flashed under a light flickering at 2-10 cps. The optimum flicker frequency for a clear after-image was determined. The effects of the flicker and prior viewing of the negative on the ease of closure were examined to validate the technique.

9783
Loveless, J.E. DISPLAY-CONTROL RELATIONSHIPS ON CIRCULAR AND LINEAR SCALES. *Brit. J. Psychol.*, 1956, 47 (4), 271-282. (University of Durham).

9783
Errors in tracking a moving pointer on a circular scale were measured for different quadrants of the circle and for direct and reverse linkage between display and control. The results of similar tracking tasks on a linear scale are discussed together with the nature of the errors to which a circular scale gives rise.

9784
Roekens, P.E., & Haicling, H.C. A MULTIPLE AUDIOMETER FOR GROUP TESTING AND ITS USE IN SCHOOL AUDIOMETRY. *Acta-Oto Laryngologica*, 1956, 46 (3), 227-235. (University Ear Nose and Throat Clinic, Groningen, The Netherlands).

9784
A set of apparatus and procedures is described that has been successfully used in the Netherlands in screening 4000 school children for hearing deficiencies. A demountable sound-proof room (3.3 x 2.5 x 2.1 meters) is described which has an attenuation of 25 db at low frequencies. Six children are tested at one time with an audiometer which gives a choice of three frequencies—300, 1500 and 3500 cps. This method permitted up to 100 children to be processed in one hour.
T. G.

9785

Frerker, P. RELATIONSHIP BETWEEN VESTIBULAR REACTIONS AND VEGETATIVE REFLEXES, STUDIED IN MAN BY MEANS OF A REVOLVING CHAIR OF A NEW DESIGN. *Acta Oto-laryngologica*, 1956, 46(3), 207-229. (Stockholm, Sweden).

9786

A revolving chair of new design is described together with associated apparatus for recording myogram, skin resistance, blood pressure and electrocardiogram. The results of an experiment on the effect of rotation on skin resistance in about 100 subjects is reported.

9786

Palva, Jarmo. ABSOLUTE THRESHOLDS FOR COXTENSIONS AND EXTENDED PURE TONES. *Acta Oto-laryngologica*, 1956, 46(2), 127-136. (Oto-laryngological Clinic, University of Turku, Finland).

9786

The absolute threshold for pure tones in the frequency range 125-4000 cps was measured with a continuous tone and with tone pulses interrupted at rates varying from 1 to 12 times per second. Audiograms were obtained on 15 ears by the binaural technique. The effect of the interruption rate on the absolute threshold is discussed.

9787

Christiansen, E. AUDITORY PATIENCE AND WHITE NOISE. *Acta Oto-laryngologica*, 1956, 46(2), 99-106.

9787

An attempt is made to develop a test that will identify individuals who are susceptible to hearing loss induced by exposure to industrial noise. The shift and recovery time of the threshold for a 4000 cps tone was measured in 41 normal ears after exposure to a white noise at 105 db SPL for 3 minutes. The research which is required to make such measurements into useful predictors of deafness is discussed.

9788

Sandstrom, G.V. SEX DIFFERENCES IN TACTILE KINESTHETIC AND VISUAL PERCEPTION OF VERTICALITY. *Quart. J. exp. Psychol.*, 1956, 8(1), 1-7. (Psychological Lab., University of Stockholm).

9788

To determine the nature of perceptual errors in setting a rod into the vertical position in a dark room by visual and by purely tactual kinesthetic cues, a large number of subjects (at least 30 of each sex) performed this task under a variety of conditions. Each combination of the following conditions was used: head upright, head tilted 30° left, head tilted 30° right; adjustment made with right hand, the left and both hands; and the initial position of the rod 60° left and 60° right. The results are analyzed in terms of the effects of the sex of the subject and the experimental conditions upon the error made in the setting of the rod.

9789

Gheesman, G.H., & Townsend, N.J. FURTHER EXPERIMENTS ON THE OLFACTORY THRESHOLDS OF PURE CHEMICAL SUBSTANCES USING THE "SNIFF-BOTTLE METHOD." *Quart. J. exp. Psychol.*, 1956, 8(1), 9-14. (Reading University).

9789

The degree to which exposure to the odor of four chemicals—iso-propanol, cyclopentane, cyclopentanol, and dioxan—influences the threshold for the odor of each of the others was determined by the "sniff-bottle method." The extent to which mutual adaptation occurs is treated as a measure of the "community of odor property" of these substances. Some of the technical problems of utilizing the "sniff-bottle method" are also discussed.

T. F. 4

9790

Davis, E. THE LIMITS OF THE PSYCHOLOGICAL REFRACTORY PERIOD. *Quart. J. exp. Psychol.*, 1956, 8(1), 24-41. (Institute of Experimental Psychology, University of Oxford).

9790

The effects of reacting to a prior signal upon the reaction to a subsequent signal were measured as functions of the length of the time interval between them. The subjects responded whenever a spot was exposed in a slit. In one experimental condition the response to each signal was made with the same finger of different hands and in the other experimental condition the two responses were made with different fingers of the same hand. The effects of the interval between spots and the method of making the response upon reaction time are discussed in terms of a "psychological refractory period."

9791

Brillatort, P.J. LES REACTIONS VESTIBULAIRES AUX EXERCICES ROTATOIRES SYNCHRONES. (VESTIBULAR REACTIONS TO SYNCHRONAL ROTATION TESTS). *Acta-Oto-laryngologica*, 1956, 46(3), 221-226.

9791

The threshold for circumferential rotation in alternating directions was measured in terms of the least detectable acceleration. The range of angular accelerations used was from 0.3 to 100 degrees/second². Myogenic eye movements were employed indirectly to define the threshold. The subject viewed a stereoscopic image that moved with him, and indicated the lateral direction in which it appeared to move. The least angular acceleration at which the reports of the subject were in phase with the actual motion was taken as the threshold. The implications of the results for an understanding of the mechanism of vestibular adaptation are discussed.

9792

Kantried, A. REPERES PSYCHOTOMIQUES: NOUVELLE METHODE D'ADJONCTION CONJECTIVE. (PSYCHOLOGICAL REFLEX: A NEW METHOD OF CONJECTIVE ADJUNCTION). *Acta-Oto-laryngologica*, 1956, 46(3), 231-243.

9792

A technique is described for using the psychodynamic skin response as a means of determining the threshold of hearing. The design of a differential bridge for measuring skin resistance and the interpretation of the resulting records are discussed. The use of the psychodynamic skin response with supraliminal stimuli is also described, and some results obtained with partially deaf children are given.

G. R. 4

9793

von Zwick, E. DIE ELEMENTAREN GRUNDLAGEN ZUR BESTIMMUNG DER INFORMATIONSKAPAZITÄT DES GEBIRS. (THE ELEMENTARY BASIS FOR DETERMINING THE CHANNEL CAPACITY OF THE EARS). *Acustica*, 1956, 4, 365-391. (Habilitationsschrift, Technische Hochschule, Stuttgart, Germany).

9793

The channel capacity of the ears is estimated on the basis of a mathematical model of amplitude and frequency discrimination. Data on the just-noticeable difference in the pitch and intensity of pure tones and white noise are taken from the literature to provide the constants of the model. The results are applied to the prediction of syllable-intelligibility.

G. R. 36

9794

Flanagan, J.L. EVALUATION OF TWO FORMANT-EXTRACTING DEVICES. *J. acoust. Soc. Amer.*, 1956, 28(1), 116-125. (Acoustics Laboratory, MIT).

9794

To compare the effectiveness of two automatic devices for extracting the formant frequencies from continuous speech, a list of 69 bisyllabic and 7 trisyllabic words was recorded on a wide-band spectrogram as uttered by 4 different speakers. Four other persons, experienced in spectrogram analysis, interpreted the record. A tape recording of the list was played to each of the formant extractors and the extent of agreement with the interpreted full spectrogram was assessed.

T. G. F. R. 8

9795
Flanagan, J.L. AUTOMATIC EXTRACTION OF FORMANT
FREQUENCIES FROM CONTINUOUS SPEECH. *J. acoust.
Soc. Amer.*, 1956, 28 (1), 119-112. (Acoustics
Laboratory, MIT).

9795
Two automatic methods of recording the first three
formant frequencies from continuous speech are described.
One method is based upon a periodic sampling of the
speech spectrum, and the other upon a continuous segmen-
tation of the spectrum. In both methods the rectified
signal represents the strength of the formant as a
function of time, and is recorded on photosensitive
paper.
C. R 23

9796
Peterson, J.E., Silverstein, Eva, & Subrahmanyam,
D.L. INTELLIGIBILITY OF DIPHASIC SPEECH.
J. acoust. Soc. Amer., 1956, 28 (3), 404-411.
(Speech Research Laboratory, University of
Michigan).

9796
The effects of switching abrupt reversals of phase
in and out of speech upon its intelligibility are in-
vestigated. Three speakers, an adult male, an adult female,
and a female child, read lists of 50 phonetically balanced
words which were recorded and played to 4 adult male lis-
teners through a switching and phase inverting channel at
a gain level set by each listener. The results are ex-
pressed in terms of the percent words understood as a
function of the switching rate (0.24 to 10600 cps), the
diphasic ratio (the relative durations of the in phase
and out of phase conditions which varied from 1:1 to 1:3)
and the rise-fall time of switching (from as short as pos-
sible to a maximum of 10 microseconds at frequencies
below 50 cps). T. C. R 4

9797
Fairbanks, G., House, A.S., & Keirose, J.
AUDITORY DETECTION OF THE PRESENCE AND ABSENCE
OF SIGNALS IN NOISE. *J. acoust. Soc. Amer.*,
1956, 28 (4), 614-616. (Speech Research
Laboratory and Control Systems Laboratory,
University of Illinois).

9797
This study is an investigation of the effects of
the set induced in a psychophysical subject by in-
structing him to report the absence of a signal as op-
posed to the usual instruction to report the presence of
a signal. A 1500 cps tone pulse one second long was
presented or omitted during a three second burst of
white noise at 60 db sensation and at a level near
threshold level. The subjects were 36 young men with
normal hearing. Half of the subjects were instructed to
report the presence of the signal and half to report its
absence. The two groups are compared with respect to the
proportion of correct signal detections, correct null
detections, signal misses and false alarms as a function
of small differences in the level of the test tone.
T. C. R 1

9798
Hughes, G.W., & Halle, H. SPECTRAL PROPERTIES
OF FRICATIVE CONSONANTS. *J. acoust. Soc.
Amer.*, 1956, 28 (2), 303-310. (Research Lab-
oratory of Electronics, MIT).

9798
To determine the distinctive acoustic features of 6
English fricative consonants, they were recorded as
spoken by a number of talkers reading isolated words
designed so that the fricatives were located before or
after a major vowel. The fricatives were isolated by
an electronic gate and their energy density spectra
determined with a band-pass filter 150 cps wide. Dif-
ferences between speakers and between classes of fri-
catives, labial, dental, and palatal, are analyzed and
a set of objective criteria for differentiating fri-
catives are developed. The analysis was verified by having
listeners attempt to identify the now isolated fricative
sounds.
C. R 4

9799
Bryant, G.L. THE AUTOMASTS: AN AUTOMATICALLY
RECORDING TEST OF ELECTRONICS TROUBLE SHOOTING.
1954, Dept. of Psychology, University of
California.

9799
This report describes the design and use of a
device for simulating a variety of electronic trouble-
shooting problems. The testing of data flow and com-
ponent characteristics can be simulated by the subject
by operating hand controls. Information on the result
of each test is presented to the subject on a printed
card which is exposed when a crank is pulled. Each
test made by the subject is automatically recorded on
a perforated tape. Some experience (but no actual data)
in the use of a trial form of 12 problems on four dif-
ferent simulated equipment is discussed.
T. F. R approx. 10

9800
Bowen, J.H., & Chernikoff, R. THE RELATIONSHIPS BETWEEN MAGNIFICATION AND COURSE-FREQUENCY IN
COMPENSATORY AIDED TRACKING. *NAL Rep. 4913*, April 1957, 6pp. *Applications Research Div.,
USN Research Lab., Washington, D.C.*

6 naval enlisted men received 20 testing cycles on each of the 12 combinations of magnifi-
cations and courses. The effects of the various magnifications on tracking performance with
the 3 course levels were examined at both the early (cycles 2-4) and late (cycles 18-20)
learning stages. The following results were found: a) Early in learning, increasing the
magnification produced a decrease in error for the low-frequency course, but produced no
systematic changes at the other course levels. b) After learning had stabilized, all magnifi-
cation levels showed equal improvement over the 1X condition for the low- and inter-mediate
frequency course, there were no differences between any pair of conditions. c) The nonlinear
magnification condition did not differ significantly from the 5X or 10X linear conditions
with any of the courses. When taken with the results of previous work comparing pursuit and
compensatory displays, the present study shows that the beneficial effects of magnification
occur at low and intermediate course frequencies, while the use of a pursuit display effec-
tively lowers error at intermediate- and high-frequency levels.
R 6

9801

Coedry, F.E., Peacock, L.J., & Cramer, R.L. NYSTAGMIC EYE MOVEMENTS DURING INTERACTING VESTIBULAR STIMULI. Proj. 6 95 20 001, Rep. 275, March 1957, 8pp. USA Medical Research Lab., Fort Knox, Ky.

This is a study of the ocular nystagmic reaction to angular acceleration followed immediately by angular deceleration. During the deceleration period, nystagmus from the acceleration terminates and shortly thereafter nystagmus in the opposite direction commences. Time from the onset of deceleration to a point midway between nystagmus of opposite directions was measured. Electronic amplification of corneo-retinal potential was the method of recording eye-movement. The results obtained on vestibular nystagmus were essentially the same as those previously obtained where subjective reports were recorded. Both sets of results show close correspondence to theoretical curves but there is a small consistent difference between obtained and theoretical results.

R 5

9802

Helfer, P.M. THE EFFECTS OF NOISE ON WORK OUTPUT AND PHYSIOLOGICAL ACTIVATION. Proj. 6 95 20 001, Rep. 270, March 1957, 25pp. USA Medical Research Lab., Fort Knox, Ky.

3 physiological variables (skin conductance, pulse interval, and muscle tension) were recorded during performance of a mental task, during exposure to 110 db noise, and during the noise and task combined. Noise by itself was found to be relatively non-stressful. However, it appeared that noise added slightly to the physiological cost of mental work, even though noise did not affect task performance. No correlation was found between physiological reactions to noise and the effects of noise on performance.

R 17

9803

Martman, B.O. THE EFFECT OF TARGET FREQUENCY ON COMPENSATORY TRACKING. Proj. 6 95 20 001, Rep. 272, April 1957, 15pp. USA Medical Research Laboratory, Fort Knox, Ky.

Using compensatory tracking, 8 Ss tracked one-dimensional simple sine waves having a frequency of 10, 20, 30, 40, 50, or 60 cps. A springless free-moving joystick was used as a tracking control. Each increase in frequency led to systematically poorer performance. Significant differences in performance were obtained for hits scores but not for time-on-target scores.

R 5

9804

Cooning, L.J. ELEMENTS IN AIRCRAFT MAINTENANCE SCHEDULING. Research Rep., 1948. Purdue University.

9806

The literature on the application of factory production scheduling methods to aircraft maintenance is reviewed in the form of a narrative discussion. The topics covered are the influence of the nature of the flying operation, the nature of the maintenance operation, the saturation limit of teamwork, the system of assigning, recording and forecasting work requirements, and the system of evaluating the effectiveness of the scheduling methods in use.

T. G. R 31

9807

Brown, J.L., Hill, J.E., & Burke, R.E. THE EFFECT OF HYPOXIA ON THE HUMAN ELECTRORETINOGRAM. Baled & Surg Proj. SM 001 110 300, Rep. 2, MADC-XA-5615, Nov. 1956, 23pp. Aviation Medical Acceleration Lab., MADC, Johnsville, Penn.

9807

To study the effect of hypoxia on the human electroretinogram (ERG), measurements were made of two subjects. Hypoxia was induced by breathing, at atmospheric pressure, oxygen-nitrogen mixtures that contain lower percentages of oxygen than that found in normal air (nine degrees and fifteen degrees). The ERG response to stimulation with a red, blue, or white test light was recorded before, during, and after 15-minute periods of breathing the oxygen-poor gas mixture. Amplitudes of both negative (A-wave) and positive (X-wave for red light, B-wave for blue light) deflections were studied for differential effects of hypoxia. Implications of the results are discussed in relation to current interpretations of the electroretinogram.

G. I. R 26

9805

Marsh, J.E. DEVELOPMENT OF THE WRITTEN EVALUATION OF MECHANIC'S PROFICIENCY (WEMP) MEASURE FOR B-50 AIRCRAFT. June 1956. AFTRC, Lackland AFB, Tex.

9808

Madden, H.L., & Friedman, G. A FACTOR ANALYSIS OF THE STENQUIST MECHANICAL APTITUDE AND THE COOPERATIVE SCIENCES TEST IN 1949 NORMATIVE SURVEY BATTERY. 1952. HRRC, Air Training Command, Lackland Air Force Base, Texas.

9805

This report describes the development of a written test to evaluate the technical competence of aviation mechanics with respect to the B-50 aircraft. Items composed by subject matter specialists were selected on the basis of item reliability and validity. The criterion was supervisory ratings. The items were grouped into test areas--e.g., hydraulic system--and analyzed separately as well as collectively. Reliabilities and validities are reported for the test areas and the whole test.

T. R 7

9808

This study was undertaken to determine the factorial structure of the Stenquist Mechanical Aptitude and the Cooperative Sciences tests and their relation to the Airman Classification Battery ACIA. The tests were administered to 645 airman as a part of a larger survey. A factor analysis of the test scores was made by the centroid method. Nine factors are extracted and six identified in psychological terms.

T. R 5

9809

Klass, P.J. BOMBING SYSTEM KEVED TO NEW HIDI-CATCH. Aviation Week, July 1957, 67(3), 62-69.

9809

This article presents a detailed description of the Navy's A-7B-3 low-altitude bombing system (LBS). Emphasis is placed on a novel feature of the system, an all-altitude indicator which combines the information previously presented by three instruments into a single instrument display system. Functionally adequate in both the loft and over-the-shoulder bombing systems, the all-altitude indicator is said to have received enthusiastic support from pilots who have employed it. The technical aspects of its construction are outlined and discussed.

I.

9816

Dix, M.R. LOUDNESS RECRUITMENT. Brit. med. Bull., 1956, 12(2), 119-124. (Medical Research Council, London, England).

The loudness recruitment phenomenon was first described by Fowler. Its occurrence in Ss suffering from certain varieties of nerve deafness has since been abundantly confirmed. Such Ss, although unable to understand speech at ordinary levels of intensity, complain of excessive loudness if these levels are exceeded. The investigation of loudness recruitment is best undertaken in cases of nocural deafness by means of the binocular balancing technique first described by Fowler. A brief description of the test follows, along with the anatomical basis of loudness recruitment, its relation to adaptation, its relation to speech intelligibility, technique of loudness recruitment tests with special reference to the measurement of the intensity difference limen and pure tone audiometry, and the clinical value of the loudness recruitment test.

R 25

9817

Hood, J.D. FATIGUE AND ADAPTATION OF HEARING. Brit. med. Bull., 1956, 12(2), 125-130. (Otolological Research Unit, Medical Research Council, London, England).

This paper represents an investigation of fatigue and adaptation of hearing and is subdivided into three parts: fatigue, adaptation, and pathological adaptation. Fatigue is discussed in terms of stimulus duration, variation with stimulus intensity, and recovery. Adaptation is discussed in terms of the same three considerations.

R 12

9818

Gray, J. MUSCULAR ACTIVITY DURING LOCOMOTION. Brit. med. Bull., 1956, 12(3), 203-209. (University of Cambridge, Cambridge, England).

This paper represents an examination of muscular activity during locomotion. It is subdivided into five parts: the movement of fish, the mechanics of standing in 4-footed animals, 4-footed movement, the starting and checking of movements, the physiological integration of movement. General considerations concerning the forces involved in locomotion and the movement of muscle and bone are also discussed.

R 10

9819

Merton, P.A. PROBLEMS OF MUSCULAR FATIGUE. Brit. med. Bull., 1956, 12(3), 219-221. (Medical Research Council, London, England).

This paper describes the problems of muscular fatigue through a discussion of 3 related topics: site of muscular fatigue, nature of fatigue, fatigue of skilled movements. Some of the points made are as follows: a) There are strong indications that fatigue is peripheral and is due to failure of the muscle to contract when motor impulses reach it and this failure is not due to blockage of impulses at the neuromuscular junction; b) To date, there is no evidence that fatigue is due to failure of the action potential-contraction coupling; c) muscular fatigue makes little difference to the performance of skilled movements until the muscles are almost too weak to make the necessary movements; d) experimental results indicate that the limit of muscular endurance may be nearer than is imagined even in light skilled tasks; e) Muscular fatigue is likely to be of importance in causing a sudden breakdown of performance when working near the limits of reserve, and it probably will not be significant at other times owing, perhaps, to the excellence of the muscle's proprioceptive servo-control which compensates automatically for fatigue. (HEIAS)

R 9

9820

Bannister, R.G. MUSCULAR EFFORT. Brit. med. Bull., 1956, 12(3), 222-225. (Hammersmith Hospital, London, England).

This paper deals with various aspects of muscular effort involved in sprint running, middle distance running, and long distance running. The rise in ventilation during exercise and oxygen transfer in the lungs are also discussed along with the increase in cardiac output which accompanies exercise. Factors, such as the role of the autonomic system in the smooth integration of exercise and that of the sympathetico-adrenal system, are also mentioned. It is concluded that the muscular effort of running is limited to 2 factors: a) the maximal contractile activity of muscle, which limits speed in sprinting, and b) the rate of supply of oxygen and metabolites to muscles along with the removal of the products of muscular contraction. (HEIAS)

R 40

9829

Beranek, L.L. CRITERIA FOR OFFICE QUIETING BASED ON QUESTIONNAIRE RATING STUDIES. *J. acoust. Soc. Amer.*, 1956, 28 (5), 833-832. (Bolt Beranek and Newman Inc., Cambridge, Mass.).

9829

In order to determine criteria for the maximum acceptable noise levels in offices, 17 locations in buildings at an Air Force Base were studied. Ratings of the intensity and the ambient noise and of such adverse effects as interference with direct and telephone communication were made on 15 different scales by 190 office workers. Time samples of the noise were made at each location and octave band analyzed. The median noise ratings given at different locations are related to the speech interference level (the average of the sound pressure levels in the three octave bands between 500 and 4500 cps) and the loudness level (computed by Stevens' method). An attempt is also made to equate the effects of intermittent and continuous noises. A set of criteria are suggested for executive and general offices in terms of the speech interference and loudness levels. T. G. R 11

9830

Blodgett, H.C., Wilbanks, W.A., & Jeffress, L.A. EFFECT OF LARGE INTERAURAL TIME DIFFERENCES UPON THE JUDGMENT OF SILENCE. *J. acoust. Soc. Amer.*, 1956, 28 (4), 639-643. (University of Texas).

9830

The maximum interaural time difference that could be introduced into the dichotic presentation of bands of noise was determined as a function of the frequency of the band. Noise bands of 105-212, 100-4800, 2400-4800 cps, and a narrow band centering around 425 cps were used. The listeners were nine experienced adult males. In one experiment the maximum time difference was determined by the method of adjustment, and in another the minimum time difference sufficient to offset a level difference of 3 db was determined by the method of constant stimuli. Individual differences among listeners are described, as well as the average trend of the results. T. G. R 1

9831

Chao, Y.R. LINGUISTIC PREREQUISITES FOR A SPEECH WRITER. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1107-1105. (University of California).

9811

The prerequisites for, and the probable limitations of, a device for automatically transcribing the spoken word into a written text are described in general terms. The considerations which will determine the approach to the design, especially the problem of storage, the choice of orthography, and the practical problems of using such a machine in dictating are indicated. R 7

9832

Cherry, C.E., & Sayers, B. McA. "HUMAN 'CROSS-CORRELATOR'" -- A TECHNIQUE FOR MEASURING CERTAIN PARAMETERS OF SPEECH PERCEPTION. *J. acoust. Soc. Amer.*, 1956, 28 (5), 889-895. (Imperial College, University of London).

9832

A method is described for using the human listener as a cross-correlator to extract the perceptually critical invariant properties of auditory signals such as normal or compressed speech. One signal is fed directly to one ear, and another, having undergone the transformation under investigation, is fed to the other ear through a variable delay line. The listener reports whether the resulting sound image is located to the right or to the left. The results are expressed in the form of a 'psychocorrelogram' analogous to the autocorrelation function. Examples are given of the results of applying this method to some signals such as peak clipped speech and speech mixed with correlated and uncorrelated noise. G. R 15

9833

Flanagan, J.L., & House, A.S. DEVELOPMENT AND TESTING OF A FORMANT-CODING SPEECH COMPRESSION SYSTEM. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1099-1106. (AFSC & Acoustics Laboratory, MIT).

9833

A system is described for transmitting intelligible speech over a reduced bandwidth by coding the formant characteristics. Seven parameters are extracted from the speech--the frequencies of the first, second, and third formants, the fundamental voice frequency, the amplitude of voicing and friction, and the frequency of the spectral maximum of fricative excitation. The intelligibility of speech transmitted over this system was evaluated on the basis of monosyllables read to six listeners by three speakers. The results are analyzed in terms of the errors attributable to vowels and to consonants. T. G. R 14

9834

Glorig, A., Quiggle, R., Wheeler, D.E., & Grings, W. DETERMINATION OF THE NORMAL HEARING REFERENCE ZERO. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1110-1112. (Research Center, Subcommittee on Noise in Industry, Los Angeles).

9834

The literature on the normal threshold of hearing as it has been measured in the laboratory and in population surveys is reviewed in the light of the findings of recent investigations in England. The discrepancies which exist among these data are described and the necessity of choosing particularly between a standard based upon survey or laboratory data is indicated. T. R 6

9835

Hawley, M.E. SPEECH COMMUNICATIONS IN NOISE: SOME EQUIPMENT PROBLEMS. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1256-1260. (RCA).

9835

The problems of speech communications equipment for use in noisy environments are considered from the point of view of the system designer. The factors determining the speech signal-to-noise ratio--speech level and spectrum, noise level and spectrum at source, microphone response to speech, microphone response to noise, automatic volume control characteristic, pre-emphasis, de-emphasis, peak clipping, electrical noise, audio level, headset sensitivity and response, acoustic noise level and spectrum, and headset noise emission characteristics--are discussed and the weak points of the available equipment emphasized. T. G. R 5

9836

Howard, C.R. SPEECH ANALYSIS-SYNTHESIS SCHEME USING CONTINUOUS PARAMETERS. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1091-1098. (North-eastern University).

9836

A device is described for compressing the bandwidth required to transmit intelligible speech. Six continuous parameters of the speech are extracted: the first and second formant frequencies, their amplitudes, the voice pitch fundamental, the amplitude and centroid frequency of the turbulent sounds. Each parameter is converted to a dc potential which is transmitted to a speech synthesizer where it excites pitch sources for non-turbulent sounds and noise sources for turbulent sounds. The results of some preliminary tests of intelligibility are discussed briefly. T. G. R 8

9837
Kirk, R.E. LEARNING, A MAJOR FACTOR INFLUENCING PREFERENCES FOR HIGH-FIDELITY REPRODUCING SYSTEMS. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1113-1115. (Ohio State University).

9837
The preferences of 119 male and 91 female college students for electroacoustic reproductions of restricted and unrestricted frequency ranges were determined with four kinds of material--string quartet, symphony orchestra, organ, and popular music, and a male voice. The following bandwidths--130-3000, 120-5000, 90-9000, 30-15,000 cps--were compared by the method of paired comparisons. One experimental group then listened to wide range reproductions of similar materials for about nine hours over a period of six weeks. Another experimental group listened to the same reproductions over the 150-3000 cps bandwidth. A control group was given no special listening experience. The preferences expressed are analyzed by the kind of material, the musical training of the individual and the experimental exposure. T. G. R 4

9838
Kump, R.G., & Eady, H.R. SOME MEASUREMENTS OF INTERAURAL TIME DIFFERENCE THRESHOLDS. *J. acoust. Soc. Amer.*, 1956, 28 (5), 859-860. (U.S. Navy Electronics Laboratory, San Diego, Calif.).

9838
The threshold for interaural time difference was determined with each of three stimuli: (1) a 1000 cps tone, (2) a 150-1700 cps band of noise, and (3) a 1 msec. click. Measurements were made on 10 subjects listening through earphones at a sound pressure level of 65 db. The range of individual thresholds and group psychometric functions are presented. T. G

9839
Lawrence, M., & Yantis, P.A. ONSET AND GROWTH OF AURAL HARMONICS IN THE OVERLOADED EAR. *J. acoust. Soc. Amer.*, 1956, 28 (5), 852-859. (University of Michigan).

9839
The limits of linearity of the ear were measured with a test tone by the method of best beats for fundamental frequencies of 100, 350, 2000 and 5000 cps. The authors, who served as their own subjects, also determined the minimum and maximum intensity of the test tone at which beats could be detected as a function of the level of the fundamental tone. The sensation level and equivalent sound pressure level of the second aural harmonic are described for each fundamental frequency and level. The implications of the results for a theory of the locus of distortion in the ear are discussed. C. R 17

9840
Olson, H.P., & Belar, H. PHONETIC TYPEWRITER. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1072-1081. (RCA Laboratories, Princeton, N.J.).

9840
This paper describes the construction and function of a device for automatically converting spoken English into an intelligible and more or less conventional typewritten text. It consists of a microphone, volume controlled amplifier, compressor, array of eight band pass filters, scanning switch, spectral memory, spectral to syllable recoder, syllable memory, syllable to letter recoder, letter matrix and electric typewriter. The device operates by making a time-frequency-amplitude analysis of the speech wave and comparing it to a set of 40 stored speech sounds, which are in turn compared to the syllable memory and transmitted through the recoder to the letter matrix and typewriter. Results obtained with an actual model with storage capacity for only ten syllables are described. T. G. R 3

9841
Ford, A. FOUNDATIONS OF BIOELECTRONICS FOR HUMAN ENGINEERING. 70 03103A, NE 091300-8358-5. (NEL N4 2), NEL Rep. 761, April 1957, 119pp. USN Electronics Lab., San Diego, Calif.

This survey of the literature is presented in annotated form under the following chapter headings: the viewpoint of human engineering; amplitude and frequency of bioelectric signals; the organized bioelectric facility; bioelectric components--electrodes and transducers; amplifiers and recorders; the human transmission system; bioelectric scoring and control; effort, fatigue, rest, and sleep; physical work and manual skills; normal mental work, unfavorable special environmental conditions; injury, drug effects, and pathology; bioelectric aspects of vision; applications to human engineering; and summary of bioelectric applications to human engineering. (MIA5) R 614

9842
Schubert, E.D. SOME PRELIMINARY EXPERIMENTS ON BINAURAL TIME DELAY AND INTELLIGIBILITY. *J. acoust. Soc. Amer.*, 1956, 28 (5), 895-901. (Cleveland Hearing and Speech Center).

9842
The effects of interaural differences in arrival time upon the intelligibility of speech in noise were investigated under three conditions: speech in phase, speech delayed in one ear by 0.2 to 7.0 milliseconds, and speech or noise out of phase. The intelligibility of simple prose was measured on 14 subjects at signal-to-noise ratios of -2 to -14 db. The effects of the antiphasic condition are compared to the effects of simultaneous arrival and to the effects of different lengths of interaural time delay as a function of the signal-to-noise ratio. T. C. R 19

9843
Stevens, S.S. CALCULATION OF THE LOUDNESS OF COMPLEX NOISE. *J. acoust. Soc. Amer.*, 1956, 28 (5), 807-832. (Psycho-Acoustics Laboratory, Harvard University).

9843
A method is described for calculating the loudness of a complex noise from a knowledge of its spectrum, a scale relating scores to phons, equal loudness contours for octave bands of noise, and a formula relating the total loudness of a noise to the individual loudnesses of the bands. A variety of experiments on loudness matching were performed to obtain the subjective relations required for this computation. The method is based upon a model of mutual inhibition, according to which each band of noise contributes less to the total loudness than it would alone, by an amount which depends primarily on the proximity of the bands and secondarily upon their level. Supplementary experiments are reported on the effects of intermittent noise, the continuity of the spectrum, and the width of the bands. T. G. R 15

9844

Tanner, W.P. Jr. THEORY OF RECOGNITION. *J. acoust. Soc. Amer.*, 1956, **28** (5), 882-888. (University of Michigan).

9845

A theory of recognition is developed to account for the situation in which an observer must decide, in the presence of noise, which of two possible signals has been received. In an experiment intended to test the adequacy of the model, two observers made forced choices, according to the method of constant stimuli, between tones of two frequencies separated by 25, 50, 100, 300, 400, 500, and 600 cps and of four durations—0.05, 0.1, 0.5 and 1.0 sec. The results are expressed in terms of a parameter in the theory reflecting the degree of independence of the probability of recognizing one signal from the probability of recognizing the other.

T. G. R 7

9845

Webster, J.C., Thompson, P.O., & Beitscher, H.R. NOISE BANDS VERSUS PURE TONES AS STIMULI IN MEASURING THE ACOUSTIC ATTENUATION OF EAR PROTECTIVE DEVICES. *J. acoust. Soc. Amer.*, 1956, **28** (4), 631-638. (U.S. Navy Electronics Laboratory, San Diego).

9845

The acoustic attenuation afforded by several kinds of ear defenders (RAF 43490; and Graydon Stadler OOL ear-phone sockets; T-512 and Flents earplugs; Airphone inserts; Mindel and David Clark earmuffs; and the Sound Absorb helmet) was determined by the threshold shift technique using both pure tone and noise band audiometry. Ear-occluded and non-occluded thresholds were obtained on 10 inexperienced listeners for each ear defender. The advantages and disadvantages of noise band audiometry are discussed in some detail, and a system is outlined for equating the results obtained in attenuation tests with noise bands to those obtained with pure tones. The efficacy of the ear-defenders studied is described and the reasons for the differences discussed.

T. G. R 14

9846

Wren, J., & Stubbs, H.L. ELECTRONIC BINARY SELECTION SYSTEM FOR PHONEME CLASSIFICATION. *J. acoust. Soc. Amer.*, 1956, **28** (6), 1082-1091. (Northeastern University).

9846

A system is described for performing the kind of phonemic analysis of speech desirable for compressed speech or for a speech writer, by means of successive binary selection. The first step separates the voiced from the unvoiced sounds and the second the turbulent from the non-turbulent. Non-turbulent sounds are further sorted by a frequency-time analysis and turbulent sounds by an amplitude-time analysis.

T. G. R 10

9847

Zwislocki, J., & Feldman, R.S. JUST NOTICEABLE DIFFERENCES IN DICHOTIC PHASE. *J. acoust. Soc. Amer.*, 1956, **28** (5), 860-864. (Psychological Acoustics Laboratory, Harvard University).

9847

The threshold for an interaural difference in the phase of a pure tone was measured as a function of its frequency (250-1250 cps) and sensation level (10-110 db). Thresholds were determined by the method of constant stimuli (forced choice) on six listeners wearing ear-phones. The data are compared with the results obtained by previous investigators with other psychophysical methods, and with experiments on the localization of pure tones in a sound field.

G. R 14

9848

Catford, G.V. AMBLYOPIA -- A COMPARISON BETWEEN DISTANCE AND NEAR VISION. *Brit. J. Ophthalmol.*, 1956, **40** (10), 633-635. (Weston-super-Mare, England).

9848

This article presents a brief analysis of 50 cases of amblyopia in young men. It was conducted to assess the relation between distance and near visual acuity. Snellen type (modified by the R.A.F. near point rule) was utilized to determine acuity. Noting the type of refractive error (myopia, emmetropia, etc.), comparisons of distance and near acuity scores are presented.

T. G. P 1

9849

Dieterle, P., & Gordon, E. STANDARD CURVE AND PHYSIOLOGICAL LIMITS OF DARK ADAPTATION BY MEANS OF THE GOLDMANN-WECKERS ADAPTOMETER. *Brit. J. Ophthalmol.*, 1956, **40** (11), 652-655. (Ophthalmological Clinic and Statistical Laboratory, University of Geneva).

9849

This article presents a detailed description of the technique of determining dark adaptation by means of the Goldman-Weckers adaptometer. In order to determine a standard curve and physiological limits, this technique was applied to twenty normal subjects whose ages ranged from 12 to 47 years. The statistical methods used to arrive at the mean curve and physiological limits are discussed.

G. P 6

9850

Irwin, J.O. THE STUDY OF THE PHYSIOLOGICAL EFFECTS OF HOT CLIMATES. *Biometrics*, 1956, **12** (4), 475-490. (London School of Hygiene and Tropical Medicine, England).

9850

The author discusses the problems involved in the study of the physiological effects of hot climates and presents as an illustrative example an experiment designed to determine the effects on men naturally acclimated to the tropics (Singapore) of exposure for four hours twice weekly to varying combinations of air temperature, humidity and movement. Three teams of four subjects each were tested under four work-clothing combinations with work consisting of a step-climbing routine. Sweat loss, evaporative water loss, rectal temperatures, pulse rates, and comfort and efficiency ratings were obtained under each of the experimental conditions. The results are discussed in terms of the effects of climatic conditions upon the physiological variables.

T. R 3

9851

Neely, J.C. THE R.A.P. NEAR-POINT RULE. *Brit. J. Ophthalmol.*, 1956, **40** (10), 636-637.

9851

This article describes the R.A.P. near-point rule, an apparatus designed to provide more effective measurement of such ocular inefficiencies as amblyopia by assessing the relation between distance and near visual acuity. A technical description and illustration of the instrument are presented.

I. R 3

9852

Weale, R.A. PROBLEMS OF PERIPHERAL VISION. *Brit. J. Ophthalmol.*, 1956, **40** (7), 392-415. (Institute of Ophthalmology, Judd-St., London, England).

9852

The author presents a detailed discussion of problems of peripheral vision ranging from diffraction phenomena to electrophysiology. Included are such aspects as the following: the nature of the retinal image, sensitivity of the dark-adapted and light-adapted retinal periphery, and color vision (methods of investigation, extra-foveal phenomena, etc.). Results of research are brought to bear on each subject discussed.

G. I. R many

9853

David, E.E., & McDonald, H.S. NOTE ON PITCH-SYNCHRONOUS PROCESSING OF SPEECH. *J. acoust. Soc. Amer.*, 1956, **28** (6), 1261-1266. (Bell Telephone Laboratories, Murray Hill, N.J.).

9853

A system for reducing the bandwidth necessary to transmit the voiced portions of speech is described. Since the waveform of voiced speech is highly repetitive over intervals of 20-70 msec., some of the redundant information can be removed by eliminating N-1 of every N pitch periods. A set of delay lines codes the reduced information for transmission as a running signal, which is decoded at the receiver. A voice simulator replaces the missing pitch periods from the one sample transmitted or from an interpolation between adjacent samples. The theoretical performance of such a system is derived as a function of the value of N selected and the method used for approximating the missing periods.

G. R 9

9854

Franko, E.K. RESPONSE OF THE HUMAN SKULL TO MECHANICAL VIBRATION. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1277-1284. (Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio).

9854

The mechanical impedance of the human skull was measured by driving it at frequencies between 200 and 1600 cps by means of a piston with a small contact area. Data were obtained on a living subject, a dried skull and a cadaver. The modulus of elasticity and velocity of flexural waves in the skull bones is calculated. Some of the difficulties of measurement, especially on a living subject, are discussed. The results are compared to those obtained vibrating a simple spherical shell.

G. R 14

9855

Neely, K.K. EFFECT OF VISUAL FACTORS ON THE INTELLIGIBILITY OF SPEECH. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1275-1277. (Defence Research Medical Laboratory, Toronto, Canada).

9855

The purpose of this study was to estimate the contribution of visual cues, "lip reading," to the intelligibility of speech in face to face communication in a noisy environment. One trained speaker read words from a multiple choice intelligibility test to 35 listeners with normal hearing. The speech was transmitted over a microphone-carphone system at an average level of 80 db sound pressure level in a noise field at 100 db sound pressure level. Each listener sat in turn in one of 11 test positions which varied in distance from the speaker and the angle of regard to his face. The proportion of words heard correctly is analyzed as a function of the availability of visual cues to the subject.

T. R 5

9856

Tarnoczy, T.H. DETERMINATION OF THE SPEECH SPECTRUM THROUGH MEASUREMENTS OF SUPERPOSED SAMPLES. *J. acoust. Soc. Amer.*, 1956, 28 (6), 1270-1275. (Post Research Institute, Budapest, Hungary).

9856

In order to measure the average spectrum of speech without regard to its short term modulation, recordings were made of several voices talking simultaneously. The resulting mixture is aperiodic and has a more stable spectrum level than the voice of a single speaker. Seven simultaneous recordings were made of Hungarian speech under standardized conditions--two of ten men, two of ten women, one of six men, one of six women, and one of five men and five women together. The spectra generated by this combination was octave band analyzed with one-half octave overlap. Male and female voices are contrasted and compared to the results of similar estimates of the speech spectra generated by English talkers.

T. G. R 1

9857

Barnett, C.H. THE PHASES OF HUMAN GAIT. *Lancet*, 1956, 271, 617-621. (St. Thomas's Hospital Medical School, London, England).

9857

This article presents the results of a study of the human gait. Utilizing a new type of pedograph, 100 subjects ranging in age from 17 to 25 years had radiographs taken of their feet and in addition, measures of their prints after they had walked with powdered feet on a black floor. The results are presented and discussed in terms of the characteristics manifested in the various phases of the normal gait: heel, standing, metatarsal, barefoot, and step-off phase. Angle of gait, pressures, etc., reflect some of the additional aspects treated. Also included is a discussion of abnormal gait.

G. I. R 26

9858

Rawlins, J.S.P. DESIGN OF CRASH HELMETS. *Lancet*, 1956, 271, 719-724. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

9858

In this article on the design of crash helmets the author utilizes data on aircrew, motorcyclists, and racing motorists to discuss the following aspects of helmet design: incidence of head injuries, sites of head injury, mechanics of brain injury, mechanics of fracture of the skull, accelerations in accidents, and British standards of helmet design. A summary of requirements of the ideal crash helmet is presented and related to the practical aspects of helmet design. Illustrative cases are presented.

T. I. R 3

9859

Pugh, L.G.C., & Ward, M.P. SOME EFFECTS OF HIGH ALTITUDE ON MAN. *Lancet*, 1956, 271, 1115-1121. (Division of Human Physiology, National Institute for Medical Research, London, England).

9859

This article describes the effects of high altitude experience on three Himalayan expeditions. The various symptoms experienced at different heights are described along with the findings of physical examinations. Mental effects of high altitude and the problem of acclimatization are discussed.

T. R 17

9860

Friedlander, Y.J. CHARACTERISTICS OF POSTURAL TREMOR IN NORMAL AND IN VARIOUS ABNORMAL STATES. *Neurology*, 1956, 6 (10), 716-724. (V.A. Hospital, San Francisco, Calif.).

9860

To investigate the phenomenon of tremor in normal and abnormal states, 1200 tracings were obtained on approximately 700 patients. In this group medical history and physical examination records were available. 39 of the 403 were categorized as normal whereas the remainder were classified in one of the following diagnostic categories: anxiety; chronic alcoholism; parkinsonism; and unilateral central nervous system pathology. The characteristics of postural tremor in normals are compared to those found in pathological disorders. Truography as a diagnostic technique is critically evaluated.

T. G. I. R 18

9861

Promley, D.B. SOME EXPERIMENTAL TESTS OF THE EFFECT OF AGE ON CREATIVE INTELLECTUAL OUTPUT. *J. Geront.*, 1956, 11 (1), 74-82. (University of Liverpool).

9861

This article presents several investigations of the effects of age on creative intellectual output. Utilizing the Shaw Test, a test of creative thinking, 256 subjects composing four age-level groups (ranging from 17 to 82 years) were evaluated. The results are presented and discussed in terms of the comparability of the age distribution of scores with previously published data (Lehman's "Age and Achievement"). Conclusions are drawn concerning the loss of intellectual efficiency (quantity and quality) with age.

T. R 10

9862

Clay, H.M. A STUDY OF PERFORMANCE IN RELATION TO AGE AT TWO PRINTING WORKS. *J. Geront.*, 1956, 11 (4), 417-424. (Nuffield Research Unit into Problems of Ageing, Psychological Laboratory, Cambridge, England).

9862

This article presents an investigation of the relation between age and performance as manifested in the operations of two printing works. The performance records were obtained of subjects ranging in age from 20 to 65 years and performing the following tasks: machine-compositors, hand compositors, and readers. The effect of an incentive scheme and the general trend of productivity are analyzed in terms of the age distribution.

T. R 11

9853

Dennis, J. AGE AND ACHIEVEMENT: A CRITIQUE. *J. Geront.*, 1956, 11 (3), 331-333. (American University of Beirut, Beirut, Lebanon).

9863

This is a critique of Lehman's "Age and Achievement". The author briefly reviews the above publication and points to what he believes to be a major methodological weakness in the treatment and presentation of data concerned with age. Other criticisms are offered with regard to interpretation of the data.

R 1

9864

Heglin, H.J. PROBLEM SOLVING SET IN DIFFERENT AGE GROUPS. *J. Geront.*, 1956, 11 (3), 310-317. (Interscutor Pilot Research Laboratory, Tyndall AFB, Fla.).

9864

In order to determine the relation of age to: (1) susceptibility to problem solving set, (2) ability to overcome set, and (3) training in avoiding set, 100 male and female subjects in each of three age groups (14-19, 20-29, and 50-55) were tested on the Luchins Water Jars and Coven's Alphabet Maze Tests (a variation of the Water Jars Test). Following the first test the effects of set were demonstrated and the subject cautioned to avoid them on the second test. An analysis of variance of the data was conducted to evaluate the role of age difference in reaction to set. The results are discussed in terms of the potential age factors operant in problem solving activity.

T. I. R 11

9865

King, H.P. AN ATTEMPT TO USE PRODUCTION DATA IN THE STUDY OF AGE AND PERFORMANCE. *J. Geront.*, 1956, 11 (4), 410-416. (Ruffield Research Unit into Problems of Ageing, Psychological Laboratory, Cambridge, England).

9865

This article reports the use of production data, obtained with women using power sewing machines, to evaluate the effect of age upon productivity. Women between the ages of 15 and 60 years were studied for four eight-week periods. An analysis of performance records provides a basis for a statement concerning the degree and point of onset in decline of productivity.

T. G. R 7

9866

Lehman, H.C. REPLY TO DENNIS' CRITIQUE OF AGE AND ACHIEVEMENT. *J. Geront.*, 1956, 11(3), 333-337. (Department of Psychology, Ohio State University).

9866

The author replies to a critique (see Accession No. 9863) of his publication "Age and Achievement." Each question raised in the critique is produced and followed by the author's reply.

R

9867

Thaler, Margaret. RELATIONSHIPS AMONG WECHSLER, WEIGL, RORSCHACH, EEG FINDINGS, AND ABSTRACT-CONCRETE BEHAVIOR IN A GROUP OF NORMAL AGED SUBJECTS. *J. Geront.*, 1956, 11 (4), 404-409. (Walter Reed Army Institute of Research, Washington, D.C.).

9867

This is a study of the abstract-concrete behavior of a group of normal aged subjects and the interrelationships among data on these subjects obtained with the following measures: Wechsler-Bellevue Intelligence Scale, the Weigl test, the Rorschach, and EEG findings. One hundred sixteen normal subjects over age 60 were tested on each of the measures. The results are presented and discussed in terms of the relations between the scores on the various tests. Conclusions are drawn concerning the concepts of abstract and concrete as applied to aged persons and the notion of "capacity" is offered as a potentially more pertinent concept.

T. R 18

9858

Beecher, H.K. EVIDENCE FOR INCREASED EFFECTIVENESS OF PLACEBOS WITH INCREASED STRESS. *Am. J. Physiol.*, 1956, 137, (1), 163-169. (Anesthesia Laboratory, Harvard Medical School).

9868

To evaluate the effectiveness of placebos with varied intensities of stress, patients who had received four doses of placebo were compared to those who had received four doses of morphine in terms of percent of patients reporting relief of pain with each dose. Increasing stress was defined by degree of anxiety (i.e., response to saline) and the effectiveness of the placebo was ascertained for severe vs. mild anxiety. The implications for the utilization of drugs as well as placebos with increasing stress are discussed.

T. G. R 17

9869

Caplan, P.E., Culver, D., & Thielen, W.C. HUMAN EXPOSURES IN POPULATED AREAS DURING AIRPLANE APPLICATION OF MALATHION. *A.M.A. Arch. Indust. Health*, 1956, 14 (4), 325-332. (California Department of Public Health).

9869

This article reports the results of a study of the effects of aerial application of malathion (organic phosphate insecticide) on potential human exposure. Utilizing surface-deposit papers (attached to buildings in area), alpha-cellulose pads (to represent skin) attached to various parts of the people working on the project, and a measure of atmospheric concentration, exposure values were obtained. The results are discussed in terms of the degree of potential hazard afforded by application of malathion.

T. G. I. R 4

9870

Guyton, H.C., & Lense, P.T. METHODS FOR EVALUATING RESPIRATORY PROTECTIVE MASKS AND THEIR COMPONENT PARTS. *A.M.A. Arch. Indust. Health*, 1956, 14 (3), 246-249. (Biological Warfare Laboratories, Fort Detrick, Md.).

9870

This article defines the function of the protective mask and describes the methods employed for determining its efficiency. Three types of masks (industrial special purpose, dust and paint respirators, and contagion masks) were evaluated in terms of the average efficiency of each in providing protection against pathogenic aerosols.

T. I. R 3

9871

Kleinfeld, M., & Wilson, J.T. DECOMPRESSION SICKNESS (COMPRESSED-AIR ILLNESS) IN A TUNNELING OPERATION. *A.M.A. Arch. Indust. Health*, 1956, 14 (6), 539-542.

9871

This article presents a review of data on the occurrence of decompression sickness in a sewer-tunneling project. Incidence of sickness is analyzed in terms of amount of pressure, person's weight, and other physical and occupational factors. The difficulties encountered (primarily worker-management resistance) in providing protection against decompression sickness are discussed in terms of potential solutions to these problems.

G. R 3

9872

Meyer, A.P. Jr. THE OCCUPATIONAL HEALTH PROGRAM OF THE STRATEGIC AIR COMMAND. *A.M.A. Arch. Indust. Health*, 1956, 14 (2), 107-113.

9872

The author briefly describes the functions and organization of the Strategic Air Command (SAC) and then goes on to describe in detail the role of the occupational health program in SAC. The necessity for such a program is discussed in terms of the health problems presented by the types of occupations, materials employed, and the Air Force working environment (e.g., long working hours, poor dietary habits, high intensity noise, etc.). Also described is the research being conducted in conjunction with the occupational health program.

I. R 4

9873

Shapiro, J. SATURATION DOSEAGE FROM BREATHING BALLOON AND ITS DAUGHTER PRODUCTS. *A.M.A. Arch. Indust. Health*, 1956, 14 (2), 169-177.

9874

To evaluate the amount of radiation damage offered to different parts of the respiratory system by exposure to radon and its radioactive daughter products, two human subjects and a number of rats were exposed to varied radon concentrations in a specially constructed chamber. Measures of retention of radon and its daughter products are discussed in terms of the degree of maximal allowable air concentration of the various radiation products.
T. I. R 10

9875

A.M.A. Archives of Industrial Health. INTERIM REPORT VALUES FOR 1956. SPECIAL REPORTS ADDED AT THE 1956 ANNUAL MEETING OF THE AMERICAN CONFERENCE OF GOVERNMENT INDUSTRIAL HYGIENISTS, PHILADELPHIA, APRIL 21-24, 1956. *A.M.A. Arch. Indust. Health*, 1956, 14(2), 186-197.

9876

This article presents tables of values of maximum average atmospheric concentration of contaminants to which humans may be exposed for an 8 hour working day without injuring their health. The values reflect the approximate milligrams per cubic meter which may be tolerated during the average time period specified (8 hour working shift). Included are values for various gases, vapors, toxic dusts, fumes, mists, and mineral dusts.
T.

9875

Bell, B., & Lillehei, J.F. EFFECT OF HYPER-VENTILATION ON PERFORMANCE. *J. appl. Physiol.*, 1956, 9 (3), 371-374. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

9875

To investigate the effects of hyperventilation on psychomotor performance, 25 subjects were tested on the USAF SAM Complex Coordination Apparatus before, during, and following hyperventilation induced by attaching a USAF A-13 pressure demand mask (worn by the subject) to the power unit of a USAF SAM portable respirator. Performance curves were plotted as a function state of hyperventilation. The results are discussed in terms of their applicability to pilot proficiency.
C. I. R 8

9876

Bernstein, L.M., Johnston, L.C., Ryan, R., Inouye, T., & Hick, P.K. BODY COMPOSITION AS RELATED TO HEAT REGULATION IN WOMEN. *J. appl. Physiol.*, 1956, 9 (2), 241-256. (University of Illinois College of Medicine).

9876

This is an investigation of the relationship between body composition and heat regulation in women. Utilizing a total population of 76 young and aged normal, obese, and hyperthyroid women, lean body mass, cell mass, and fat mass were determined. Each of the subjects was then required to spend one hour in a hot environment, one hour in a comfortable environment, and three hours in comfortable and cooling environments. Appropriate indices were applied to ascertain heat regulation. The results are treated in terms of the relative rates of oxygen consumption, skin temperature, heat loss, etc., as functions of body composition. In addition, comparisons of body compositions for the various types of subjects are presented and discussed.
T. G. R 37

9877

Brooks, C.M.C., Hoffman, B.P., Snodgrass, E.E., Kleyntjes, P., et. al. SLEEP AND VARIATIONS IN CERTAIN FUNCTIONAL ACTIVITIES ACCOMPANYING CYCLIC CHANGES IN DEPTH OF SLEEP. *J. appl. Physiol.*, 1956, 9 (1), 97-104. (New York University).

9877

To investigate sleep and the functional changes attributable to variations in sleep, multiple recordings were employed with six subjects (three men and three women) sleeping in single beds for five nights a week for a total of 30-52 nights. Electroencephalographic tracings, cardiostimulator records, skin temperatures, body movements, etc., reflect the types of measures utilized. The data are treated in terms of an electroencephalographic evaluation of sleep, and the relation between estimated depth of sleep and such variables as heart rate, body movement, toe temperature, and so forth.
T. G. R 4

9878

Colville, P., Stagg, C., & Ferris, B.G. Jr. EFFECTS OF BODY TILTING ON RESPIRATORY MECHANICS. *J. appl. Physiol.*, 1956, 9 (1), 15-24. (Harvard School of Public Health).

9878

To conduct a quantitative evaluation of the effects of body tilting on respiratory mechanics, 12 subjects with severe respiratory muscle paralysis (poliomyelitis) and three normal subjects were protected for functional residual capacity (with a helium dilution technique) in the supine and horizontal position. Measures were then taken with the tilt bed facilities head-down and foot-down (limits of tilt: 30° head-down, 40° foot-down). Volume changes, angle, and airway pressure were recorded simultaneously. The results are presented and discussed in terms of volume-angle-airway relations as a function of trunk angle and compliance of the respiratory mechanisms (lung, diaphragm, rib cage, etc.).
T. G. R 11

9879

Frank, M.R., Mead, J., Stephens, A.A., & Storey, C.F. MEASUREMENT OF PULMONARY COMPLIANCE IN SEVENTY HEALTHY YOUNG ADULTS. *J. appl. Physiol.*, 1956, 9 (1), 38-42. (Harvard University).

9879

The volume-step method was used in this evaluation of pulmonary compliance measurements designed to determine variability of successive determinations made on a single and on separate occasions with esophageal balloon in fixed and varied positions, and the relationship of sex, age, height, body surface, and vital capacity to these measures. Seventy healthy adults were used as subjects and various measures were taken (e.g., vital capacity, elastic recoil of lungs, etc.). The results are discussed in terms of the intercorrelations among the variables as indicative of the nature of compliance measures and their dependence upon other physiological factors.
T. G. R 13

9880

Goff, L.G., Brubach, H.F., Specht, H., & Smith, N. EFFECT OF TOTAL IMMERSION AT VARIOUS TEMPERATURES ON OXYGEN UPTAKE AT REST AND DURING EXERCISE. *J. appl. Physiol.*, 1956, 9 (1), 59-61. (National Institute of Arthritis & Metabolic Diseases, National Institute of Health, Bethesda, Md.).

9880

To evaluate the effect of total immersion on oxygen consumption at rest and during exercise, measurements were made over 20 minute periods with four subjects submerged under conditions of rest and mild exercise, and controlled temperature levels (range 29.5-36.5° C). The results are presented and discussed in terms of the relative effect of immersion per se versus average skin temperature upon oxygen consumption and heart rate.
T. G. R 9

9881
Goff, L.G., Frassetto, R., & Specht, E. OXYGEN REQUIREMENTS IN UNDERWATER SWIMMING. *J. appl. Physiol.*, 1956, 9 (2), 219-221. (National Institute of Arthritis and Metabolic Diseases, National Institute of Health, Bethesda, Md.).

9882
To determine the average speeds and oxygen requirements during free open water swimming and to investigate the validity of laboratory data application to field problems, a total of 27 subjects were observed over a total of 200 open water swims of varying distances. Oxygen consumption was measured by the pressure-drop method and average swimming rates determined by the amount of time required to swim a known distance. The results are presented in terms of average swimming rate as a function of distance and the range of oxygen consumption as a function of various swimming rates. These findings are related to previous ones.
T. G. R 3

9882
Katscher, A.E., Piro, J.D., Zegarelli, E.V., Chilton, N.S., & Bennett, Aline. THRESHOLD OF PAIN: STUDIES WITH THE BARRY-WOLFF-GOODALL ESTHESIOGRAPH (ALLEGHENY). *J. appl. Physiol.*, 1956, 9 (3), 451-452. (Columbia University).

9882
In this investigation of the Barry-Wolff-Goodall pressure pain threshold instrument, thresholds were determined for eight trained subjects (2 male, 6 female) representing 10 pain thresholds made daily for 30 days. Pain threshold was defined as that force which must be exerted on the subcutaneous and peritoneal tissues of the forearm by a part of the apparatus (plastic tip of plunger) to elicit a minimum painful stimulus. The results are discussed in terms of the effectiveness of the method.
T. R 5

9883
Le Blanc, J. EVIDENCE AND MEANING OF ACCLIMATIZATION TO COLD IN MAN. *J. appl. Physiol.*, 1956, 9 (3), 355-358. (Defence Research Northern Laboratory, Fort Churchill, Manitoba, Canada).

9883
In this study of acclimatization to cold, observations were made of ten soldiers exposed for 4 months to Arctic climate. During the day they performed a 10 mile walk and in the evening simulated watchkeeping conditions by standing motionless for 2-3 hours. Skin and body temperature, and oxygen consumption (Barbier Metabolator) measures were taken and compared with a non-acclimatized group. The results are presented and discussed in terms of differences in physiological measures (between the groups) as indicative of the occurrence and character of acclimatization.
T. G. R 11

9884
Le Blanc, J.S. IMPAIRMENT OF MANUAL DEXTERITY IN THE COLD. *J. appl. Physiol.*, 1956, 9 (1), 62-64. (Defence Research Northern Laboratory, Fort Churchill, Manitoba, Canada).

9884
In an investigation of the factors involved in impairment of manual dexterity in the cold, eight subjects were tested on two manual dexterity tests (Hunter test, tapping test) following exposure to cooling of one of the following: finger, hand, or arm, while the other two were excluded from exposure. The results are treated in terms of the relative effect upon finger dexterity of cooling the finger, the hand, and the arm. The occurrence of impairment when the synovial fluid is unaffected is discussed with regard to other potential factors in dexterity impairment under conditions of cold.
G. R 5

9885
Marshall, R., Lamphier, E.H., & DeBois, A.B. RESISTANCE TO BREATHING IN NORMAL SUBJECTS DURING SIMULATED DIVES. *J. appl. Physiol.*, 1956, 9 (1), 5-10. (Graduate School of Medicine, University of Pennsylvania).

9885
This is an investigation of difficulty in breathing as a function of the ambient pressures resulting from dives to depths of 100 or more feet of water. Utilizing an occluding balloon technique, intrapulmonary pressures were made on three normal male subjects during simulated dives varying from 66 and 99 feet for two of the subjects and 132 feet for the third. Maximal expiratory and inspiratory flow were recorded electrically with an (Osterlind) low resistance spirometer (with rapid kymograph). The data are presented and discussed in terms of resistance to breathing at various depths as indicated by inspiratory and expiratory flows and as a function of quiet vs. forced breathing.
T. G. R 5

9886
Mills, A.W. FINGER NUMBERS AND SKIN TEMPERATURE. *J. appl. Physiol.*, 1956, 9 (3), 447-450. (Harvard University).

9886
This is an investigation of tactile discrimination under conditions of cold exposure. Twenty-five subjects were tested on a replica of Machworth's "Y test" following exposure of the right index fingertip to temperatures varying from +10° C to -25° C. "Y test" times and skin temperature were taken during conditions of cold exposure and periods of rewarming. The relation between skin temperature and Y test time is discussed in terms of tactile performance as a function of skin cooling.
G. I. R 13

9887
Fenbertson, J., Flanagan, Elizabeth G. VITAL CAPACITY AND FIXED VITAL CAPACITY IN NORMAL MEN OVER FORTY. *J. appl. Physiol.*, 1956, 9 (2), 291-296. (Harvard School of Public Health).

9887
This is a study of vital capacity and timed vital capacity in normal men over forty. Utilizing a new formula involving age and height the vital capacities for 425 healthy men (in age range 40 to 80) were computed along with the mean one-second timed vital capacity. The accuracy of this formula is compared to the one in common use (formula of Bairstow et al) and the value of timed vital capacity as a diagnostic technique is discussed.
T. G. R 9

9888
Shepherd, R.J. PHYSIOLOGICAL CHANGES AND PSYCHOMOTOR PERFORMANCE DURING ACUTE HYPOXIA. *J. appl. Physiol.*, 1956, 9 (3), 343-351. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

9888
To evaluate physiological changes and psychomotor performance during acute hypoxia, ten subjects were exposed to a simulated altitude of 20,000 feet for a period of ten minutes. A pursuit meter was used to evaluate psychomotor performance while the following physiological measures were employed: a two-channel earpiece oximeter, a low resistance bellows flowmeter (respiration), a pneumotachograph, etc. The data are treated in terms of heart rate, arterial oxygen saturation, breathing, and psychomotor performance as functions of duration of exposure to hypoxia.
T. G. R 25

9889

Benjamin, F.B. EFFECT OF PAIN ON SYMPATHETIC PERCEPTIONS OF PAINFUL SENSORY STIMULATION. *J. appl. Physiol.*, 1956, 8 (6), 630-634. (U. S. N. Aviation Medical Acceleration Laboratory, NADC, Johnsville, Penn.).

9889

To investigate the effect of pain on the simultaneous perception of nonpainful sensory stimulation, subjects were tested before and during pain stimulation for perception of the following sensations: addition, vision (finger fusion thresholds), vibration, and heat sensation. Three methods of pain induction were employed: (1) obstruction of blood flow on upper arm (pressure cuff); (2) heat applied to interdigital skin; and (3) five per cent saline solution injected intracutaneously. The results are presented and discussed in terms of the relative effect of pain upon each of the sensory modalities. An additional study is reported on the effect of clinical pain (dental patients). T. R 15

9890

Burton, A.C., Snyder, B.A., & Leach, W.G. COLD VS. DRY COLD. SPECIFIC EFFECTS OF EXHAUSTION ON HEAT EXCHANGE OF UNACCLIMED MAN. *J. appl. Physiol.*, 1955, 2 (3), 269-273. (University of Western Ontario Faculty of Medicine, London, Canada).

9890

This article presents a series of quantitative and qualitative studies on the effects of humidity on unclothed subjects conducted on the basis of predictions from physical theory concerning the nonradiative heat loss of a warm body. Nine subjects were placed in an air-conditioned room for 2-2 1/2 hours in each experiment under temperatures of 50° and 60° F. Relative humidity was varied and air movement was measured along with skin temperature, oxygen consumption, and so forth. The data were analyzed in terms of skin and rectal temperatures, mean tissue temperature and heat debt, piloerector response, etc. The relative effect of humidity at various temperature levels is discussed. T. G. R 14

9891

Larey, C.R., Schaefer, E.E., & Alvis, H.J. EFFECT OF SKIN DIVING ON LUNG VOLUMES. *J. appl. Physiol.*, 1956, 8 (5), 519-523. (U.S. N. Medical Research Laboratory, Naval Submarine Base, New London, Conn.).

9891

To evaluate the effect of skin diving on lung volumes, vital capacity (Collins Vitalometer), inspiratory-expiratory reserve and tidal volume (Collins Respirometer), and residual volume (modification of Lundsgaard-Yan Slyke method) measures were taken with three groups of subjects: (1) 16 Escape Training Tank instructors who had served in this capacity for an average of 1 1/2 years; (2) 16 male subjects; and (3) 20 additional tank instructors. The initial study involved a simple comparison between groups one and two while a second study attempted a longitudinal analysis, i.e., tested two months and again after one year of duty. The results are presented and discussed in terms of relative difference in lung capacity measures between tank instructors and other personnel as indicative of skin diving effects on lung capacity. T. R 9

9892

Chapin, J.I. RELATIONSHIP BETWEEN LUNG VOLUME AND BREATH-HOLDING BREAKING POINT. *J. appl. Physiol.*, 1955, 8 (1), 88-90. (School of Medicine, University of Colorado, Denver, Colo.).

9892

To evaluate the relationships between lung volume and breath holding, seven subjects between the ages of 22 and 37 years were required to hold their breath at each of two different lung volumes: functional residual capacity and full vital capacity. Alveolar gas at the breaking point was analyzed. The results are presented and discussed in terms of the effects of breath holding (on large volumes) upon the breaking point of certain elements in the alveolar gas composition and the type of breath holding breaking point curve. T. G. R 4

9893

Cox, G.J., Mathias, J.W., & Yocum, E. SUB-THRESHOLD-TO-TASTE THRESHOLDS OF SODIUM POTASSIUM, CALCIUM AND MAGNESIUM IONS IN WATER. *J. appl. Physiol.*, 1955, 8 (3), 283-286. (School of Dentistry, University of Pittsburgh).

9893

This article presents the results of a series of studies on the subthreshold-to-taste thresholds of sodium, magnesium, potassium, and calcium ions in water. Subjects were shown a mouth flushing method but were then left to choose any method of their own. A test of significance of difference of thresholds was applied to the four cations. The results are discussed in terms of the relative potency of each of the stimuli in the subthreshold-to-taste mechanism. T. R 6

9894

Hall, J.P., Jr., & Polte, J.W. EFFECT OF WATER CONTENT AND COMPRESSION ON CLOTHING INSULATION. *J. appl. Physiol.*, 1956, 8 (5), 533-545. (Aero Medical Laboratory, AFSC, Wright-Patterson AFB, Ohio).

9894

This is a study of: (1) the effects of water compression and clothing water content on thermal insulation; (2) the relative heat loss of a clothed manikin in air and water under conditions of dry versus wet clothing; and (3) the effect of wetting small as compared to large areas of the body. Utilizing a copper manikin dressed in various combinations of clothing both wet and dry, thermal insulation measures were taken in the air and under water. The results are presented and discussed in terms of the relative thermal insulation values of particular clothing assemblies, the relative heat loss of the clothed manikin, and so forth. T. G. R 10

9895

Hellon, R.P., & Lind, A.R. OBSERVATIONS ON THE ACTIVITY OF SWEAT GLANDS WITH SPECIAL REFERENCE TO THE INFLUENCE OF AGEING. *J. Physiol.*, 1956, 133 (1), 132-144. (University of Oxford).

9895

To evaluate the effect of age on activity of palmar sweat glands, a total of twenty-four subjects, reflecting two age groups (18 to 23 and 45 to 57 years), were exposed to cool and hot environments and records taken of sweat gland activity (Thomson and Jutarman technique). The results are presented and discussed in terms of the differences between the groups and the general nature of palmar gland activity under conditions of heat and cold as reflected by the measures on all of the subjects. T. G. R 25

9896

Hellon, R.P., Lind, A.R., & Weiner, J.S. THE PHYSIOLOGICAL REACTIONS OF MEN OF TWO AGE GROUPS TO A HOT ENVIRONMENT. *J. Physiol.*, 1956, 133 (1), 118-131. (Medical Research Council Unit for Research on Climate and Working Efficiency, University of Oxford).

9896

To investigate the potential relationship between age and heat regulatory and circulatory responses, 36 subjects, divided into two groups with the following age range: 19-31 and 39-45 years, were exposed to controlled heat conditions of 37.8° C dry-bulb and 29.4° C wet-bulb temperatures for a period entailing a four hour work routine. The work, consisting of stepping on and off a stool, was interspersed with rest periods (sitting on stool). Sweat losses, oxygen consumption, blood flow, etc., were measured at intervals. The results are presented and discussed in terms of the relative differences in the physiological measures between the two groups as indicative of the influence of age. T. G. R 22

9897

Roffman, B.P., Seckling, E.E., Brooks, C.M., Penick, E.E., Coleman, E.S., & Treisman, H.J. QUANTITATIVE ESTIMATION OF SLEEP. *J. appl. Physiol.*, 1956, 8 (4), 361-368. (State University of New York College of Medicine).

9898

This study attempts to determine the measures best suited to quantitative evaluation of depth of unconsciousness and degree of muscular relaxation during normal uninterrupted sleep and to evaluate the interrelations among the functions of various organ systems during sleep. Three conscious subjects and six sleeping subjects were studied for changes in heart rate, metabolic rate, skin and rectal temperatures, etc. In addition, electroencephalogram and electrocardiogram records were taken on sleeping subjects. The results compare and contrast the effectiveness of the various measures of depth of consciousness and relaxation. The relation of heart rate to over-all metabolism is discussed. T. G. I. R 12

9899

Seifert, B.P., Streeley, W.P., Myers, J.R., & Chinn, R.I. EFFECT OF HEAD IMMOBILIZATION ON INCIDENCE OF AIRSICKNESS. *J. appl. Physiol.*, 1956, 8 (4), 369-370. (Infantry School, Fort Benning, Ga.).

9899

To evaluate the effects of head immobilization and drugs on incidence of airsickness, 112 paratroopers received either a placebo or 0.45 mg. of hyosine hydrobromide prior to embarking upon a two hour flight in which alternate subjects were strapped to head restraints. The flight employed tactics designed to increase severity of exposure. The subjects flew and jumped in three flights. The results are presented in terms of incidence of airsickness as a function of medication, head rest, and the combination of the two. The previously affirmed prophylactic effects of head immobilization are questioned. T. B 5

9899

Lurt, U.C., & Noell, W.K. MANIFESTATIONS OF BRIEF INSTANTANEOUS ANOXIA IN MAN. *J. appl. Physiol.*, 1956, 8 (4), 444-454. (Lovelace Foundation, Albuquerque, N.M.).

9899

In this study of cerebral and neurological manifestations of brief instantaneous anoxia in man, oscillographic, electroencephalographic, and photographic records were made on two subjects during and after exposure to a barometric pressure of 68-70 mm Hg by rapid decompression. The results are analyzed in terms of changes in blood oxygen saturation, changes in posture and movement, the occurrence of anoxia, electroencephalographic effects, and so forth. Photographic illustrations of the subjects' reactions are presented. T. G. I. R 21

9900

Moncrieff, R.W. OLFACTORY ADAPTATION AND ODOUR LIKENESS. *J. Physiol.*, 1956, 133 (2), 301-316. (Consulting Laboratory, 93 St., Pancras, Chichester, England).

9900

A series of experiments were conducted in this investigation of the effect of likeness of pairs of smells on their mutual adaptation effects. With the odorants consisting of acetone, isopropanol, n-butanol, diacetone alcohol, cellosolve, methanol, and odorants of similar smells, e.g., n-butanol and sec-butanol, cellosolve and benzylamine, etc., three subjects were tested to determine the following thresholds: 1) having first smelt water, the threshold of the components of each pair; 2) threshold concentration of each component after self-adaptation; and 3) having first smelt the other, the threshold of each component of the pair. The results compare and discuss self-adaptation vs. heterogeneous adaptation, the effect of similarity of smells on consequent adaptation, the effect of entities with almost indistinguishable smells on adaptation, etc. T. R 12

9901

Miller, A.T., & Blyth, C.S. INFLUENCE OF BODY TYPE AND BODY FAT CONTENT ON THE METABOLIC COST OF WORK. *J. appl. Physiol.*, 1956, 8 (2), 135-141. (School of Medicine, University of North Carolina).

9901

This is an investigation of the influence of body type and body fat content upon the metabolic cost of work. Thirty subjects reflecting a wide range of body type and of fat content and varying in age from 19 to 25 years were measured for rate of oxygen consumption (by the open circuit method) during the last five minutes of a 15 minute exercise period (treadmill walking). The data are treated in terms of multiple correlations among the various factors, e.g., exercise vs. height, weight, etc., height vs. weight, etc. On the basis of three correlations, the most accurate predictor of metabolic cost of work is specified and discussed. T. R 7

9902

Boddie, R.A. EFFECT OF ARM POSITION ON CIRCULATION THROUGH THE FINGERS. *J. appl. Physiol.*, 1956, 8 (1), 67-72. (The Queen's University, Belfast, Northern Ireland).

9902

In this investigation of the effect of arm position on circulation through the fingers, observations were made on 19 healthy subjects of the heat elimination from fingers of both hands to water (29°-32° C) with a calorimeter. The finger tips were supported at various levels above or below the horizontal plane. The results are presented and discussed in terms of rate of heat elimination as a function of level of arm position. G. B 23

9903

Schaefer, L.E. OXYGEN TOXICITY STUDIES IN UNDERWATER SWIMMING. *J. appl. Physiol.*, 1956, 8 (5), 524-531. (U.S.E. Medical Research Laboratory, Naval Submarine Base, New London, Conn.).

9903

To investigate oxygen toxicity in underwater swimming, twelve trained subjects swam in a 100-foot lock at depths of surface, 20, 30, and 40 feet while breathing oxygen for 93 minutes with rest periods after each 15 minutes. Pulse rate and respiratory rate (oxygen consumption) were recorded. The results are presented and discussed in terms of the relative changes in pulse and respiratory rates at each submergence level as a function of the amount of continuing exercise. T. G. R 21

9904

Schilling, J.A., Harvey, R.B., Becker, C.L., Velasquez, T., Wells, G., & Baake, B. WORK PERFORMANCE AT ALTITUDE AFTER ADAPTATION IN MAN AND DOG. *J. appl. Physiol.*, 1956, 8 (4), 381-387. (University of Rochester School of Medicine and Dentistry).

9904

In this study of work capacity before, during, and after adaptation to varied altitudes (14,900 feet, 760 feet, and 19,000 feet) three human subjects and four dogs were employed. Work capacity, defined by performance on a treadmill test, was measured along with other physiological indices (pulse rate, oxygen consumption, etc.). The results are presented and discussed in terms of the relation of work capacity to characteristic physiological changes found at each altitude level. G. R 13

9905

Schneider, A., & Wolf, S. OLFACTORY PERCEPTION THRESHOLDS FOR CITRAL UTILIZING A NEW TYPE OLFACTORY. *J. appl. Physiol.*, 1956, 5 (3), 337-342. (University of Oklahoma, School of Medicine).

9906

This article presents a description of a new type of wall-in olfactory and its utilization in the determination of odor perception thresholds for citral (an aromatic organic compound). Thresholds were made on 150 occasions in 53 healthy Ss under varied conditions of humidity and temperature and by means of three methods: 1) proceeding up from smallest amount of odor, 2) starting well above threshold and working down, and 3) random amounts of odor. The results are discussed in terms of mean threshold for citral and threshold fluctuation as a function of menstrual flow, stress, and pressure of nasal obstruction.

G. I. R 9

9906

Strydom, J.B., Morrison, J.F., Scoones, J., & Peter, J. COMPARISON OF ORAL AND RECTAL TEMPERATURES DURING WORK IN HEAT. *J. appl. Physiol.*, 1956, 8 (4), 406-408. (Applied Physiology Laboratory, Transvaal and Orange Free State Chamber of Mines, Johannesburg, South Africa).

9906

This study attempts to determine the accuracy with which oral temperature reflects rectal temperature during work in the heat, the latter having been found a reliable safeguard against heat illnesses but impossible for practical reasons. Simultaneous oral and rectal temperature measurements were taken on 229 underground laborers at ten mines under environmental conditions of 20° to 93° F and following a 2-3 hour work period. The data are treated in terms of the relative differences and variation of differences between oral and rectal temperatures. An oral temperature equivalent to 103° F rectal is selected and discussed.

G. R 8

9907

White, R.P., Rinaldi, P., & Himwich, H.E. CENTRAL AND PERIPHERAL NERVOUS EFFECTS OF ATROPINE SULFATE AND MEPERPERPHENIDOL BROMIDE (DARSTINE) ON HUMAN SUBJECTS. *J. appl. Physiol.*, 1956, 8 (6), 635-642. (Hindichum Psychiatric Research Laboratory, Galesburg State Research Hospital, Galesburg, Ill.).

9907

To evaluate the central and peripheral effects of atropine sulfate and meperperphenidol bromide (darstine) on humans, 27 subjects were administered either one or the other or a combination of the drugs. Electroencephalograph, electrocardiograph, blood pressure, oral dryness, and other physiological and psychophysiological phenomena were recorded prior to and compared with the same measures following administration of the drugs. The results are presented and discussed in terms of the relative effect of each of the drugs and their combination upon central and peripheral nervous system functioning.

T. I. R 15

9908

Joseph, J., & Nightingale, A. ELECTROMYOGRAPHY OF MUSCLES OF POSTURE: LEG AND THIGH MUSCLES IN WOMEN, INCLUDING THE EFFECTS OF HIGH HEELS. *J. Physiol.*, 1956, 132 (3), 465-468. (Guy's Hospital Medical School, London, England).

9908

This investigation of the electromyography of leg and thigh muscles (of posture) in women includes an assessment of the effects of high heels. Electromyographic records of 21 women age 18-28 years wearing both low and high heels were obtained while each subject maintained a standard posture. The results are discussed in terms of defining the muscular areas of continuous activity and the effect on this activity of the wearing of high heels.

I. R 6

9909

Balliday, A.N., & Redfearn, J.W.P. AN ANALYSIS OF THE FREQUENCIES OF FINGER TREMOR IN HEALTHY SUBJECTS. *J. Physiol.*, 1956, 134 (3), 600-611. (Medical Research Council Neurological Research Unit, National Hospital, Queens Sq., London, England).

9909

To investigate the phenomenon of finger tremor, a method utilizing a system free from inertia was employed to record finger tremor in 46 healthy subjects (male and female). An analysis of the frequencies of tremor was conducted and the results are presented in terms of the mean spectra of tremor frequencies with loaded vs. unloaded finger, for male vs. female, and for subjects clinically defined as having active vs. those having not very active reflexes. A discussion is presented concerning the possible causes of the rhythm of finger tremor as demonstrated here.

G. I. R 15

9910

Shepherd, R.J. ASSESSMENT OF VENTILATORY EFFICIENCY BY THE SINGLE-BREATH TECHNIQUE. *J. Physiol.*, 1956, 134 (3), 630-649. (RAF Institute of Aviation Medicine, Farnborough Hants, England).

9910

A single-breath technique was utilized in this assessment of ventilatory efficiency. Nine subjects varying in age from 22 to 43 years were used to ascertain respiratory dead space, uniformity of alveolar nitrogen concentration, and functional residual volume. The results are discussed in terms of the factors contributing to the variance of these measures and the nature of each of these aspects as functions of time, breath-holding, and so forth.

T. G. R 32

9911

Stanger, Priscilla H. PITCH-INTENSITY DEPENDENCE AND ITS RELATION TO THE THRESHOLD OF HEARING FOR HIGH FREQUENCIES. *J. Physiol.*, 1956, 134 (3), 741-746. (Institute of Ophthalmology, Judd St., London, England).

9911

This is an investigation of pitch intensity dependence and its relation to the threshold of hearing for high frequencies. Utilizing subjects with a slight perceptive deafness (i.e., hearing loss at highest frequencies of the audiogram), and subjects with good hearing at frequencies up to 12,000 c/s, a series of pitch tests were conducted and consisted of forced-choice comparisons of pairs of pure tones. With the first tone constant, the intensity of the second was varied. The results are presented and discussed in terms of the relative effect of intensity upon pitch as perceived by subjects with normal and partially defective hearing at high frequencies.

T. G. I. R 3

9912

Babione, R.W. ACCIDENTAL DEATHS IN MILITARY VEHICLES: IN RELATION TO THE USE OF SEAT BELTS. *US Armed Forces Med. J.*, 1956, 7 (10), 1500-1505. (Armed Forces Epidemiology Board, Washington 25, D.C.).

9912

This article presents a classification of all Army and Marine Corps ground vehicle accidents during the period of 1952 to 1954 in terms of type of vehicle, whether or not it rolled over, and whether or not the victim was thrown clear. Examining this data, the author notes the potential role of the seat belt and evaluates its overall potential contribution to safety, both in terms of the reduction in fatalities and the potential monetary savings.

T. R 4

9913
McGuire, P.L. PSYCHOLOGICAL COMPARISON OF
AUTOMOBILE DRIVERS. US Armed Forces Med. J.
1956, 7 (12), 1741-1749. (U.S. Naval Hospital,
Philadelphia, Penn.).

9913
This study of highway safety employed two groups of
67 subjects each, whose accident history had been screened
so as to define one group as accident- and violation-free
and the other as having had at least one accident and
violation (of traffic regulations). Both groups were
tested on a series of personality tests and the results
analyzed in terms of the significant personality differ-
ences between the groups. A list of personality
characteristics reflecting the safe-driver is presented
and discussed.
T. R 19

9914
McGuire, P.L. AN OUTLINE FOR A NEW APPROACH
TO THE PROBLEM OF HIGHWAY ACCIDENTS. US
Armed Forces Med. J., 1956, 7 (8), 1157-1166.
(U.S. Naval Hospital, Philadelphia, Penn.).

9914
The author assesses the highway safety program (in
the military) and advocates a new approach based on the
definition of different personality groups. Six types
of groups (e.g., well-adjusted; emotional problems, but
socially responsible and controlled; etc.) are defined
in terms of their personality makeup, expected driving
record, and program of treatment most adequate for
achieving safe driving (with the particular group). In
addition to the personal approach, a program of mass con-
sultation is described and discussed.
T. R 5

9915
McGuire, P.L. THE SAFE-DRIVER INVENTORY: A
TEST FOR SELECTING THE SAFE AUTOMOBILE DRIVER.
US Armed Forces Med. J., 1956, 7 (9), 1249-
1264. (U.S. Naval Hospital, Philadelphia,
Penn.).

9915
This article presents a description of the Safe-
Driver Inventory, a paper and pencil test designed to
select the safe automobile driver. Four hundred forty-
six subjects were screened on attitude, intelligence, and
personality tests in the process of selecting test items.
The validity and reliability of two forms of the Inven-
tory were assessed with two matched groups of subjects
with known accident and violation histories. The inter-
pretation of the Inventory is discussed in terms of the
theory underlying its construction. Both forms of the
Inventory are presented in the appendix.
T. G.

9916
Mayer, Jean, Purnima, R., & Kamakhya, P.M.
RELATION BETWEEN CALORIC INTAKE, BODY WEIGHT,
AND PHYSICAL WORK: STUDIES IN AN INDUSTRIAL
MALE POPULATION IN WEST BENGAL. Amer. J. Clin.
Nutrition, 4 (2), 169-175. (Harvard School
of Public Health).

9916
To investigate the relation between caloric intake,
body weight, and physical work, 213 mill workers (in
West Bengal) varying in physical activity from sedentary
to very hard work were studied. Food intakes were deter-
mined by dietary interviews, additional information was
obtained concerning height, weight, etc., and five
classes of work ranging from sedentary to very heavy
work were defined. An analysis of the data was conducted
in terms of the intercorrelations among caloric intake,
physical activity, and body weight. The results are
discussed with specific regard to the implications of
sedentary life for the mechanism of regulation of food
intake.
T. G. R 16

9917
House, E.P., Davis, E., Glorig, A. Jr., Hoople,
G.D., & Fox, H.S. A REPORT FROM THE SUBCOM-
MITTEE ON NOISE IN INDUSTRY. Trans. Amer.
Acad. Ophthalmol. & Otolaryngol., 1956, 50 (6),
821-931. (Los Angeles, Calif.).

9917
This report presents several articles concerning the
problem of noise in industry. Two articles outline con-
temporary research problems (e.g., temporary threshold
shift, permanent effects of exposure to noise, etc.) and
briefly review results of research on such aspects of the
problem as prophylaxis, ear protection, etc. In another
section the principles for evaluating hearing loss are
critically reviewed and in the final section the role of
the otologist in the industrial noise problem is dis-
cussed.
C.

9918
Hill, S.R., Goetz, F.C., Fox, H.M., Murawski,
B.J., et al. STUDIES ON ADRENOCORTICAL AND
PSYCHOLOGICAL RESPONSE TO STRESS IN MAN. Ann
Arch. Internal Med., 1956, 97 (3), 269-298.
(Departments of Medicine and Psychiatry,
Harvard Medical School).

9918
This is a report of an extensive series of studies on
adrenocortical and psychological responses to stress.
Utilizing metabolic, statistical, and physiological tech-
niques of evaluation, the effect of stress was investi-
gated as manifested in the physical and psychological
responses of two crews of college cadets prior to and
following actual (and practice) races. An analysis of
the data was conducted in terms of a comparison between
"winning" and "losing" crews and the general effects of
stress for all subjects with regard to changes in psycho-
logical and metabolic tests.
T. G. R 26

9919
Chin, N.B., & Horn, R.F. INFRARED SKIASCOPE
MEASUREMENTS OF REFRACTIVE CHANGES IN DIM
ILLUMINATION AND DARKNESS. J. opt. Soc. Amer.,
1956, 46 (1), 60-66. (Aero Medical Labora-
tory, WADC, Wright-Patterson AFB, Ohio).

9919
Measurements of the refractive state of one eye were
made on nine subjects with an infrared skiascope. This
apparatus permits the experimenter to view the image of
the retina which is formed in the pupil without stimulat-
ing the subject with visible light. The subjects viewed
a Landolt ring at luminance levels of from 10.6 ft.L. to
complete darkness while skiascopic measurements were made
on the other eye. The implications of the results for
the interpretation of night and empty field myopia are
discussed.
T. G. R 7

9920
Johannsen, Dorothea E., McBride, P.I., & Wul-
fbeck, J.W. STUDIES ON DARK ADAPTATION: I.
THE PRE-EXPOSURE TOLERANCE OF THE DARK-ADAPTED
FOVEA. J. opt. Soc. Amer., 1956, 46 (1),
67-71. (Institute for Applied Experimental
Psychology, Tufts University).

9920
The effect of brief pre-exposure to low intensity
light on foveal dark-adaptation was measured on two adult
subjects with a modified Crozier-Holway discriminometer.
After ten minutes of dark-adaptation one eye was exposed
for 1.0, 10, or 100 seconds to a 27° patch of light at
0.1, 1.0, 10, or 100 ft.L. The course of re-adaptation
was followed by the method limits (ascending only) with
a 1° test patch until the threshold stabilized. The re-
sults are compared with those predicted from the ItC
relation for the pre-exposure stimulus.
O. R 9

9921

Polinsky, D.M., & Young, P.A. EFFECT OF HUE DURATION ON ADAPTATION TO DARKNESS. *J. opt. Soc. Amer.*, 1956, 46 (2), 118-121. (State College of Washington).

9921

Dark-adaptation curves were determined on 10 young men with a Bost adapter following exposure to red, green or blue pre-exposure lights. The subject was exposed for a white light of 150 m. for 10 minutes. He then wore goggles with written #25, #2, #56, or C5 #47 filters for 2, 3, 5, 5, or 10 minutes before the light was extinguished. The filters each admitted a luminance of 16 m. in the selected band of wavelengths. The test light was a 3° spot from a #47 filter. It was located to the nasal side of the field and flashed for 0.2 sec. every sec. The measure of adaptation was the time required before the test spot was seen at each of 15 pre-selected levels which grew progressively lower. The differential effects of hue and duration of pre-exposure are described by a trend analysis of the adaptation curves. T. G. R 22

9922

Teichner, W.H., Kobrick, J.L., & Dasek, E.R. EFFECTS OF TARGET SEPARATION AND DISTANCE ON COMMONPLACE BINOCULAR DEPTH DISCRIMINATION. *J. opt. Soc. Amer.*, 1956, 46 (2), 122-125. (Quartermaster Research and Development Center, Natick, Mass.).

9922

The effect of the separation between the targets on the acuity of depth discrimination in commonplace binocular viewing was investigated as a function of the viewing distance. The separation between targets was varied so as to give constant angular or constant linear lateral displacement between them. The range of viewing distance was 10 to 100 ft. The subjects were two sophisticated and three unsophisticated observers. The size of the angle of binocular disparity corresponding to the depth threshold is described as a function of the viewing distance, and the significance of target separation for vernier and stereoscopic acuity is discussed in relation to the importance of the other cues to depth present in commonplace binocular viewing. T. G. R 16

9923

Westheimer, G.L., & Tanzman, I.J. QUALITATIVE DEPTH LOCALIZATION WITH DIPLOPIC IMAGES. *J. opt. Soc. Amer.*, 1956, 46 (2), 116-117. (School of Optometry, Ohio State University).

9923

The effects of unnaturally large binocular disparities on the qualitative perception of depth was measured on six subjects. Two spots of oppositely polarized white light were flashed tachistoscopically on a screen which the subject viewed through oppositely polarized lenses. The subject judged the diplopic image in front or behind an unpolarized spot of light presented continuously on the same screen. Crossed and uncrossed disparities were presented ranging from 1° to 10°. The upper limit of disparity for the induction of the stereoscopic illusion is described as a function of the direction of the disparity and experience of the observer. G. R 4

9924

Harker, G.S., & Weaver, L.A. RELATIVE PRECISION OF RANGE INFORMATION OBTAINABLE WITH FIXED BALLISTIC AND WANDERMARK STEREOSCOPIC RETICLES. *J. opt. Soc. Amer.*, 1956, 46 (3), 195-200. (AMRL, Fort Knox, Ky.).

9924

The accuracy of stereoscopic range finding for three natural targets was measured with two different types of range finder reticles. The Army "V" wandermark reticle was compared to an experimental reticle incorporating a series of markings in the form of a shell trajectory. The subjects were five experienced observers and 25 naive soldiers. Each subject took 20 readings on each target with each instrument. The order of the targets and the initial dial settings on the instruments were randomized. The accuracy obtained with each of the reticles is compared separately for the experienced and naive subjects. T. G. R 4

9925

Leibowitz, H., & Walker, L. EFFECT OF FIELD SIZE AND LUMINANCE ON THE BINOCULAR SUMMATION OF SUPRATHRESHOLD STIMULI. *J. opt. Soc. Amer.*, 1956, 46 (3), 171-172. (University of Wisconsin).

9925

The extent of binocular brightness summation at suprathreshold levels was determined as function of the size and luminance of the stimulus fields. Two subjects adjusted one of a pair of targets, viewed diplopically, to equal brightness, and then repeated the adjustment while one eye was exposed to both stimuli. Two standard luminance levels, 300 and .03 m., and three sizes, 15, 30 and 60 min., were used. Disagreements found among previous experiments on binocular summation are discussed in the light of the relation between summation and the stimulus area. G. P 5

9926

Fendoff, R. COLORS OF NATURAL OBJECTS. *J. opt. Soc. Amer.*, 1956, 46 (3), 180-182. (Geophysics Research Directorate, AFRC, Bedford, Mass.).

9926

The colors of various natural objects are calculated (for vegetation, forests, soil, water, etc.) as seen from different distances and altitudes under the illumination of a clear day at noon. The data are taken from the large number of spectrograms obtained by Krinov and the colors calculated from the C.I.E. standard in the usual way. The application of these results to the problem of aerial recognition is discussed briefly. T. G. R 6

9927

Kulowski, J. INTRODUCTION TO SUPPLEMENTARY SAFETY: THE CRASH-IMPACT ENGINEERING POINT OF VIEW. *Clinical Orthopaedics*, 1956, (3), 261-264. (Saint Joseph, Mo.).

9927

This is an introductory article to a symposium on highway safety. The author discusses the role of human engineering in automotive safety engineering and design and defines the concept of crash-impact engineering. The investigation of the interrelations among human, mechanical, and environmental variables is emphasized as an effective approach to resolving problems of motorway safety.

9928

Jessup, F.A., & Paul, E.C. HISTORY OF AUTO CRASH INJURY RESEARCH: POLICE POINT OF VIEW. *Clinical Orthopaedics*, 1956, (8), 265-267. (Indiana State Police).

9928

This article presents a brief historical description of the contribution of comprehensive police observation to effective crash-impact engineering. The results of a pilot study are reported in terms of the evidence they lend to the hypothesis that crash injuries to automobile passengers are of a repetitive nature. The data reporting form used in this study is described as consisting of a vehicle report, a medical report, and on-the-scene photographs.

9929

Hasbrook, A.H. THE HISTORICAL DEVELOPMENT OF THE CRASH-IMPACT ENGINEERING POINT OF VIEW. *Clinical Orthopaedics*, 1956, (8), 268-274. (Cornell University Aviation Crash Injury Research).

9929

The author describes the historical development of the crash-impact engineering point of view with emphasis upon the types of research conducted on aircraft and automotive safety. The various safety devices and their development are discussed along with techniques of recording accident data. A special injury scale is presented as an illustration of an effective means of recording and coding accident and injury data.

9930

Severy, D.L., & Mathewson, J.H. AUTOMOBILE-BARRIER IMPACTS, SERIES II. Clinical Orthopaedics, 1956, (3), 275-300. (University of California, Los Angeles).

9930

This article describes the experimental procedures and results of studies utilizing the barrier impact as a technique of evaluating crash phenomena under controlled automobile velocities. Utilizing high-speed photography, electrical accelerometers, safety-belt tensionometers, and dummy damage diagnosis, the effects upon the human body of a collision were determined under five conditions of restraint and varied conditions of deceleration. The results are presented and discussed in terms of the relative safety provided by the types of restraint (e.g., lap belt, chest belt, etc.). Autonomic analysis provides a basis for discussing implications for safety design in automobiles.
T. O. I. R 6

9931

Dye, E.R. KINEMATICS OF THE HUMAN BODY UNDER CRASH CONDITIONS. Clinical Orthopaedics, 1956, (8), 305-309. (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).

9931

This article discusses the effects upon the human body of rapid deceleration. Experimental techniques and apparatus (e.g., crash sampling test vehicle, dummies, etc.) are described along with the results of an experiment designed to test the effects of deceleration under conditions of unrestrained seating on a simulated adult and six-year-old child. The flight path, head impact energy, etc., were recorded for various body attitudes. The results are related to reduction of head injuries by means of more adequate automobile interior design.
O. I.

9932

Lissner, H.R., & Evans, P.G. ENGINEERING ASPECTS OF FRACTURES. Clinical Orthopaedics, 1956, (8), 310-322. (Wayne University).

9932

This article presents an extensive survey of the experimental results of studies concerned with the relation between various types of accidents and the resultant types of bone fractures. The effects of velocity, energy input, structure of the bone, etc., are discussed in terms of their effects upon fractures of the skull, femur and pelvis. Illustrations of tensile strain patterns are presented along with a description of the Stresscoat technique (i.e., a means of investigating fractures which employs a brittle lacquer designed to crack in response to tensile strain).
I. R 15

9933

Kulowski, J. SUMMARY AND CONCLUSIONS. Clinical Orthopaedics, 1956, (8), 323-326. (Saint Joseph, Mo.).

9933

This is a summary article of a symposium on motorist safety and injury reduction. In addition to summarizing the results of the various researches, the author draws specific conclusions with regard to the status of crash-impact engineering and the implications for accident prevention and reduction of injury potential.
R 3

9934

Kulowski, J. GENERAL INTRODUCTION: ACCIDENT PREVENTION, REDUCTION OF INJURIES AND AIDS TO RECOVERY. Clinical Orthopaedics, 1956, (7), 243-245. (Saint Joseph, Mo.).

9934

This is an introductory article to a series of papers which are concerned with several aspects of motor vehicle safety. The author discusses briefly the etiological factors in accidents, the role of crash-impact engineering in reduction of motorist injuries and safety design, and the clinical aspects of motorist injuries.
R 21

9935

Kulowski, J. ETIOLOGY OF MOTORIST INJURIES. Clinical Orthopaedics, 1956, (7), 245-252. (Saint Joseph, Mo.).

9936

The etiology of motorist injuries is discussed in terms of factors stemming from the external automotive environment (i.e., pertaining to the vehicle) and those stemming from the internal automotive environment (i.e., pertaining to the occupant). In addition to the explicit implications for medical diagnosis and treatment, this article offers considerable data (e.g., effects of acceleration and deceleration) pertinent to the human engineering aspect of motorist safety.
G. I. R 40

9937

Kulowski, J. PATHOLOGY OF MOTORIST INJURIES. Clinical Orthopaedics, 1956, (7), 253-260. (Saint Joseph, Mo.).

9937

Among the data analyzed in this discussion of motorist injuries is included a comparison of internal injuries occurring in aircraft and in ground vehicle accidents. In addition to specifying the primary injuries in automotive accidents, the author discusses direct and indirect complications. Many implications for accident and injury prevention may be found in this treatment of motorist injuries.
T. O. R 16

9938

Kulowski, J. IMPLICATIONS OF TIME INTERVALS BETWEEN INJURY AND DEATH (MORTALITY DIFFERENTIALS). Clinical Orthopaedics, 1956, (7), 261-266. (Saint Joseph, Mo.).

9938

The time intervals between accidental injury and death for 29 motorist casualties are analyzed in terms of the implications for automotive design, first aid, emergency care, and definitive diagnosis and treatment. An illustration of the effects of faulty automotive safety design is presented and discussed with regard to the relative pressure areas offered by various projecting structures on the dash-board and the resultant injuries.
G. I. R 4

9939

Kulowski, J. PILOT STUDY: THE GENERAL MORBIDITY. Clinical Orthopaedics, 1956, (7), 267-271. (Saint Joseph, Mo.).

9939

In order to evaluate the types of injuries resulting from motor vehicle accidents, 661 motorist casualties whose injuries were severe enough to require inpatient hospital treatment were analyzed with regard to pattern and type of injury. Since the casualty group reflected an age span of three months to 82 years, both males and females, drivers and non-drivers, the analysis includes implications concerning areas of bodily involvement, relation of type of injury to seating position (i.e., front back, driver, etc.) and so forth, and on a more general level, implications for the role of automotive design in degree of morbidity.
T. I. R 11

9940

Kulowski, J. HEAD INJURIES: JANUSLIKE PROBLEM. Clinical Orthopaedics, 1956, (7), 272-278. (Saint Joseph, Mo.).

9940

An analysis of 532 motorist survivors was conducted to determine the relation of type of head injury to seating, the nature of head injuries as related to the type of impact, the relative distribution of injuries to the head, etc. The results are discussed in terms of the injury potentials of dashboard design and seating (including position and lack of safety restraints), and the need for protective head equipment, changes in spatial relationships between occupants and impact areas, etc.
T. O. I. R 16

9941
Kulowski, J. INJURIES OF CHEST AND ABDOMEN. Clinical Orthopaedics, 1956, (7), 279-285. (Saint Joseph, Mo.).

9941
A total of 216 motorist-casualty survivors were investigated to determine the extent and type of injury to the chest and abdomen. Type of injury is related to seating and type of impact. The results are then discussed in terms of the need for safety restraint devices and the general implications for automotive safety design.
T. G. I. R 13

9942
Kulowski, J. EXTREMITY INJURIES: THE COMMON DENOMINATOR. Clinical Orthopaedics, 1956, (7), 235-294. (Saint Joseph, Mo.).

9942
The records of 378 motorist-casualty survivors were consulted in this analysis of extremity injuries. The buffer action of soft (body) tissues is discussed along with the role of age, sex, seating, type of impact, etc. The data contain many implications for automotive safety design.
T. G. I. R 5

9943
Kulowski, J. EXTREMITY INJURIES: SPECIAL CONSIDERATIONS. Clinical Orthopaedics, 1956, (7), 295-301. (Saint Joseph, Mo.).

9943
In this discussion of extremity injuries resulting from motor vehicle accidents the author describes several preventive measures, e.g., elbow contained within vehicle rather than on car-window ledge, change in truck width, etc., which are specifically oriented towards elimination of elbow injuries. Case studies are presented as illustrative examples of the results of maintaining the elbow on the window ledge during accidents.
I. R 6

9944
Kulowski, J. ACUTE MOTORIST INJURIES OF THE SPINE. Clinical Orthopaedics, 1956, (7), 307-312. (Saint Joseph, Mo.).

9944
Injuries to the neck, back and pelvis as a result of motor vehicle accidents were studied with 189 motorist casualty survivors. The data are treated in terms of the relation of type of injury to seating, type of impact, and distribution of soft tissue (at site of injury). Implications for automotive safety design are noted.
T. G. R 3

9945
Kulowski, J. ACUTE INJURIES OF THE LUMBAR SPINE AND THE PELVIS. Clinical Orthopaedics, 1956, (7), 313-317. (Saint Joseph, Mo.).

9945
In this article the author discusses the role of seating, type of impact, etc., in acute injuries of the lumbar spine and pelvis. Techniques of safety design are mentioned and include the following: seat retention devices and adequate seat, seat back, and gear installations.
T. G. R 8

9946
Kulowski, J. INJURIES OF YOUNG AND OLD. Clinical Orthopaedics, 1956, (7), 316-323. (Saint Joseph, Mo.).

9946
To investigate the potential relation of age to incidence and type of motor vehicle accident injury, 661 motorist casualty survivors were divided into four major age groups (0-15, 15-20, 20-60, and 60-85 years). The particular body areas involved, distribution of young and old casualties according to seating incidence of injuries as a function of age, and the types of injuries and accidents are analyzed and discussed in terms of the implications for accident prevention.
T. G. R 6

9947
Kulowski, J. RESIDUAL DISABILITIES: GENERAL SKELETAL. Clinical Orthopaedics, 1956, (7), 324-328. (Saint Joseph, Mo.).

9947
Two hundred fifteen motorist casualty survivors were used in this study of general skeletal disabilities resulting from motor vehicle accidents. Age distribution, type of impact, and type of vehicle are examined in terms of incidence and type of residual injury to the musculoskeletal system. Implications for motor safety design are noted.
T.

9948
Kulowski, J. RESIDUAL DISABILITIES: NECK AND BACK. Clinical Orthopaedics, 1956, (7), 329-332. (Saint Joseph, Mo.).

9948
Incidence and type of residual disability injury to the neck and back of motorist casualty survivors are examined in terms of their relation to seating, posture, etc. The implications for seating design are noted and discussed.
T. R 9

9949
Brandeleone, H., & Friedman, G.J. PHYSICAL STANDARDS FOR VEHICLE OPERATORS: AN AID TO ACCIDENT PREVENTION. Industr. Med. & Surg., 1956, 25 (1), 17-22. (Third Avenue Transit System, N.Y.).

9949
This article presents a Profile Classification of medical standards to be used specifically with bus drivers but which may be adapted to truck and private vehicle operators. Its utilization is described as an aid to accident prevention. The system includes physical, mental, motorability, psychophysical and psychological examinations.
R 5

9950
Fox, H.S. OCCUPATIONAL HEARING LOSS: WISCONSIN'S APPROACH TO THE PROBLEM. Industr. Med. & Surg., 1956, 25 (7), 310-316. (Milwaukee, Wisconsin).

9950
The author describes the work of the Wisconsin Industrial Commission in its attempt to define medical and legal criteria of occupational hearing loss (resulting primarily from noise exposure) and to develop a hearing conservation program. Equipment and audiometric techniques used in such a program are described and discussed along with the general problem of noise reduction in industry.
T. G. I. R 17

9951
Goodman, V.H. IMPROVED SAFETY THROUGH EFFECTIVE COMMUNICATION. Bell Telephone Magazine, 1956, 35 (2), 106-115. (Northwestern Bell Telephone Co.).

9951
The author discusses the importance of effective communication as a means of improving safety and presents charts to demonstrate the effect of the Bell System's attempts to communicate safety knowledge and practices. These charts present data concerning the following aspects of safety development: (1) frequency of lost time due to work injuries over an 11 year period (2) a comparison of on-the-job vs. off-the-job injuries in terms of frequency; (3) number of fatalities occurring on-the-job vs. off-the-job; and (4) an analysis of causal factors in a series of work injuries. The factors involved in establishing an adequate safety program are discussed in a general manner.
G. I.

9952
Hoven, A.L. HOW TO MAKE A LIGHTING SURVEY;
A VISION SURVEY. PART II. VISION. Industr. Med. & Surg., 1956, 25 (4), 159-163. (US
Public Health Service, Washington, D.C.).

9952
This discussion of techniques of assessing visual functional ability is presented in terms of two major aspects: (1) assessment of the individual's visual capacity, and (2) assessment of the visual requirements of the task. Included are the following topics: proper job placement (employing such visual tests as the Telebinocular, the Ortho-Rater, and the Sight-Screener), job analysis (for visual requirements), emergency eye care, and eye safety. Included is a form (Industrial Vision Survey) used to assess visual functional ability.
R 9

9953
Schulzinger, H.S. THE PRE-ACCIDENT PATIENT -
DIAGNOSIS AND TREATMENT. Industr. Med. & Surg., 1956, 25 (10), 451-458. (Cincinnati, Ohio).

9953
In this discussion of the pre-accident patient the author offers information concerning the diagnosis and treatment of accident proneness and also data concerning personality and environmental factors which seem to effect the incidence of accidents. Included are the following: effects of temperature, humidity, season, basic attitudes of the individual toward society, traffic rules, etc., psychological impairments, etc. Specific recommendations are offered concerning treatment of accident prone patients and prevention of occupational and motor vehicle accidents.
R 11

9955
American Aviation. AF DEVELOPS LOW-LEVEL EJECTION SEAT.
Amer. Aviat., 1956, 19(20), p.41.

9955
This article presents a brief description and illustrations of a low-level ejection seat escape system developed by the Air Force Wright Air Development Center. A brief summary of experimental tests with this escape system is presented along with test data concerning aircraft speed and height of ejected dummy.
I.

9956
Steier, H.P. CAA IDEAS ON HOW TO AVOID COLLISIONS.
Amer. Aviat., 1956, 20(12), 34-37.

9956
This article presents the recommendations offered by CAA's Technical Development Center with regard to the problem of aircraft collision prevention. Three basic needs are specified: "sensing and alerting devices; increased conspicuity of aircraft; and increased angles of vision for the pilot from his cockpit position". Results of studies on each of these aspects are presented and discussed. These include conspicuity aids, devices to provide greater contrast, and angles of vision as functions of cockpit and windshield configurations.
I.

9957
The Aeroplane. DEVELOPING THE MARTIN-BAKER EJECTION SEAT. The Aeroplane, 1956, 40(2325), 168-171.

9957
This article presents illustrations and a detailed description of the Martin-Baker automatic ejection seat. Actual experiences with this as well as with other types of seats are recounted and discussed in terms of the relative efficacy of specific seats in meeting problems of high and low speed ejection, oxygen supply, etc. Current developments in this area of research are discussed. The specific seats mentioned in this article are the following: Martin-Baker Mk.1, Mk.2, Mk.3, Swifts Mk.2, Hunters Mk.2H, Javelins Mk.2J, and others.
I.

9958
The Aeroplane. DISCUSSING APPROACH AND RUNWAY LIGHTING.
AIR TRANSPORT. The Aeroplane, 1956, 40(2339), 624-625.

9958
This article presents a summary of a report on aerodrome approach and runway lighting problems. By utilizing a simulator, known as the cyclogram, four types of lighting patterns were evaluated: Newark/Jalaviid (A.L.P.A.) approach lights with narrow-gauge runway pattern, Type J (Jenks); Calvert approach lights with narrow-gauge runway pattern (but lights 300 ft. apart), Type E; London Calvert approach lights with narrow-gauge pattern, Type G (Gater); and Schiphol approach lights with broad-gauge runway lights and ILS reference point lighting. The results are discussed in terms of the particular characteristics of each of these systems and their contribution to the problem of providing adequate visibility conditions for pilots.
I.

9959
The Aeroplane. STRATOSPHERE FLYING—ON THE GROUND.
The Aeroplane, 1956, 41(2346), 214-215.

9959
This article describes the effects of a simulated altitude of 37,000 feet upon coordination, thought processes, memory, etc. Five pilots were observed in a decompression chamber as high altitudes were simulated. The effects of anoxia are noted and discussed in a general manner.
I.

9960
The Aeroplane. SURVIVAL AND MILITARY EQUIPMENT.
FARNBOROUGH FINAL. The Aeroplane, 1956, 41(2350), 431-432.

9960
This article presents a survey of contemporary British aviation equipment. It describes partial and full-pressure suits, pressure helmets, the Martin-Baker Mk.4 ejection seat, the Folland Aircraft Type 3 ejection seat, and other equipment of this sort. The emphasis is upon the principle improvements reflected in these new equipments and their application to problems of survival at high altitudes and hypersonic speeds.
I.

9961
Davis, R.C. AIRCRAFT ACCIDENT INVESTIGATION.
Aeronautical engng. Rev., 1956, 15 (2), 37-38, 47. (Royal Canadian AP).

9961
This article presents a discussion of aircraft accidents in terms of four specific precepts concerning safety design and including factors of maintenance, operating procedures, uncontrollable human errors, permanence of design structures, and the failure of parts or components of an aircraft. Each of the precepts is illustrated by an example of an aircraft accident in which the situation, the results of investigation, the hazard, and the fix (i.e., remedial measure) are specified. Conclusions are drawn concerning the use of accident data in safety design.

9962
Kirchner, O.E. AIR SAFETY. Aeronautical engng. Rev., 1956, 15 (2), 48-53.

9962
In this report on the Six Annual Air Safety Seminar (held in Taxco, Mexico, Nov. 17-20, 1955) brief descriptions of papers on the following topics are presented: turbulence, vortex wakes, Strategic Air Command experience with jets, pilot stress in accidents, the crash location beacon, crash-resistant fuel tanks, traffic density, collision lights, crash rescue, survival in the tropics, backward facing seats, and others.

[illegible]

Integrated flight equipment systems are discussed with emphasis upon the design of instrumentation and controls from the point of view of integration with human pilot characteristics. A brief theoretical exposition of controls and cockpit environment is presented along with specific methods for the design of the optimum system. Such features as the following are considered: definition of mission objectives, the function of sections in the system, the need for excess redundancy with instruments, etc. Several specific systems are illustrated and discussed, e.g., Sperry Integrated Instrument System, 1, 2, 3, 4.

Brinkley, J. J., Jr. THE H-FLIGHT COLLISION
PHENOMENON. Aeronautical Engng. Ser., 1966,
15 (7), 45-53. (Cornell Aeronautical Labo-
ratory, Inc.).

The author discusses the problem of in-flight air-
craft collision in terms of the various solutions which
have been proposed, e.g., cooperative collision warning,
air-borne radar system, etc. Following a definition of
the problem the basic function and basic classification
of various collision warning systems are elaborated.
The cooperative system is contrasted to the air-
borne radar or self-sufficient system, and the advan-
tages and disadvantages of each are specified within the
context of collision prevention under conditions of
heavy air traffic.

Beth, G.L. PILOT, INSTRUMENTS, CONTROLS.
Aeronautical Engng. Rev., 1956, 15 (9),
66-71. (General, Division of General Dynamics
Corporation).

This article presents an historical description of the development of flight control systems and visual aids for the pilot. The components of the contemporary flight system along with partial or additional systems are described and discussed in terms of their coordinated operation. Implications for the future development of systems and their modification of the pilot's function are briefly discussed.

T. G. I. R.

Baron, P. PROPAGATION DU SON DANS L'ATMOSPHERE ET L'AUDIBILITE DES SIGNAUX AVERTISSEURS DANS UN ENVIRONNEMENT AGITANT. (PROPAGATION OF SOUND IN THE ATMOSPHERE AND AUDIBILITY OF ALARM SIGNALS IN SURROUNDING NOISE). Le Groupeement des Acousticiens de Langue Francaise, No. 56, 1954, 259-274. Oct. 1956, 19pp. Langley Aeronautical Laboratory, NACA. (Commission for Study and Research of Electricity in France).

To determine the optimal method of locating public alarm sirens, measurements of sound propagation were made under a variety of meteorological conditions in the Yonne valley, and in Paris France. Tests were made with a sound source (15 hp siren) at ground level and on a tower at heights of 5, 15, or 37 meters. Temperature, humidity, wind velocity and direction were measured at the same tower. Sound pressure levels were measured and averaged over a period of 1 min. Two listening stations were maintained, one at a fixed position, and the other, at various positions from the tower. Records of sound pressure level are analyzed for the effects of the topography of the area, the wind velocity, and direction. Threshold of hearing for a sound from the same source was determined on 6 observers as a function of ambient level of street noise in Paris. T. G. I. R 4 11

TOLSON, J. EDWARD, JR., 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635,

The implications of high-speed aircraft for the pilot's control function are investigated in this study of the effects of human dynamics upon control of an aircraft in pitch. Another aspect of the study involves determining criteria to predict pilot transfer function during pitching flight. Specific transfer functions involving reaction time, muscular lag, etc., are expected by formulas which consider the aerodynamic, inertial, and other parameters of various aircraft. Conclusions are drawn concerning the effects upon pilot control of reducing aircraft size and shortening the aircraft period.

U. S. I. 164

Schwartz, L.S. PRINCIPLES OF WIRELESS COMMUNICATION
BY COMMUNICATION CHANNELS. Trans. Amer. Inst.
Electrical Eng., Part 1: Communication and
Electronics, 1956, 75, 44-50. (New York Uni-
versity).

The author discusses the principles of noise reduction in communication channels in terms of communication objectives, filtering principles in error minimization, improving signal-to-noise ratio as a means of maintaining the probability of error and applications of linear filtering techniques. Conclusions are drawn concerning optimal techniques for reducing signal-to-noise ratio.

Trans. Inst. electrical Eng., Part 1: Communication and Electronics, 1956, 75, 75-79. (Station WGB, Fort Worth, Tex.).

Following a description of the lighting facilities on hand, the author elaborates upon the conversion from black and white to color television operation. Illustrations are presented along with a description of changes in lighting layout, switchboard design, etc.

Bice, S.O. A FIRST LOOK AT RANDOM NOISE.
Trans. Amer. Inst. electrical Engr., Part I:
Communication and Electronics, 1956, 75,
129-131. (Bell Telephone Laboratories, Inc.,
New York, N.Y.).

The author presents a discussion of the elementary aspects of "random" or "Gaussian" noise. A representation of random noise is presented and the power spectrum is discussed and related to the autocorrelation function. Two probability distributions of noise are discussed.

Johannsen, Dorothea E., McBride, Patricia I., & Wulfeck, J.W. STUDIES ON DARK ADAPTATION: II. THE PRE-EXPOSURE TOLERANCE OF THE HUMAN POPEYE ADAPTED TO DIFFERENT BRIGHTNESS LEVELS. J. opt. Soc. Amer., 1956, 46 (4), 266-269. (Institute for Applied Experimental Psychology, Dart. University).

The course of dark adaptation in the human fovea was traced following adaptation to luminance levels of 0.1, 1.0 or 100 fL, and a pre-exposure period of 0, 1, 10 or 100 sec at 1.0, 10, or 100 fL. The adaptation and pre-exposure fields subtended 27°. The test patch was centrally located and subtended 1°. Successive thresholds were determined during dark adaptation by the method of limits, employing only ascending series. The criteria used to evaluate the effects of pre-exposure were the initial threshold, the shape of the curve, and the time required for the curve to level off.

G. R. 1

9975

Gale, E.S. STEREOSCOPIC ACTIVITY AND THE ROLE OF OVERTURNING. *J. opt. Soc. Amer.*, 1956, 46 (4), 274-277. (New York State College of Optometry, Rochester, N.Y.).

9976

To determine whether stereoscopic cues of convergence contribute to stereoscopic acuity, stereoscopy was measured while a reference object (a vertical needle) was fixated continuously, and also while the fixation was alternated between the reference and the comparison object (also a vertical needle). The angle of separation between the reference and comparison needles was varied from 2-24 degrees. Each of three subjects made 20 adjustments at each separation of the needles to match the apparent depth of the comparison needle to that of the reference needle. The stereo threshold was taken as one standard deviation of the matched position. The amount of improvement in stereoscopy found during alternating fixation is compared to the improvement to be expected theoretically on the basis of the change in the extent of the binocular disparity.

9977

Hahn, E.T., & Averback, E. SPATIAL EFFECTS IN PURSUIT DISCRIMINATION. *J. opt. Soc. Amer.*, 1956, 46 (4), 274-277. (Johns Hopkins University).

9978

Sensitivity to luminance differences between two separated homogeneous visual fields was measured as a function of the angle of separation and the luminance pattern in the intervening space. Four separations, 1, 10, 15 and 25 min. were used. The intervening space was either dark, or consisted of a linear gradient of luminance increasing from that of the darker field to that of the brighter. In a third experimental condition the intervening space was occupied by an extension of either the brighter or the darker field. The observers were two male undergraduates, who made 10 judgments of relative brightness at each value of the variable field under each experimental condition during 45 sessions. The results are presented in terms of the relative difference limit $\Delta I/I$. T. G. R 14

9979

Heathcote, G. EFFECT OF BINOCULAR MAGNIFICATION DEVICES ON STEREOSCOPIC DEPTH RESOLUTION. *J. opt. Soc. Amer.*, 1956, 46 (4), 278-280. (Ohio State University).

9978

The effect of optical magnification on stereoscopic acuity is deduced theoretically, and the prediction tested by an experiment comparing six diopter magnification with unaided viewing. The stimuli were two parallel vertical lines, 0.5 mm wide, 8 mm long and 2 mm apart, scribed on a glass plate viewed from a distance of 25 cm. The glass plate could be rotated to bring one line nearer than the other with sufficient precision to control the binocular disparity within 0.1 sec. Stereo thresholds were obtained on two normal emmetropic observers by the method of constant stimuli, using 30 presentations of each of seven different disparities. The differences between the thresholds obtained with and without optical magnification is compared to that predicted from the theoretical analysis. T. G. R 3

9979

Dianick, P.L. SPECIFICATIONS AND CALIBRATION OF THE 1953 EDITION OF THE INTER-SOCIETY COLOR COUNCIL COLOR APTITUDE TEST. *J. opt. Soc. Amer.*, 1956, 46 (6), 349-393. (U.S.N. Medical Research Laboratory, Naval Submarine Base, New London, Conn.).

9979

The specification and calibration of the 1953 edition of the Inter-Society Color Council Color Aptitude Test are described. The test consists of matching separate color chips to a saturation series in four colors. The specification of the color chips and the method of testing are outlined briefly. A system of scoring was developed on the basis of an item analysis of the performance of a group of 200 subjects. Test-retest reliability was established by retesting the same 200 subjects. The distribution of the scores obtained by the standardization population of 698 subjects is compared to the normal distribution. T. G. R 3

9980

Baker, C.A., Lebons, A., & Roberts, D.P. DARK ADAPTATION AS A FUNCTION OF THE INTENSITY AND DISTRIBUTION OF LIGHT ACROSS THE RETINOTOPIC FIELD. *J. opt. Soc. Amer.*, 1956, 46 (6), 491-504. (Arco Medical Laboratory, Waco, Wright-Patterson AFB, Ohio).

9980

The effects of the distribution of light across the visual field during the preadaptation period on the course of subsequent dark adaptation were determined at total preadapting luminances of 2500, 500, 100, 20, 4 and 0.8 cd. The preadapting field and test flash were produced by a modified Beck-Dolner adapter. The preadapting field subtended 30° and was broken up by a perforated screen which confined the illumination to 100, 20, 4, or 0.8% of the total area. The test flash was a patch subtending 4° located 70° temporally and lasting for 0.2 sec. Three subjects were adapted for five min to 2500 cd., for 30-50 min to darkness, and for 10 min to the experimental preadaptation field, just before the course of dark adaptation was traced by the method of limits. T. G. R 2

9981

Kasdan, D.L. CHROMATIC ADAPTATION. *J. opt. Soc. Amer.*, 1956, 46 (7), 500-513. (Research Laboratories, Eastman Kodak Co., Rochester, N.Y.).

9982

The effects of chromatic adaptation on the apparent color of light seen after an adaptation period were determined with a wide field colorimeter. The observer ($N = 2$) fixated a line dividing a binocular field into two halves. Different adapting colors were presented in either half of the field for a period of nine seconds, followed by a period of one second during which two different test colors were presented, one of which could be varied by the observer to match the other. The cycle of adapting and test periods was repeated until the observer reported that he had succeeded in matching the test colors. The adapting colors were tungsten light and daylight, green and pink, red and daylight. The chromatic coordinates are given for colors equivalent in the normal and adapted states. T. I. G. R 19

9982

Barlow, H.B. RETINAL NOISE AND ABSOLUTE THRESHOLD. *J. opt. Soc. Amer.*, 1956, 46 (8), 634-639. (Physiological Laboratory, Cambridge, England).

9982

The absolute threshold of visibility was determined on a single subject with a narrow band of light centering around 495 mμ, subtending 7.5 min, located 20° nasal of the fixation point, and lasting for 2.4 sec. The subject triggered the stimulus shutter to present himself with 100 flashes at each 5 randomly ordered intensity levels interspersed with 300 blanks. He responded, yes, possible or no. The resulting psychometric functions are analyzed in relation to other available evidence to show that the factor limiting the visual threshold is noise in the nervous system at a level higher than the first order neuron. T. G. R 27

9983

Walls, G.L., & Heath, G.G. NEUTRAL POINTS IN 138 PROTANOPES AND DEUTERANOPES. *J. opt. Soc. Amer.*, 1956, 46 (8), 640-649. (School of Optometry, University of California; Division of Optometry, Indiana University).

9983

The neutral points of 71 protanopes and 77 deuteranopes were determined by means of a rotary mixer and Munsell papers. The illuminant used was the CIE standard C for 58 protanopes and 52 deuteranopes, and D for 13 protanopes and 15 deuteranopes. The subjects were diagnosed on the basis of clinical tests prior to the experiment. Some of the subjects who were close relatives provided data on genetic relations. The mean and standard deviation of the neutral points are given for each type of dichromat. The use of the neutral points alone to differentiate protanopia from deuteranopia is evaluated. The effects of ocular pigmentation on the validity of neutral points obtained by this and other methods and the choice of illuminant C or D as the true "physiologic white" is discussed. T. R 12

9934

Hopkinson, R.G. GLARE DISCOMFORT AND PUPIL DIAMETER. *J. Opt. Soc. Amer.*, 1956, 46 (6), 549-556. (Department for Scientific and Industrial Research, Building Research Station, Garston, Watford, England).

9984

The relation between pupillary diameter and glare discomfort was measured on two subjects. The subject sat in a white-painted room at a diffuse luminance level of 0.16 to 200 fcd. In front of a glare source which projected a beam of up to 20,000 fcd. in a beam 9 x 10° steradians. The intensity level of this source at which the glare was just noticeable, just acceptable, just uncomfortable, just tolerable, and definitely intolerable was determined as a function of the surround luminance. At each threshold level a photograph was made of the eye from which accurate measurements of the diameter of the pupil could be made. The significance of pupillary diameter as an indicator of subjective discomfort is evaluated.

T. G. R 13

9985

Baldwin, M.W., & Nielsen, G. SUBJECTIVE SHARPNESS OF SIMULATED COLOR TELEVISION PICTURES. *J. Opt. Soc. Amer.*, 1956, 46 (9), 581-585. (Bell Telephone Laboratories, Murray Hill, N.J.).

9985

The subjective sharpness of a simulated color television image was measured on ten observers as a function of the total bandwidth, bandwidth apportionment, and viewing distance. The image was produced by three optical projectors that could be focused independently without altering their mutual register. The apparent sharpness of any focus combination was equated by the subject to the sharpness of the image produced when all three projectors were out of focus by the same amount. To equate bandwidth to focus, the subjects matched the sharpness of an image transmitted over a telephoto circuit of known bandwidth to that of the same picture optically defocused. The principal result is expressed as a statistically fitted surface relating bandwidth apportionment to equivalent total bandwidth.

T. G. I. R 2

9986

Leistner, K. EXPERIMENTS CONCERNING THE INTERRELATIONSHIP OF RESOLVING POWER AND RECOGNITION. *J. Opt. Soc. Amer.*, 1956, 46 (9), 686-690. (Signal Corps Engineering Laboratories, Fort Monmouth, N.J.).

9986

Several camera lenses of equal focal length and aperture, but of different design, were evaluated in terms of both resolution and image recognition. The heads of eight soldiers were photographed standing in each of five different arrangements from each of five distances. At each distance 15 to 18 negatives were made at focus settings 0.03 mm apart. The reduction of the image varied from 1830 to 2400. Nine observers identified the faces of the soldiers by comparing positives, mounted on microscope slides and viewed through a 50 power microscope, with numbered enlargements of the faces. The results of the recognition test are compared to a measure of line resolution obtained from the same subjects.

T. G. I. R 6

9987

MacDonald, D.E., & Watson, J.T. DETECTION AND RECOGNITION OF PHOTOGRAPHIC DETAIL: I. EMPIRICAL DATA APPLICABLE TO THE PREDICTION OF PERFORMANCE OF DIFFRACTION LIMITED SYSTEMS. *J. Opt. Soc. Amer.*, 1956, 46 (9), 715-720. (Physical Research Laboratory, Boston University).

9987

This experiment was undertaken to provide an empirical basis for predicting the performance of diffraction limited optical systems in terms of the detection and recognition of visual objects. A matrix of 16 squares, circles or blanks at one of three levels of contrast (relative log luminances of 0.07, 0.14 and 0.26) was photographed. The scale of the image varied from 1:1250 to 1:20,000 and the aperture ratio from 1/25 to 1/450. Four experienced observers viewed the images under a magnification that they could vary at will from 7 to 45. Each image was presented at least twice to each observer; the total number of observations made was of the order of 105. The results are described in terms of the probabilities of detection and of recognition as a function of target resolution and contrast.

T. G. I. R 4

9934

Higgins, G.C., Wolfe, R.E., & Lamberts, R.L. RELATIONSHIP BETWEEN DEFINITION AND RESOLVING POWER WITH TEST OBJECTS DIFFERING IN CONTRAST. *J. Opt. Soc. Amer.*, 1956, 46 (9), 752-754. (Research Laboratories, Eastman Kodak Co., Rochester, N.Y.).

9988

To determine the relation between definition and resolution in photographic images, a series of pictures were made of a uniform grating. The lengthwidth of the bars was 3:1 and the spaces were as wide as the bars. The luminance ratio was 0.2. Exposures were made at nine focal positions covering a range of 0.5 inches. Relative definition thresholds were obtained from the standard deviation of the arrangements of nine positive transparencies made in order of apparent definition by 20 subjects. A just-noticeable-difference scale is given as a function of resolution at low contrast and also from a previous experiment at high contrast.

T. G. R 4

9989

Soynton, R.W., & Bush, W.R. RECOGNITION OF FORMS AGAINST A COMPLEX BACKGROUND. *J. Opt. Soc. Amer.*, 1956, 46(9), 758-764. (Department of Psychology, University of Rochester, Rochester, N.Y.).

9989

The purpose of this investigation was to determine some of the factors that influence the recognition of a target figure against a background of many figures. The targets were six rectilinear forms, and the background figures were curvilinear patches without sharp corners. Targets were present in 50% of the presentations. They subtended 5-13° and the whole array 2-6°. The subjects were nine undergraduates, who were rewarded randomly for 35% of the correct responses. Each subject viewed 36 targets once during each of 18 experimental sessions. The proportion of trials resulting in correct recognition is reported as a function of the total number of figures in the array (16, 32 or 64), the exposure time (3, 6, 12 or 24 seconds) and the viewing distance (798, 1116, 1431, 1749, or 2065 cm).

T. G. R 7

9990

Campbell, C.J., McEachern, L.J. & Marg, E. AIRCRAFT FLIGHT BY AN OPTICAL PERISCOPE. *J. Opt. Soc. Amer.*, 1956, 46(11), 944-949. (Institute of Ophthalmology, Columbia-Presbyterian Medical Center, New York, N.Y.; USAF: School of Optometry, University of California, Berkeley, Calif.).

9990

To determine the feasibility of flying an aircraft by viewing through a periscope, 20 Air Force pilots carried out routine flight operations with an experimental periscope mounted in a B-17. The magnification factor was one or three and the field of view 70°, augmented by hand controlled azimuth and declination prisms which scanned 180°. A reticle indicated the position of the aircraft relative to the field of view. The flight instruments were introduced into the bottom of the same field of view. The pilot operated the aircraft from the prone position by means of a specially designed one-hand control. The results are expressed qualitatively in terms of the pilots' and observers' judgments.

T. G. R 3

9991

Cornsweet, T.N. DETERMINATION OF THE STIMULI FOR INVOLUNTARY DRIFTS AND SACCADIC EYE MOVEMENT. *J. Opt. Soc. Amer.*, 1956, 46 (11), 987-993. (Department of Psychology, Yale University, New Haven, Conn.).

9991

The purpose of this study was to determine the adequate stimuli for saccadic and drifting motions of the eye. The eye movements of two subjects were recorded photographically by a black annulus bisected by a fine black line. The target was viewed under normal conditions and also with the contact lens mirror in the optical path so as to stop the image at one point on the retina. The fine black line was flickered on and off at 0.8 to 4.4 cps, and the disappearance time of its image recorded under normal and stopped viewing. Eye movements were also measured in darkness with and without a fixation point. The probability, direction and magnitude of saccades are reported as a function of the position of the image on the retina under both normal and stopped viewing.

T. G. I. R 7

9992 Vos, J.J., Lazet, A., & Bouman, M.A. VISUAL CONTRAST THRESHOLDS IN PRACTICAL PROBLEMS. Opt. Soc. Amer., 1956, 46 (12), 1065-1068. (Research Institute for Perception, National Defence Research Council, TNO, Kampweg 3, Soesterberg, The Netherlands).

The purpose of this investigation was to determine thresholds for visual contrast and to estimate the variability of thresholds between different observers. Four trained observers judged the position of the break in a Landolt ring projected on a screen a distance of four meters. Both positive and negative contrast was used. The luminance of the brighter portion of the image was varied from 10^{-6} to 0.6 cd/m^2 . Contrast was varied by projecting light from another source onto the same area at luminances of 10^{-5} to 10^3 cd/m^2 . In a similar experiment contrast thresholds for dots in positive contrast were determined on 11 untrained observers. The dots were the same size and in the same positions as the breaks in the Landolt rings. The results are reported in terms of the average, minimum and maximum threshold contrast as a function of the background luminance.

G. R. I

9993 Mertens, J.J. INFLUENCE OF KNOWLEDGE OF TARGET LOCATION UPON THE PROBABILITY OF OBSERVATION OF PERIPHERALLY OBSERVABLE TEST FLASHES. J. opt. Soc. Amer., 1956, 46 (12), 1069-1070. (Research Department of N.V. KEMA Laboratories, Arnhem, The Netherlands).

9993 This investigation was undertaken to determine the influence of knowledge of target location upon the threshold for a peripheral flash of light. Four target locations were arranged symmetrically around a fixation point. In one experiment test flashes came from only one point, and in another from all four points in random order. The size of the test flash was $12'$ or $26'$, the separation from the fixation point 7° or 15° , and the duration 0.2, 2.5, or 5.0 sec. Measurements were made on two experienced and three inexperienced observers in the dark adapted state. Not all observers served under all experimental conditions. The threshold intensities with fixed and variable target locations are compared, and the difference tested for statistical significance.

T. G. R 8

9994 Vann, H.E. SAFETY... A BIG PART OF THE MAINTENANCE JOB. Safety Maintenance and Production, 1956, 111 (1), 24-26, 28. (General Electric Co., Cleveland, Ohio).

9994 This article discusses the role of the maintenance program in accident prevention. The specific advantages of a scheduled preventive maintenance program are described along with the application of such a program to specific equipment such as control boxes, electrical tools, etc.

I.

9995 Wendall, C. SELECTING PROTECTIVE CLOTHING. Safety Maintenance and Production, 1956, 111 (2), 18-19. (Bethlehem Steel Co., Bethlehem, Penn.).

9995

The author discusses the importance of adequate selection of protective clothing in the prevention of accidents. The kind of protection offered by various garments, e.g., gloves, aprons, etc., is described and discussed along with the various applications in which such equipment is utilized.

I.

9995 Gregg, J.R. SAFETY DEPENDS ON SEEING. Safety Maintenance and Production, 1956, 111 (4), 24-25. (Vision Conservation Institute, Inc., Los Angeles, Calif.).

9996

The author emphasizes the role of accurate vision in safety and discusses the particular visual abilities which are important in effective and safe job performance. The implications for safety of visual defects such as loss of peripheral field of view are discussed with regard to potential safety hazards. Safety devices such as goggles are seen as ancillary to adequate visual function.

I.

9997 Safety Maintenance & Production. PLASTICS IN EYE PROTECTION. Safety Maint. Prod., May 1956, 111(5), 20-24 & 34.

9997

This article discusses the utilization of plastic goggles and face shields as eye protective devices. Research results concerning the potential applications and the limitations of various types of plastics are presented and discussed in terms of their relative protection against glare, ultraviolet and infrared transmissions.

I. R 1

9998 Maas, R.P. AUDIOMETRIC AND EAR PROTECTION PROGRAM. Safety Maintenance and Production, 1956, 111 (5), 40-42. (Employers Mutual Liability Insurance Co.).

9998

This article presents a discussion of the equipment, personnel, and procedures necessary in the establishment of an audiometric and ear protection program. Location and size of hearing measurement rooms, proficiency of the audiometric technician, and the employment of protective devices are the primary aspects treated by the author.

I.

9999 Miller, L.N. DOES NOISE AFFECT YOU AND YOUR WORK? Safety Maintenance and Production, 1956, 111 (6), 42-46, 48-49. (Boit Beranek and Newman Inc., Cambridge, Mass.).

9999

This article presents a review of the various effects of noise on man. The feeling of annoyance engendered by noise is discussed along with such aspects as the effects (of noise) on hearing, psychomotor efficiency, communication, and so forth.

R 11

10,000 Miller, L.N. NOISE LEVELS, ACTUAL AND DESIRED. Safety Maintenance and Production, 1956, 112 (1), 39-44, 56-57. (Boit Beranek and Newman Inc., Cambridge, Mass.).

10,000

This article, the second in a series of articles on noise control in industry (see accession No. 9999), presents a discussion of the effect of noise levels on communication and hearing ability. Recommended noise levels for various industrial locations are presented along with examples of noise level criteria applications.

T. G. R 4

10,001
Miller, L.N. NOISE CONTROL IN INDUSTRY.
Safety Maintenance and Production, 1956, 112
(2), 42-44, 46-51, 57-59. (Bolt Beranek and
Newman Inc., Cambridge, Mass.).

10,001
In this article, the third of a series of articles
on noise control in industry (see accession No.'s 9999
and 10,000), the author describes the various techniques
and devices used to control typical industrial noise
problems. Illustrations and discussion of the following
devices and sound absorption techniques are included:
ear-protective devices, jet engine muffler, vibration
isolation, acoustic enclosures, functional sound absor-
bers, etc.
T. G. I. R 5

10,002
Safety Maintenance & Production. SAFETY LENSES FOR
RADIANT ENERGY. Safety Maint. Prod., Oct. 1956, 112
(4), 18-20, 22 & 24.

10,002
This article describes various protective lenses
and filters and discusses their utilization in industry
with specific emphasis upon the degree of protection
afforded from ultraviolet and infrared rays. Glass and
plastic lenses are contrasted. The discussion is not
limited to protection from radiant energy but includes
a discussion of the effects of sun glasses on night
driving ability.
I.

10,003
Chinn, H.I. (Princ. Investigator). EVALUATION OF DRUGS
FOR PROTECTION AGAINST MOTION SICKNESS ABOARD TRANSPORT
SHIPS. J. Amer. Med. Ass., March 1956, 160(9), 755-760.
(USAF School of Aviation Medicine, Brooks AFB, Tex.).

10,003
This is a report of a study conducted by the Army,
Navy, Air Force Motion Sickness Team and designed to
evaluate the effectiveness of certain drugs in affording
protection against motion sickness. Approximately 17,000
servicemen were used to compare the effectiveness of 26
drug compounds with that of a placebo in preventing sea-
sickness. The results are presented and discussed in
terms of the most effective drugs, incidence of side-
effects, the role of age, and the effect of past history
of motion sickness.
T. R 10

10,005
Beecher, H.K. RELATIONSHIP OF SIGNIFICANCE
OF WOUND TO PAIN EXPERIENCE. J. Amer. Med.
Ass., 1956, 161 (17), 1609-1613. (Harvard
Medical School).

10,005
To investigate the relationship between experienced
significance of a wound and the degree of pain experi-
enced, data were collected on the frequency of pain of
sufficient severity to require a narcotic in 150 male
civilian patients. These data were then contrasted to
similar data collected in a previous study with wartime
casualties. The results are presented and discussed in
terms of the relative influence of situationally induced
anxiety, attitude of patient, and reaction to wound on
the severity of pain experienced.
T. R 14

10,006
Basowitz, H., Korchin, S.J., Oken, D., Gold-
stein, M.D., & Gussack, H. ANXIETY AND PER-
FORMANCE CHANGES WITH A MINIMAL DOSE OF EPIN-
EPHRINE. AMA Arch. Neurology & Psychiatry,
1956, 76 (1), 98-105. (Michael Reese Hospi-
tal).

10,006
This study was designed to investigate the effects
of epinephrine at a low dose level on anxiety patterns,
cardiovascular activity, and psychological and motor
performance. Twelve subjects were interviewed to de-
termine past history of stress and then given epine-
phrine and saline injections. Half the subjects re-
ceived the placebo first while the others were given the
epinephrine first. A series of tests was administered
following each of the two injections. The results are
presented and discussed in terms of the relative degree
to which epinephrine produces anxiety symptoms con-
sistent with the subjects characteristic reaction to
stress.
T. R 9

10,007
Grinker, R.R., Korchin, S.J., Basowitz, H.,
Hamburg, D.J., Sabshin, M., et. al. A THE-
ORETICAL AND EXPERIMENTAL APPROACH TO PRO-
BLEMS OF ANXIETY. AMA Arch. Neurology &
Psychiatry, 1956, 76 (4), 420-431. (Michael
Reese Hospital).

10,007
The authors present an extensive discussion of anxi-
ety based on experimental research and including such
aspects as the following: types of anxiety (e.g., shame,
guilt); the function of anxiety in the general psycho-
biological organization; the disparity in time between
stimulus and duration of total anxiety response; the
relation of subsystems to the central process of anxiety;
and other aspects. A general overall picture is pre-
sented of the design of the research being conducted.
Some of the variables under investigation are perception,
decision, physiological measures, hormonal measures,
and affective variables.
R 19

10,008
Cohen, S.I., Silverman, A.J., & Zuidema, J.
PSYCHOLOGIC STRESS RESPONSE EVALUATION BY
FOCUSED INTERVIEWING. A.M.A. Arch. Neurology
& Psychiatry, 1956, 76 (5), 670-674. (Aero
Medical Laboratory, WADC, Wright-Patterson
AFB, Ohio).

10,008
To investigate the technique of focused interviewing
as a means of assessing physiologic stress response, 6
subjects were interviewed following completion of a
series of trials in a human centrifuge. Prior to the
initial run they were chastized by the experimenter.
This was then used for the focal point of the interview.
On the basis of the affective constellations expressed
in the interview an estimate was made of g tolerance and
compared to the actual level of g tolerance. The re-
sults are discussed in terms of the relative value of
this method in predicting reaction to physiologic stress.
T. R 4

10,009
Instrumentation. PRECISION SWITCHES. Instrumentation,
1956, 2(1), 20-23. (Minneapolis-Honeywell Regulator
Company, Freeport, Ill.).

10,009
This article presents illustrations and discussion
of the design and operational aspects of a variety of
electric switches. The particular switches utilized in
process control, motion control, level controls, package
conveyors, bulk flow control, and counting and weighing
are described in terms of the factors operant in their
selection.
I.

10,010
Woodward, J.E., & Kirshner, D.R. DESIGN OF
ASDE RADAR EQUIPMENT. Tele-Tech & Electronic
Industries, 1956, 15 (6), 86-87, 180, 182-186.
(Woodward, Airborne Instruments Lab., Inc.,
Mineola, N.Y.; Kirshner, RADG, Griffis AFB,
Rome, N.Y.).

10,010
This article presents an extensive description and
discussion of the design considerations, construction
and performance of Airport Surface Detection Equipment
(ASDE), short range, K-band radar. Designed to sup-
plement (or replace) the visual observation of the con-
trol-tower operator, this equipment was developed speci-
fically for the Air Force. The various modifications
and stages of development are described along with a
specification of the component parts of this equipment.
I.

10,011
Slitzstein, J., & Levine, T. OPTICAL SENSITIZATION OF RADAR. Tele-Tech & Electronic Industries, 1956, 15 (6), 110-111, 190-192. (Project Wescom, University of Pennsylvania).

10,017
Aviation Week. NEW STICK GRIP. Aviation Week, May 1956, 64(20), p.81.

10,012

Following a specification of the basic requirements for radar stimulation and a brief description of the principle existent methods, i.e., analog computer technique, magnetic tape technique, and television technique the authors describe in detail a new system of optical stimulation of radar. The components of the system and the aspects which may be simulated include the following: synchronization, azimuth rotation, optical system, optical target detector, resolution, ground clutter, noise, target size, altitude, etc. A limitation of the system, i.e., lack of linear relation between delay of transmission and reception of a pulse and the target range, is briefly discussed.
I.

10,017

This is a brief illustrated article which compares the new B-9 control stick grip developed by the Aero Medical Laboratory with the old B-8 grip. The new design is said to be more efficient to use when pilots are subjected to high loads.
I.

10,012

Morant, G.M. & Smith, H.F.R. CRITICAL DIMENSIONS OF A STANDARD HELICOPTER COCKPIT. FPRC 1002, March 1957, 10pp. Flying Personnel Research Committee, London, England. (Institute of Aviation Medicine, RAF, Farnborough, England).

This report deals with an enquiry carried out to determine all the dimensions of significance to pilots which could best be chosen for a "standard" helicopter cockpit developed by the Ministry of Supply for the RAF. 20 Ss, 7 of whom were pilots (none having been trained to fly helicopters) were chosen. 4 were service personnel and the remaining 9 were civilians. The group was chosen for its wide range of body sizes. Body measurements were taken and critical dimensions of the cockpit determined. Factors taken into consideration were: a) vision; b) leg reach and movement; c) arm reach and movement; d) clearances; e) the distance of the pivoting point on the floor from the seat; f) eye heights of the pilots; and g) comparisons with other standard cockpits. 4 drawings appended give all the critical dimensions recommended for adoption in the helicopter cockpit. (HEIAS)
R 2

10,013

Aviation Week. ARDC SLED TESTS EJECTION IMPACT FORCE. Aviation Week, Dec. 1956, 65(24), 81-83.

10,018

Christian, G. COMFORT IN AIRLINE CABIN DESIGN MAKES DOLLAR SENSE. Aviation Wk., 1956, 64(20), 92-93, 95, 97, 99, 101.

10,013

This article describes the facilities and program at Holloman Air Development Center in biodynamics--the investigation of high impact forces on living tissues. The discussion pertains to a description of the "Daisy Track," a 120 foot track and outspurt for producing 5-200 G acceleration-deceleration range and a listing of several of the human volunteers who have been observed in studies of abrupt deceleration.
I.

10,018

This article reviews trends in the design of commercial aircraft cabins and cites the experience and design orientations of Dreyfus, Teague, Lowy and Butler. The discussion stresses seat design, use of color, cabin compartmentalization, location and design of passenger controls, instructional displays for passengers, etc., as they relate to passenger comfort, fatigue, and emotional reactivity. The importance of industrial design, human engineering, and color psychology in such design work is cited.
I.

10,014

Aviation Week. NEW OPTICAL SYSTEM SPEEDS RADAR PLOTTING. Aviation Week, Jan. 1956, 64(2), p.49.

10,019

Klass, P.J. AUTO-TESTER FINDS FAULT, DETAILS REPAIR. Aviation Wk., 1956, 15(23), 97-105.

10,014

This article describes Sky Screen, a new optical device developed by Morthrop Aviation Company, which is expected to speed the display and identification of radar-detected aircraft. The device provides for the optical transfer of radar "blips" from a radar tube to a plotting surface, where they are marked with glass marking chips, and then the entire plotting surface is optically projected onto a large screen.
I.

10,019

This article discusses automatic line maintenance tester being developed by Sperry Gyroscope and General Electric Companies. Sperry's Rapid Automatic Check-out Equipment (RACE) is described in some detail and comparisons are made between operator and automatic maintenance procedures. In addition existing and pending applications of automatic maintenance of military equipments are cited.
I. R few

10,015

Aviation Week. OMNIVIRONMENT SUIT. Aviation Week, Oct. 1956, 65(16), p.55.

10,015

This is a series of five pictorial plates showing a new environment suit developed by the U.S. Navy and Goodrich Rubber Co. The suit is said to provide protection against low atmospheric pressures, heavy G forces, heat, cold, and exposure in winter after bailout.

10,020

Aviation Week. PRONE-COCKPIT LAYOUT PROMOTES FATIGUE. Aviation Week, April 1956, 64(14), 47-49.

10,016

Aviation Week. EJECTION SEAT DEVELOPED FOR MACH 3 AFTER ARDC DECIDES ON CAPSULES. Aviation Week, Oct. 1956, 65(15), p.72.

10,020

This article discusses a prone-cockpit layout developed by the Institute of Aviation, RAF, Farnborough, England which was recently used in a Gloster Meteor 8 test vehicle. Information is presented on load factor tolerance of the prone pilot, effectiveness of control, pilot fatigue, visibility, and pilot escape. Detailed descriptions of the pilot bed and escape mechanisms are also given.
I.

10,016

This article describes an ejection seat, developed by Lockheed Aircraft Corporation, which is designed to permit safe escape limits exceeding 800 knots at sea level and Mach 3 at altitude. Closed features of the seat's design are: skip-flow generator, side fins and horizontal vanes, lateral head supports, and restraining webbing.
I.

10,021

Staver, P. HOW ELECTRA INSTRUMENT PANEL WILL LOCK. Aviation Wk., 1956, 64(13), 92-93.

10,021

This article reviews the recommendations of the Air Line Pilots Association on the instrument panel layouts for the Lockheed Electra turbo prop transports. Based on the experience and preferences of air line pilots, the proposed panel layouts stress horizontal scanning of instruments, facilitate check reading of instruments, and give optimal location to the Flight Director and other pictorial-type course indicator instruments. Standardization and flight safety aspects of the proposed layouts are discussed.

I.

10,022

Doty, L.L. BAD VISIBILITY BLAMED IN MID-AIR COLLISIONS. Aviation Wk., 1956, 65(22), 40-41.

10,022

This article reviews information and conclusions set forth by the Aircraft Owners and Pilots Association and the Civil Aeronautics Board regarding the role of cockpit visibility in mid-air collisions and near misses. Included in the presentation are comparative data on cockpit visibility of several civilian and military aircraft.

I.

10,023

Hawkes, R. HIGH SPEED, ALTITUDE TO ALTER PILOT RULES. Aviation Wk., 1956, 65(18), 56-58.

10,023

The author discusses the implications of high speed and high altitude flight conditions for aircraft control. Citing the experimentation being conducted with simulators, he defines a number of control problems, e.g., slowness of control responses, rotary inertia in space flight, etc. A stability and control simulator is described.

I.

10,024

Campbell, H.E. REARWARD SEATING URGED FOR AIRLINE USE. Aviation Wk., 1956, 64(3), 65, 68, 70-71, 74. (Colorado State Medical Society).

10,024

Specific accident data are cited in this discussion of the relative safety advantages of rearward seating in aircraft. Other factors such as seat design, seat anchoring, and safety belts are discussed in terms of their role in crash survival. It is suggested that the tolerance of the human anatomy to deceleration forces is potentially increased by rearward seating.

R 7

10,027

Christian, G. MATING MAN TO NEW WEAPON SYSTEMS. Aviation Wk., 1956, 65(6), 343, 345, 347-348, 351.

10,027

The author presents a detailed description of the primary objectives of the Human Factors Division of the Air Research and Development Command. The various components of human behavior being investigated are discussed along with the primary research problem areas. A brief description of research results on the problem of the effects of noise on performance is presented.

I.

10,030

Hawkes, R. AIR CRASH DEATH OR INJURY MAY BE PREVENTED BY SOUND DETAIL DESIGN. Aviation Wk., 1956, 65(19), 61-62, 64, 67, 68-69, 73, 77, 79.

10,030

This article presents a brief summary and discussion of the role of various design factors in aircraft crash survival. Among these factors the following receive primary attention: the role of the passenger tie-down (i.e., seat belt, seat structure, and floor attachments), aft vs. forward facing seating, and seat-back, shoulder harness, and seat belt design. The role of flying missiles is also discussed.

I.

10,031

Hawkes, R. NAVY INTEGRATING FLIGHT SYSTEM IN PILOT CAPSULE. Aviation Wk., 1956, 64(18), 54-55, 57-59.

10,031

This article presents a description of an interchangeable and ejectable Navy pilot capsule which contains all of the sensing, interpreting, and communicating components of a new integrated flight control system. The results of evaluation tests conducted with both the capsule and the flight control system are presented along with a detailed outline of ongoing research. Among the various aspects discussed are the following: problems of highspeed escape, the results of onset rate studies, the design requirements of oxygen systems, and the design factors involved in the development of the new flight system.

I.

10,034

Klass, P.J. COMMUNICATIONS CHORES LIMIT CAPACITY TO CONTROL TRAFFIC. Aviation Wk., 1956, 64(7), 65-66.

10,034

On the basis of studies conducted in the Boston area (Hartford, Salem, and Boston) the author describes excessive voice communications as the basic factor in certain traffic control problems. Traffic capacity limitations and delays represent the primary results of excessive communications. Certain remedial measures centering primarily upon the utilization of automatic devices are also described.

10,035

Christian, G.L. NEW SPEED AND ALTITUDE CONDITIONS CHALLENGE EQUIPMENT DESIGNERS. Aviation Wk., 1956, 64(11), 203, 207-208, 211.

10,035

The author discusses the implications of aircraft operating at hypersonic speeds and high altitudes for equipment designers. Among the various types of equipment discussed are the following: canopies, control seats, air conditioning systems, ejection seats, engine control components, collision-warning systems, etc. Included are certain suggested changes in the design of such equipments.

10,036

Klass, P.J. AUTOMATION TECHNIQUES COULD REMEDY AIR CONGESTION HEADACHES. Aviation Wk., 1956, 64(11), 240-241, 243, 245-246.

10,036

The author discusses the potential role of automation as a technique for alleviating certain air traffic control problems, e.g., over-burdened air traffic controllers, overloaded radio communications, poor airspace utilization, etc. The automation techniques now available for application to such problems are described along with the types of automatic equipment which should be developed to meet these problems. The application of the SAGE system to air traffic control is critically evaluated.

I.

10,031
Murrell, K.F.H. DATA ON HUMAN PERFORMANCE FOR ENGINEERING DESIGNERS. Engng., Oct. 1957.
32pp. (Psychology Dept., University of Bristol, Bristol, England).

This article discusses many of the aspects of equipment design which are relevant when man-machine interactions are considered. Among them are: body measurements, seating, control panel and display design, industrial heat, noise, lighting and color.
A 42

10,038
Aviation Week. HELMET VISOR WARM UP IN NORMAL FLIGHT.
Aviation Week, Sept. 1957, 67(13), p.87.

10,038
This article presents several illustrations and a brief description of the Taylor pressure helmet which incorporates the novel feature of a face visor, automatically controlled by the pressure suit system, which remains in an open position under normal conditions of flight. Other features of the helmet are noted. Also presented are illustrations of the C. Q. Parachute Company's pressure helmet.
I.

10,040
Aviation Week. MANIPULATORS SERVE NUCLEAR AIRCRAFT
UNITS. Aviation Week, Dec. 1957, 67(24), 83 & 87.

10,040
This article presents illustrations and a description of mechanical manipulators being utilized by General Electric Co. (Idaho) to perform operations with radioactive materials. Primary emphasis is placed upon the specific skills required of the operator (e.g., good depth perception), the procedures necessary to ensure safety of the operator, and selection, evaluation, and training techniques.
I.

10,042
Hawkes, R. HUMAN FACTORS APPROACHING MATURITY.
Aviation Week, Feb. 25, 1957, 66(8), 201-202.

10,042
The role of human factors in aircraft design is defined in this article by highlighting the design modifications which result from the combined Office of Naval Research and Douglas Aircraft human factors approach to the design of an integrated flight system capsule. The human factors considered include the following: man's time constants, effects of freefall, high altitude capacities, deceleration tolerance, and so forth. These factors influence the design of such components as seats, pressure suits, oxygen regulators, displays, and so forth. The specific advantages of each aspect of the integrated flight system are discussed in terms of their relation to the human factors involved in the pilot's task.

10,043
Aviation Week. CONTROL IMPROVEMENTS DUE IN 1958.
Aviation Week, Feb. 1957, 66(8), 255-258.

10,043
This article defines the potential improvements and persistent problems in the area of aircraft traffic control. Among the improvements to be introduced shortly or currently undergoing tests are the following: a peripheral VHF-UHF communication station and an air traffic control beacon. Problems as yet unresolved include the development of the following: an adequate technique to display the traffic situation, an efficient point-to-point communication system, an air-ground data link system, and others. The implications of these problems for both controller and pilot are discussed.
I.

10,044
Aviation Week. USAF PILOTS FAVOR CENTERLINE LIGHTING.
Aviation Week, Sept. 1957, 67(10), 117-119.

10,044
This article presents the results of Air Force and Navy evaluations of a centerline approach lighting system utilizing flush-mounted threshold lights. The tests were conducted at Marsh Air Force Base and utilized United States Air Force lighting equipment with the exception of Sylvania Stroboscopic Condenser Discharge Lights and Elfaka Flush Lighting units. Pilot preferences following 395 approaches are reported along with the particular technical and performance advantages offered by a centerline system. The flush lights are evaluated with regard to their role in aiding depth perception.
I.

10,045
Aviation Week. TWO GROUND EJECTION SEATS TESTED IN
LIVE, DUMMY RUNS. Aviation Week, Sept. 1957, 67(11),
69-89.

10,045
The performance of two ground ejection seats is described in a series of photographs. The British Martin-Baker Mark V ground level ejection seat was tested with a live subject while the North American seat employed an anthropomorphic dummy. The presentation permits a general comparison of the characteristics of each seat though specific technical details are not defined for either of them.
I.

10,047
Aviation Week. BOOMS STABILIZE SUPERSONIC ESCAPE SEAT.
Aviation Week, Aug. 1957, 67(8), 30-31.

10,047
This article presents illustrations and a brief description of the B supersonic ejection seat which utilizes telescoping booms and fins instead of stubby rudders and horizontal stabilizers. The change in design was made in an attempt to eliminate the roll-yaw coupling motion encountered in traditional seats. Some of the performance characteristics of this seat are discussed.
I.

10,050
Sweeney, R. PILOT'S PICTURE TUBE DISPLAY
TEST FLOWN. Aviation Week, Oct. 21, 1957,
67(16), p.34, 37.

10,050
This article briefly describes some of the basic contact flying analog units utilized in the Army-Navy Instrument Program (ANIP) for integrated cockpit development. Included are the following: (1) a flat cathode ray tube designed to present a symbolic display of altitude and speed, (2) a lightweight airborne digital computer designed to record information from sensors and relay computed data concerning altitude and speed, and (3) a display generator designed to translate computer and cathode ray tube information into electronic signals to be read by the pilot.
I.

10,051
Butz, J.S. Jr. NACA STUDIES WAYS TO SOFTEN
JET NOISE. Aviation Week, Nov. 4, 1957, 67(18),
73-77.

10,051
This report describes the research efforts of the National Advisory Committee for Aeronautics directed towards resolving the problem of reducing turbojet noise to piston-engine levels. The relative efficiency of each of the following approaches to noise reduction is discussed: (1) the utilization of mechanical suppressors (e.g., nozzle-ejectors, and so forth); (2) change in turbojet design; and (3) variation of the aircraft flight technique. The effect of potential combination of all three aspects is briefly considered.
G. I.

10,052
Aviation Week. FLAT, TRANSPARENT CATHODE RAY TUBE
TESTED IN ARMY-NAVY COCKPIT DISPLAY. Aviation Week,
Nov. 1957, 67(18), 96-97.

10,052
This article presents a series of illustrations and a brief description of a newly developed flat, transparent cathode ray tube designed to present a simulated picture of contact flight. The tube, currently being tested in the Army-Navy cockpit display, employs a lightweight digital computer and an analog generator.
I.

10,053

Stone, I. LABORATORY SIMULATES 95-MILE ALTITUDE. Aviation Week, Oct. 14, 1957, 67(15), 62-67.

10,053

This article briefly describes a high vacuum laboratory in which it is possible to simulate a 95-mile altitude. A special suit designed to be worn in the chamber is described and its function illustrated. Relative ease of general movement and specific tool manipulation are described along with the system which provides oxygen and removes body heat. The dimensions of the chamber and its potential applications are enumerated.

10,054

Aviation Week. OPTICAL TRACKING DATA SPEEDED BY HUMAN-ENGINEERED THEODOLITE. Aviation Week, July 1957, 66(26), 71-72, 75-76.

10,054

This article describes the specifications and human engineering features of a prototype optical tracking theodolite designed to present near on-time digital read-out and thus obviate data reduction difficulties. The device, designated as the RADOTT (Recording Angular Data Optical Tracking Theodolite), utilizes second order aided tracking, open loop programming, a pencil type control stick rather than steering wheels, and other novel features. The limiting aspects of the theodolite are discussed along with the probable efficiency of this device.

F. I.

10,055

Stone, I. HUMAN FACTORS STRESSED IN ATLAS PLANT. Aviation Week, May 20, 1957, 66(20), 53-57.

10,055

This article describes the consideration given human factors in the design and construction of a ballistic missile facility. The role of such factors as layout of rooms, lighting, floor space, and so forth, is discussed with regard to its effect on the final design of the facility. The potential effectiveness of the resultant design is considered in terms of simplification of production procedures, conversion flexibility, space economy, and so forth.

F. I.

10,056

Christian, G.L. CRASH PROGRAM SEEKS EJECTOR FOR HIGH MACH ESCAPE. Aviation Week, May 1957, 66(18), 94-116.

10,056

This article presents an extensive description of three supersonic aircraft escape systems: (1) the Bobbed or B-seat upward ejection system; (2) the D-seat downward ejection system; and (3) the A-seat upward ejection system. The new design features of the various seats and systems are described and illustrated. Included among these features are the following: a skip flow generator to divert trapezoidal air flow, foot retention devices, seat-frame design to eliminate tip off, etc. Human safety requirements of supersonic ejection are elaborated and applied to each system. Also emphasized are the relative differences between upward and downward ejection systems.

I.

10,057

Christian, G. SUPERSONIC ESCAPE CAPSULE COMPLETED. Aviation Week, May 1957, 66(21), 77-82.

10,057

This article describes a supersonic escape capsule designed specifically for the Convair F-102A but adaptable to other supersonic fighters. The technical specifications are denoted along with certain novel features in capsule ejection and performance. The general factors pertinent to successful escape from high-speed aircraft are also discussed with regard to performance of the capsule. An incident is related concerning the accidental use of the capsule in an underwater ejection. The effects on the pilot are described.

G. I.

10,058

Aviation Week. SAFER, MORE COMFORTABLE SUIT DEVELOPED FOR SUPERSONIC FLIGHT. Aviation Week, Aug. 1957, 67(7), p.32.

10,058

This article describes a new lightweight flying suit designed for supersonic flight and developed by a subcommittee of the Industry Crew Escape Systems Committee. The primary advantages of the suit are briefly outlined and refer to such aspects as buoyancy, burn protection, ease of head movements, visibility, number of individual garments, bulk, etc.

I.

10,060

Sweeney, R. STUDIES PROBE MAN'S FUNCTION IN SPACE. Aviation Week, Dec. 1957, 67(26), 45-47, 49.

10,060

This article outlines the studies being conducted at several installations on the problems of man's existence and function in space flight. The organizations mentioned include North American Aviation, Convair, and Douglas Aircraft. Research sponsored by the Office of Naval Research is included among the various studies mentioned. The general areas of endeavor characterized in this article are the following: display and navigational aids design, human tolerance to environmental stress, programming of research, weightlessness, job assessment, and others.

10,061

Aviation Week. IMPROVING PERFORMANCE, SAFETY OF MAN IS ARDC GROUP'S GOAL. Aviation Week, Dec. 1957, 67(26), p.49.

10,061

This article briefly describes the three primary directions of research being conducted by the Human Factors Directorate of Air Research Development Command. These research goals are characterized as (1) the development of adequate means to protect the human operator in the weapon system and accordingly, the assessment of real and potential hazards; (2) to human engineer the weapon system so as to provide optimum performance efficiency; and (3) to facilitate communication between and coordinate the endeavors of system engineers and human factors groups.

10,062

Sweeney, R. DOUGLAS PROPOSED TV COCKPIT FOR A4D. Aviation Week, Dec. 1957, 67(26), 56-59.

10,062

This article illustrates and describes an operational cockpit developed by Douglas Aircraft for its A4D attack plane. Among the features discussed the following are included: cockpit layout, weather and modes of operation displays, system computers, various indicators, signal lights, and so forth. The design philosophy of the cockpit is discussed along with the particular function of each control-display system.

I.

10,063

Christian, G.L. COMPLEX AIRCRAFT DEMAND SIMULATORS. Aviation Week, Feb. 1957, 66(7), 96-101.

10,063

This article outlines the types of simulators and training programs being utilized by various aircraft companies to meet the knowledge and training demands presented by the complex aircraft systems of today. The efforts of Lockheed, United and American Aircraft companies, as well as Westinghouse, are discussed in terms of the human engineering design aspects of simulators, the necessary knowledge requirements involved in various tasks, the relative effectiveness of simulators, the utilization of training aids, etc.

I.

10,064
Aviation Week. NAVAL RESEARCH EVALUATES MAN'S LIMITS AS AIRCRAFT CONTROL SYSTEM. *Aviation Week*, Jan. 1957, 66(3), p.74.

10,064
This brief article describes the attempts of the Office of Naval Research to define and evaluate the limitations of man as an aircraft control system. These limitations are outlined within two primary conceptions of the human organism; (1) as a receiver and (2) as a computer. Additional discussion occurs with regard to the variation in the human operator and the relation of systems design to man's limitations.

10,065
Murray, J.H. STAIR LIGHTING FOR SAFETY-UTILITY-APPEARANCE. *Illum. Engng.*, Dec. 1957, 52(12), 619-620. (Georgia Power Co., Atlanta, Ga.)

10,065
In this brief article the author notes the incidence of lighting problems in comparatively small areas to be as significant as those occurring with large-scale installations. He illustrates such a problem and its solution in terms of the provision of adequate illumination for entry steps to a residence which meets the goals of safety, utility and good appearance.
I.

10,066
Marsh, C. HIGHWAY VISIBILITY IN FOG. *Illum. Engng.*, Dec. 1957, 52(12), 621-628. (Pennsylvania State University).

10,066
This is a progress report of the research being conducted at Pennsylvania State University on the problem of increasing highway visibility under conditions of fog. The degree of visibility afforded by various types of vehicle lamps under both night and day fog conditions is presented and discussed along with a series of recommendations for optimal fixed highway lighting. The work on fog detection and traffic control is outlined and the types of research equipment employed are described. Included is a brief discussion of the article by two engineers.
T. I. R 4

10,067
Projector, T.H. EFFECTIVE INTENSITY OF FLASHING LIGHTS. *Illum. Engng.*, Dec. 1957, 52(12), 630-640. (National Bureau of Standards, Washington, D.C.)

10,067
This article reviews the attempts to assess the effective intensity of flashing lights with specific emphasis on the work of Blondel and Rey and the Blondel-Rey equation. The latter is discussed in terms of its applicability to a variety of conditions under which it is desirable to assess effective intensity. Two aspects receive particular attention: (1) the validity of the equation with extremely short flashes, and (2) the effect of above threshold illuminance on the equation. Conclusions are drawn concerning the general validity of the equation.
F. G. R 16

10,068
Douglas, C.A. COMPUTATION OF THE EFFECTIVE INTENSITY OF FLASHING LIGHTS. *Illum. Engng.*, Dec. 1957, 52(12), 641-646. (National Bureau of Standards, Washington, D.C.)

10,068
The author presents a method for the computation of the effective intensity of flashing lights. The fundamental theorems of the effective intensity formula are presented along with guides for the computation of effective intensity, conformance of a flashing light (to specifications), and visual range. Also discussed are the formula's application to complex intensity-time curves, and to groups of short flashes. Numerical examples of such applications are presented.
F. G. R 5

10,069
Presbrey, Priscilla (Chm.). ILLUMINATING ENGINEERING NOMENCLATURE AND PHOTOMETRIC STANDARDS. *Illum. Engng.*, Nov. 1957, 52(11), 600-608. (Nomenclature Committee, Illuminating Engineering Society, New York, N.Y.).

10,069
This article presents a series of revisions of segments of the ASA Z7.1-1942 "Illuminating Engineering Nomenclature and Photometric Standards". The specific sections included here are the following: Photometric Quantities, Radiation, Color, Characteristics of Surfaces and Media for Controlling Light, and Aeronautic Lighting. Standards and terminology are defined for various measurement and descriptive criteria under each major section.
T.

10,070
Peck, S.C. FLUORESCENT STRIP RUNWAY LIGHTING. *Illum. Engng.*, Oct. 1957, 52(10), 512-516. (Sylvania Products Inc., Salem, Mass.)

10,070
This article reviews the use of the linear light source system as applied to airport runway lighting. Various types of lighting systems are evaluated with regard to the type and accuracy of visual information afforded the pilot. The potential application of gray-scale lights is discussed along with the results of field tests conducted at Andrews Field, Maryland, in an effort to solve the "black hole" problem through application of new lighting systems.
G. I. R 3

10,071
Ketch, J.M., & Fisher, W.S. EXPERIENCE WITH HIGH LEVEL OFFICE LIGHTING. *Illum. Engng.*, Oct. 1957, 52(10), 529-534. (General Electric Co., Nela Park, Cleveland, Ohio).

10,071
In order to assess a variety of factors operant in high level office lighting, the authors and an associate worked full time for approximately one year in two types of high level installations. Each of the systems is described in detail with specific emphasis upon the advantages and limitations experienced in each. Among the many factors discussed the following are included: radiant heat, types of work materials, reflected glare, color, etc. Appropriate recommendations are offered.
I. R 1

10,072
Tobias, P.E. (Chm.). LIGHTING FOR THE COLOR APPRAISAL OF REFLECTION-TYPE MATERIALS IN GRAPHIC ART. *Illum. Engng.*, Sept. 1957, 52(9), 492-500. (Color Appraisal Task Committee, Illuminating Engineering Society, New York, N.Y.).

10,072
This report offers an extensive outline of recommended requirements for appraising certain color properties of reflective-type materials used in graphic arts. Following an introductory statement on the role of visual response, light source, and color of basic materials in color appraisal, a series of requirements are presented for the appraisal of color quality and color uniformity. The report also presents requirements for color matching of basic materials and an outline of methodological test procedures. The use of fluorescent materials, the effect of the illuminator on a color transparency, the use of contrast to inspect individual colors, and some applications of the Primary Standard Light Source are discussed in an appendix.
T. G. I. R 15

10,073
Semple, W.N. PRECISION SEEING TASKS AND HOW TO LIGHT THEM. *Illum. Engng.*, Aug. 1957, 52(8), 410-411.

10,073
In this brief article the author emphasizes the importance of providing and maintaining adequate illumination for tasks which require precise manipulation of visually minute objects. A specific system of luminaires is described and the various effects of its components upon the marker defined and exemplified. Illustrations are included.
I.

10,075
Hopkinson, R.G. EVALUATION OF GLARE. Illum. Engng., June 1957, LII(6), 305-316. (Dept. of Scientific & Industrial Research, Building Research Station, Watford, England).

10,075
The author reviews a basic formula utilized in the assessment of glare discomfort with specific emphasis upon its limitations. Following an explicit definition of each of the exponents in the glare formula, its relative value is described to be a function of the precision required and such aspects as observed variance, method of experimentation, etc. Also discussed is the additivity of glare with specific relation to the saturation characteristics of the adaptation mechanism. Finally, the primary research needs in the evaluation of glare discomfort are defined.
G. I. R 9

10,076
Hauptschheim, A., & Schwartz, L.S. SEMANTIC CONSTRAINTS IN THE ANALYSIS OF COMMUNICATION SYSTEMS. Proc. of I.R.E., Sept. 1957, 45(9), 1284-1285. (New York University).

10,076
A problem highlighted in the Shannon theory of communications, namely, the implication that the speaker of a language possesses an unusually extensive knowledge of the statistics of that language, received preliminary investigation. Phrasing the problem as the ability of the speaker to fill in missing or incorrect letters in proofreading, subjects were required to reconstruct variously coded, corrupted messages. Two systems of transmission were constructed to reflect natural and artificial restraints in one group and natural restraints alone in the other. Systems of coding and transmission are evaluated and conclusions drawn covering the effect of speaker's knowledge of the language upon reduction of uncertainty implicit in a message utilizing that language.
T. R 4

10,078
Kilgariff, T.G. ESCAPE FROM HIGH-PERFORMANCE AIRCRAFT. Aeronaut. Engng. Rev., July 1957, 16(7), 59-64. (Douglas Aircraft Co., Santa Monica, Calif.).

10,078
The author examines the historical trends in aircraft performance and compares these with the trends in successful escape from aircraft. Contemporary limitations on successful escape imposed by high speed, high altitude aircraft are examined and ten criteria elaborated in the definition of the successful escape sequence. An escape factor is defined as a function of the relation between area of escape envelope and area of level flight envelope. This relation is compared graphically. Conclusions are drawn concerning escape system and flight equipment design and evaluation, the role of basic research on the aerodynamic coefficients of the human body in escape-system research, and the types of investigation necessary to contribute further knowledge about the topics discussed in this article. T. G. R 19

10,079
Price, E., & Westerwick, R. ANALYSIS OF AN ELECTRICAL FLIGHT-CONTROL SYSTEM FOR INTERCEPTOR-TYPE AIRCRAFT. Aeronaut. Engng. Rev., Aug. 1957, 16(8), 63-67, 77. (Convair, San Diego, Calif.).

10,079
The authors describe the efforts on behalf of Convair to develop an electrical primary control system for advanced aircraft. The program of research is discussed under four major developmental endeavors: (1) system dynamic analysis, i.e., the selection of the most adequate type of system, e.g., closed-loop, electrical equivalent of typical mechanical system, etc., (2) evaluation of systems, i.e., the techniques of assessing the selected system, (3) stick configurations, i.e., selection of the most adequate type of stick for electrical control system, and (4) reliability summary, i.e., assessment of the reliability of the electrical as compared to the mechanical control system.
F. I.

10,080
American Aviation. NEW AIRLINER SEATS FEATURE IMPROVED COMFORT, STYLE. Amer. Aviat., Sept. 1957, 21(9), p.56.

10,080
Illustrations and a brief description are presented of several new aircraft seat designs. Materials, fabrics, and other seat specifications are enumerated and discussed in terms of their contribution to comfort and attractive styling.
I.

10,081
Stellar, H.P. HUMAN FACTORS: KEY TO EQUIPMENT RELIABILITY. Amer. Aviat., Aug. 1957, 21(7), 43-44.

10,081
This article presents a summary of a report by Aeronautical Radio Inc.'s Reliability Research Department on the major factors involved in producing unreliability in military electronic equipment. The "human environment" is specified as one major factor and its specific manifestations are elaborated. These include disregard for user satisfaction in equipment design, inappropriate and/or inadequate field tests of equipment, insufficient consideration of many human engineering aspects of equipment design and maintenance, inadequate assessment of the role of human handling of equipment in the breakdown of such equipment, etc. Specific examples of such oversights and their effects are cited.
T. G.

10,083
Safety Maintenance & Production. SUN GLARE CUTS NIGHT VISION. Safety Maint. Prod., July 1957, 114(1), p.57.

10,083
This article presents a brief description of the effects of prolonged exposure to the glare of the sun upon night visual efficiency within the context of automotive safety. The negative effects of glare are exemplified by reference to the differences in effective object recognition (and consequent available stopping distance) between exposed versus unexposed drivers.
I.

10,084
Safety Maintenance & Production. MAKE SAFETY DYNAMIC WITH COLOR. Safety Maint. Prod., Aug. 1957, 114(2), 24-27.

10,084
The role of color in industrial safety is discussed in terms of both its symbolic and perceptual value. The specific effects of color are enumerated and include the following: reduction of absenteeism, as an aid in critical object identification, to provide relief of eye-strain, as an aid to lighting system design, as a means of directing floor traffic, etc. The symbolic value of color is treated in terms of its emotional impact upon the worker and as a learning aid in the differentiation of degree of danger involved in a particular task, machine, work area, etc.
I.

10,085
van Osten, R. AEROJET-GENERAL UNVEILS 30-LB. PWI SYSTEM. Amer. Aviat., Aug. 12, 1957, 21(6), 63-64, 66-67.

10,035
This article describes a 30 pound proximity warning indicator which utilizes infrared energy and consists of three components: an IR receiver, the power supply, and an electronic processing unit. The methods of IR signal selection are discussed along with the potential application of a system of this sort. The advantages and limitations of the system are enumerated in terms of the requirements it imposes upon the pilot. Examples of the coverage provided by the system are also presented.
I.

10,086
Steier, H.P. LMHEP: PUSHBUTTON CONTROL FOR HELICOPTERS. Amer. Aviat., July 29, 1957, 21(5), 38-39.

10,086
This article presents an illustration and description of an experimental self-contained instrument landing system for helicopters. The three primary components of the system are the Bendix-Decora navigator, the Bendix sonic altimeter, and a Doppler hovering indicator. In addition to these a new motion indicator known as the transitorator is described. The functional value of each of the systems currently undergoing tests is discussed along with the potential value of certain new developments in the area of helicopter control systems. I.

10,087
Billinski, C.R. AN EVALUATIVE SURVEY OF MAINTENANCE TRAINING AT THE FLEET SONAR SCHOOL, SAN DIEGO. PRPASD Rep. No. 64, Jan. 1955, 155pp. USN Personnel Research Field Activity, San Diego, Calif.

10,087
This report presents the results of an investigation of the extent of involvement and utility of the different ratings involved in A/S sonar maintenance. Appropriate rating scales were constructed and presented to pertinent personnel on 45 destroyer type ships. In addition, sonar men engaged in technical maintenance and sonar specialist field engineers were interviewed and completed a card sort in which 295 sonar training topics were rated with regard to their utility, difficulty, importance, and so forth. On the basis of the survey, conclusions are drawn concerning (1) the allocation of ratings in preventive and technical sonar maintenance, (2) the effect of contemporary sonar maintenance training, and (3) the types of changes necessary to increase the efficiency of such training programs. T. R 4

10,088
Roemmich, H. A SURVEY OF SHIPBOARD TRAINING IN SONAR OPERATION AND MAINTENANCE. PRPASD Rep. No. 79, May 1955, 90pp. USN Personnel Research Field Activity, San Diego, Calif.

10,088
In order to obtain descriptive information with regard to sonar maintenance and operation tasks as performed by various sonar rates aboard ship and to determine the status of shipboard sonar training, a survey was conducted among 39 A/S officers and 272 sonar men on 48 destroyer-type ships. Survey forms were constructed and survey teams were organized and appropriately trained. The results of the survey are presented and conclusions are drawn concerning delay in utilization of skills and knowledge imparted by the basic training course, the means of acquisition of additional skills, the relevancy of available training aids and references, techniques to assess training proficiency and progress, and the general efficiency of training aboard ship vs. shoreboard training. T. R 4

10,089
Asher, J.W., Hanley, T.D., & Steer, M.D. A FACTOR ANALYSIS OF TWELVE PHYSICAL MEASURES OF VOICE. Contract N6ori-104, Proj. 20-F-8, Tech. Rep. 104-2-48, Feb. 1957, 11pp. USN Training Device Center, Port Washington, L.I., N.Y.

10,089
In order to assess more accurately the effects of a variety of voice variables upon speech intelligibility, the data on twelve such variables obtained in a previous study were subjected to factor analysis. The four factors which emerged as significant are discussed in terms of their implications for the design of communications training programs. Each of the twelve variables treated is described in the appendix and include the following: median pitch, pitch variability, functional pitch range, downward pitch inflection, etc. T. R 6

10,090
Bowman, D.W., & Lang, A.T. EFFECT OF POLARIZATION ON THE COLOR APPEARANCE OF VARIOUS SURFACES AND SUBSTANCES VIEWED BY INFRA-RED, VISIBLE AND ULTRA VIOLET LIGHT. DA Proj. 5 B 9901004, Rep. 3723, Oct. 1956, 13pp. Applied Physics Lab., Detroit Arsenal, Center Line, Mich.

10,090
This study was designed to assess the effect of polarized light upon the color and surface appearance of vegetation, certain metallic and non-metallic surfaces, and several colors of paint kodachrome transparencies were made of trees, grass, metal doors, painted cinder block walls, red, green, blue, and yellow paper panels and similarly colored wood and enameled steel panels. The pictures were exposed under natural and artificial lighting systems, with and without polarizing filters. Transmittance curves and dominant wave lengths were computed. Conclusions are drawn concerning the degree and nature of the color difference attributable to polarization. T. G. I.

10,091
Moseley, H.G. AEROMEDICAL INVESTIGATION OF AIRCRAFT ACCIDENTS. Aeronaut. Engng. Rev., Aug. 1957, 16(8), 74-75.

10,091
The author discusses the importance and types of aeromedical investigation utilized in determining the cause of aircraft accidents. The problems to be considered in assessing types and cause of injury are elaborated and related to the provision of safety measures. Emphasis is placed on determining the role of human factors as causative agents in accidents. Factors such as the following are isolated: hypoxia, disorientation, discipline delinquencies, inexperience, complications and distractions, temporary illness, and others. Conclusions are drawn concerning the dependence of effective corrective action upon thorough assessment of the human errors in aircraft accidents.

10,092
Illuminating Engineering. LIGHTING TRAFFIC TUNNELS AND UNDERPASSES. Illum. Engng., June 1957, 52(6), 325-335.

10,092
This article presents a series of recommendations formulated by the Subcommittee on Tunnel and Underpass Lighting of the Street and Highway Committee of the Illuminating Engineering Society and offered as an aid to engineers and agencies concerned with the illumination of traffic tunnels and underpasses. The outlined recommendations are presented under the following general headings: basic objectives in tunnel and underpass illumination, atmospheric requirements for lighting equipment, brightness, reflectance, daytime tunnel entrance lighting, etc. The article includes many illustrations of the effects of various lighting systems. T. G. I. R 11

10,093
Gavini, H. NORMES DU SEUIL D'AUDIBILITE BIN-AURAL EN CHAMP LIBRE. (NORMS OF BINAURAL AUDITORY THRESHOLD IN A FREE FIELD). Acustica, 1957, 7(5), 293-298. (Centre National de la Recherche Scientifique, C.R.S.I.M., Marseille, France).

10,093
This is a study of the auditory threshold in a free field for pure tones between 250 and 14,000 cycles per second (cps), made under analogous conditions to those data which served for the setting up of norms by Sivan and White in 1933. The values for the mean threshold at various frequencies are compared with those obtained in the United States. T. G. I. R 9

10,094

Janssen, J.E. A METHOD FOR THE CALCULATION OF THE EFFECT OF INTERMITTENT NOISE ON THE HEARING OF HUMANS. *Acustica*, 1957, 7(5), 305-310. (Technical Physics Dept., T.N.O. and T.E., Delft, Netherlands).

10,095

A method for comparing the intelligibility of speech material is presented. The method uses the concepts of useful speech level, reverberant speech level, random noise level, reverberation time, and articulation index. Results from the measurements, with and without headphones, in an anechoic room, a reverberation chamber, and in churches and theatres are compared with predicted values.

T. I. R 2

10,096

Robinson, D.W. THE SENSITIVE LOUDNESS SCALE. *Acustica*, 1957, 7(4), 217-218. (National Physical Lab., Teddington, England).

10,097

This paper examines the discrepancies between published determinations of the sound intensity/loudness relation. It is suggested that the variations, both between different observers and between the various studies, may be interpreted as random errors in the subjective estimation of sensation ratios. The function relating loudness to loudness level is derived from the data and, for practical purposes, a simple approximation to it is proposed.

T. I. R 2

10,098

Chocaille, R. LA SENSIBILITE AUDITIVE DIFFERENTIELLE D'INTENSITE EN FREQUENCE D'UN SON COS SINEUSIAL DE HAUTE FREQUENCE. (THE DIFFERENTIAL AUDITIVE SENSITIVITY OF INTENSITY IN THE FREQUENCY OF A COSINE SINEUSIAL TONE OF THE HIGH FREQUENCY). *Acustica*, 1957, 7(2), 74-83. (Laboratoire de Neuropsychologie de College de France).

10,099

This is a study of the response curves to a variation of intensity received at one ear while the other is subjected to a steady tone of the same frequency. Examination of the curves, particularly of their slope, and of the differential thresholds, is made to determine whether there is reduction of differential sensitivity.

T. I. R 5

10,097

Robinson, W. MANAGEMENT, LIGHTING AND ENGINEERS. *Engng.*, Nov. 1957, 184(4783), 578-580.

10,097

This is the first of a series of three articles (see 10,097, 10,099) on industrial lighting. In this article the author reviews the general developments in industrial lighting, defines the role of management in industrial lighting practice, and discusses some of the primary problems in the attempt to achieve optimal lighting systems. The contemporary channels of lighting information and education are enumerated and the relation between research and application is assessed in terms of the acceptance of lighting engineering as a profession.

I.

10,098

Robinson, W. MANAGEMENT, LIGHTING AND ENGINEERS. *Engng.*, Nov. 1957, 184(4784), 626-630.

10,096

In this, the second of three articles on industrial lighting (see 10,097, 10,099), the author is concerned with current design and practice. Among the topics discussed are the following: brightness control, new methods of lighting design, lamps and the cost of lighting, lighting fittings, lighting maintenance, lamp replacement, and so forth. Appropriate data and illustrations are presented.

G. I.

10,099

Robinson, W. MANAGEMENT, LIGHTING AND ENGINEERS. *Engng.*, Nov. 1957, 184(4785), 656-661.

10,099

This is the third and concluding article of a series of three articles on industrial lighting (see 10,097, 10,098). In this article the author is concerned with factory layout and productivity. Lighting is related to several aspects of the factory installation, including heating, but primary emphasis is upon its relation to the total integrated structure. The results of tests of the effect of lighting on productivity are presented along with a brief discussion of the broader aspects of lighting design and assessment.

T. I. R

10,100

Murrell, E.P.H. DATA ON HUMAN PERFORMANCE FOR ENGINEERING DESIGNERS. *Engng.*, Aug. 1957, 184(4772), 194-198. (Dept. of Psychology, University of Bristol).

10,100

This is the first in a series of five articles (see 10,100, 10,102, 10,103, 10,104) which present data on human performance collected in a variety of areas and offered for use by engineering designers. This article discusses the general problems in designing equipment for human use and presents specific data in body structure and movement and body measurements as applied to the design of optimal seating. Specifications are offered for seat height, length, width, and shape, backrests, padding and seating under conditions of restricted leg room.

T. I. R 17

10,101

Murrell, E.P.H. DATA ON HUMAN PERFORMANCE FOR ENGINEERING DESIGNERS. *Engng.*, Aug. 1957, 184(4772), 247-249. (Dept. of Psychology, University of Bristol).

10,101

This article, the second of a series presenting data on human performance for engineering designers (see 10,100, 10,102, 10,103, 10,104) is concerned with the design of dials and indicators in visual displays. Data and recommendations are presented concerning: (a) the choice of displays for various uses (e.g., warning, check controlling, setting, etc.); (b) methods of increasing the readability of such displays (including such factors as color, reading distance, numeral design, etc.); and (c) techniques for the optimal utilization of indicators. Auditory and tactual displays are briefly discussed.

T. I. R 6

10,102

Murrell, E.P.H. DATA ON HUMAN PERFORMANCE FOR ENGINEERING DESIGNERS. *Engng.*, Sept. 1957, 184(4774), 302-310. (Dept. of Psychology, University of Bristol).

10,102

The control-display relationship is the general topic of this article, the third in a series of five articles presenting data on human performance for engineering designers (see 10,100, 10,101, 10,103, 10,104). Following a general discussion of the principles of control-display relationships, data and recommendations are offered concerning: (1) the choice of controls (considering such factors as multiple switching slow movement, and so forth), and (2) the design of controls (including each of the following types: cranks, handwheels, knobs, levers, joysticks, pedals, and push buttons).

T. I. R 2

10,103

Marrell, K.P.H. DATA ON HUMAN PERFORMANCE FOR ENGINEERING DESIGNERS. *Engng.*, Sept. 1957, 184(4775), 344-347. (Dept. of Psychology, University of Bristol).

10,103

Industrial heat and noise are the topics discussed in this article, the fourth of a series of five articles presenting data on human performance for use by engineering designers (see 10,100, 10,101, 10,102, 10,104). Methods of measuring industrial heat are presented along with a discussion of its effects on human performance, the use of personal protective devices, and techniques to deflect and/or reduce heat at its source. Noise is discussed in terms of its function of hearing impairment, methods of noise protection, its role in communication, and its effect on efficiency. Some illustrations and pertinent references are included.
F. G. I. R 11

10,104

Marrell, K.P.H. DATA ON HUMAN PERFORMANCE FOR ENGINEERING DESIGNERS. *Engng.*, Oct. 1957, 184(4778), 438-440. (Dept. of Psychology, University of Bristol).

10,104

This is the concluding article of a series of five articles presenting data on human performance for engineering designers (see 10,100, 10,101, 10,102, 10,103). This article is concerned with the effects of lighting and color on visual efficiency and comfort. Data are presented to define three primary factors in efficient visual performance of a task: (1) the amount of light on the task; (2) the time allowed for seeing; and (3) the effect of glare. Recommendations for optimal design are offered throughout the discussion of the various factors which influence visual performance.
G. R 6

10,105

King, A.J. VIBRATION AND NOISE OF MECHANISMS AND MACHINES. *Engng.*, June 7, 1957, 183(4761), 716-719.

10,105

Vibration and noise are defined in terms of units of measurement, subjective response, and methods of measurement. The common causes of noise and vibration are described and various techniques of reduction discussed. Particular emphasis is placed upon machine installation effects, the effect of the foundation block on noise and vibration, avoidance of transmission effects, and the use of a special kind of enclosure, the gearbox. Some general conclusions are drawn concerning the problems of noise and vibration and their solution.
T. R 37

10,106

Birren, F. SAFETY ON THE HIGHWAY: A PROBLEM OF VISION, VISIBILITY AND COLOR. *Amer. J. Ophthalmol.*, 1957, 43(2), 265-270.

10,106

In this brief paper, the author reviews, in a general way, research on highway visibility. In addition, a study demonstrating that drivers react primarily to color and shape of signals rather than to legends and another study ranking various color combinations with respect to legibility are briefly reported.
I. R 3

10,107

Fair, J.R. EYE ARMOR. *Amer. J. Ophthalmol.*, 1957, 43(2), 258-264. (Medical College of Georgia).

10,107

This article describes a spectacle type goggle with tempered glass lenses and side shields recommended as a device to protect combat soldiers from ocular injuries arising from the use of the fragmentation type of explosive weapon.
I.

10,108

Kornmweig, A.L., Feldstein, K., & Schneider, J. THE EYE IN OLD AGE: IV. OCULAR SURVEY OF OVER ONE THOUSAND AGED PERSONS WITH SPECIAL REFERENCE TO NORMAL AND DISTURBED VISUAL FUNCTION. *Amer. J. Ophthalmol.*, 1957, 44(1), Series 3, 29-37. (The House for Aged and Infirm Hebrews of New York, New York City, N.Y.)

10,108

In ocular survey of 1,068 persons between 65 and 90 years of age was made to obtain statistics on visual acuity, contrast formation, glare, and scleral rigidity for this age range. The results are presented in terms of percentage variation in the various factors in successive age decades.
T. R 37

10,109

Sorens, C., Girard, L.J., Ponda, G., & Sells, S.R. EFFECTS OF TACHISTOSCOPIC TRAINING ON VISUAL FUNCTIONS IN MYOPIC PATIENTS. *Amer. J. Ophthalmol.*, 1957, 44(4), Part II, 25-49. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,109

To test the effects of tachistoscopic training on visual functions in myopic patients, two groups of myopic subjects were used. Eighty highly motivated subjects constituted the experimental group, while the control group was composed of 60 poorly motivated individuals. The experimental group received three training sessions per week for 10 weeks. At the completion of the course, both groups received ophthalmological examinations identical to those given before training. The effects of training were determined in terms of the differences between initial and final measurements for the two groups.
I. R 47

10,110

Sells, S.B., & Fixott, R.S. EVALUATION OF RESEARCH ON EFFECTS OF VISUAL TRAINING ON VISUAL FUNCTIONS. *Amer. J. Ophthalmol.*, 1957, 44(2), 230-236. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,110

This report presents an evaluation of research on visual training with reference to a number of visual functions. One phase of visual performance, the perceptual phase, is selected for particular emphasis. The nature of perception, the reciprocal relation between perception and learning, and the conditions of learning conducive to learning, retention, and transfer are all discussed briefly.
R 67

10,111

Carbajal, U.K. PLOTTING THE BLINDSPOT. *Amer. J. Ophthalmol.*, 1957, 44(3), 379-384.

10,111

The author describes current methods of mapping the blindspot, gives average measurements, and enumerates the factors affecting the size of the blindspot for the benefit of the clinician concerned with the diagnosis of certain visual anomalies.
I. R 23

10,112

Taylor, E.A. THE SPANS: PERCEPTION, APPREHENSION, AND RECOGNITION, AS RELATED TO READING AND SPEED READING. *Amer. J. Ophthalmol.*, 1957, 44(4), Part I, 501-507.

10,112

Some of the history of research on eye movements is reviewed, but the major emphasis in this article is on defining concepts which the author considers to be important considerations in reading instruction: span of perception (the visual field as measured by perimetry), span of apprehension (the amount of material seen during a tachistoscopic exposure), and span of recognition (amount of print perceived and organized during a single eye stop).
R 27

10,113

Danielson, R.W. THE RELATIONSHIP OF FIELDS OF VISION TO SAFETY IN DRIVING. *Amer. J. Ophthalm.*, 1957, 44(5), Part I, 657-680. (University of Colorado).

10,113

This paper discusses the various facets of the problem of the relationship of fields of vision to safety in driving. Factors affecting fields of vision, such as diseases of the media, fundi, visual tracts and blindspot, loss of an eye, effect of drugs, errors of refraction, and fatigue are discussed in some detail. From a study of the literature and cases, certain conclusions are suggested as to the importance of defects in fields of vision as a cause of accidents. T. G. I. R 52

10,114

Kobrak, H.G. OBJECTIVE AUDIOMETRY: UTILIZATION OF AN UNCONDITIONED MUSCLE REFLEX FOR THE DETERMINATION OF SOUND PERCEPTION. *Arch. Otolaryng.*, 1957, 65(1), 26-31. (Wayne State University).

10,114

For this paper, the contractions of the two intratympanic muscles are analyzed as to their usefulness as objective indicators of cochlear function. Animal experiments demonstrating the quantitative relation between sound stimuli and muscular response are quoted. A limited number of observations made on patients through a perforation of the eardrum are also given. Representative values which were found under acoustic stimulation are given and the results evaluated. G. I. R 5

10,115

Epstein, A., & Schubert, E.D. REVERSIBLE AUDITORY FATIGUE RESULTING FROM EXPOSURE TO A PURE TONE. PART I. *Arch. Otolaryng.*, 1957, 65(2), 174-182. (University of Pittsburgh).

10,115

This paper is a report of an attempt to determine the critical fatiguing intensity for a 4000 cycles per second pure tone of three-minute duration as measured by post-stimulatory auditory fatigue. The measures used are (1) amount of threshold shift, (2) length of recovery time, (3) intensity of exposure tone at the half-octave shift of the frequency of maximal fatigue, and (4) the amount of recruitment present after stimulation. Results are presented for twenty-three adult subjects. G. I. R 20.

10,116

Spuehler, H.E., & Hanley, T.D. AN AUDITORY LOUDNESS RECRUITMENT TEST BATTERY: ANALYSIS AND COMPARISON OF SUBTESTS. *Arch. Otolaryng.*, 1957, 65(2), 183-190. (Purdue University).

10,116

The purpose of the investigation was to establish, by rigorous statistical analysis, the capability of a series of tests to distinguish between normal hearing and that characterized by recruitment in the loudness function. The results for five normal subjects and four with known auditory loss are given for the following tests: (1) range of comfortable loudness (RCL) test, (2) difference limen (DL) test, and (3) speech sound discrimination (SSD) test. T. G. R 11

10,117

Winchester, R.A., & Gibbons, E.W. RELATIVE EFFECTIVENESS OF THREE MODES OF DELAYED SIDETONE PRESENTATION. *Arch. Otolaryng.*, 1957, 65, 275-279.

10,117

Adults (160) with normal hearing were tested under three different methods of delayed sidetone presentation and one condition of unimpeded reading in an effort to investigate the relative effectiveness of these different modes of presentation in relation to speech distortion. Results are presented for: 1) binaural presentation, 2) uniaural presentation without contralateral masking, and 3) uniaural presentation with contralateral masking. T. R 6

10,118

Shimizu, H., Sugano, T., Segawa, Y., & Nakamura, P. A STUDY IN PSYCHOGALVANIC SKIN RESISTANCE AUDIOMETRY. *Arch. Otolaryng.*, 1957, 65, 499-508. (Kyoto Prefectural Medical University, Japan).

10,118

This paper explores the usefulness of psychogalvanic skin resistance (PSCR) audiometry for confirming deaf-mutism and for judging the level of residual hearing throughout the frequency range. Various measuring methods and confidence limits were studied and results are given for a number of child patients. G. I. R 10

10,119

Palva, T. SELF-RECORDING THRESHOLD AUDIOMETRY AND RECRUITMENT. *Arch. Otolaryng.*, 1957, 65, 591-602. (University of Turku, Finland).

10,119

This paper gives a short review of papers dealing with self-recording audiometry and reports results of such testing on 17 normal subjects and 56 perceptively deaf persons for 101 frequencies. The experimental procedure is described in some detail, along with an analysis of threshold variability as a function of time, and the differential results for normal and deaf subjects. T. G. R 15

10,120

Mahoney, J.L., Harlan, W.L., & Bickford, R.G. VISUAL AND OTHER FACTORS INFLUENCING CALORIC NYSTAGMUS IN NORMAL SUBJECTS. *Arch. Otolaryng.*, 1957, 66(1), 46-53. (The Mayo Foundation, Rochester, Minn.).

10,120

This paper reports observations made to determine the effect of fixation, eye closure, and alerting activity on caloric nystagmus. The caloric responses of eighteen normal subjects were recorded electrographically. The average amplitude, frequency, and duration of response under the various conditions is analyzed and discussed in relation to certain cerebral concomitants. G. I. R 12

10,121

Gibbons, E.W., & Winchester, R.A. A DELAYED SIDETONE TEST FOR DETECTING UNIAURAL FUNCTIONAL DEAFNESS. *Arch. Otolaryng.*, 1957, 66(1), 76-78.

10,121

Seventy cases of uniaural organic deafness were studied in order to validate a new delayed sidetone test designed to detect uniaural functional deafness. A tape recorder provided the delayed sidetone. Testing involved obtaining two oral reading times for each subject, one obtained during the provision of masking noise to the better ear and one when the poorer ear receives masking noise. The time differences between the two test conditions were examined to establish a minimal standard below which a functional involvement must be suspected. T. R 13

10,122

Pell, S. THE RELATION OF OCCUPATIONAL NOISE EXPOSURE TO LOSS OF HEARING ACUITY. *Arch. Otolaryng.*, 1957, 66(1), 79-92. (University of Pittsburgh).

10,122

The audiograms of 1049 male employees of a manufacturing plant were utilized to study the relation of occupational noise exposure to five-year audiometric changes, taking into account the variables of age and hearing acuity at the onset of the five-year study period. Each employee was placed in one of three over-all noise level categories. Statistical analysis of the difference between auditory acuity of the worst ear at the beginning and end of the study is used as the basis for certain conclusions. T. G. R 18

10,123
Palva, T. RECRUITMENT TESTING. Arch. Otolaryng., 1957, 66(1), 93-98. (University of Turku, Finland).

10,123
This paper reviews and evaluates various indirect recruitment tests, e.g., tests for intensity and frequency difference lines, masking, auditory fatigue and adaptation, self-recording threshold audiometry, and speech intelligibility. These tests are compared for reliability with direct tests and certain conclusions are reached.
G. R 33

10,124
Lewy, A., Shapiro, S.L., & Leahin, N. FUNCTIONAL EXAMINATION OF HEARING. Arch. Otolaryng., 1957, 66(1), 101-116.

10,124
This article provides brief summaries of 53 references pertinent to the functional examination of hearing. Included among these references are aspects such as the following: determination of accuracy of audiometric findings, factors in hearing aid recommendations, the effects of abnormal states upon auditory threshold, psychogalvanic skin resistances (PGSR) audiometry, and so forth.
R 53

10,125
Schechter, D.C. AEROTITIS MEDIA. Arch. Otolaryng., 1957, 66(2), 117-126.

10,125
This paper provides an overview on the topic of aerotitis media. Included are discussions of etiology of the condition, symptoms, diagnosis, pathology, complications, prognosis, and treatment.
R 61

10,126
Jerger, J.F. AUDIOLOGY. Arch. Otolaryng., 1957, 66(2), 192-213.

10,126
This paper presents brief summaries of articles in the field of audiology for 1955. The first section discusses primarily anatomically and physiologically oriented studies of the hearing mechanism, while a second section considers psychoacoustic studies. The third section deals with the literature on various aspects of hearing impairment and the fourth reviews new books and journals.
R 179

10,127
Harbert, F. MASKING LEVELS FOR CLINICAL USE. Arch. Otolaryng., 1957, 66(2), 214-222. (U.S. Naval Hospital, Philadelphia, Penn.).

10,127
To determine the effectiveness of 80 decibels of white noise concerning normal threshold as a mask for eliminating hearing in the contralateral ear during bone-conduction testing, eleven subjects with normal hearing were tested with both ears open, with receiver occlusion of the opposite ear, and with 80 decibels of noise. Effectiveness was also tested for seventeen cases with unilateral deafness and the results evaluated.
G.

10,128
Glorig, A., & House, H.P. A NEW CONCEPT IN AUDITORY SCREENING. Arch. Otolaryng., 1957, 66(2), 228-232. (University of Southern California).

10,128
This paper reviews briefly the available methods of rapid auditory testing and progresses to the consideration of a pure-tone auditory screening test employing a single frequency (1000 cycles per second). More than 2000 audiograms were selected to check the validity of screening with this one frequency alone.
T.

10,129
Eisenberg, Rita B. STUDY OF THE REPEATABILITY OF ONE DECIBEL STEP PULSED-TONE THRESHOLDS IN NORMAL HEARING PERSONS. Arch. Otolaryng., 1957, 66(3), 278-280. (San Francisco Hearing and Speech Center, Calif.).

10,129
This paper gives the results of repeated threshold measurements for a 250 millisecond pulsed tone repeated once per second on 15 subjects with normal hearing. The results are analyzed to determine the repeatability of such thresholds measured in one decibel steps.
I. R 9

10,130
Bergman, M. BINAURAL HEARING. Arch. Otolaryng., 1957, 66(5), 572-576. (Hunter College).

10,130
This paper reviews the advantages of binaural hearing with respect to localization, selectivity, speech discrimination, identification of common sounds, and ease of listening and suggests a new battery of tests to quantify these advantages.
G. R 9

10,131
Corso, J.F., & Wilson, J.F. ADDITIONAL VARIABLES ON THE BEKESY-TYPE AUDIOMETER. Arch. Otolaryng., 1957, 66(6), 719-728. (Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio).

10,131
This study was conducted to determine the effects of four operating conditions on a Bekesy-type audiometer on the absolute threshold of hearing: (1) attenuation rate, (2) testing time, (3) direction of frequency sweep, and (4) type of stimulus noise. Right ears of ten subjects were tested by an analysis of variance design. The results are analyzed so that ideal operating conditions with this type of audiometer can be stated.
T. G. R 10

10,132
Simonson, E. CHANGES OF PHYSICAL FITNESS AND CARDIOVASCULAR FUNCTIONS WITH AGE. Geriatrics, 1957, 12(1), 28-39. (Physiological Hygiene Lab., University of Minnesota).

10,132
As part of a symposium on physiological aspects of aging, the author reviews the evidence for performance drop, in people over forty, in muscle strength, endurance and oxygen intake, and discusses the possibility of counteracting aging processes through training. Finally, the relation between heart disease and aging processes is discussed in some detail.
T. G. R 61

10,133
Shock, N.W. AGE CHANGES IN SOME PHYSIOLOGIC PROCESSES. Geriatrics, 1957, 12(1), 40-48. (Baltimore City Hospital, Baltimore, Md.).

10,133
As part of a symposium on physiological aspects of aging, clinical evidence is presented on such topics as (1) physiological functions which are affected by age as opposed to those which are not, (2) individual differences in the effects of age, and (3) age and diminishing protoplasm.
G. R 20

10,134
Masserman, J.H. THE PSYCHODYNAMICS OF AGING. Geriatrics, 1957, 12(2), 115-122. (Northwestern University).

10,134
This paper constitutes a part of a symposium on the psychiatric aspects of aging. The author discusses the concept of senility, the problems inherent in adapting to advanced age, and the place of psychotherapy and institutional care in this sphere.

10,135
Craig, F.M., & Cain, S.M. BREATH HOLDING AFTER EXERCISE. *J. appl. Physiol.*, 1957, 10(1), 19-25. (Chemical Warfare Labs., Army Chemical Center, Md.).

10,135
Twelve enlisted men served as subjects in this experiment to determine the influence of certain factors on the length of time the breath can be held. Breath holding time was measured after exercise of the five following types: standing, walking at 3 miles per hour (mph) on the level and 3.5 mph up a 6 per cent grade (for 1.5 minutes), and running at 6 mph (for 2 minutes) and 9 mph (for 1.5 minutes) on the level. The stimulus was evaluated in terms of a rate of accumulation of a chemical stimulating condition proportional to the previous respiratory minute volume, multiplied by the length of the hold and divided by the estimated volume of the lungs during the hold.
T. G. R 17

10,136
Goff, L.G., Brubach, H.P., & Specht, H. MEASUREMENTS OF RESPIRATORY RESPONSES AND WORK EFFICIENCY OF UNDERWATER SWIMMERS UTILIZING IMPROVED INSTRUMENTATION. *J. appl. Physiol.*, 1957, 10(2), 197-202. (National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Bethesda, Md.).

10,136
This paper describes improved instrumentation for making work efficiency and respiratory measurements on underwater swimmers. Data are presented to show the effect of swimming style and swimming aids on drag resistance and metabolic factors for several subjects.
G. I. R 8

10,137
Proesse, G., & Burton, A.C. HEAT LOSSES FROM THE HUMAN HEAD. *J. appl. Physiol.*, 1957, 10(2), 235-241. (Biophysics Lab., University of Western Ontario).

10,137
This paper describes a set of experiments in which nonevaporative heat loss of the head was measured under different conditions. A simple gradient calorimeter was used on three subjects with heads unprotected, but (1) body adequately clothed, at temperatures between 32°C and 21°C, and (2) unclothed, at 10°C, (3) clothed, at 20°C, and (4) clothed and heated by pad at 29°C. The results are interpreted and the importance of head insulation in cold is pointed out.
T. G. I. R 5

10,138
Hertzman, A.B. INDIVIDUAL DIFFERENCES IN REGIONAL SWEATING. *J. appl. Physiol.*, 1957, 10(2), 242-248. (Physiology Dept., St. Louis University School of Medicine).

10,138
For this experiment on individual differences in regional sweating, five subjects adapted to chamber temperatures varying from 30° to 40°C, after which total sweating rates, rates for twenty different loci on chest, abdomen, thigh, calf, and dorsum of the foot were measured. The topographical distribution of the sweating response was plotted for each subject, with differences and similarities in the patterns being discussed in detail.
G. I. R 7

10,139
LeBlanc, J.A. USE OF HEART RATE AS AN INDEX OF WORK OUTPUT. *J. appl. Physiol.*, 1957, 10(2), 275-280. (Defence Research Northern Lab., Fort Churchill, Manitoba, Canada).

10,139
This paper evaluates the use of recovery pulse rate as a substitute for oxygen consumption measurement for problems in the area of nutrition and clothing where energy expenditure must be assessed. Young men walked or ran various distances under different climatic conditions, sometimes pulling or carrying loads, so that the correlation between heart rate and oxygen consumption might be determined.

10,140
Specht, H., Goff, L.G., Brubach, H.P., & Bartlett, R.G. Jr. WORK EFFICIENCY AND RESPIRATORY RESPONSE OF TRAINED UNDERWATER SWIMMERS USING A MODIFIED SELF-CONTAINED UNDERWATER BREATHING APPARATUS. *J. appl. Physiol.*, 1957, 10(3), 376-382. (National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Bethesda, Md.).

10,140
To study the work efficiency of trained underwater swimmers, oxygen consumption, respiratory rate, tidal volume and minute volume were measured during open water swimming. The results are given as a function of swimming speed and kick rate.
G. R 3

10,141
Brozek, J., Grande, P., Taylor, H.L., Anderson, J.T., et al. CHANGES IN BODY WEIGHT AND BODY DIMENSIONS IN MEN PERFORMING WORK ON A LOW CALORIC CARBOHYDRATE DIET. *J. appl. Physiol.*, 1957, 10(3), 412-420. (Physiological Hygiene Lab., University of Minnesota).

10,141
This is a study of the effect of maintenance on low caloric carbohydrate diet on body dimensions and weight. Twenty-five soldiers served as subjects, half as controls on a diet of C rations, half on 580 calories per day for 12 days or 1010 calories for 24 days. Physical work (treadmill and outside walking) was the same for all conditions. Weight, basal metabolism, oxygen consumption, and body measurements were traced throughout the period of the experiment and constitute the data of the study.
T. G. R 20

10,142
Taylor, H.L., Buskirk, E.R., Brozek, J., et al. PERFORMANCE CAPACITY AND EFFECTS OF CALORIC RESTRICTION WITH HARD PHYSICAL WORK ON YOUNG MEN. *J. appl. Physiol.*, 1957, 10(3), 421-429. (Physiological Hygiene Lab., University of Minnesota).

10,142
The effects of caloric restriction while maintaining a rigorous schedule of physical activity (running and walking) were measured by pulse rate, oxygen consumption, and blood sugar determinations. The conditions specifically investigated were: (1) 3100 calories per day (Cal/day) for the entire experiment (control group of 6 men) (2) 580 Cal/day for 12 days (6 men), and (3) 1010 Cal/day for 24 days (13 men). Performance and symptoms are discussed in detail.
T. G. R 18

10,143
Rasch, P.J., & Morehouse, L.E. EFFECT OF STATIC AND DYNAMIC EXERCISES ON MUSCULAR STRENGTH AND HYPERTROPHY. *J. appl. Physiol.*, July 1957, 11(1), 29-34. (Los Angeles County Osteopathic Hospital, Los Angeles, Calif.).

10,143
To assess the differential effects of isometric and isometric exercises on muscular strength and hypertrophy, two groups of subjects (approximately 25 in each) matched for height and weight performed either isometric or isometric exercises for a period of six weeks. Anthropometric and strength measures were made prior to, during, and following the exercise period. The results are presented and discussed in terms of the differential changes demonstrated in strength and hypertrophy on tests of elbow flexion, arm elevator, unpracticed elbow, and the modified Martin test. The physiological and psychological desirability of the particular type of exercise is discussed.
T. I. R 8

10,144

Lind, A.R., & Mellon, R.F. ASSESSMENT OF PHYSIOLOGICAL SEVERITY OF HOT CLIMATES. *J. appl. Physiol.*, July 1957, *II*(1), 35-40. (Medical Research Council Unit for Research on Climate and Working Efficiency, Oxford, England).

10,144

This study was designed to assess the differential accuracy of the Effective Temperature scale and the MSR scale in assessing the physiological severity of hot climates. Ten healthy subjects, ranging in age from 20 to 28 years, were exposed, following a period of appropriate acclimatization, to eight different climates with temperatures chosen to correspond to an increasing order of severity on the Effective Temperature scale. Measures of rectal and skin temperature, pulse rate, weight loss, and blood flow were taken prior to and during exposure to the climates. The results were plotted against the MSR scale. The predicted severity of each scale is evaluated against the experimentally demonstrated severity. Conclusions are drawn concerning the accuracy of each scale. T. G. R 18

10,145

Spurr, G.B., Hutt, B.K., & Horvath, S.M. SHIVERING, OXYGEN CONSUMPTION AND BODY TEMPERATURES IN ACUTE EXPOSURE OF MEN TO TWO DIFFERENT COLD ENVIRONMENTS. *J. appl. Physiol.*, July 1957, *II*(1), 58-64. (State University of Iowa College of Medicine).

10,145

In order to determine the initial metabolic and body temperature changes occurring upon exposure of the human to a 10°C environment (and their relation to shivering) 9 nude male adults were placed in such an environment in a series of 11 experiments. Skin and rectal temperature, oxygen consumption, respiratory minute volume and quotient, carbon dioxide production, metabolic rate, and shivering were recorded during and after exposure. Control observations were made on nude subjects in a 26°C environment. The results are compared statistically with an earlier study employing a -3°C environment in terms of the significant differences in metabolic and body temperature changes and the relative effectiveness of shivering (as a protective measure) under each environment. T. G. R 10

10,146

Bartlett, R.G. Jr., & Specht, H. MAXIMUM BREATHING CAPACITY WITH VARIOUS EXPIRATORY AND INSPIRATORY RESISTANCES (SINGLE AND COMBINED) AT VARIOUS BREATHING RATES. *J. appl. Physiol.*, July 1957, *II*(1), 79-83. (National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Bethesda, Md.).

10,146

This study was designed to assess the effect of breathing rate on maximum breathing capacity (MBC) and the effect of added inspiratory or expiratory resistances on the MBC. Utilizing a 50-liter Douglas bag, the MBC was determined for three subjects under conditions of varied breathing rates and varied expiratory and inspiratory resistances. The results are presented and discussed in terms of the differential effects of each of the variables upon MBC. A discussion of the results centers upon their implications for previous conceptions of MBC and the testing equipment necessary to assess the MBC for normal subjects. T. G. R 3

10,147

Cain, S.M. BREAKING POINT OF TWO BREATH HOLDS SEPARATED BY A SINGLE INSPIRATION. *J. appl. Physiol.*, July 1957, *II*(1), 87-90. (Chemical Warfare Labs., Army Chemical Center, Md.).

10,147

To determine the factors affecting the breaking point of breath holding, three male subjects pursued six trials characterized by breathing for five minutes from a recording 13-liter spirometer with a final maximal inspiration; the same procedure but with the subject holding his breath on the maximal inspiration; and the same procedure again but following the maximal inspiration a second maximum breath hold was made. Appropriate measures were applied and the resultant data are analyzed in terms of duration of initial versus secondary breath holding times, the volume of inspiration, and so forth. The potential influences of non-chemical stimuli upon this phenomenon is emphasized. T. G. R 10

10,148

Wyndham, C.H., & Jacobs, G.E. LOSS OF ACCLIMATIZATION AFTER SIX DAYS OF WORK IN COOL CONDITIONS ON THE SURFACE OF A MINE. *J. appl. Physiol.*, Sept. 1957, *II*(2), 197-198. (Applied Physiology Lab., Transvaal and Orange Free State Chamber of Mines, Johannesburg, South Africa).

10,148

To investigate the duration of acclimatization, 73 men having been acclimatized for a period of 12 days to a temperature of 91 degrees Fahrenheit were placed in a cool environment for six days and then returned to the original environment. Mouth temperatures were measured at each stage and plotted. Significant differences in the temperatures are discussed as indicative of the relative lack of stability of acclimatization under the specific conditions employed in this study. G. R 2

10,149

Rennie, D.W. & Adams, T. COMPARATIVE THERMOREGULATORY RESPONSES OF NEGROES AND WHITE PERSONS TO ACUTE COLD STRESS. *J. appl. Physiol.*, Sept. 1957, *II*(2), 201-204. (Arctic Aeromedical Lab., Seattle, Wash.).

10,149

To investigate the hypothesis that Negroes are more susceptible on a physiologic basis to cold injury, eight Negro and eight white combat infantrymen stationed near Fairbanks, Alaska, were given an acute cold test during both the summer and winter seasons. Each subject, lying supine on a cot, was exposed to an air temperature of -120°C for 90 minutes while fully clothed except for hands and fingers. Body temperatures and metabolism were assessed continuously. The results are presented in terms of a statistical analysis of the differences in the general thermal state, mean finger temperatures, cold vasodilation, and metabolism between the two groups. The observed differences in thermoregulatory response are discussed with regard to predisposition to cold injury. G. R 10

10,150

Teichner, W.H. MANUAL DEXTERITY IN THE COLD. *J. appl. Physiol.*, Nov. 1957, *II*(3), 333-338. (USA Quartermaster Research and Engineering Center, Natick, Mass.).

10,150

In this study of the effects of cold on manual dexterity, 560 subjects were placed in a climatic chamber under varied temperatures, wind speed, windchill, and clothing conditions (arctic, nude, and fatigues). The first 25 minutes consisted of acclimatization followed by 15 trials on the Minnesota Rate of Manipulation Test, assessment of visual reaction times, three minutes of mild exercise, and, finally, five additional trials on the manual dexterity test. The data are presented and analyzed in terms of performance time and body temperatures as functions of each of the experimental conditions and their combination. A brief discussion of the findings focuses upon the potential role of psychological factors in influencing a decrement in manual dexterity under conditions of exposure to cold. G. R 9

10,151

Kreider, M.B., & Buskirk, E.R. SUPPLEMENTAL FEEDING AND THERMAL COMFORT DURING SLEEP IN THE COLD. *J. appl. Physiol.*, Nov. 1957, *II*(3), 339-343. (USA Quartermaster Research and Development Center, Natick, Mass.).

10,151

This study was designed to investigate the effect of feeding practice upon thermal comfort during sleep in the cold. Six subjects were presented dietary supplements of 0, 600, or 1200 calories (in addition to usual three meals per day) at ten minutes prior to sleeping in arctic sleeping bags at -34.5 degrees Centigrade. Rectal, toe and mean skin temperatures and measures of oxygen consumption were taken at predetermined intervals throughout the sleeping period. The results are presented and discussed in terms of the differential effects of each group of supplements upon the thermal comfort assessment scores. Wakefulness and certain subjective factors as a function of dietary supplement are also discussed. T. G. R 6

10,152

LeBlanc, J.A., & Rosenberg, P.J. LOCAL AND SYSTEMIC ADAPTATION TO TOPICAL COLD EXPOSURE. *J. appl. Physiol.*, Nov. 1957, II(3), 344-348. (Chemical Warfare Labs., Army Chemical Center, Md.).

10,152

In this study of local and systemic adaptation to topical cold exposure, a total of 12 subjects were utilized in a series of three experiments in which the hand was immersed in a cold water bath (30°C). The conditions experimentally varied included occlusion of circulation to immersed hand, duration of immersion, number of cold immersion tests, and others. Blood pressure and finger-tip temperatures were recorded during and following the immersion at regular intervals. The results are presented and discussed in terms of the relative changes in these measures under the varied experimental conditions as being indicative of the underlying determinants of local and systemic adaptation to cold. T. G. R 14

10,153

Iampietro, P.F., Buskirk, E.R., Bass, D.E., & Welch, B.E. EFFECT OF FOOD, CLIMATE AND EXERCISE ON RECTAL TEMPERATURE DURING THE DAY. *J. appl. Physiol.*, Nov. 1957, II(3), 349-352. (USA Quartermaster Research and Engineering Center, Natick, Mass.).

10,153

A series of experiments are reported on the effect of climate, activity, and food upon the diurnal pattern of rectal temperature during the time period of eight a.m. to eight p.m. Mean climates consisted of -23 degrees Fahrenheit for one group and 72 degrees Fahrenheit for another; the activity variables were bed rest for one group and a nine to ten mile march for the other; and food was varied with exercise to provide four conditions (i.e., food and exercise, no food and exercise, and so forth). The resultant diurnal patterns are discussed in terms of the differential effects of each of the experimental variables at various periods throughout the day. G. R 11

10,154

Rubin, L.S., & Goldberg, M.N. EFFECT OF SARIN ON DARK ADAPTATION IN MAN: THRESHOLD CHANGES. *J. appl. Physiol.*, Nov. 1957, II(3), 439-444. (Directorate of Medical Research, Army Chemical Center, Md.).

10,154

In order to assess the effects of sarin on the course and absolute threshold of dark adaptation, two subjects were exposed to sarin, with a third acting as a control, and then assessed for dark adaptation under appropriate experimental conditions. Erythrocyte (RBC) cholinesterase levels were determined prior to and following exposure to sarin. In addition, extent of miosis was similarly determined. The results are treated in terms of significance of difference in absolute and relative threshold values pre- and post-exposure. The implications for the photochemical theory of brightness vision are discussed. T. G. R 10

10,155

Rubin, L.S., Krop, S., & Goldberg, M.N. EFFECT OF SARIN ON DARK ADAPTATION IN MAN: MECHANISM OF ACTION. *J. appl. Physiol.*, Nov. 1957, II(3), 445-449. (Chemical Warfare Labs., Army Chemical Center, Md.).

10,155

In order to clarify the site of action (i.e., intra versus extracellular) of sarin, three subjects were tested with the Hecht-Shlaer adaptometer for dark adaptation thresholds following exposure to sarin. Method of exposure was varied with each subject in order to assess the drug's effect as being direct, systemic, or extracellular (e.g., an action on central neural factors). The effect of the drug on each of the subjects is analyzed in terms of the changes in pre- and post-exposure thresholds. Conclusions are drawn as to the probable site of its action. T. G. R 7

10,156

Houtz, S.J., Lebow, M.J., & Beyer, P.R. EFFECT OF POSTURE ON STRENGTH OF THE KNEE FLEXOR AND EXTENSOR MUSCLES. *J. appl. Physiol.*, Nov. 1957, II(3), 475-480. (Detroit Orthopaedic Clinic, Detroit, Mich.).

10,156

This study was designed to introduce a specially developed strain gauge and by its application to assess the effects of the prone, seated, and supine postures on two muscles, the knee antagonist and extensor. Eight females, ranging in age from 23 to 50 years and in weight from 102 to 160 pounds, were required to manifest maximum contractions of knee flexion and extension through various angles while assuming each of the three postures. The specially designed muscle dynamometer was employed in a total of 150 experiments. The results are analyzed in terms of the significance of difference between mean strength of the muscles at various angles in the different postures. Discussion concerns itself with the effectiveness of the dynamometer and the effect of posture on knee strength. T. G. I. R 7

10,157

Asher, H. THE FIXATOR. *Brit. J. Ophthalmol.*, 1957, 41(10), 622-625. (Physiology Dept., Medical School, Birmingham, England).

10,157

This paper describes briefly an apparatus which is designed to afford an accurate test of binocular fixation and to allow a comparison of the visual acuities of the two eyes at reading distance. The optical system, as well as the errors of fixation which the test can ascertain, are outlined. I.

10,158

Efron, R. STEREOSCOPIC VISION. I. EFFECT OF BINOCULAR TEMPORAL SUMMATION. *Brit. J. Ophthalmol.*, 1957, 41(12), 709-730. (National Hospital, Queen Square, London, England).

10,158

For this experiment, designed with the hypothesis that binocular fusion results from alternating attention by the brain to the retinal images from the two eyes, alternating flash exposures of each eye to the stimulus (letters at different distances from the eyes) were provided at short and long intervals. Subjective and objective results (interval between exposures, flash duration, and the effect of brightness) are evaluated with respect to the original hypothesis. G. I. R 5

10,159

Leighton, J.R. FLEXIBILITY CHARACTERISTICS OF FOUR SPECIALIZED SKILL GROUPS OF COLLEGE ATHLETES. *Arch. Phys. Med. & Rehab.*, Jan. 1957, 38(1), 24-28. (Eastern Washington College of Education).

10,159

This study of specialized flexibility characteristics that accompany specialized skills or movements investigated the flexibility performance of 100 college baseball players, 100 college basketball players, 50 college swimmers, and 44 college shot putters and discus throwers to find what variations between the groups might be present. The data provided through the use of the Leighton Flexometer, which measures flexibility of a wide variety of joints, are analyzed by determining the t values by which each group exceeded or fell below the performance of a group of 16-year olds. T. R 6

10,160

Leighton, J.R. FLEXIBILITY CHARACTERISTICS OF THREE SPECIALIZED SKILL GROUPS OF CHAMPION ATHLETES. *Arch. Phys. Med. & Rehab.*, 1957, 38, 580-583. (Eastern Washington College of Education).

10,160

For this second study of flexibility characteristics of special skill groups, 5 champion weight-lifters, 11 champion gymnasts, and 2 champion wrestlers were tested on the Leighton Flexometer. The means of each group were compared with the corresponding means for a group of 16-year old boys. Flexibility patterns are suggested for the various groups. T. R 7

10,161
Clarke, H.H. MUSCULAR STRENGTH-ENDURANCE
RELATIONSHIPS. Arch. Phys. Med. & Rehab.,
1957, 38, 594-596. (University of Oregon).

10,161
This brief paper describes eight ways in which mus-
cular strength, defined as the tension a muscle can
apply in a single contraction, and muscular endurance,
defined as the ability of the muscle to continue moving
a load, are related.
R 14

10,162
Hong, Syng-Min. TYPES OF ACQUIRED COLOR-
VISION DEFECTS. Arch. Ophthalmol., Oct. 1957,
58(4), 505-509. (Chonnam University, Kwang-
ju, Korea).

10,162
This paper suggests a method by which certain aspects
of color vision in diseases such as central retinitis,
diabetic and renal retinopathy, be divided into two
categories (retinal and neural) on the basis of the lu-
minosity curves, the Rayleigh equation, and Grassman's
third law.
T. G. R 8

10,163
Nauheim, J.S. A PRELIMINARY INVESTIGATION
OF RETINAL LOCUS AS A FACTOR IN FUSION.
Arch. Ophthalmol., July 1957, 58(1), 122-125.

10,163
This is a study of the ability of macula and paramac-
ula to stimulate divergent fusional movements. The
measurements were made on twelve subjects with normal
vision in a stroposcope. An attempt is made to determine
the fusion value of retinal locus as compared with total
retinal area stimulated.
T. I. R 7

10,164
Parks, M.M. STRABISMUS. Arch. Ophthalmol.
July 1957, 58(1), 136-160.

10,164
This is a review of the literature published in 1956
dealing with strabismus. Basic sensory studies, as well
as those dealing with complications of strabismus,
heterophorias, esotropia, and the various types of
fixation disparity, are covered.
R 191 approximately

10,165
Nebel, B.R. THE PHOSPHENE OF QUICK EYE
MOTION. Arch. Ophthalmol., Aug. 1957, 58(2),
235-243.

10,165
This paper describes certain "polarized" patterns
(flick phosphenes of short duration) which are observed
entoptically by certain older individuals upon movement
of the eye. The relation to a primary deformation near
the posterior face of the vitreous is discussed as are
the implications for diagnosis and prognosis.
I. R 13

10,166
Unger, M. A NEW METHOD OF MEASURING INTER-
PUPILLARY DISTANCE. Arch. Ophthalmol., Aug.
1957, 58(2), 257-258.

10,166
This brief paper describes a device, consisting of
two circular disks with a centrally placed tubule in
each, which can be placed in a frame so that the subject
can manipulate adjustment screws to obtain a satisfac-
tory image of a stimulus chart and thus achieve an ac-
curate measure of his interpupillary distance.
I.

10,167
Pierce, J.R., & Karlin, J.E. READING RATES
AND INFORMATION RATE OF A HUMAN CHANNEL.
Bell Sys. Tech. J., March 1957, 36(2), 497-
516.

10,167
This study attempts to assess the discrepancy between
human channel capacity and telephone and television
channel capacity. To do this subjects read words over
an ordinary telephone channel and the rate at which in-
formation was transmitted was measured, in bits, as a
function of vocabulary size, type of prose, and whether
or not the reader was performing a tracking task while
reading.
T. G. R 9

10,168
Pugh, L.G.C.E. RESTING VENTILATION AND AL-
VEOLAR AIR ON MOUNT EVEREST: WITH REMARKS ON
THE RELATION OF BAROMETRIC PRESSURE TO ALTI-
TITUDE IN MOUNTAINS. J. Physiol., 1957, 135,
590-610. (National Institute for Medical Re-
search, Hampstead, London, England).

10,168
To study physiological changes associated with accli-
matization to altitudes above 15,000 feet, alveolar air
samples were obtained from mountain climbers at altitudes
ranging from 15,000 to 24,000 feet and resting ventila-
tion was followed in a single subject up to 21,000 feet.
Data on the effect of breathing supplementary oxygen on
the alveolar gases in resting subjects are also presented
to check for evidence of loss of acclimatization in per-
sons using oxygen over prolonged periods. The relation
of barometric pressure to altitude is also discussed in
relation to simulation.
T. G. R 24

10,169
Dickson, J.A. THE EFFECT OF LIMB POSITION ON
THE VASODILATOR RESPONSE TO COLD IN THE FINGER.
J. Physiol., 1957, 135, 93-97. (Dept. of
Physiology, Queen's University of Belfast).

10,169
The purpose of this experiment was to determine how
a reduction of perfusion pressure (by elevating the arm
to various heights) affects the vasodilator response to
cold in the finger. The heat elimination from the finger
tips of nine subjects to water in the zero to four degree
Centigrade range was measured calorimetrically at various
limb positions. The results are discussed in relation
to perfusion pressure.
G. R 6

10,170
Shephard, R.J. SOME FACTORS AFFECTING THE
OPEN-CIRCUIT DETERMINATION OF MAXIMUM BREATH-
ING CAPACITY. J. Physiol., 1957, 135, 98-113.
(RAF Institute of Aviation Medicine, Farn-
borough, Hants, England).

10,170
An improved pneumotachograph system having a very low
resistance to gas flow, and capable of recording peak
flows up to 500 litres per minute (l/min) was used to
define factors affecting maximum breathing capacity as
measured by open-circuit techniques. The value of the
test as a measure of breathing potential is rated against
other methods for various respiratory rates.
T. G. R 31

10,171
Coles, D.R. HEAT ELIMINATION FROM THE TOES
DURING EXPOSURE OF THE FOOT TO SUBATMOSPHERIC
PRESSURES. J. Physiol., 1957, 135, 171-181.
(Dept. of Physiology, Queen's University of
Belfast).

10,171
Vascular reactions to transmural pressure were studied
in six subjects by measuring the heat elimination from
the toes of both feet during exposure of one foot to
sub-atmospheric pressures of -50, -100, -150, and -200
millimeters of hydrogen for periods of ten minutes. Cer-
tain conclusions are offered concerning the stabilization
of blood flow under such circumstances.
T. G. I. R 12

10,172
 Glasser, E.M., & Whitlow, G.C. RETENTION IN A WARM ENVIRONMENT OF ADAPTATION TO LOCALIZED COOLING. *J. Physiol.*, 1957, 136, 98-111. (Dept. of Physiology, University of Malaya).

10,172
 The right hands of eight male subjects, living in a constantly warm environment, were immersed in near freezing water repeatedly over a period of days to determine blood pressure, heart rate, and skin temperature adjustments. Both quick and slow adjustments, as well as subjective sensations, are discussed in relation to adaptation processes.
 T. G. R 3^{1/2}

10,173
 Doyle, H.N. EMERGING INDUSTRIAL HEALTH PROBLEMS. *Indust. Med. Surg.*, Jan. 1957, 26(1), 1-5. (U.S. Dept. of Health, Education, and Welfare, Washington, D.C.).

10,173
 The author notes the contemporary and potential developments in industry as these will affect problems of industrial health. Specific emphasis is placed on human engineering and the type of problems it presents to the physician in industry and to health programs. Specific discussion of the following emerging health problems is presented: (1) dangers of radiation; (2) industrial toxicology; (3) the determination of occupational factors in chronic disease; (4) the maintenance of health; and (5) the role of the private physician in industrial health programs.

10,174
 Brandaleone, H., Blaney, L., Irwin, G.H., Kuhn, H.S., Miller, S.E., Penalter, R., Soth, R.E., Sim, R., & Friedman, G.J. RECOMMENDATIONS FOR MEDICAL STANDARDS FOR MOTOR VEHICLE DRIVERS. *Indust. Med. Surg.*, Jan. 1957, 26(1), 25-32.

10,174
 Following a brief discussion of the role of the human factor in motor vehicle accidents, the authors note the positive relation between accident prevention and the comprehensive medical program (and subsequently improved driver selection). Recommendations are offered concerning frequency of examination and type of examination in the form of four charts entitled: (1) "Private or Civilian Drivers Health History", (2) "Commercial or Industrial Drivers Health History", (3) "Physical Examination Motor Vehicle Drivers", and (4) "A Reference List of Conditions Which May be Non-Acceptable for Driving."
 R 9

10,175
 Cook, W.A. (Chm.). SURVEY OF THE OCCUPATIONAL ENVIRONMENT. AN ESSENTIAL OF INDUSTRIAL MEDICAL PRACTICE. *Indust. Med. Surg.*, March 1957, 26(3), 149-155.

10,175
 Noting the importance of the survey of the occupational environment for the industrial physician, the element to be considered in such a survey are elaborated. These include: potential health hazards, (e.g., dusts, gases, and so forth), hazardous conditions (excessive noise, temperature and pressure extremes, and so forth), harmful operations (vibration and repetitious movements), accident hazards, and sanitation. Also discussed are techniques of hazard evaluation and methods of medical and engineering control of health hazards.
 R 13

10,176
 American Academy of Ophthalmology and Otolaryngology, Subcommittee on Noise in Industry. GUIDE FOR CONSERVATION OF HEARING. *Indust. Med. Surg.*, April 1957, 26(4), 185-192.

10,176
 This is a report of the Subcommittee on Noise in Industry of the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. Following a presentation of eight points of information concerning the relation of hearing loss to noise-exposure, six general topics are discussed: (1) the need for a hearing conservation program, (2) the primary aspects of such a program (i.e., analysis and control of noise exposure and measurement of hearing), (3) the medical and industrial responsibility for hearing conservation, (4) the specific aspects of assessment of noise-exposure, (5) techniques to control noise-exposure, and (6) methods of measuring hearing ability.
 T. R 6

10,177
 Industrial Medicine & Surgery. MAXIMUM PERMISSIBLE RADIATION EXPOSURES TO MAN. A PRELIMINARY STATEMENT OF THE NATIONAL COMMITTEE ON RADIATION PROTECTION AND MEASUREMENT. *Indust. Med. Surg.*, May 1957, 26(5), 263-264.

10,177
 This report of the National Committee on Radiation Protection and Measurement presents a revision of recommendations on permissible radiation exposures based on studies subsequent to the publication of recommendations (the NBS Handbook 59 or Permissible Dose from External Sources of Ionizing Radiation). Along with the recommendations, four pertinent terms are given tentative definition: (1) controlled area, (2) workload, (3) occupancy factor, and (4) RBE dose.
 R 1

10,178
 Dismay, C.T. AN APPROACH TO RADIATION HEALTH PROBLEMS IN INDUSTRY. *Indust. Med. Surg.*, July 1957, 26(7), 343-347. (General Motors Technical Center, Detroit, Mich.).

10,178
 Following a definition of the various types of radiation, the author discusses the implications for health and safety of the introduction of radioisotopes into the industrial plant. Along with detection and measurement, the author discusses accident prevention in terms of both physical protection and therapeutic medical techniques. Emphasis is placed on the physician's detailed knowledge of the inherent hazards in radioisotopes, and to aid its acquisition, an extensive bibliography is included.
 R 63

10,179
 Ashe, W.F., Largent, E.J. & Roberts, L.B. STUDY OF HEAT IN INDIAN TEXTILE MILLS. *Indust. Med. Surg.*, Aug. 1957, 26(8), 391-395.

10,179
 The results of a study conducted to assess thermal stress in Indian textile mills are reported. Eight specific sub-studies were conducted: 1) a study of the climate of India; 2) a comparison of thermal stress data on Indians with other human subjects throughout the world; 3) a study of Indian workmen's ingestion of salt and water under thermal stress; 4) a study of the relation between productivity and thermal stress; 5) an appraisal of the Indian thermal comfort zone; 6) assessment of thermal conditions in representative Indian exposure to thermal stress in such mills; and 8) a comparison between this safe upper limit and the actual thermal conditions. Recommendations are offered on the basis of the results of these studies.
 T. G. R 10

10,180
Griggs, W., Summerfield, Anne & Glorig, A. HEARING LOSS IN RELATION TO INDUSTRIAL NOISE EXPOSURE. Indust. Med. Surg., Oct. 1957, 26(10), 451-458. (Research Center, Subcommittee on Noise in Industry, Los Angeles, Calif.).

10,180
This report presents a definition and discussion of a number of major issues in the problem of noise-induced hearing loss. To exemplify these issues a study of the audiometric records of 5,816 aircraft employees was conducted. Analysis of the data demonstrates three primary aspects: 1) evidence of hearing loss attributable to noise exposure; 2) the differential occurrence of hearing loss as a function of type of occupation; and 3) definition of sources of error which occur in making such audiometric comparisons. Conclusions are drawn concerning the validity of such studies and recommendations offered for the optimal collection and utilization of data of this sort.
G. R 3

10,181
Merkle, R.A., & Fox, M.S. SINGLE FREQUENCY SCREENING TECHNIQUE - A TEST OF ITS VALIDITY. Indust. Med. Surg., Nov. 1957, 26(11), 497-498.

10,181
In order to assess the validity of the single frequency screening technique of assessing hearing (i.e. testing at 400 cps) 220 subjects were tested with this technique and then with the discrete frequency air conduction threshold tests to establish thresholds both below and above 4000 cps. A comparison of the results of both techniques was conducted to determine whether magnitude of loss at 4000 cps was larger than loss at lower frequencies. On the basis of the findings conclusions are drawn concerning the validity and reliability of the single frequency screening test.
T. R 6

10,182
Smith, S.W., & Dimmick, F.L. MEASUREMENT OF THE LIGHT ADAPTATION OF THE RODS. J. opt. Soc. Amer., May 1957, 47(5), 391-395. (USN Medical Research Lab., New London, Conn.).

10,182
In order to assess the length of time required to attain stable light adaptation, dark adaptation curves were obtained for three subjects through: an initial period of 30 minutes, 21 minutes, and a test period in which a white stimulus was presented in an adaptometer at an intensity somewhat below threshold. The latter stimulus occurred at three second intervals for 0.20 seconds until it was seen twice in succession. Brightness was then reduced. The results are presented and discussed in terms of the relative differences in scotopic sensitivity under each of the conditions of adaptation. The influences of light history on the course of adaptation are illustrated graphically.
G. R 4

10,183
Burnham, R.W., Clark, Joyce R. & Newhall, S.M. SPACE ERROR IN COLOR MATCHING. J. opt. Soc. Amer., Oct. 1957, 47(10), 959-966. (Eastman Kodak Co., Rochester, N.Y.).

10,183
This study was designed to assess the magnitude of the space-error in the typical color matching task and to evaluate the effect of stimulus position on precision and time of matching. Three observers were required to make a series of matches of 4 test colors in each of 4 positions under conditions designed to ensure the assessment of the potential space-error. CIE tristimulus values and chromaticities were computed and the results are discussed in terms of matching precision and time as a function of position. Having found no evidence for assuming a space-error in color matching, conclusions are drawn concerning the generalizability of this finding and its implications for results which indicate space-error.
T. G. R 9

10,184
Gerstewohl, S.J. CONSPICUITY OF FLASHING LIGHT SIGNALS: EFFECTS OF VARIATION AMONG FREQUENCY, DURATION, AND CONTRAST OF THE SIGNALS. J. opt. Soc. Amer., Jan. 1957, 47(1), 27-29. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,184
This study was designed to assess the interaction between flash frequency, duration, and brightness contrast of flashing light signals and its effect upon the conspicuity of such signals. Three brightness contrasts, one of three frequencies, and one of two flash duration were utilized to compare the conspicuity of a total of 18 different flashing signals. Each of 18 observers seated six feet before a Multiple Complex Reaction Apparatus responded to a series of 120 signals by either operating a handle or pushing a button. The results are presented in terms of mean response time as a function of contrast, frequency, and duration. Relative conspicuity as a function of the variance factors and their interaction is discussed with an attempt to explain the findings of this and previous studies.

10,185
Buchmann-Olsen, B., & Rosenfalck, A.M. SPECTRAL ENERGY CALIBRATION OF A LIGHT FLASH SOURCE USED IN PHYSIOLOGICAL EXPERIMENTS. J. opt. Soc. Amer., Jan. 1957, 47(1), 30-34. (University of Copenhagen).

10,185
The authors describe a technique for utilizing the Sylvania glow modulator tube in the study of color vision. The results of its application in an experiment are presented and include the following information: (1) the relative spectral irradiance from three types of glow modulator tube, (2) the short- and long-term stability of the relative spectral distribution of the glow modulator tube over a 350-700 millimeter range, (3) the individual variation of seven tubes, (4) the variation in concentration of irradiance for two wavelengths (blue and yellow), and (5) the absolute energy of the light flashes from the tube.
G. R 8

10,186
Nowhall, S.M., Burnham, R.W., & Clark, Joyce R. COMPARISON OF SUCCESSIVE WITH SIMULTANEOUS COLOR MATCHING. J. opt. Soc. Amer., Jan. 1957, 47(1), 43-56. (Eastman Kodak Co., Rochester, N.Y.).

10,186
This study was designed to provide a basis for the prediction of color appearance with different adaptation illumination. Twelve comparison colors (a colorimetrically mixed comparison color to right eye and a variable colorimetric mixture to left eye) were presented to four color-normal subjects, under each of three illuminants, to be appearance matched. CIE tristimulus values were obtained for each of the matches (a total of 1260) and CIE chromaticities plotted for pairs of illuminants. Color shift is discussed along with a computational method for the prediction of color appearance and the theoretical implications of the findings.
T. G. R 12

10,187
Sperling, H.G., & Hsia, Y. SOME COMPARISONS AMONG SPECTRAL SENSITIVITY DATA OBTAINED IN DIFFERENT RETINAL LOCATIONS AND WITH TWO SIZES OF FOVEAL STIMULUS. J. opt. Soc. Amer., Aug. 1957, 47(8), 707-713. (Psychology Lab., Columbia University).

10,187
This paper presents relative cone sensitivity measurements made from 420 millimicrons to 700 millimicrons in the spectrum using 42 minute and three minute diameter testlight fields in the fovea and a 42 minute diameter field at ten degrees in the periphery. The data are used for analysis of the problem of certain typical discontinuities in photopic sensitivity curves.
T. G. R 25

10,188
Westheimer, G. ACCOMMODATION MEASUREMENTS IN EMPTY VISUAL FIELDS. *J. opt. Soc. Amer.*, Aug. 1957, 47(8), 714-718. (Ohio State University).

10,188
This paper reports the use of a subjective measuring technique for evaluating accommodative level in empty visual fields, both dark and light. The eye's accommodative response to the empty field is measured by flashing into the eye for .05 second every ten seconds a beam whose configuration indicates over-accommodation, correct versus under-accommodation for the measuring level. Harmonic analysis is performed on the data obtained from five subjects and the results are discussed in detail.
G. I. R 7

10,189
Krauskopf, J. EFFECT OF RETINAL IMAGE MOTION ON CONTRAST THRESHOLDS FOR MAINTAINED VISION. *J. opt. Soc. Amer.*, Aug. 1957, 47(8), 740-744. (USA Medical Research Lab., Fort Knox, Ky.).

10,189
In this study, contrast thresholds for maintained vision were determined under the following conditions of retinal image motion: 1) "stopped image", 2) controlled motion at various frequencies and amplitudes. The results are analyzed to show the effects of various types of vibration on ability to maintain vision.
G. I. R 6

10,191
Ronchi, L., & Toraldo di Francia, G. ON THE RESPONSE OF THE HUMAN EYE TO LIGHT STIMULI PRESENTING A SPATIAL OR TEMPORAL GRADIENT OF LUMINANCE. *J. opt. Soc. Amer.*, July 1957, 47(7), 639-642. (Istituto Nazionale di Ottica, Arcetri, Florence, Italy).

10,191
This paper discusses the results of both psychophysical experiments with spatial gradients of luminance and electrophysiological experiments with time gradients of luminance and points out a possible parallel between the psychophysical and electrophysiological results.
G. R 6

10,192
Shipley, T. CONVERGENCE FUNCTION IN BINOCULAR VISUAL SPACE. II. EXPERIMENTAL REPORT. *J. opt. Soc. Amer.*, Sept. 1957, 47(9), 804-821. (American Optical Co., Research Center, Southbridge, Mass.).

10,192
This paper reports alley experiments for two observers above and below the eye-level plane and compares the data with previous work in relation to the geometry of binocular visual space. It is suggested that further empirical evidence on distance perception for small angles of convergence is necessary before precise quantitative predictions can be made.
I. G. R 7

10,193
Shipley, T. CONVERGENCE FUNCTION IN BINOCULAR VISUAL SPACE. I. A NOTE ON THEORY. *J. opt. Soc. Amer.*, Sept. 1957, 47(9), 795-803. (American Optical Co., Research Center, Southbridge, Mass.).

10,193
This paper attempts to review and clarify the theory of the convergence function. Certain aspects of binocular visual experience and the Lunsburg theory of the alley experiments are discussed in some detail as preparation for experimental work.
G. R 10

10,196
Singer, J.R. ELECTRO-MECHANICAL MODEL OF THE HUMAN VISUAL SYSTEM. *J. opt. Soc. Amer.*, March 1957, 47(3), 205-207. (National Scientific Labs., Washington, D.C.).

10,196
This paper proposes an electrical servomechanism to simulate eye response in directing visual receptors. The model uses photoelectric cells to receive images which are then separated into two parts and reproduced in the "brain" by illumination of light bulbs corresponding to the photoelectric cell receptors. A photoelectric scanner to determine the amount of agreement of images and a feedback device to correct position of the "eyeball" are also described.
I. R 2

10,197
Biersdorf, W.R., & Armington, J.C. RESPONSE OF THE HUMAN EYE TO SUDDEN CHANGES IN THE WAVELENGTH OF STIMULATION. *J. opt. Soc. Amer.*, March 1957, 47(3), 208-215. (Walter Reed Army Institute of Research, Washington, D.C.).

10,197
This is the third of a series of three papers dealing with the effects of chromatic adaptation stimuli upon relative spectral sensitivity of the human electroretinogram (ERG). In this experiment, the ERG response was elicited by the abrupt replacement of a chromatic adaptation stimulus with a long duration test stimulus. Three determinations of the spectral sensitivity of each of two subjects were made for twelve stimuli and various luminances. Data are analyzed for evidence of possible spectral processes.
T. G. R 9

10,198
Knoll, H.A., Stimson, R., & Weeks, C.L. NEW PHOTOKERATOSCOPE UTILIZING A HEMISPHERICAL OBJECT SURFACE. *J. opt. Soc. Amer.*, March 1957, 47(3), 221-222. (University of California at Los Angeles).

10,198
This paper gives a brief history of the development of photokeratoscopy and describes a scope which records the contour of the entire corneal surface of the eye in a single photographic exposure. By using a hemispherical object surface whose center coincides with that of the cornea, the reflection of the corneal surface is photographed through a small hole in the object surface.
I. R 7

10,199
Taylor, J.H., & Yates, H.W. ATMOSPHERIC TRANSMISSION IN THE INFRARED. *J. opt. Soc. Amer.*, March 1957, 47(3), 223-226. (Naval Research Lab., Washington, D.C.).

10,199
As part of a program to measure infrared transmission for as great a variety of atmospheric conditions as possible, this paper presents data for 0.5 micron to 15 micron as measured over three horizontal paths of 1000 feet, 3.4 miles, and 10.1 miles on clear, foggy, and snowy winter days, using a 60 inch carbon arc searchlight as the source.
T. G. I. R 10

10,200
Grant, D.E. DOVE PRISM VIEWER FOR INVESTIGATION OF SPACE ERROR IN COLOR MATCHING. *J. opt. Soc. Amer.*, March 1957, 47(3), p.256. (Eastman Kodak Co., Rochester, N.Y.).

10,200
This is a brief description of an optical device for reverting or inverting a bipartite matching field for the purpose of investigating space errors in color matching.
I. R 2

- 10,201
Brown, W.R.J. COLOR DISCRIMINATION OF TWELVE OBSERVERS. *J. opt. Soc. Amer.*, Feb. 1957, 47(2), 137-143. (Eastman Kodak Co., Rochester, N.Y.).
- 10,201
Twelve observers were used to study color discrimination by the method of color matches about a color center with the added refinement of using a binocular wide-field colorimeter with a broad surrounding field. The colorimeter provided a circular field, subtending 10 degrees at the observer's position, with white surround. Twenty-two color centers from various parts of the chromaticity diagram were used, the average luminance of the colors being 4.9 foot lamberts. The results were transformed to primaries allowing plotting on the chromaticity diagram.
T. G. R 8
- 10,203
Mote, F.A., & Forbes, L.M. CHANGING PRE-EXPOSURE AND DARK ADAPTATION. *J. opt. Soc. Amer.*, April 1957, 47(4), 287-290. (University of Wisconsin).
- 10,203
To investigate the effect of continuously changing pre-exposure on dark adaptation, dark adaptation of two subjects was measured with the monocular Hecht-Shlaer adaptometer following pre-exposures that changed from zero to maximum intensity and the reverse, from maximum to zero, as well as for equivalent unchanging pre-exposures. Three intensities and four durations of pre-exposure were investigated. Results are presented to show the conditions having the most effect on subsequent thresholds.
G. R 2
- 10,204
LeBlanc, J.A. EFFECT OF ENVIRONMENTAL TEMPERATURE ON ENERGY EXPENDITURE AND CALORIC REQUIREMENTS. *J. appl. Physiol.*, 1957, 10(2), 281-283. (Defence Research Northern Lab., Fort Churchill, Manitoba, Canada).
- 10,204
This article reports the findings of studies on the effect of environmental temperature upon the energy expenditure and caloric requirements of individuals participating in representative military exercises and relates these findings to previous investigations of this problem. The results of the survey conducted with subjects under arctic conditions are presented and discussed in terms of the relations between environmental temperature and (a) food intake, (b) energy expended, and (c) energy balance.
T. R 18
- 10,205
Yonemura, D., & Nango, R. STUDIES OF ROD-PROCESS TO SUPRATHRESHOLD LIGHT STIMULI WITH A DIRECT CURRENT METHOD. *J. opt. Soc. Amer.*, Sept. 1957, 47(9), 822-827. (Kanazawa University).
- 10,205
This paper describes (1) a technique for stimulating the rod mechanism with a single constant current pulse, 25 milliseconds in duration, and (2) measurements by this method of rod responses at a temporal retinal region 15 degrees from the fovea as a function of wavelength and as a function of increasing intensity of stimulus light. The results are compared with those obtained by other methods.
G. R 26
- 10,206
Sanchez Longo, L.P., Forster, P.X., & Anth, T.L. A CLINICAL TEST FOR SOUND LOCALIZATION AND ITS APPLICATIONS. *Neurology*, Sept. 1957, 7(9), 655-663. (Veterans Administration Hospital and Georgetown University School of Medicine, Washington, D.C.).
- 10,206
This article describes the development of a clinical test for sound localization. A review of the historical approaches to this problem is presented with emphasis upon the various theoretical explanations of the phenomenon of sound localization. The role of the central nervous system and that of other factors is discussed prior to presentation of the clinical test. Results of application of the test (which utilizes a Masco H-1 model audiometer and a Perree-Rand type of perimeter) with normal subjects and five cases of temporal lobe lesions are presented. The role of the temporal lobe in sound localization is discussed along with the potential applications of the test.
T. F. I. R 90
- 10,207
Masterton, J.P., Lewis, H.E., & Widdowson, Elsie M. FOOD INTAKES, ENERGY EXPENDITURES AND FAECAL EXCRETIONS OF MEN ON A POLAR EXPEDITION. *Brit. J. Nutrition*, 1957, 11, 346-358. (Division of Human Physiology, Medical Research Council, London, England).
- 10,207
This article reports an investigation on the relations among food intake, energy expenditure and fecal excretions of men quartered in northeast Greenland. Four subjects were studied under conditions of typical work (e.g., sledging, cooking, fetching water, and so forth). Food intake, duration of particular tasks, body weight, and composition of feces were assessed. The results are presented and discussed primarily in terms of dietary intake as a function of energy expenditure. The other interrelations are discussed along with the implications of the findings for the definition of optimal diets for particular tasks under such climatic conditions.
T. G. R 19
- 10,208
Kleinfeld, M., Giel, C., & Tabershaw, I.R. HEALTH HAZARDS ASSOCIATED WITH INERT-GAS-SHIELDED METAL ARC WELDING. *A.M.A. Arch. Indust. Health*, Jan. 1957, 15(1), 27-31. (Div. of Industrial Hygiene, New York State Dept. of Labor).
- 10,208
In order to assess the health hazards associated with inert-gas-shielded metal arc welding, a study was conducted at three industrial plants and consisted of collecting medical and environmental data relevant to the effect of exposure to the ozone, ultraviolet radiation, oxides of nitrogen, and metal fumes produced by this welding process. These data are evaluated in terms of the relation between severity of symptoms of toxicity and degree of exposure to the toxic substances. The diagnosis of ozone toxicity and the techniques of control applicable to the primary hazards found in this process, are discussed.
R 7
- 10,209
Griswold, S.S., Chambers, L.A., & Motley, H.L. REPORT OF A CASE OF EXPOSURE TO HIGH OZONE CONCENTRATIONS FOR TWO HOURS. *A.M.A. Arch. Indust. Health*, Feb. 1957, 15(2), 108-110. (Los Angeles Air Pollution Control District, Calif.).
- 10,209
To investigate the effects of prolonged exposure to ozone, one of the pollutants in smog, a subject was placed in a fumigation chamber and exposed to approximately two parts per million ozone for a period of two hours. Spirogram recordings were made prior to, immediately following the two-hour exposure, and 22 hours following exposure. Total vital capacity, timed vital capacity, shape of exhalation curve, and maximal breathing capacity are analyzed for each of the three periods. The results are discussed in terms of the implications of the demonstrated changes in respiratory functions for the establishment of alert levels for smog. Need for further, better-controlled, study is emphasized.
G. R 1

10,210

Mahon, Ellis R., Pryor, Claire K., Ingireff, L.S., & Wyshak, Grace. AGE AND ADJUSTMENT. A.M.A. Arch. Indust. Health, Jan. 1957, 15(2), 156-167. (Harvard School of Public Health).

10,210

In order to evaluate the relation between age and adjustment, a study was conducted at a foot-processing plant employing 450 workers, with an age distribution of 15% under 45 and 85% over 45 years of age. The various characteristics of the adjustment and the absence rates were compared. These factors were correlated with age for the male and female workers. The results are analyzed and discussed with primary reference to the differential occurrence of absence in the under 45 versus the over 45 years of age distribution of workers. Certain qualitative factors such as experience, motivation, etc., are related to the statistical findings.
T. G.

10,211

National Committee on Radiation Protection and Measurement, Washington, D.C. MAXIMUM PERMISSIBLE RADIATION EXPOSURE TO MAN: A RECOMMENDED STATEMENT. Health Phys. Indus. Hyg., April 1957, 15(4), 250-254.

10,211

This is a special report of the National Committee on Radiation Protection and Measurement (NCRP) which presents a series of revised recommendations concerning the maximum permissible radiation exposure to man. These recommendations are offered for controlled areas, for the whole population, and for internal emitters. Along with a discussion of the recommendations there is included a statement on responsibilities of the medical profession in the use of X-rays and other ionizing radiation which was prepared by the United Nations Scientific Committee on the Effects of Atomic Radiation.
R. G.

10,212

Stallones, R.A., Gould, R.L., Dodge, H.J., & Lemmers, T.F.N. AN EPIDEMIOLOGICAL STUDY OF HEAT INJURY IN ARMY RECRUITS. A.M.A. Arch. Indust. Health, June 1957, 15(6), 455-455. (Walter Reed Army Medical Center, Washington, D.C.).

10,212

To assess the injurious effects of unfavorable climatic conditions, an epidemiological study was conducted at an Army base which characteristically reported a high incidence of heat injuries. Weather data, activities, age, weight, and so forth, of the subjects and types of injury were determined for a three-month summer period. These data are analyzed in terms of the various interrelations among climatic condition and activities and personal characteristics as related to incidence and type of heat injury. Conclusions are drawn concerning the human and environmental determinants of optimal susceptibility to heat injury.
T. G. 3 6

10,213

Hogan, M.J. EVALUATION OF VISION SCREENING METHODS IN INDUSTRY. A.M.A. Arch. Indust. Health, Aug. 1957, 16(2), 93-99. (University of California School of Medicine).

10,213

In this discussion of the vision screening methods employed in industry the author presents at the outset a definition of the following terms: visual acuity, depth perception, muscle coordination, marking distance, visual field, and visual service. He then goes on to an outline of various tests of visual acuity (e.g. Snellen and Jaeger Visual Acuity Charts, the Orthorater, the Sightscreener, etc.) and to a discussion of the merits of tests of color vision, stereopsis, muscle coordination, visual fields, and of the proper correction for working distances.

10,214

Parasurath, D. TESTING FOR COLOR DEFICIENCY IN INDUSTRY. A.M.A. Arch. Indust. Health, Aug. 1957, 16(2), 100-103.

10,214

The author presents a program for the administration of color vision tests and the identification of color deficiencies based on fifteen years' experience in the Medical Research Laboratory of a United States Naval Submarine Base. It is directed primarily toward industrial utilization and consists of a classification of types and degrees of color deficiency and a series of recommendations concerning the most appropriate test to assess the particular deficiency.
F. R. 2

10,215

Smith, C.S. DISCUSSION OF THE ESTIMATION OF LOSS OF VISUAL EFFICIENCY. A.M.A. Arch. Indust. Health, Aug. 1957, 16(2), 154-167.

10,215

This article on the estimation of loss of visual efficiency directs itself initially to the regulations and recommendations offered by the Joint Committee on Industrial Ophthalmology of the American Medical Association and the American Academy of Ophthalmology with emphasis upon the dissatisfaction with which they were received. A contemporary report published by the Council on Industrial Health of the American Medical Association which offers a revision of assessment criteria is outlined in terms of the major changes in the determination of loss of visual efficiency.

10,216

American Medical Association Archives of Industrial Health. THRESHOLD LIMIT VALUES FOR 1957. A.M.A. Arch. Indust. Hyg., Sept. 1957, 16(3), 261-265.

10,216

This article presents the table of recommended values for the maximum average atmospheric concentration of a variety of substances to which the worker may be exposed during the typical eight-hour working day without injury to health. These values were adopted by the American Conference of Governmental Hygienists in April, 1957, and include the following types of substances: gases and vapors, toxic dusts, fumes, and mists, and mineral dusts. An additional table of tentative values for certain substances is also included.
7.

10,217

Blackwell, H.R. QUANTITATIVE RELATIONSHIPS OF ILLUMINATION AND VISION. A.M.A. Arch. Indust. Health, Aug. 1957, 16(2), 108-124.

10,217

The author presents an extensive discussion of the relationships between illumination and vision with specific emphasis on two aspects of vision: visual discrimination and the operation of the oculomotor mechanisms (particularly accommodation and convergence). Experimental data is presented with regard to both aspects and in reference to visual discrimination concerns such aspects as: accuracy of object identification as a function of contrast between figure and ground, speed of seeing as a function of background luminance, and so forth. The data on oculomotor function concern such aspects as: the relation between accommodative vergence and luminance, amplitude of vergence for various luminances, and so forth.
G. I.

10,218

Yaglou, C.P., & Minard, D. CONTROL OF HEAT CASUALTIES AT MILITARY TRAINING CENTERS. A.M.A. Arch. Indust. Health, Oct. 1957, 16(4), 302-316.

10,218

Designed to define the conditions conducive to heat injury among basic and advanced trainees in military training programs, a series of studies were conducted at three Marine Corps Training Centers. Data is presented on such aspects as the following: average heat loads and heat stress on trainees, incidence of casualties, tolerance limits for work in heat, the effectiveness of various preventive measures, the epidemiology of heat illness, and many other aspects. The need for future studies with reference to four particular problems is emphasized.
G. R. 5

- 10,219
Korgan, E.Z. RECENT CHANGES IN MAXIMUM PERMISSIBLE EXPOSURE VALUES. *A.M.A. Arch. Indust. Health*, Nov. 1957, 16(5), 357-362. (Oak Ridge National Lab., Oak Ridge, Tenn.).
- 10,219
In this article the author discusses the basic standards of maximum permissible radiation exposure and the results of application of these standards. In addition, he outlines and discusses some of the recent changes in maximum permissible exposure values as adopted by two organizations, the International Commission on Radiological Protection (ICRP) and the National Committee on Radiation Protection (NCRP).
T. 3 9
- 10,220
House, H.P. METHODS FOR CONSERVATION OF HEARING. *A.M.A. Arch. Indust. Health*, Dec. 1957, 16(6), 445-449. (University of California School of Medicine).
- 10,220
In this discussion of the methods of conservation of hearing in industrial environments, the author reviews briefly various types of impairment and then considers the preventive program in terms of determining its necessity and establishment. Three factors are defined as indices for the existence of a noise problem and three specific recommendations are outlined with regard to the organization of a hearing conservation program. The control of noise exposure is discussed in terms of the reduction of environmental noise and the provision of personal protection.
G. 1.
- 10,221
Glorig, A. STATUS OF RESEARCH ACTIVITIES OF THE SUBCOMMITTEES ON NOISE IN INDUSTRY. *A.M.A. Arch. Indust. Health*, Dec. 1957, 16(6), 449-453.
- 10,221
In this article the author reports on studies conducted by the subcommittee on Noise in Industry which he feels to be particularly relevant to the control of noise-induced hearing loss. Accordingly, data is presented on such aspects as the following: the relation between noise exposure and temporary shifts in the auditory threshold, the variation among individuals with regard to susceptibility to hearing loss following noise-exposure, the relation of duration of exposure to hearing loss, etc. In addition, a hearing conservation data card, utilized in the studies but of potential general applicability is described.
I.
- 10,222
Whitaker, P.J. TEAMWORK APPROACH TO THE NOISE PROBLEM. *A.M.A. Arch. Indust. Health*, Dec. 1957, 16(6), 459-463.
- 10,222
The author discusses the advantages of ensuring joint cooperative effort among physician, hygienist, engineer, the supervisory management staff, and the personnel department in the definition of a successful hearing-conservation program. In addition, recommendations, based on the administration of 22,265 examinations, are offered concerning the management of methodological and human factors pertinent to the audiometric examination and its interpretation.
I.
- 10,223
Scholtz, W.P. THE INDUSTRIAL HYGIENIST'S PART IN THE SOLUTION OF THE INDUSTRIAL NOISE PROBLEM. *A.M.A. Arch. Indust. Health*, Dec. 1957, 16(6), 469-474. (Allis-Chalmers Manufacturing Co., Milwaukee, Wis.).
- 10,223
The role of the hygienist in the industrial hearing-conservation program is exemplified by a description of the procedures taken in the establishment of such a program in an industrial plant. The author describes the selection of equipment, the organization of surveys, the introduction of personnel changes, and the techniques of noise abatement as each of these aspects occurred in the development of the program and also in reference to their relative effectiveness within the program.
F. C. I. R 4
- 10,224
British Medical Journal. STRONTIUM - 90 IN MAN. *Brit. Med. J.*, March 1957, I, 752-753.
- 10,224
This article discusses the hazards for man which result from the release of strontium-90 in the explosion of a nuclear weapon. The static and genetic hazards are defined and evaluated in terms of their potential threat to man. The problems of accurately assessing the concentration of strontium-90 in bone and of establishing maximum permissible concentration levels are discussed briefly.
R 4
- 10,225
British Medical Journal. ROAD ACCIDENTS. *Brit. Med. J.*, March 1957, I, 753-754.
- 10,225
This article presents a statistical comparison of types and frequency of road accidents in Great Britain and the United States. The safety program in the U. S. is assessed in terms of the types of research being conducted and the translation of the findings into medical facilities, safety devices, etc. The need for a similar program in Great Britain is emphasized.
R 8
- 10,226
Glaser, E.H., & Livett, B.H. EFFECT OF VITAMIN B COMPLEX ON HEALTHY PEOPLE IN A WARM CLIMATE. *Brit. Med. J.*, June 1957, I, 1331-1332. (Dept. of Physiology, University of Malaya).
- 10,226
This study was designed to discover whether individuals living in a warm climate have an increased need for vitamin-B complex. Seventy-nine medical students residing in Singapore served as subjects. The experiment was conducted in two periods of eight weeks with an intervening non-experimental period of six weeks. Placebos were administered to all subjects at the beginning of each experimental period for fourteen days and then half the subjects received B complex for the remainder of the period. Symptoms of illness were assessed prior to, during, and following the experimental periods. The results are discussed in terms of the effect of vitamin-B complex on existence in a warm climate as evidenced by relative incidence of symptoms during its addition to the diet.
T. R 18
- 10,227
British Medical Journal. INCREASING MUSCLE STRENGTH. *Brit. Med. J.*, July 1957, II, 150-151.
- 10,227
This article presents a summary of the research findings and theoretical considerations pertinent to the problem of defining the techniques and dynamics of muscular strength development. Among the aspects treated are the following: the effect of training in one skill upon the development of other skills, the definition of optimal location and degree of maximum resistance, the evaluation of exercise repetition, and so forth.
R 14
- 10,228
British Medical Journal. MAN IN SPACE. *Brit. Med. J.*, Nov. 1957, II, 1041-1042.
- 10,228
A variety of problems inherent in the design of a manned space ship are discussed in this article, but primary emphasis is placed on medical problems. These include such aspects as food, water, and oxygen needs, effects of high acceleration, weightlessness, cosmic radiation, and so forth. The implications of these problems for the design of cabins, clothing, and so forth, are mentioned along with such hazards as meteor collision, reentry into the earth's atmosphere, and so forth.
R 9

10,229

Lombardi, A.M., & Lurie, A.S. HEALTH HAZARDS ENCOUNTERED IN REPAIR OF JET AIRCRAFT FUEL CELLS. *J. A.M.A.*, June 1957, 164(5), 531-533. (USAF Hospital, Schilling AFB, Kan.).

10,229

This article presents a definition of the health hazards involved in the repair of jet aircraft fuel cells. The toxicity and chemical nature of various jet engine fuels are noted along with the toxic reactions of twelve airmen who regularly performed fuel cell repairs. Six safety measures are recommended.

T. I. R 6

10,230

Ruedemann, A.D. Jr. AUTOMOBILE SAFETY DEVICE-HEADREST TO PREVENT WHIPLASH INJURY. *J. A.M.A.*, Aug. 1957, 164(17), p. 1989. (1633 Whitney Bldg., Detroit, Mich.).

10,230

The author presents an illustration and a brief description of a headrest to be used in the automobile and designed to prevent whiplash injury of the cervical spine and musculature. The design of this device is such as to permit application with the ordinary front seat.

I.

10,231

Alvis, H.J. SUBMARINE MEDICINE - AN OCCUPATIONAL SPECIALTY. *New England J. Med.*, Jan. 1957, 256(1), 21-25. (Submarine Medicine Div., Bureau of Medicine and Surgery, Washington, D.C.).

10,231

This is a survey of the occupational problems existent in submarine medicine. In addition to the problems, the author includes the research findings pertinent to the following aspects of submarine service: visual and hearing requirements; psychological factors in crew selection training, and interpersonal relations; the psychological and physiological effects of the work environment; exposure to toxic substances (e.g., freon, oil vapors, and so forth), and others.

R 20

10,232

Lanphier, E.H. DIVING MEDICINE. *New England J. Med.*, Jan. 1957, 256(3), 120-131. (USN Experimental Diving Unit, Naval Gun Factory, Washington, D.C.).

10,232

The author presents an extensive description of recent developments and contemporary problems in diving medicine. The material is presented under the following five major aspects: (1) the physical condition of the diver (e.g., obesity, diabetes, otitis, and so forth); (2) environmental factors (e.g., effects of pressure, nitrogen narcosis, oxygen poison, decompression sickness and so forth); (3) miscellaneous accidents and conditions (drowning, anoxia, overexertion, cold, and so forth); (4) recognition and treatment of diving accidents (e.g., barotrauma, conditions requiring recompression, and so forth); and (5) preventive measures (e.g., "buddy system" in "scuba" diving, and so forth).

T. R 57

10,233

McFarland, R.A., & Moore, R.C. HUMAN FACTORS IN HIGHWAY SAFETY. *New England J. Med.*, April 1957, 256(17), 792-799. (Harvard School of Public Health).

10,233

This is the first of a series of three articles (see 10,234, 10,235) which present an extensive review and evaluation of research on the role of human factors in highway safety. In this article the discussion concerns data on the following: the accident repeater, characteristics of drivers as related to accidents, and the influence of fatigue, alcohol consumption, emotional stress, drugs and medications upon driving performance. A definition of the epidemiologic approach to accident prevention is also included.

T. G. I. R 27

10,234

McFarland, R.A. & Moore, R.C. HUMAN FACTORS IN HIGHWAY SAFETY. A REVIEW AND EVALUATION. *New England J. Med.*, May 1957, 256(18), 837-845. (Harvard School of Public Health, Boston, Mass.).

10,234

This is the second of a series of three articles (see 10,233, 10,235) on the role of human factors in highway safety. In this article the authors review and evaluate the research pertinent to the following: the development of driving ability criteria, the establishment of minimal physical standards for licensing, the role of physiological deficits in accidents, the role of driver training in accident reduction and the improvement of safety through the design of equipment with regard to human factors, i.e., human engineering. Within this latter category discussion centers on the design of controls, instruments, and visual displays and on the general anthropometric factors involved in the design of automotive equipment.

T. G. I. R 18

10,235

McFarland, R.A., & Moore, R.C. HUMAN FACTORS IN HIGHWAY SAFETY. A REVIEW AND EVALUATION. *New England J. Med.*, May 1957, 256(19), 890-897. (Harvard School of Public Health).

10,235

This is the concluding article of a series of three (see 10,234, 10,233) on the role of human factors in highway safety. The research data reviewed and evaluated in this article concerns the aspects of control of physical variables which influence the driver and the driver-environment interrelations in highway safety. Under the former category the following are included: temperature, humidity, ventilation, carbon monoxide, noise, vibration, and impact forces. The driver-environment relation is discussed in terms of environmental influence on visibility, the effects of weather, the role of the social environment, the design of highways, and traffic engineering with regard to human factors. A summary statement based on the series of articles is included.

T. F. G. R 17

10,237

Hill, R.V. THE HYPERBOLAS OF ACCOMMODATION AND CONVERGENCE. *A.M.A. Arch. Ophthalmol.*, Feb. 1957, 57(2), 259-265. (Dept. of Ophthalmology, University of Oregon Medical School).

10,237

The author presents a mathematical analysis of accommodation and convergence with regard to their normal functions and their interrelationships. Utilizing the prism diopter, the parametric variable and focal distance of each function are analyzed mathematically. Certain mathematical, physiologic, and clinical advantages are discussed.

G. R 3

10,238

Alpern, M. THE POSITION OF THE EYES DURING PRISM VERGENCE. *AMA Arch. Ophthalmol.*, March 1957, 57(3), 345-353. (University of Michigan).

10,238

Two experiments are reported in this study of the position of the eyes during prism vergence. In the first, horizontal movements were electrically recorded when base-in and base-out prisms were alternately presented and withdrawn before one eye. The second experiment was designed to assess the effects of presenting a prism and then occluding the eye upon the perception of Maxwell's spot. The results are presented and discussed in terms of their implications for the explanation of perceptual distortions occurring during prism vergence tests.

G. I. R 34

10,236

Breinin, G.M. QUANTITATION OF EXTRAOCULAR MUSCLE INNERVATION. *A.M.A. Arch. Ophthalmol.*, May 1957, 57(5), 644-650. (Dept. of Ophthalmology, New York University Post-graduate School of Medicine).

10,239

The author describes an instrument designed to integrate electromyographic potentials and thus provide a technique for quantitative evaluation of innervation in ocular motility. A full wave integrator and differentiator are combined in this instrument. The value is demonstrated by the presentation of the results obtained with its application to studies of kinesiology. Also included are results obtained in measuring lens-induced innervation and in the assessment of the effects of drugs on extraocular muscle innervation.

T. R 3

10,240

Gunkel, R.D., & Bornschein, H. AUTOMATIC INTENSITY CONTROL IN TESTING DARK ADAPTATION. *AMA Arch. Ophthalmol.*, May 1957, 57(5), 681-686. (National Institute of Neurological Diseases and Blindness, Bethesda, Md.).

10,240

The authors describe an automatic device designed to operate the intensity control of the Goldmann-Weekers adapter and thus provide better standardization of the test and a reduction of examination time. Following a definition of the primary technique which the method utilizes, a statistical comparison of results obtained with conventional and automatic methods is presented and discussed in terms of the relative advantages of the automatic method.

T. G. I. R 2

10,241

Linksz, A. OPTICS AND VISUAL PHYSIOLOGY. *AMA Arch. Ophthalmol.*, June 1957, 57(6), 869-927. (New York University, Postgraduate School of Medicine and Manhattan Eye, Ear and Throat Hospital).

10,241

This is a partial review of the literature of 1956 dealing with optics and visual physiology. The major categories under which the material is classified are as follows: historical notes; electroretinography; studies of retinal sensitivity; adaptation; flicker; illumination; glare; color vision and its defects; refraction; visual acuity; refractive errors; optical aids; clinically useful optical methods; binocular vision; space perception; aniseikonia; ocular rotations; convergence; accommodation; and miscellaneous topics.

R 176

10,242

Hain, Y., & Graham, C.H. SPECTRAL LUMINOSITY CURVES FOR PROTANOPIC, DEUTERANOPIC, AND NORMAL SUBJECTS. *Proc. Nat. Acad. Sci. USA*, 1957, 43, 1011-1019. (Dept. of Psychology, Columbia University).

10,242

This study was designed to evaluate the cone sensitivity of deuteranopes as compared to normals and to define similar threshold luminosity data for protanopes. Utilizing the Ishihara and Stilling plates, the Hecht-Schlaer anomaloscope, and a modified Helmholtz color mixer, five protanopes, six deuteranopes, and seven normal subjects were defined. Spectral luminosity curves were plotted for each of the subjects. The results are presented in the form of log sensitivity curves as a function of wave length for each of the subjects and the average log sensitivity curves for each of the groups. Relative loss of luminosity in red and green by color blind subjects is discussed.

T. G. R 13

10,243

This study was designed to assess the effects of anxiety on perceptual functioning. Nineteen anxiety-prone patients were tested for accuracy and speed of size discrimination over a four-day period during which stress interviews were conducted. Eighteen normal subjects served as a control by taking the same perceptual test (the Area Judgment Test). Each of the experimental subjects was tested both prior to and following the stress interview. The resultant scores are compared with regard to those of the control subjects and in terms of pre- versus post-stress scores throughout the experiment. The relation between accuracy and decision time is discussed along with the general effects of anxiety on perceptual functioning.

T. G. R 7

10,243

Korchin, S.J., Basowitz, F., Chevalier, J.A., Grinker, R.R., et al. VI. *THE DISCRIMINATION AND THE DECISION PROCESS IN ANXIETY*. *AMA Arch. Neurol. & Psychiat.* Oct. 1957, 78(4), 425-438. (Institute for Psychosomatic and Psychiatric Research & Training, Michael Reese Hospital, Chicago, Ill.).

10,244

Glorig, A. SOME MEDICAL IMPLICATIONS OF THE 1954 WISCONSIN STATE FAIR HEARING SURVEY. *Trans. Amer. Acad. Ophthalm. & Otolaryng.*, March-April 1957, 61(2), 160-171. (Research Center, Subcommittee on Noise in Industry, Los Angeles, Calif.).

10,244

To evaluate the significance of the relation between various items in the medical histories used to diagnose otologic disease and actual hearing loss reflected in measured auditory thresholds, data on 3500 persons participating in a hearing survey at the 1954 Wisconsin State Fair were statistically analyzed. The data consisted of a medical history and otologic examination, a personal history, a non-medical history, and auditory tests consisting of air conduction and speech reception threshold tests. Degree of hearing loss reflected in the auditory tests is evaluated statistically with regard to its relation to (1) subjective report of otologic disorder, (2) subjective report of familial hearing loss, and (3) evidence of disease of external ear. The validity of these three indices of hearing loss is discussed. T. G. R 2

10,245

Spaeth, E.B. ESTIMATION OF LOSS OF VISUAL EFFICIENCY. *Trans. Amer. Acad. Ophthalm. & Otolaryng.*, Sept.-Oct. 1957, 61(5), 592-597.

10,245

The author presents a discussion of the revisions of the American Medical Association's publication "Appraisal of Loss of Visual Efficiency" presented by a committee of the Council on Industrial Health. A brief history of the need for such revisions is followed by a discussion of the legal and methodological implications of the proposed methods of assessing loss of visual efficiency. Data are presented to illustrate some of the diagnostic interrelationships of the criteria offered in this revision.

T. I.

10,246

McFarland, R.A. THE ROLE OF HUMAN FACTORS IN ACCIDENTAL TRAUMA. *Amer. J. Med. Sci.*, July 1957, 234(1), 1-27. (Harvard School of Public Health).

10,246

Three primary aspects are emphasized in this discussion of the role of human factors in accidental trauma: (1) the role of preventive medicine in accident prevention; (2) human factors as primary causal agents in accidents; and (3) the role of the medical officer in accident control and prevention. The epidemiological approach to accident investigation is defined and representative data generated by utilizing this approach are presented for industrial, air, and motor vehicular accidents. The interrelations of human and environmental factors are defined and their application by human engineering in the control and prevention of accidents is exemplified.

T. G. I. R 30

10,247

Benjamin, F.B. THE EFFECT OF PAIN ON PERFORMANCE. US Armed Forces Med. J., March 1957, 8(3), 332-345. (Aviation Medical Acceleration Lab., NADC, Johnsville, Penn.).

10,247

In this investigation of the effects of pain on performance, 25 subjects, each serving as his own control, were required to perform a series of mental, memory, time perception, muscular coordination, and reaction time tests under normal and pain conditions. Three methods of inducing pain were used: (1) a Styrofoam helmet in which water pressure was controlled to yield pain of approximately 1 dol, (2) a pressure cuff yielding 2-3 dols, and (3) ice water to produce 4 dols. Reflex activity, pulse rate, respiratory function, and work performance on an ergometer bicycle were determined. The results are presented and discussed in terms of change in rate and accuracy of performance as a function of degree of pain. T. R 21

10,248

Johnson, L.C. ATTITUDES AND MOTIVATIONS OF TEST PILOTS. US Armed Forces Med. J., May 1957, 8(5), 718-724. (Dept. of Psychiatry & Neurology, Washington University School of Medicine).

10,248

This explanatory study was designed to assess the attitudes and motivations of test pilots and thus afford more accurate selection and performance criteria. An unstructured open-ended interview was conducted with 12 randomly selected test pilots and an additional 21 pilots completed an attitude-motivation questionnaire. The results of both techniques are presented and discussed in terms of the predominant motivations found to exist among both groups of pilots and their functional values for individuals performing tasks of this nature. G. I. R 4

10,249

Lawton, W.H. PHYSIOLOGICAL INVESTIGATIONS IN THE FLYING SAFETY PROGRAM OF THE FLYING TRAINING AIR FORCE. US Armed Forces Med. J., July 1957, 8(7), 937-944. (Flying Training Air Force, Waco, Tex.).

10,249

The author discusses the physiological problems being investigated in a program of research designed to improve flying safety. The practice effects of three specific applications of the research findings (i.e., use of a Physiological Near Accident Report, education regarding hyperventilation, and a program to improve pilot eating habits) are noted. Problems yet to be solved are outlined. T. R 11

10,250

Wilber, C.G. WATER REQUIREMENTS OF MAN. US Armed Forces Med. J., Aug. 1957, 8(8), 1121-1130. (USA Chemical Center, Md.).

10,250

The author presents a summary, based on experimental findings, of the water requirements of man under various environmental conditions including the desert, the tropics and cold climates. Also discussed are the following general topics: the average water exchange in man, the role of water in temperature regulation, survival at sea, and others. T. R 35

10,251

Burke, E.L., Glenn, C.G., & Wales, J.F. RIFLE-SLING PALSY IN MARINE CORPS RECRUITS. US Armed Forces Med. J., Aug. 1957, 8(8), 1189-1194. (US Naval Hospital, San Diego, Calif.).

10,251

This article presents the results of a study of 15 Marine Corps recruits who were hospitalized with rifle-sling palsy. An additional screening of 1213 recruits completing the rifle-training course was conducted to assess degree of similar nerve deficit. Incidence, duration, and severity of disorders are discussed with regard to the implications for redesign of the "tourniquet" type rifle sling. T. I. R 2

10,252

Ogle, D.C. MAN IN A SPACE VEHICLE. US Armed Forces Med. J., Nov. 1957, 8(8), 1561-1570. (Surgeon General of the AF).

10,252

The author presents a general discussion of the problems of space flight from the points of view of aviation medicine and human engineering. Among the problems defined as facing man in a space vehicle, the following are included: acclimatization to space, thermal stress, psychological isolation and boredom, cosmic radiation, and so forth. Also discussed is the process of selection and adaptation of personnel for space flight. R 10

10,254

Kornetsky, C., Humphries, O., & Everts, E.V. COMPARISON OF PSYCHOLOGICAL EFFECTS OF CERTAIN CENTRALLY ACTING DRUGS IN MAN. AMA Arch. Neurol. & Psychiat., March 1957, 77(3), 318-325. (National Institute of Mental Health, Bethesda, Md.).

10,254

This study was designed to assess the effects of lysergic acid diethylamide (LSD), meprobamate, scopolamine, and chlorpromazine (all centrally acting drugs) on the performance of a variety of intellectual, motor, and perceptual tasks. Ten subjects, six male and four female, ranging in age between 18 and 23 years were required to perform the various tasks 75 minutes after injection of the particular drug. Analysis of variance of the resultant data was utilized to indicate the significant effects of the various drugs on the particular types of psychological behavior utilized in this study. Conclusions are drawn concerning the relative effects of each drug on psychological performance. T. G. R 24

10,255

Tindall, G.T., & Kunkle, E.C. PAIN-SPOT DENSITIES IN HUMAN SKIN. AMA Arch. Neurol. & Psychiat., June 1957, 77(6), 605-610. (Dept. of Medicine, Duke University School of Medicine).

10,255

This study was designed to systematically evaluate the phenomenon of pain-spot densities in human skin with emphasis upon the nature and degree of individual differences. Utilizing a two by two centimeter rubber stamp containing spaced squares and a calibrated needle algometer, 150 tests were made with a total of 21 subjects. While the principle area of testing was the dorsum of the hand, the forehead skin and dorsum of the foot were also tested in six of the subjects. The results are presented and discussed in terms of the interindividual variations in pain-spot densities as indicative of the range and variations in pain sensitivity. T. G. I. R 12

10,256

Kulowski, J. INTRODUCTION: PREVENTION OF ACCIDENTS. Clinical Orthopaedics, Spring, 1957, 9, 251-255.

10,256

This is the introductory article of a series of articles on motorist injuries and safety (see 10,257, 10,258, 10,259). The author directs his discussion toward the problems of accident prevention with emphasis upon the role of traffic law enforcement and traffic engineering. A bibliography and source list of agencies offering safety information is included. R 77

10,257

Vey, A.H. DRIVER PROFICIENCY. Clinical Orthopaedics, Spring 1957, 9, 256-259. (Simpson & Curtin, Transportation Engineers, Philadelphia, Penn.).

10,257

This is one of a series of articles (see 10,256, 10,258, 10,259) on motor vehicle safety. In this article driver proficiency as a problem in safety engineering is discussed in terms of both the environmental and motivational factors which must be considered in defining effective engineering design. The need for research on this problem is emphasized.

10,258
McFarland, R.A. HUMAN ENGINEERING AND AUTO-MOBILE SAFETY. Clinical Orthopaedics, Spring 1957, 9, 260-276. (Harvard School of Public Health).

10,259

This is one of a series of articles on motor vehicle safety (see 10,256, 10,257, 10,259). In this article, pertinent research data is presented to exemplify the role of human engineering in motor vehicle safety. Among the various aspects treated the following are included: the application of anthropometry to motor vehicle design, the design of controls and instruments as a function of human capabilities and limitations, the role and control of environmental factors (e.g., noise, temperature, vibration, etc.), and so forth. Conclusions are drawn concerning the type of research necessary for further progress in safety design.
T. G. R 27

10,259

White, A.J. THE ROLE OF SAFETY BELTS IN THE MOTORIST'S SAFETY. Clinical Orthopaedics, Spring 1957, 9, 317-330. (Motor Vehicle Research, Inc., So. Lee, N.H.).

10,259

This is one of a series of articles on motor vehicle safety (see 10,256, 10,257, 10,258). The role of the safety belt is examined in this article. The relative value of the belt as a safety device is discussed within the following frames of reference: design considerations kinematic behavior of passengers during a crash, and the contribution of the belt itself to various types of injuries. Wherever relevant the results of field investigations are brought to bear on the factors under consideration.
1.

10,260

MacLeod, R.B. IMPACT OF DIET ON BEHAVIOR. Am. J. Clin. Nutrition, March-April 1957, 5(2), 107-108. (Cornell University).

10,260

This is a brief introductory article to a symposium on the relation between diet and behavior (see 10,261-10,267). The general problems to be discussed are outlined along with a brief historical statement of the general problem of the relation between diet and man's psychological and physiological state.

10,261

Brozek, J., & Guetzkow, H. PSYCHOLOGIC EFFECTS OF THIAMINE RESTRICTION AND DEPRIVATION IN NORMAL YOUNG MEN. Amer. J. Clin. Nutrition, March-April 1957, 5(2), 109-120. (University of Minnesota).

10,261

This is one of a series of articles (see 10,261 and 10,267) on the relation between diet and behavior. In this article an investigation of the psychological effects of thiamine restriction and deprivation upon the psychological and physiological state of the human organism is reported. Following a period of one month, during which dietary intake was controlled, ten subjects were required to perform exercise and physical fitness tasks through successive experimental periods of thiamine restriction, acute deprivation, and supplementation. Personality tests, intelligence scales, and tests of sensory function were administered at appropriate periods. Effects of the dietary stress are analyzed both in terms of the specific and gross changes in the subject's psychological and physiological functioning. T. G. R 24

10,262

Young, P.T. PSYCHOLOGIC FACTORS REGULATING THE FEEDING PROCESS. Am. J. Clin. Nutrition, March-April 1957, 5(2), 154-161. (University of Illinois).

10,262

This is one of a series of articles (see 10,261-10,267) presented at a symposium on the relation between diet and behavior. In this article the author presents a review and discussion of the literature pertinent to the psychological factors believed to exert a regulating effect on the feeding process. Included in this discussion are the following topics: the differentiation between taste and post-ingestion regulators of intake, the relation between bodily needs and feeding habits, palatability and appetite, food preference and body chemistry and others.
T. G. R 13

10,263

Siegel, P.S. THE REPETITIVE ELEMENT IN THE DIET. Am. J. Clin. Nutrition, March-April 1957, 5(2), 162-164. (University of Alabama).

10,263

This is one of a series of articles (see 10,261-10,267) presented at a symposium on the relation between diet and behavior. In this article the author presents a summary of the results of a series of studies on eating monotony. The basic study involved the presentation of two alternate daily menus to 79 subjects for a period of 22 days. The findings of this and similar studies are discussed with regard to the effects of repetitive diet on palatability, amount of food consumption, and so forth. The relation of the monotony effect to learning theory is discussed.
R 4

10,264

Lee, Dorothy. CULTURAL FACTORS IN DIETARY CHOICE. Am. J. Clin. Nutrition, March-April 1957, 5(2), 166-170. (Merrill-Palmer School, Detroit, Mich.).

10,264

This is one of a series of articles (see 10,261-10,267) presented at a symposium on the relation between diet and behavior. This article presents a discussion of various cultural factors which may be influential in the process of dietary choice. Included in this consideration are the psychological goals of food presentation and the cultural definition of differential reactions to food, adequate food objects, form of food to be consumed, and so forth. The importance of culture in attempting dietary change is also noted.
R 16

10,265

Pilgrim, F.J. THE COMPONENTS OF FOOD ACCEPTANCE AND THEIR MEASUREMENT. Amer. J. Clin. Nutrition, March-April 1957, 5(2), 171-175. (Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.).

10,265

This is one of a series of articles (see 10,261-10,267) presented at a symposium on the relation between diet and behavior. This article is concerned with the problem of predicting the acceptance of foods. The author presents the relevant research data and a discussion of three primary aspects of the problem: (1) the establishment of criteria of food values, (2) the definition of the pertinent components of the human's behavior toward food, and (3) the formulation of adequate methods of assessing these components. Many of the problems encountered in studies attempting to assess and predict food behavior are outlined.
T. F. R 9

10,266

Torrance, E.P., & Mason, R. PSYCHOLOGIC AND SOCIOLOGIC ASPECTS OF SURVIVAL RATION ACCEPTABILITY. *Amer. J. Clin. Nutrition*, March-April 1957, 5(2), 176-179. (Survival Research Field Unit, AFPRC, Stead AFB, Nev.).

10,266

This is one of a series of articles (see 10,261-10,267) presented at a symposium on the relation between behavior and diet. This article reports three studies designed to assess the socio-psychological acceptability of a survival ration. Utilizing a total of 1152 subjects, an emergency ration, "Ration, Special Survival, RS-1" containing pemican, a meat food product of low acceptability rating, was presented under simulated survival situations to each of three experimental groups. Methods of pemican preparation were varied. The results are presented and discussed in terms of the relation of pemican acceptability to a variety of psychological and sociological factors, e.g., motivation, early experience, and so forth.

T. R 5

10,267

Brozek, J. NUTRITION AND BEHAVIOR. AN EPILOGUE. *Am. J. Clin. Nutrition*, March-April 1957, 5(2), 332-343. (University of Minnesota).

10,267

This is one of a series of articles (see 10,262-10,267) presented at a symposium on the relation between diet and behavior. This article presents a survey of the current trends in research concerned with the relation of nutrition and behavior and a selective bibliography of pertinent references. Methodology, clinical and experimental studies, food flavor and acceptability, and other such topics are utilized to delineate the various aspects of the general problem.

R 78

10,268

Booyens, J., & McCance, R.A. INDIVIDUAL VARIATIONS IN EXPENDITURE OF ENERGY. *The Lancet*, Feb. 1957, 1, 225-229. (University of Cambridge).

10,268

The research reported in this article was designed to assess the existence of individual variations in the expenditure of energy and to discover the causal factors underlying such variations. A trial investigation was conducted in which the metabolic rates of 36 male and female subjects were determined while they were in the basal state. Six subjects manifesting energy expenditures at the extremes of the normal range were selected and studied in detail for a period of from seven to 14 days. Caloric intake and energy expenditure were assessed while the subjects performed a variety of tasks. Results are discussed in terms of the validity of contemporary definition of normal basal rates and the potential causal factors in variations as a function of weight, type of activity, and so forth. T. G. R 6

10,269

Kennedy, A. INDIVIDUAL REACTIONS TO CHANGE AS SEEN IN SENIOR MANAGEMENT IN INDUSTRY. *The Lancet*, Feb. 1957, 1, 261-263. (University of Edinburgh).

10,269

The author presents a discussion of the factors felt to be operant in the reaction of an individual to change within the context of industrial management. The response to stress as induced by the complex adaptation demands of change of task, the role of selection and placement, the relation of maturity and insecurity to efficiency, and other similar aspects receive primary consideration.

10,270

Woodward, F.D. GENERAL MEDICAL ASPECTS OF AUTOMOBILE CRASH INJURIES AND DEATHS. *J. Amer. Med. Assoc.*, Jan. 1957, 162(4), 225-227. (University of Virginia, Charlottesville, Va.).

10,270

In this discussion of automobile crash injuries and deaths, the author emphasizes the importance of the design of safety factors in cars and elaborates on certain specific safety features, e.g., belts, harnesses, padding, etc. The role of alcoholism is discussed along with the problem of effective screening of the driver.

R 1

10,271

Guerry, D. OPHTHALMOLOGICAL ASPECTS OF DRIVER LICENSING AND REPEAT OFFENSES. *J. Amer. Med. Assoc.*, Jan. 1957, 163(4), 227-228. (Medical College of Virginia).

10,271

The author discusses the role of visual dysfunctions in highway safety with emphasis on the lack of standardized visual requirements, the potential role of screening programs, the potential role of visual dysfunction in the repeat offender, and the implications of certain basic optical principles in the design of the automobile windshield.

R 1

10,272

Boies, L.R. OTOLOGICAL ASPECTS OF CRASH INJURIES. *J. Amer. Med. Assoc.*, Jan. 1957, 163(4), 229-230. (University of Minnesota, Minneapolis, Minn.).

10,272

This is a brief article in which the author defines the role of hearing impairment in highway safety. The criteria for assessment of hearing for licensing, the role of vertigo in highway safety, and a specific recommendation concerning the minimal hearing acuity necessary for safe driving, are among the aspects discussed.

10,273

Kulowski, J. ORTHOPEDIC ASPECTS OF AUTOMOBILE CRASH INJURIES AND DEATHS. *J. Amer. Med. Assoc.*, Jan. 1957, 163(4), 230-233.

10,273

In this discussion of the orthopedic aspects of automobile crash injuries and deaths, the author emphasizes the need for designing the automobile to eliminate certain hazards to the operator on the basis of existent knowledge of the human body. Accident prevention and the reduction of injury potentials in the design of the automobile are discussed and a table is presented offering information concerning types of crash force, injuries resulting, and necessary counterbalance safety device.

T.

10,274

McFarland, R.A. PSYCHOLOGICAL AND PSYCHIATRIC ASPECTS OF HIGHWAY SAFETY. *J. Amer. Med. Assoc.*, Jan. 1957, 163(4), 233-237. (Harvard School of Public Health).

10,274

The author presents a review and evaluation of studies concerned with the role of the human factors in accident causation. Data are presented and discussed in relation to the methodological approach to the problem, the attitudes and personal characteristics of accident repeaters, and the influence of age, fatigue, and automotive equipment design on highway safety. The role of the physician in accident prevention is defined.

T. R 7

10,275

Berry, M. HELICOPTER FLIGHT SIMULATOR. *Amer. Helicopter*, Oct. 1957, 40(11), 10-12.

10,276

In this article the author describes a helicopter flight simulator designed by the Research Department of Short Brothers and Harland, Limited. The various components of the simulator are defined and its special features discussed. The apparatus utilized to provide the various displays is also described.

10,277
Williams, C. BELL SIMULATOR. Amer. Helicopter, Nov. 1957, 48(12), p9.

10,277
This article presents a brief description of the Bell simulator, a flight simulator designed to simulate helicopter blind flight. The components of the simulator are described along with the various tasks it presents to the pilot.
1.

10,278
Sutton, J. LET'S ELIMINATE A STATISTICAL STIGMA "PILOT ERROR". Flying, Feb. 1958, 62(2), 28-29, 80, 82. (Human Engineering Group, Convair-San Diego, Calif.).

10,278
The author discusses the concept of pilot error in terms of its definition application, and relative role as a causative factor in accidents. Techniques for minimizing pilot error are outlined and refer primarily to training and design of the aircraft and its controls. Certain design criteria are enumerated and discussed.
1.

10,279
Geyer, B.H., & Johnson, C.W. MEMORY IN MAN AND MACHINES. General Electric Rev., 1957, 60(2), 29-33.

10,279
This article presents an extensive discussion of the memory function (the storage of information) in man and machines. Information is defined in terms of "bits" and then a comparison is made of the relative efficiency of the human brain versus electronic devices in the storage and integration of such information. Various storage devices are described and the future requirements of such devices discussed.
1.

10,280
Fletcher, H. AN ACOUSTIC ILLUSION TELEPHONICALLY ACHIEVED. Audio, July 1957, 41(7), 22-23.

10,280
The author describes a binaural illusion presented at the American Academy of Music in Philadelphia in 1952. Illustrations and descriptions of the various equipment components utilized and an evaluation of the effect of the illusion are included.
1.

10,281
Snow, W.B. AUDITORY PERSPECTIVE. Audio, 1957, 41(8), 20-21, 45-46.

10,281
In this discussion of auditory perspective, the author presents a quantitative evaluation of two- and three-channel stereo systems. Included are evaluations of various microphones, loudspeakers, and their combinations. Angular and depth localization reverberation differences of loudness in the two ears, and similar topics are treated in the discussion.
G. I. R 1

10,282
Bodoll, E.H. AUDITORIUM ACOUSTICS AND CENTRAL FACILITIES FOR REPRODUCTIONS IN AUDITORY PERSPECTIVE. Audio, 1957, 41(9), 24, 86-88.

10,282
In this article the author discusses the role of the acoustic characteristics of the auditorium and the types of control facilities to be utilized in the optimal production of auditory perspective. Room coloring, audience reception, localization, and many other aspects are treated in this discussion.
G. I.

10,283
Thurman, A.L. LOUDSPEAKERS AND MICROPHONE FOR AUDITORY PERSPECTIVE. Audio, 1957, 41(10), 34-36.

10,283
This is a brief article in which the author describes the loudspeaker and microphone components utilized in Constitution Hall in April, 1933, to provide auditory perspective. The general auditory principles involved in auditory perspective are elaborated and discussed in terms of provision of the optimal perspective effect.
G. R 2

10,284
Fletcher, H., & Munson, W.A. LOUDNESS, ITS DEFINITION, MEASUREMENT AND CALCULATION. PART I. Audio, 1957, 41(11), 53-54, 56, 58.

10,284
This is the first of a two part article on the definition, measurement and calculation of loudness. In this article the authors treat the following aspects of loudness: sound intensity, reference intensity, loudness level, intensity level, reference tone and the manner of listening to sound. A formulation of the empirical theory for calculating the loudness level of a steady complex tone is presented and discussed in detail.
R 4

10,285
Fletcher, H., & Munson, W.A. LOUDNESS, ITS DEFINITION, MEASUREMENT AND CALCULATION. PART II. Audio, 1957, 41(12), 40, 42, 44, 46, 48, 83.

10,285
This is the second of a two part article (see 10,284) on the definition, measurement and calculation of loudness. In this section the authors treat the field calibration of telephone receivers, the determination of loudness level contours, and the calculation of various aspects of loudness under varied conditions (e.g., masking, etc.). Tables are presented to illustrate among other aspects, the differential between calculated and observed fractional loudness.
T. G. R 4

10,286
Cooper, G.E. UNDERSTANDING AND INTERPRETING PILOT OPINION. Aeronaut. Engng. Rev., March 1957, 16(3), 47-51, 56. (Ames Aeronautical Lab., NACA, Moffett Field, Calif.).

10,286
In this article the author outlines the various approaches utilized in insuring reliability and validity of data obtained in surveys of pilot opinion with primary emphasis upon definition of the most effective type of question to be utilized in such surveys. Treatment of the answers, the effects of pilot experience and background, and the applicability of the information obtained to aircraft equipment design, reflect the additional aspects which are treated in the discussion.
G. I.

10,287
Ramo, S. THE NEW EMPHASIS ON SYSTEMS ENGINEERING. Aeronaut. Engng. Rev., April 1957, 16(4), 40-44.

10,287
In his discussion of systems engineering the author describes the techniques, methodology, problems, and primary goals of this discipline. The training of systems engineers, system stability, the role of simulation, and the types of systems analyses which may be utilized, and the common characteristics of systems engineering tasks reflect the primary issues which are discussed.

10,288
Hasbrook, A.H. GREATER SAFETY THROUGH CRASH INJURY ANALYSES. Aeronaut. Engng. Rev., June 1957, 16(6), 67-69. (Aviation Crash Injury Research of Cornell University).

10,288
The goals of aviation safety and crash injury research are defined and the application of accident prevention techniques discussed. The design features of contemporary and future aircraft which introduced safety hazards are outlined and discussed in terms of their implication for the provision of optimal crash protection.

10,289

C'Donnell, W. NEW ANTI-COLLISION LIGHTS WIN PILOTS' FAVOR. Amer. Aviation, May 1957, 20(25), p34, 37.

10,289

This article describes a white strobe light system designed to provide positive directional indication along with the general indication of the approach of an aircraft. Pilot reactions to these anti-collision lights are noted and relative effectiveness of various mountings discussed. An illustration of the collision zone is presented and the average closure time for aircraft in collision courses from various approach angles is indicated. I.

10,290

Pierce, J.R., & Earlin, J.E. INFORMATION RATE OF A HUMAN CHANNEL. Proc. I.R.E., 1957, 45(3), p.368. (Bell Telephone Labs., Inc., Murray Hill, N.J.).

10,290

This is a brief article in which the authors present the results of research pertinent to the information rate of the human as a channel of communication. Reading rates expressed as bits per second, are presented in tabular form for the following varied conditions: number of syllables per word, form of the message (e.g., prose repetitive phrases, etc.), and reading while simultaneously tracking. Man's limitations as a communication channel are discussed briefly. G. R 5

10,291

Hardy, H.C. A GUIDE TO OFFICE ACOUSTICS. Architect. Record, 1957, 121(2), 235-240.

10,291

This article is concerned with the design of the environment to provide optimal acoustical conditions. Criteria are offered with regard to the definition of acoustical acceptance within the office environment; they pertain to the degree of noise which is acceptable, the extrinsic and intrinsic factors which contribute noise to this type of environment, the application of sound-proofing materials, the arrangement of office equipment, and the definition of adequate acoustics. Also offered, in tabular form, are data reflecting the differential loudness of various human environments. T. G. I.

10,292

Suckling, E.E., Koenig, E.H., Hoffman, B.F., & Brooks, C.M.C. THE PHYSIOLOGICAL EFFECTS OF SLEEPING ON HARD OR SOFT BEDS. Hum. Biol., 1957, 29(3), 274-288. (Psychology Dept., State University of New York).

10,292

To determine whether there is variation in certain physiological reactions recorded during sleep which can be related to type of supporting surface of the sleeper, four subjects were observed for a total of 90 sleep nights. The EEG (electro-encephalogram), heart rate, body movement, and skin temperature were recorded from each subject as he slept on a soft surface (feather bed) medium surface (innerspring mattress) or a hard surface (board covered by thin carpet). Sound stimuli were used at intervals during the EEG recording to evaluate depth of sleep. These data were analyzed for relationships between them and the supporting surfaces. Individual preferences were treated. T. G. R 6

10,293

Morrell, D.J. DOMINANCE OF EYE AND HAND. Hum. Biol., 1957, 29(4), 314-327. (University of Minnesota).

10,293

To investigate various aspects of eye and hand dominance, 123 subjects were tested for dominant eye and dominant hand (needle threading, throwing, striking match, writing, and yicking). These data were analyzed by correlational methods for relationships between dominant eye and hand. In addition, data on handedness was obtained, through correspondence, on 103 sets of parents and children and studied for hereditary inferences. The findings are compared with similar studies in the literature. T. R 34

10,294

McFarland, R.A. HUMAN LIMITATIONS AND VEHICLE DESIGN. Ergonomics, 1957, 1(1), 5-20. (Harvard School of Public Health).

10,294

This paper reviews an extensive research project on human variables in the design and operation of vehicular equipment, with particular reference to efficiency and safety. The various procedures used to collect and evaluate the necessary data are discussed and the following studies are described: size range of professional drivers, evaluation of trucks and buses, operational studies of driver activities (activities and work-load analysis, operating proficiency, eye-movements in relation to displays, and critical incidents analysis), and studies on visibility and design of windshields (man's area of vision, visibility through tinted windshields at low illumination). T. G. I. R 17

10,295

Broadbent, D.E. EFFECTS OF NOISES OF HIGH AND LOW FREQUENCY ON BEHAVIOR. Ergonomics, 1957, 1(1), 21-29. (Applied Psychology Unit, Medical Research Council, Cambridge, England).

10,295

To investigate the effects of noise frequencies on performance: (1) Three groups of eight subjects worked for two 25-minute sessions in noise (intensities of 60, 90, and 100 decibels respectively) at a five-choice serial reaction task. During one session the noise was restricted to frequencies above 2000 cycles per second, and during the other frequencies below. Error data were analyzed for effects of frequencies and intensities. (2) Reaction times to these same noise frequencies at the lowest and highest intensity levels were measured on 26 subjects. The results from both experiments were analyzed in terms of the manner in which noise affects performance. Practical implications are discussed. T. R 15

10,296

Scholz, H. CHANGING PHYSICAL DEMANDS OF FOUNDRY WORKERS IN THE PRODUCTION OF MEDIUM WEIGHT CASTINGS. Ergonomics, 1957, 1(1), 30-38. (Max-Planck-Institut fur Arbeitsphysiologie, Dortmund, Germany).

10,296

This paper reviews extensive investigations in evaluating the degree of working stress in seven foundries producing medium weight castings. The methods used to gather and evaluate the data are listed: time studies, work intensity, extent of muscular fatigue, measurement of bodily performance capacity and measurements of noise and heat stress. Summaries of the results concerning physical demands in mechanized and non-mechanized foundries are discussed. Examples are given in which the findings are used as a basis for advice on methods of rationalization and mechanization for increased production at reasonable work loads for the worker. G. I. R 11

10,297

Collins, J.B., & Hopkinson, R.G. INTERMITTENT LIGHT STIMULATION AND FLICKER SENSATION. Ergonomics, 1957, 1(1), 61-76. (Dept. of Scientific and Industrial Research, Building Research Station, London, England).

10,297

To study the variability of frequency of intermittent light stimulus required for constant criteria of flicker discomfort, flicker judgments were obtained from 20 subjects. In one series of experiments the whole visual field was stimulated, in another a field of approximately 20 by 30 degrees. Four criteria of flicker sensation were used: just perceptible, just obvious, just uncomfortable, and just intolerable. Except in a series carried out to determine adaptation to flicker the method of decreasing frequency was used. The data were analyzed for effects of size of visual field, subject variability, adaptation and frequency. The use of the data to predict degree of complaint about lighting installations is discussed. T. G. I. R 18

10,298
Karlin, J.E. CONSIDERATION OF THE USER IN TELEPHONE RE-
SEARCH. *Ergonomics*, 1957, 1(1), 77-83. (Bell Tele-
phone Labs., Inc., Murray Hill, N.J.).

10,298
This paper discusses formal preference research among
telephone users that aims to guide technical research
and development. Some general problems of methods for
investigating preferences (polling, observation, and
simulation) are discussed and illustrated with examples
obtained in the course of telephone-user research.
Principles that are felt to be fundamental and well-
established are enumerated.

T.

10,299
Schwab, R.S. FACTORS IN FATIGUE AND STRESS IN
THE OPERATION OF HIGH-SPEED DIESEL PASSENGER
RAILWAY CARS WITH ONLY ONE DRIVER PRESENT.
Ergonomics, 1957, 1(1), 84-90. (Harvard Med-
ical School).

10,299
This paper presents a case study of a railroad en-
gineer, age 74, who had on several occasions forgotten
to stop his train at certain stations and had had one or
two minor accidents. In addition to the medical examina-
tion, an observer accompanied the engineer on one of his
runs (a 200-mile trip) in a high-speed diesel car of
which he was the sole operator. Observations of factors
which increased both fatigue and stress are noted and
discussed. Recommendations for remedial action are
included.

10,300
Quinn, J.D. DEVELOPMENTS IN THE ANALYSIS OF
MAINTENANCE PROBLEMS. *Mech. Engng.*, 1957,
79(10), 931-933. (E.I. du Pont de Nemours &
Co., Wilmington, Del.).

10,300
This paper discusses available means for accumulating
adequate data on equipment component performance which
will permit systematic analysis of the maintenance prob-
lems. The use of equipment to facilitate correction of
these problems is also discussed. Accounting methods,
equipment-history cards, and adaptation of recording
equipment developed primarily for production control are
described in relation to data gathering. Types of data
analysis for proper diagnosis of difficulties as well as
for evaluation of improvements being considered and,
later, to establish effects of improvements are detailed.

G. I.

10,301
Mechanical Engineering. MAN AND HIS THERMAL ENVIRONMENTS.
Mech. Engng., Nov. 1957, 79(11), 1029-1036.

10,301
This report presents condensed versions of six papers
contributed by the Heat Transfer Division and presented
at the Semi-Annual Meeting, San Francisco in June 1957
of the American Society of Mechanical Engineers. All the
papers relate to a new design factor confronting engi-
neers - human tolerance to heat or cold. Topics and
authors are: factors in heat stress (Alan E. Woodcock),
the body as a heat exchanger (L. P. Herrington), reaction
to extreme heat (Konrad Bueltner), reaction to extreme
cold (P. P. Meehan), exposure to infrared radiation (E.
Bendler), and histologic studies of burns (J. R. Hinshaw).

T. G. I. R 7

10,302
Gould, A.F. MATERIALS IN MOTION. *Mech.
Engng.*, 1957, 79(12), 1116-1118. (Lough
University).

10,302
This paper reviews new analytical methods that are
primarily associated with operations research but also
could prove to be useful for the materials-handling engi-
neer. These methods are: (1) work sampling, (2) waiting
line, or queueing theory, and (3) linear programming.
Applications to the solutions of shop problems, including
materials handling, are given to illustrate possible
uses.

T.

10,303
Wilson, R.B. DESIGNING EQUIPMENT FOR RELIABILITY. *Mech.
Engng.*, 1957, 79(12), 1142-1144. (General Dynamics Corp.,
San Diego, Calif.).

10,303
Reliability concepts as applied to equipment design
are defined and discussed. Procedures for solving re-
liability problems are outlined beginning with systems re-
quirements, environmental factors to which the equipment
may be subjected, design stage, testing or "search for
critical weakness", and analyses of failures. A list of
design check-points and a form for reporting failures or
malfunctions are given.

T. G. I.

10,304
Massey, B.H. & Chaudet, M.L. EFFECTS OF SYSTEMATIC,
HEAVY RESISTIVE EXERCISE ON RANGE OF JOINT MOVEMENTS IN
YOUNG MALE ADULTS. *Res. Quart.*, 1956, 27(1), 41-51.
(University of Maryland, College Park, Md.).

10,304
To investigate the effects of systematic, heavy resis-
tive exercise on the range of joint movements, two
matched groups of 13 young, male subjects were studied.
One group was trained in weight-lifting for six and one-
half months; the second group participated in general
physical education activity. Measurement of height,
weight, girths, joint movement (elbow, shoulder, knee,
and hip) and strength was conducted prior to, midway in,
and at the end of training. The data were analyzed for
differences due to weight-training program. The find-
ings are discussed in relation to "muscle-boundness"
believed to be induced by such activities as weight
training.

T. R 13

10,305
Vanderbie, J.H. METABOLIC COST OF SIMULATED
PULLING ON THE TREADMILL. *Res. Quart.*, 1956,
27(1), 111-116. (USA Quartermaster Research
and Development Center, Hattick, Mass.).

10,305
To investigate physiological changes in the body pro-
duced by sled-pulling, 12 men were studied on a simulat-
ed sled-pulling task before and after going a period of
work in Fort Churchill, Canada. Metabolic rates and
pulse responses to an exercise consisting of pulling
against a drag of 17.5 pounds while walking on a tread-
mill (2.5 and 3.5 miles per hour, with and without a
44-pound load) were measured. Metabolic rates, expressed
as Calories per square meter of body surface per hour
(Cal/M²/hr), and pulse rates were analyzed for effects of
the pull under the various speed and load conditions.
The possible applications of these experimental procedures
in designed experiments, clothing tests, and progressive
conditioning are discussed.

T. R 6

10,306
Clarke, H.H. RECENT ADVANCES IN MEASUREMENT AND UNDER-
STANDING OF VOLITIONAL STRENGTH. *Res. Quart.*, 1956, 27
(3), 263-275. (University of Oregon, Eugene, Ore.).

10,306
This report presents a critical discussion of some
strength measurement devices and reviews recent studies
on volitional muscular strength of the human organism.
The cable tensiometer, Newmen myometer, strain gauge de-
vices, and the Kelso Mellebrandt ergograph are described
briefly and their use indicated. Body position and
strength application, the relationship of strength to
endurance, training and various anthropometric measures,
and strength-decrement fatigue patterns are discussed.

R 45

10,307
Rasch, P. EFFECT OF POSITION OF FOREARM ON
STRENGTH OF ELBOW FLEXION. *Res. Quart.*, 1956,
27(3), 333-337. (Los Angeles County Osteo-
pathic Hospital, Los Angeles, Calif.).

10,307
To determine the effect of the position of the fore-
arm on the strength of elbow flexors with the subject
in the erect position normally assumed for manual labor
or operation of control panels, 24 adult male subjects
were tested. Strain gauge dynamometer measurements of
the amount of elbow flexor tension which could be exerted
with the forearm in the supine position, the midposition
and the prone position. The strength scores in pounds
were analyzed for differences due to forearm position.

T. I. R 8

10,308
Hunsicker, P., & Greay, G. STUDIES IN HUMAN STRENGTH. Res. Quart., 1957, 28(2), 109-122. (University of Michigan).

10,308
This paper reviews investigations in human strength and is primarily concerned with the area of strength testing. The results of such tests and relationships between strength and age, skeletal position, body build, and exercise are presented. Some theoretical considerations regarding strength are dealt with and gaps in present knowledge are indicated.
R 89

10,309
Slater-Hammel, A.T. MEASUREMENT OF KINESTHETIC PERCEPTION OF MUSCULAR FORCE WITH MUSCLE POTENTIAL CHANGES. Res. Quart., 1957, 28(2), 153-159. (Indiana University, Bloomington, Ind.).

10,309
To explore the usefulness of muscle potential measurements in the study of kinesthetic perception, forty subjects (twenty male and female with half of each group physical education majors) were given practice in contracting the triceps brachii at an intensity necessary to generate muscle potentials of approximately 150 microvolts. An electronic voltmeter was used to provide subject with information on his muscular force. Following practice, each subject attempted to reproduce the same muscular force without the voltmeter for a series of trials. Performance (error data) was analyzed for reliability of test methods and for differences due to sex and training in physical exercise.
T. R 11

10,310
Ulrich, Celeste & Burke, R. EFFECTS OF MOTIVATIONAL STRESS UPON PHYSICAL PERFORMANCE. Res. Quart., 1957, 28(4), 403-412. (Women's College, University of North Carolina, Chapel Hill, N.C. & Occidental College, Los Angeles, Calif.).

10,310
To investigate the effects of "encouraging" reports of success and "discouraging" reports of failure on work output, mechanical efficiency, and associated cardio-respiratory functions, 18 subjects (nine men and nine women) were studied. Three one-minute trials on a frictional bicycle ergometer were given: (1) base trial with knowledge of results given verbally, (2) buzzer, signalling poorer performance than on base trial, and (3) bell, signalling better performance. Half the subjects were assigned to bell-buzzer and half to buzzer-bell order. Pulse rate, respiratory rate, oxygen consumption, ergometer work (calories per hour), and gross mechanical efficiency (a derived measure) were analyzed for differences due to motivating conditions and sex.
T. R 2

10,311
Peterson, A. NOISE MEASUREMENT AT VERY HIGH LEVELS. Noise Control, 1956, 2(1), 20-26. (General Radio Co., Cambridge, Mass.).

10,311
In this paper, the instrumentation and problems of high-level noise measurement are discussed. The limitations and useful features of a number of microphones used for measurement features are explored: the Rochelle-salt crystal microphone, the condenser microphone, the dynamic type microphone, the ADP (ammonium dihydrogen phosphate) crystal type, and other types such as hydrophones and blast gages. Methods of extending the range of a particular soundlevel meter are described.
G. I. R 5

10,312
Hunter, Gertrude S. SOUND REDUCTION PROGRAM FOR CONVAIR-LINER 340. Noise Control, 1956, 2(1), 27-32. (Engng. Dept., Convair Co., San Diego, Calif.).

10,312
A test model Convair-Liner 340 with sound modifications, designed to provide a quiet passenger cabin, is described. The design criteria based upon two groups of octave bands (S, or arithmetic average of noise levels in three bands covering range of frequencies important to speech communication and A, or arithmetic average of two bands at lower end of frequency spectrum) and initial sound level measurements are discussed. Three major phases of the program are presented: (1) analyses of existing noise levels and specification of noise reduction measures, (2) implementation, and (3) evaluation. Procedures and results obtained are described and presented graphically.
T. G. I. R 1

10,315
Wheeler, D.E., & Glorig, A. THE INDUSTRIAL HYGIENIST AND EAR PROTECTION. Noise Control, 1956, 2(1), 45-49, 72. (Subcommittee on Noise in Industry, Committee on Conservation of Hearing, American Academy of Ophthalmology & Otolaryngology).

10,315
This article outlines the problems with which the industrial hygienist in charge of a hearing conservation program must cope - in particular the use of personal protective equipment. The properties of ear protectors are discussed in terms of principles of ear protection, factors producing variability in amount of protection provided, methods of testing an ear protection, and medical aspects of ear protection. Interaction between protectors and the men who must wear them is treated.
G. I. R 7

10,316
McAuliffe, D.R. 1 PICAL FACTORY AND OFFICE NOISE PROBLEMS IN AN AIRCRAFT PLANT. Noise Control, 1956, 2(2), 22-25, 90. (Armour Research Foundation of Illinois Institute of Technology).

10,316
This paper provides some details concerning noise problems that are peculiar to the aviation industry and describes their solutions in one plant. The problems include: (1) the drop hammer room, (2) the engine test stand with test house, (3) the airplane run-up mufflers, (4) vibration isolation of motor-generator sets, and (5) a useful audiometric room.
G. I.

10,317
Peterson, A. THE MEASUREMENT OF IMPACT NOISE. Noise Control, 1956, 2(2), 46-51, 100. (General Radio Co., Cambridge, Mass.).

10,317
This paper discusses the characteristics of impact noise and the need for a new instrument for its measurement. A new Type 1556-A Impact Noise Analyzer is described and measurement procedures discussed. Results from noise measurements on a punch press are presented. The limitations of the instrument and the need for research on impact noises are discussed.
G. I. R 4

10,319
Bolt, R.H. CRITERIA FOR NEIGHBORHOOD NOISE CONTROL. Noise Control, 1956, 2(4), p. 20. (Massachusetts Institute of Technology & Bolt Beranek & Newman, Inc., Cambridge, Mass.).

10,319
This is an abstract of a paper presented to the West Coast Noise Symposium in Los Angeles, 1955. The criteria proposed are: (1) intrusion factor, (2) warning of unpleasantness or danger, and (3) interference.
I.

10,321

Wheeler, D.E. PROPER INDUSTRIAL AUDIOMETRIC ENVIRONMENTS. Noise Control, July 1956, 2(4), 61-63, 91.

10,321

This paper outlines some of the principles that govern the selection of a proper environment in which to conduct industrial audiometry. Samples of noise spectra taken in areas proposed as suitable locations in several industrial plants are shown. From these examples it seems evident that further treatment would be necessary to meet required standards. Prefabricated booths are suggested and recommendations are made as to methods for evaluating their efficiency.

G.

10,323

Berger, R.L. & Ackerman, E. THE PENN STATE ANECHOIC CHAMBER. Noise Control, Sept. 1956, 2(5), 16-21. (Pennsylvania State University, University Park, Penn.).

10,323

The design, construction, and calibration of an anechoic chamber are presented in detail. The noise levels in the chamber are such (per cycle level at least ten decibels below the MAF - minimum audible field - curve) that no masking of hearing due to noise should occur. Free-field studies on electro-acoustic equipment can also be made in the chamber. The overall sound level in the frequency band of 20 cycles per second to ten kilocycles of approximately 20 decibels is sufficiently low to be negligible for all acoustical experiments.

G. I. R 7

10,324

Patterson, W.H., & Northwood, T.D. NOISE CONTROL IN TORONTO'S NEW SUBWAY. Noise Control, Sept. 1956, 2(5), 28-32, 62.

10,324

This paper discusses the sources of noise in subway systems and the consequent problems of noise produced within the subway and noise produced in buildings adjacent to the subway. Methods of dealing with both types of problems are reviewed. Noise control measures applied to the Toronto Transit System are described.

T. I. R 3

10,325

Christman, R.P., Jones, H.H., & Baker, R.E. SOUND-PRESSURE LEVELS IN THE WOOD PRODUCT INDUSTRY. Noise Control, Sept. 1956, 2(5), 33-38, 72.

10,325

To give a comprehensive picture of worker exposure to sound in the wood products industry and to demonstrate the effect of machine and operating characteristics on sound-pressure levels, 23 plants, both large and small, were selected from three major segments of the industry: saw and planing mills, miscellaneous wood products factories, and furniture factories. A total of 461 sound survey meter readings and 144 octave-band analyses were taken. The data were analyzed in terms of number of workers exposed to various ranges of sound pressure levels and average sound-pressure levels according to type of machine.

T. G. R 3

10,326

Farrack, H.O. NOISE, VIBRATION, AND PEOPLE. Noise Control, Nov. 1956, 2(6), 10-24.

10,326

In this paper the acoustic energy concept (interactions among acoustic energy sources, transfer paths, and receivers) is proposed for dealing with problems of acoustic energy from aircraft operations and its effect on people. Data from previous investigations on human responses and the parameters of the acoustic energy field to which they may be exposed are reviewed. The characteristics of some acoustic energy fields in which men must work are examined in terms of acoustic energy sources and the transfer characteristics of the atmosphere. Some conclusions are drawn from these data with respect to the people--aircraft passengers, crew, maintenance and support personnel, men outside airports--in these noise fields. Future problems are discussed.

T. G. I. R 8

10,327

Olorig, A., & Quiggle, R. A HEARING CONSERVATION DATA CARD. Noise Control, Nov. 1956, 2(6), 34-35.

10,327

A hearing conservation data card, based upon two years of study and consultation with many large industrial companies and groups such as the Armed Services - National Research Council Committee on Hearing and Bio-Acoustics, is presented and discussed. The card is designed for general use and allows for recording only the minimum amount of data necessary to study the relations of hearing loss to noise exposure. The card has been precoded to facilitate transfer of data to punched cards. Information on the card can be used for a meaningful interpretation of the subject's audiogram.

I.

10,328

Beranch, L.J. REVISED CRITERIA FOR NOISE IN BUILDINGS. Noise Control, Jan. 1957, 3(1), 19-27.

10,328

This paper summarizes a detailed study of noise in office space made to determine the maximum noise level at which personnel feel they can work without loss of efficiency. Two independent field checks were made of the conclusions. Based upon an analysis of these data, noise criteria and octave-band noise criteria curves are recommended for use in specifications for offices and rooms of various types. These criteria represent a revision of earlier ones published by the author. An appendix gives directions and nomograms for computing loudness levels from sound pressure level.

T. G. R 9

10,329

Ward, W.D. THE SINGLE-DESCENT GROUP AUDIOMETER. Noise Control, May 1957, 3(3), 15-18.

10,329

This paper describes briefly the use of the method of single-descent for group audiometer by which a complete audiogram, covering a range from -20 to 70 decibels hearing loss in about ten minutes on as many men as space permits. A staff of three are required. The method, procedures for administration and recording results, sources of variability and methods for minimizing these are discussed.

G. I. R 9

10,330

House, H.P. GUIDE FOR CONSERVATION OF HEARING IN NOISE. Noise Control, May 1957, 3(3), 23-31. (Research Center, Subcommittee on Noise in Industry, Los Angeles, Calif.).

10,330

The purpose of the Guide is to assist members of the industrial community in their efforts to protect hearing. The information presented is based on both clinical and industrial experience and from research. Included are a summary of basic information about hearing loss and noise exposure, an outline of a hearing conservation program, and a discussion of procedures for carrying out the program. This letter contains technical information on assessment and control of noise-exposure and measurement of hearing methods and equipment.

T. R 15

10,331

Hayes, S.B. MEDICAL ASPECTS OF NOISE; BLAST AND VIBRATION. Noise Control, May 1957, 3(3), 39-41, 62.

10,331

This paper discusses the concern of the Medical Services with high levels of noise and hearing conservation programs, with keeping vibration within the limits of tolerance for human operators of military equipment, and with effects of repeated low-level shock waves as well as the effects of high-level shock waves at greater intervals. Medical aspects of each condition are treated briefly and typical hazardous situations in the Army where each arise are described. Research should aim for protection of military personnel as well as appropriate therapeutic procedures and measures.

10,332
Dentler, W.C. OPERATIONAL PROBLEMS AND ASPECTS OF NOISE. Noise Control, May 1957, 3(3), 41-43, 52.

10,332
This paper discusses the loadings imposed upon military operations by the great amount of noise produced by equipment and activities. The fundamental military need is for more power and thus more noise can be expected. Examples of situations where advances in performance are allowed by noise and vibration problems are given. Present noise abatement and protection procedures are related to new problems of maintenance, lubrication, public relations, and the like. The need for greater effort in the future is emphasized.

10,333
Bennett, E. RESEARCH REQUIREMENTS AND TECHNIQUES. Noise Control, May 1957, 3(3), 43-44.

10,333
Three major areas in hearing and bio-acoustics where research and development are urgently required are discussed: (1) effects of noise on human beings and protection from such effects, (2) the need for more engine power with less noise, and (3) development of instrumentation for high-level noise measurements. Examples from each area are given and the need for new approaches to the problem is stressed.

10,334
Lane, E.V. NOISE CONTROL IN SCHOOLS. Noise Control, July 1957, 3(4), 27-34. (Somer and Lane, Consultants in Acoustics, Austin, Tex.).

10,334
The major steps in noise control for schools are outlined and discussed: (1) location of building site, (2) locating noisy rooms, such as music rooms and gymnasiums, in relation to classrooms and other spaces where comparative quiet is needed, and (3) control of sound and noise inside and between the various spaces. Wall transmission loss caused by various factors of layout, construction and materials are treated with suggested corrective procedures to meet standard noise criteria. Problems specific to such areas as auditoriums, gymnasiums, music and shop rooms are explored.
G. L.

10,335
Loye, J.P. NOISE CONTROL IN HOTELS, HOSPITALS, AND MULTIPLE DWELLINGS. Noise Control, July 1957, 3(4), 35-37, 54.

10,335
The fundamental aspects of noise control for building in which many people live are presented. Noise control is here considered as an integral part of architectural planning and reduction techniques applying to control of outside noises (selection of site, noise survey, and building plans) and control of inside noises (people, radio and television sets, and machinery noise) are discussed. Recommended acceptable average noise levels are given for unoccupied rooms. Some acoustical control problems peculiar to the three types of buildings, particularly hospitals, are considered.
T. R 2

10,336
Goodfriend, L.S. NOISE CONTROL IN CIVIC BUILDINGS. Noise Control, July 1957, 3(4), 38-42, 60.

10,336
The basic properties of civic buildings are discussed in terms of uses to which the spaces are put and civic demands for size and aesthetic appearance. Acoustical requirements and balanced design are analyzed and some practical solutions offered to some noise control and reverberation problems. The use of functional or space absorbers, glass blocks and other materials for low frequency absorption is treated.
I.

10,337
Sachs, W.W. NOISE CONTROL IN OFFICE BUILDINGS. Noise Control, July 1957, 3(4), 43-49. (University of California, Berkeley).

10,337
Many of the aspects of office building design and construction which have a bearing on problems of acoustics and noise control are considered. Among the topics treated are office building location, certain wall construction, transmission loss of windows, acceptable noise levels, speech communication criteria, prefabricated partitions, and sound insulation of movable and fixed partitions. The value of a full-size mockup of a typical office section prior to construction of the building is pointed out.
T. L. R 40

10,339
Appel, J.C. RECENT DEVELOPMENTS IN TRAFFIC NOISE CONTROL. Noise Control, Sept. 1957, 3(5), 34-36, 60.

10,339
Evidence is presented that of all vehicular traffic, trucks, as a class, are considered too noisy and that mufflers are available which are capable of making them quiet. Records for the years following the 1954 new-vehicle noise specification of 125 cones (Automobile Manufacturers Association) are quoted to show that there are still many trucks exceeding the specifications. Probable factors and consequences in restrictive legislation are discussed.
T. G. R 4

10,340
Glorig, A. DAMAGE RISK LEVELS OR HEARING CONSERVATION LIMITS? Noise Control, Sept. 1957, 3(5), 41-42.

10,340
This paper defines the concept of damage risk level and discusses it in relation to the specific problem of noise-exposure. Limitations in the present state of knowledge about the relations of noise-exposure to hearing loss are pointed out and a tentative hearing conservation limit is suggested until damage risk criteria can be set.

10,341
Kryter, K.D. NOISE CONTROL CRITERIA FOR BUILDINGS. Noise Control, Nov. 1957, 3(6), 14-20. (Bolt Beranek and Newman, Inc., Cambridge, Mass.).

10,341
Criteria available for determining permissible noise levels for spaces in buildings are listed and discussed in terms of the way they have been set and the extent of their usefulness. They are: (1) disruption of work performance, (2) damage to the auditory mechanism, (3) annoyance, (4) speech interference, and (5) loudness level. Recommended criteria for various types of buildings are included.
G. R 17

10,342
Weiter, E.G. HEARING CONSERVATION IN INDUSTRY. Noise Control, Nov. 1957, 3(6), 38-41, 62.

10,342
This paper discusses the following aspects of putting a hearing conservation program for industry into effect: selling hearing conservation to management, noise measurements, reduction of noise exposure by engineering methods and by ear protection, and hearing evaluation. Practical suggestions are made concerning the implementation of each of these steps and guides are given to sources for necessary help and advice.
T. I. P 9

- 10,344
Perry, D.R. & Hayes, J.F. PREDICTION OF SOLDIERS' FOOD PREFERENCES BY LABORATORY METHODS. *J. appl. Psychol.*, Feb. 1957, 41(1), 2-5. (Quartermaster Food & Container Institute, Chicago, Ill.).
- 10,345
To compare food preference ratings of laboratory panels and soldier-consumer panels, 12 foods were selected for testing. All physical factors such as food source, methods of preparation, time of day, number of foods sampled per day were kept identical. Preference was measured by marking a nine-interval rating scale ranging from like extremely to dislike extremely. Forty laboratory personnel participated in each session in the laboratory testing rooms and fifty soldiers in each session at an army base dining hall. Mean preference ratings for laboratory and field were studied by correlational methods. Practical implications of the results for methods of food acceptance evaluation are discussed.
C. R. 4
- 10,346
Smith, A.A. & Hayes, G.E. VISIBILITY ON RADAR SCREENS: THE EFFECT OF CRT BIAS AND AMBIENT ILLUMINATION. *J. appl. Psychol.*, Feb. 1957, 41(1), 15-18. (Defence Research Medical Labs., Toronto, Canada).
- 10,345
To determine the optimal cathode-ray tube (CRT) bias and its interaction with ambient illumination, a series of experiments were conducted on a "noise-free" Plan-Position Indicator fitted with a 12-inch CRT. Visibility thresholds (minimum signal strength of target of first appearance) were measured in all the following tests: 1) CRT bias and ambient illumination were varied jointly over a range of values; 2) a suggested optimal CRT bias was determined in (1) and held constant while ambient illumination was varied to find an upper limit. Threshold visibility (decibels) was analyzed in terms of the variables. The findings are discussed in relation to those from earlier studies.
C. R. 5
- 10,346
Klare, G. R., Nichols, W.H. & Shuford, E. H. THE RELATIONSHIP OF TYPOGRAPHIC ARRANGEMENT TO THE LEARNING OF TECHNICAL TRAINING MATERIAL. *J. appl. Psychol.*, Feb. 1957, 41(1), 41-45.
- 10,346
To investigate the relationship of two newly developed methods of typographic arrangement (square span and spaced unit) to the learning of technical material, a 1,206-word printed lesson from an aircraft mechanics training course was divided into "thought units" and set up in both types of arrangement. A second version was constructed using shorter units than the first. The subjects (599 male airmen) were randomly assigned to one of the test versions (normal version included). Reading efficiency acceptability (preference for experimental or normal arrangement) and immediate retention (test following reading) were analyzed for differences due to versions.
R. 8
- 10,347
Bessey, E.G. & Machen, G.S. AN OPERATIONAL TEST OF LABORATORY DETERMINED OPTIMA OF SCREEN BRIGHTNESS AND AMBIENT ILLUMINATION FOR RADAR REPORTING ROOMS. *J. appl. Psychol.*, Feb. 1957, 41(1), 51-52. (Defence Research Medical Labs., Toronto, Canada).
- 10,347
To test the validity of laboratory findings on optimum screen brightness and room illumination for radar reporting, six regular service operators worked at a radar sight. They searched for targets, reported their positions for plotting and faced all conditions typical of an operational situation. In one condition the bias was set to give a just visible sweep line (VRI) and no ambient illumination; in a second the bias was seven volts positive from VRI and room illumination was 0.1 foot-candle. Performance (number of plots, aircraft tracks) was compared for the two conditions.
R. 4
- 10,348
Bartz, A.E. ATTENTION VALUE AS A FUNCTION OF ILLUMINANT COLOR CHANGE. *J. appl. Psychol.*, April 1957, 41(2), 82-84. (North Dakota University).
- 10,348
To study the effect of several characteristics of the visual task upon the speed and accuracy of visual search, two situations were investigated. Using a simulated instrument panel of 16 dial faces, the first situation required the subjects (64) to identify the number of dials deviating from normal position (from one through eight) with the normal red illumination. In the second, the error dials were accompanied by a change in illuminant from red to green. Performance (response time and number of errors) was analyzed as a function of number of dials in error and for effect of illuminant change.
T. G. I. R. 9
- 10,349
Hilding, D.H. DIRECTION OF MOTION RELATIONSHIPS BETWEEN CONTROLS AND DISPLAYS MOVING IN DIFFERENT PLANES. *J. appl. Psychol.*, April 1957, 41(2), 93-97.
- 10,349
To investigate the direction of motion relationships when display pointer moves at right angles to plane of rotation of the control knob, 710 subjects were tested by sequential methods on seven combinations of planes. The apparatus produced a single direction of movement of a pointer along a linear scale for either clockwise or anti-clockwise rotation of the control. Each subject was asked to set the pointer to an arbitrarily selected scale marking by means of the knob. Responses (direction of turning the knob) were analyzed by probability methods to determine whether the predominant response direction was significant.
T. I. R. 5
- 10,350
Weiss, E.C. AN EXAMINATION OF VISUAL ACUITY AND DEPTH PERCEPTION AS A FUNCTION OF MAGNIFICATION. *J. appl. Psychol.*, April 1957, 41(2), 104-109.
- 10,350
To examine the effectiveness of magnification as a visual aid to Ordnance optics, 20 men were tested under conditions of desert terrain and high ambient temperatures. Magnification was expressed by means of three pairs of binoculars (6 x 30, 7 x 50, and 10 x 50) and the naked eye. Visual acuity (Landolt Ring display at 100 yards) and depth perception (two tombstone targets at 200, 400, 800, and 1600 yards) were measured. The data for both tests were analyzed as a function of magnification. Recommendations for the magnification required for handheld binoculars are included.
T. G. R. 9
- 10,352
Thores, D.R. EXPOSURE TIME AS A VARIABLE IN DIAL READING EXPERIMENTS. *J. appl. Psychol.*, June 1957, 41(3), 150-152. (Duke University, Durham, N.C.).
- 10,352
To compare the relative legibility of horizontal, vertical, round, semi-circular, and open-window dials at four different exposure times (.50, .10, .04, and .02 seconds), 80 subjects were tested on nine settings of each dial at each exposure time. The dials were small, the round dial had a diameter of 7/8" with the others proportionately drawn, so that differences due to eye-fixation would be minimized. Error data were analyzed in terms of exposure time and dial type. The findings are discussed in relation to the validity of the tachistoscopic method of stimulus presentation for studies of this type.
T. R. 6

10,353

Weldon, R.J., & Peterson, G.M. EFFECT OF DESIGN ON ACCURACY AND SPEED OF OPERATING DIALS. *J. appl. Psychol.*, June 1957, 41(3), 153-157. (University of New Mexico).

10,353

To compare the accuracy with which information could be set into three types of multiturn dials on which a three-digit number could be set precisely, 124 subjects were tested. The dials included two commercially available types, scale-type and counter-type, and one experimental dial of a modified scale design. Subjects worked in pairs, making fifty settings according to instructions and checking settings of partners under normal illumination. Time and error scores were compared for differences due to dial design.

T. I. R 5

10,354

Roby, T.B., & Lanzetta, J.T. CONFLICTING PRINCIPLES IN MAN-MACHINE SYSTEM DESIGN. *J. appl. Psychol.*, June 1957, 41(3), 170-178. (Institute for Applied Experimental Psychology, Tufts University; Fels Group Dynamics Center, University of Delaware).

10,354

To investigate the concurrent operation of two principles in system design (autonomy and load balancing), 16 three-man teams operated simulated aircraft controls as indicated from readings on specific pairs of instrument displays. Each subject sat in a separate booth with interphone connection to the others. The two principles of design were varied by manipulating the number of displays and controls assigned to each subject with three resultant structures. Each team responded to 18 instrument changes (three repetitions) under each structure. Error scores (number of times a given control was not correctly set) were studied for differences due to experimental treatment. The findings are related to design of systems.

T. R 6

10,355

Pearson, R.G. SCALE ANALYSIS OF A FATIGUE CHECKLIST. *J. appl. Psychol.*, June 1957, 41(3), 186-191.

10,355

This report describes the development and validation of two 13-item fatigue checklists. The checklists were developed by the scale discrimination method. An experimental checklist was subjected to a test designed to provide data for item validity estimates and internal consistency item analyses. Subjects (48) completed the checklist before and after four hours work on a multi-dimensional pursuit task. After analysis of these data, two equivalent checklists were formed and tested as before. These data were further analyzed for equivalence and for validity. The methodology used is discussed at length and the uses of such a checklist are indicated.

T. R 10

10,357

Adams, H.L. THE COMPARATIVE EFFECTIVENESS OF ELECTRIC AND MANUAL TYPEWRITERS IN THE ACQUISITION OF TYPING SKILL IN A NAVY RADIOMAN SCHOOL. *J. appl. Psychol.*, Aug. 1957, 41(4), 227-230. (Human Factors Staff, Engineering Dept., Convair, San Diego, Calif.).

10,357

To compare electric and manual typewriters as teaching devices, the acquisition of typing skills required of radiomen was studied. Experimental and control groups (equated for age, education, general ability, code aptitude and typing experience) were trained on electric and manual typewriters, respectively, with the experimental groups transferring to manual typewriters for fourth week of training. A series of tests composed of cipher groups were used to measure typing proficiency. The data were analyzed for group differences in performance. Transfer effects were analyzed as well as final proficiency. Training recommendations are made.

T. G. R 3

10,358

Scheiss, E.H. THE EFFECTS OF SLEEP DEPRIVATION ON PERFORMANCE IN A SIMULATED COMMUNICATION TASK. *J. appl. Psychol.*, Aug. 1957, 41(4), 247-252.

10,358

To study the effects of loss of sleep on ability to send and receive complex instructions, twenty subjects were tested before, during, and after 55 and 70 hours without sleep. The sending task required the subject to observe the arrangement of a set of colored blocks (ten or twenty-five pieces) and to give oral instructions for reproducing the pattern, one piece at a time; the receiving task was to reproduce the pattern from recorded instructions. Accuracy of performance was analyzed in terms of decrement during the deprivation period. Qualitative observations on performance and feelings of fatigue and an analysis of performance and intelligence level were reported.

T. G. I. R 1

10,359

Knowles, W.B. & Newlin, E.P. REDUCTION CODING IN RESPONDING TO SIGNAL SEQUENCES. *J. appl. Psychol.*, Aug. 1957, 41(4), 257-262.

10,359

To compare several conditions of rate-paced signal groups with a control condition of self-paced single-item presentations, a 5 x 5 matrix of lights and a similar panel of pushbuttons were constructed. Five subjects responded to sequences of 60 signals presented in sub-sequences of two, three, or four signals per group with intervals of .37, .52, .62, or 1.02 seconds between items. A self-paced trial was given before and after each of eighteen series of rate-paced conditions. Speed and accuracy measures were compared. The rate of transmission of information was also calculated and used in the comparison. The findings are discussed in relation to coding problems.

T. G. R 8

10,360

Groth, Hilde, & Lyman, J. A COMPARISON OF TWO MODES OF PROSTHETIC PREHENSION FORCE CONTROL BY ARM AMPUTEES. *J. appl. Psychol.*, Oct. 1957, 41(5), 325-328. (University of California at Los Angeles).

10,360

To evaluate two principles of prosthetic terminal device control (voluntary closing, VC, and voluntary opening, VO), 20 unilateral below-elbow amputees (ten regular VO and ten VC hook wearers) served as subjects. Simple performance tests (Minnesota Rate of Manipulation Test and pickup, transport, and release of ten drinking straws and ten paper cups) were performed with prehension force continuously measured by strain gages attached to the prosthetic device. Prehension force data were analyzed for differences due to type of device worn. The range of forces that the wearers habitually use was assessed by supplementary interview.

G. I. R 6

10,361

Klemmer, E.T. RATE OF FORCE APPLICATION IN A SIMPLE REACTION TIME TEST. *J. appl. Psychol.*, Oct. 1957, 41(5), 329-332.

10,361

To investigate the relation between reaction time and response magnitude, an electrical strain gauge was fitted to a pressure key and continuous force records taken during the experiment. The subject was required to maintain a given force (from zero to twenty ounces) on the key previous to stimulus onset with two different amounts of additional force (one and twenty ounces) required to make the key pressing response. Reaction times (measured to first ounce and to twenty ounces of response) were analyzed as a function of changes in force required of the response. The practical implications of the findings are discussed.

T. G.

10,362

Rubin, L.S. MANUAL DEXTERITY OF THE GLOVED AND BARE HAND AS A FUNCTION OF THE AMBIENT TEMPERATURE AND DURATION OF EXPOSURE. *J. appl. Psychol.*, Dec. 1957, 41(6), 377-383. (Eastern Pennsylvania Psychiatric Institute, Philadelphia, Penn.).

10,362

To evaluate the dexterity afforded by two commercially available neoprene gloves that provide protection against chemical injury of the skin under conditions that could prevail during use, 72 subjects were tested. Dexterity tasks included three laboratory tests and one military task; six hand conditions (bare hands, two types neoprene gloves with and without liners, and a cotton glove) and four ambient temperatures (25, 50, 75, and 100 degrees Fahrenheit) and three exposure durations (40, 60, and 120 minutes) were used. Performance data were studied for relations among tasks, effects of gloves, temperature and duration of exposure. Practical implications of the results are discussed.

T. G. I. R 8

10,363

Murray, J.E. DEPTH PERCEPTION IN A STEREOSCOPIC DISPLAY AS A FUNCTION OF NUMBER OF STIMULI, DEPTH RANGE, AND NUMBER OF SCALE MARKERS. *J. appl. Psychol.*, Dec. 1957, 41(6), 414-418. (Fordham University, Fordham, N.Y.).

10,363

To determine the effectiveness of presenting three-coordinate data stereoscopically for use in an operational situation (targets on a radar display), subjects were tested on two tasks - ranking dots in order of depth and specifying the actual depth of dots in space. The stimuli, photographic slides containing two disparate pictures of dots in space, were presented by means of a stereoscopic projector. In the ranking task, number of dots (from ten to forty) and depth range (from five to fifteen miles) were varied; the second task included reference rings (one, two, or five). Time and error scores were studied by analysis of variance for effects of variables on depth discrimination.

T. R 9

10,364

Beyer, D.H., & Sells, S.B. SELECTION AND TRAINING OF PERSONNEL FOR SPACE FLIGHT. *J. Aviat. Med.*, Feb. 1957, 28(1), 1-6.

10,364

The problems of selection and training of space flight crews are reviewed. Tentative proposals concerning crew requirements, based upon present concepts of the characteristics of early space craft and its probable mission, are presented and discussed. The need for research and interest in human factors' aspect of space flight to keep abreast of progress in engineering is emphasized.

R 6

10,365

Gerathewohl, S.J., Strughold, H. & Stallings, H.D. SENSORIMOTOR PERFORMANCE DURING WEIGHTLESSNESS. EYE-HAND COORDINATION. *J. Aviat. Med.*, Feb. 1957, 28(1), 7-12.

10,365

To study the effects of changes of acceleration and gravity upon eye-hand coordination and ability of subjects to adjust to such conditions, subgravity and zero-gravity states were produced by flying dives at high altitudes in a T-33A type aircraft. Each of seven subjects participated in at least three flights, during each of which he repeated the test (aiming and hitting the center of a bull's eye test chart with a metal stylus) six times during (1) straight and level flight or one g, (2) zero-G, and (3) radial accelerations of three g. Hit data were evaluated in terms of distance and position from target center.

T. G. I. R 5

10,366

Swearingen, J.J. AN ADHESIVE TYPE OXYGEN MASK. *J. Aviat. Med.*, Feb. 1957, 28(1), 19-22.

10,366

An adhesive oxygen mask designed to meet the requirements for high flying commercial aircraft, is described. It is based on a set of specifications that were determined in a previous study. The time taken by indoctrinated and unindoctrinated subjects to don the newly designed adhesive mask and the Boothby, Lovelace, Benson oral mask are compared.

T. G. I. R 4

10,367

Roebuck, J.A. Jr. ANTHROPOMETRY IN AIRCRAFT ENGINEERING DESIGN. *J. Aviat. Med.*, Feb. 1957, 28(1), 41-56. (Douglas Aircraft Co., Santa Monica, Calif.).

10,367

This report describes the program developed by one airframe manufacturer for the collection and application of anthropometric data to aircraft design. Emphasis is placed on the importance of means of communication of data to engineers in terms of design applications. Standardization of data accumulated from diverse sources is discussed. Some typical problems and the techniques that have been used to solve them are presented. Included are techniques for using the normal probability graphs, for combining dimension distributions, and for use of manikins and mock-ups.

T. G. I. R 28

10,368

Phoebus, C.F. PROBLEMS OF ESCAPE FROM HIGH PERFORMANCE AIRCRAFT: A SYMPOSIUM. *J. Aviat. Med.*, Feb. 1957, 28(1), 57-100.

10,368

This symposium of nine papers was presented on April 18, 1956 at the annual meeting of the Aero Medical Association, Chicago. Problems of escape from high performance aircraft were discussed under the following headings: introduction and history, aircraft performance systems related to escape systems, United States Navy and Air Force experience with ejection seat escape, engineering problems, human tolerance factors in supersonic escape, accessory equipment and testing problems, psychologic factors, and predictions for the future.

T. G. I. R 30

10,369

Zeller, A.F., & Moseley, H.G. AIRCRAFT ACCIDENTS AS RELATED TO PILOT AGE AND EXPERIENCE. *J. Aviat. Med.*, April 1957, 28(2), 171-179.

10,369

To study the relation of age and experience to the operation of aircraft, a statistical analysis of Air Force accident data for the last six months of 1953 was conducted. Other data included pilot age and number of flying hours in various types of aircraft. The findings are discussed in terms of their implications for Air Force training and practice.

T. G.

10,370

Bloom, A., & Michel, E.L. THE PROBLEMS OF OXYGEN MASK DEVELOPMENT. *J. Aviat. Med.*, April 1957, 28(2), 180-184.

10,370

The need for an efficient, comfortable aviator's oxygen breathing mask is discussed. Three types of masks are identified - oro-nasal, full-face, and head-closure - and problems common to all are discussed: mask design criteria and sizing; design of valve to be leak-proof and lightweight; and suitable support design. An experimental oro-nasal mask with a combination inhalation-exhalation valve, and individually sized and shaped laminate is described.

I. R 1

10,371

Rosenberg, S. METHODS FOR THE RATIONAL ASSEMBLY OF AIRCREWS. *J. Aviat. Med.*, April 1957, 28(2), 185-189.

10,371

This report summarizes what is presently known about a number of assembly methods for work groups with special reference to aircrews. Self-selection methods upon the basis of some inter-personal contact are discussed. Combinations of psychologic measurements obtained before crewing and combined to predict group effectiveness are next reviewed. Finally, procedures based on distribution of technical skills are mentioned.

R 25

10,372

Balke, B., Wells, J.G., & Clark, R.T. IN-FLIGHT HYPERVENTILATION DURING JET PILOT TRAINING. *J. Aviat. Med.*, June 1957, 28(3), 241-246.

10,372

To determine whether true over-ventilation exists during flight, in-flight sampling of expired air during three phases of jet training in the T-33, F-86, and F-100 aircraft were taken on 65 pilots. Estimations of carbon dioxide tensions were derived from samples of the distributions and studied in relation to measures taken directly from subjects during sitting rest and during a coordination test. Incidence of hyperventilation in relation to the high performance capabilities of the three aircraft were also analyzed.

T. G. I. R 7

10,373

Domanski, T.J. THE STRESS CONCEPT APPLIED TO FLYING. *J. Aviat. Med.*, June 1957, 28(3), 249-252.

10,373

Stress response is defined as the product of the interaction of a stress with a susceptible individual. Fatigue is treated as a stress response associated with duration of job performance. Studies using eosinopenia (preflight to post-flight decrease in blood count of at least 50 per cent) as an emotional stress response in flying are reviewed. Two categories of problems are included: (1) individual differences in response to a given stress and (2) the relative severity of a particular inflight stress or stress complex.

G. R 3

10,374

Greider, H.R., & Santa Maria, L.J. SUBJECTIVE THERMAL COMFORT ZONES OF VENTILATED FULL PRESSURE SUIT AT ALTITUDE. *J. Aviat. Med.*, June 1957, 28(3), 272-276.

10,374

To determine the limiting ambient temperatures characterizing comfort zones for subjects wearing a full pressure suit in simulated flight conditions, 50 two-hour runs were made (two subjects) with a ventilating flow of 140 liters per minute under standard conditions at 18,000 feet simulated altitude. Ventilating temperatures were 60, 75, and 90 degrees Fahrenheit; ambient temperatures (constant for a run) ranged from 40 to 120 degrees Fahrenheit. Subjects rated comfort on a seven-point scale; physiological measurements were taken before and after each trial. Additional runs were made without the ventilating flow for comparative analysis of data.

T. G. I. R 1

10,375

Hinchcliffe, R., & Wheeler, L.J. AN INVESTIGATION OF THE EFFECT OF FLYING ON SPEECH INTELLIGIBILITY IN NOISE. *J. Aviat. Med.*, June 1957, 28(3), 277-280.

10,375

To assess the influence of flying on telecommunications efficiency of aircrewmembers, the Royal Air Force hearing efficiency test (a phonetically balanced word list against a background of aircraft noise) was administered to eighteen aircrewmembers before and after a long operational flight of from ten to fifteen hours. A control series of eighteen subjects were given the test 48 hours apart with no interim flying. The efficiency scores were analyzed for losses that could be attributed to impairment due to long flights. Application of the results to aviation otology are discussed.

T. R 5

10,376

Stapp, J.P., & Blount, W.C. EFFECTS OF MECHANICAL FORCE ON LIVING TISSUE. III, A COMPRESSED AIR CATAPULT FOR HIGH IMPACT FORCES. *J. Aviat. Med.*, June 1957, 28(3), 281-290.

10,376

This report describes a compressed air catapult designed to explore the effects of mechanical trauma and visceral displacements by application of high rate of onset, high magnitude forces of less than 0.2 second duration. Preliminary experimentation conducted on this short track facility with animal and human subjects is presented. Continued research in decelerations above 100 G for all directions of subject orientation are planned.

T. G. I. R 5

10,377

Walton, H., Jr. A DEVICE FOR ARTIFICIAL PRODUCTION OF ALTERNATING GRAVITATIONAL FORCES. *J. Aviat. Med.*, June 1957, 28(3), 291-294.

10,377

This report presents a proposal for a device that is suitable for the production of alternating gravity forces, including intermittent gravity free state, at ground level over indefinitely long periods of time. Two forms of the device, named "gravitron" are shown schematically. Equations governing acceleration, velocity and flight path in the device are given. The research uses are discussed.

T. G. I. R 2

10,378

Barron, C.I. AUDIOMETRIC STUDIES OF FLIGHT LINE MECHANICS. *J. Aviat. Med.*, June 1957, 28(3), 295-302. (Lockheed Aircraft Corp., Burbank, Calif.).

10,378

This report presents the results of serial audiometric studies of a group of 470 flight line mechanics exposed to reciprocating and turbojet engine noise for periods up to seven years during employment by an aircraft manufacturing company. Testing consisted of pure tone audiometry, checking eight frequencies from 500 to 8000 cycles per second. Threshold data were analyzed for changes due to years of exposure to noise, to age, and to use of ear plugs. The results are discussed in relation to the need for a closely supervised hearing conservation program.

T. G. R 1

10,379

Bhatia, B. EYE MOVEMENT PATTERNS IN RESPONSE TO MOVING OBJECTS. *J. Aviat. Med.*, June 1957, 28(3), 309-317.

10,379

To study eye movement patterns of trained and untrained persons while they viewed moving objects, a test object (black letter from Snellen chart mounted on white background) was fixed to an endless belt that could be moved downward in the vertical direction. Two subjects viewed the test object through a slit as it moved at certain uniform speeds and eye movements were recorded by the corneoretinal potential method. One subject was trained in such observations, the other was naive. Eye movement records were analyzed for response patterns due to different velocities and to training.

I. R 8

10,380

Noble, Rosalie, & Lezo, J. INVESTIGATIONS OF THE OPTIMAL CHARACTERISTICS OF VISUAL LIGHT INDICATOR SYSTEMS. *J. Aviat. Med.*, June 1957, 28(3), 318-321. (Naval Air Material Center, Philadelphia, Penn.).

10,380

This report is a brief summary of a series of experiments in which the optimal visual characteristics of a master caution and warning system for aircraft are considered. Three types of stimulus lights were used - steady, flashing, and alternating in a manner to produce apparent movement. Effect of background (homogeneous versus heterogeneous), lighting (day and night), various positions within and without the visual field, and shape of signal lights were investigated. The use of these results in future indicator systems is discussed.

R 6

10,381

Bradley, J.V. CONTROL KNOB ARRANGEMENT CAN SAVE AIRCRAFT INSTRUMENT PANEL SPACE. *J. Aviat. Med.*, June 1957, 28(3), 322-327.

10,381

This report compares the efficiencies of two methods of saving panel space, both of which involve gauging the control knobs of several instruments: (1) shielded knobs on concentric shafts, and (2) several knobs side by side in a straight line. A graph, based on experimental data, is presented in which, for a variety of multiple-knob arrangements, relative likelihood of accidental operation is plotted against aircraft instrument panel space required for the arrangement used. Recommendations for space-saving arrangements are made.

G. I. F 2

- 10,383
Powell, T.J., Carey, T.M., Brent, H.P., & Taylor, W.J.R. EPISODES OF UNCONSCIOUSNESS IN PILOTS DURING FLIGHT IN 1956. *J. Aviat. Med.*, Aug. 1957, 28(4), 374-386. (Royal Canadian Air Force Institute of Aviation Medicine, Toronto, Canada).
- 10,384
Eight cases of unconsciousness or diminished consciousness while flying were investigated at the Institute of Aviation Medicine in Toronto. The criteria for the syndrome of "physiologic unconsciousness" in medically fit aircrew were used in evaluating the cases: (1) established or diminished unconsciousness; (2) hypoxia excluded as a factor; (3) the involvement of two or more conditions - G, hyperventilation, and hypoglycemia; and (4) should be reproducible under experimental conditions. The findings are discussed in relation to preventive measures.
T. G. R 6
- 10,385
Schmidt, Ingeborg. VISIBILITY OF ARTIFICIAL SATELLITES OF THE PLANET EARTH. *J. Aviat. Med.*, Oct. 1957, 28(5), 435-446. (Indiana University).
- 10,386
To investigate the visibility of an artificial satellite with the unaided eye, calculations were made based upon data available in the literature about the first satellite of the project Vanguard. The visibility of such a satellite (polished aluminum surface of reflectance .09, 20 inches in diameter, with an illuminance of the sun of 12,700 foot-candles and with a perigee of 200 miles) was treated as a problem of brightness discrimination. By computing visual ranges for the satellite in eight meridians for several positions of the sun below horizon, "spaces of potential visibility" were determined for observation at sea level, latitude 30 degrees, and clear air.
T. G. I. R 13
- 10,386
Clark, B., & Graybiel, A. VERTIGO AS A CAUSE OF PILOT ERROR IN JET AIRCRAFT. *J. Aviat. Med.*, Oct. 1957, 28(5), 469-478. (San Jose State College and USN School of Aviation Medicine, Pensacola, Fla.).
- 10,386
To obtain information on the occurrence of vertigo in jet pilots, individual interviews and a check list were used to obtain descriptions of these experiences from 13 naval and Marine Corps jet pilots. Vertigo was defined as an error or illusion of spatial orientation. Incidents were classified as vertigo of attitude and motion, visual vertigo, and vertigo involving geographical disorientation. The number of responses to items on the check list considered to describe vertigo were analyzed for relationships to such things as emotional factors, flying hours, and flight conditions. The results were compared with similar studies of pilots in propeller driven aircraft.
T. R 7
- 10,387
Campbell, P.A. SPACE TRAVEL: A SYMPOSIUM. *J. Aviat. Med.*, Oct. 1957, 28(5), 479-512.
- 10,387
This report contains eight papers presented at a symposium on space travel which was held in May, 1957, at the annual meeting of the Aero Medical Association, Denver, Colorado. The topics presented here are: the propulsion engineer's views, the astronomer's views, the astrophysicist's views, a test pilot's viewpoint, instrumentation for space flight, some survival aspects of space travel, the Vanguard project, and the possibilities of an inhabitable extraterrestrial environment reachable from the earth.
T. G. I. R 8
- 10,388
Moseley, H.G., & Stembridge, V.A. THE HOSTILE ENVIRONMENT AS A CAUSE OF AIRCRAFT ACCIDENTS. *J. Aviat. Med.*, Dec. 1957, 28(6), 535-540.
- 10,388
To gain a better understanding of accidents due to pilot error and to gather clues that might help in solving unexplained accidents, a study of the physical and physiological factors that create an adverse environment for the pilot was undertaken. Frequency and type of these factors, as found in 332 major aircraft accident reports of 1956, were tabulated and discussed in relation to four major problem areas: the adversity of space, of altitude, of velocity, and of intolerance. Implications for the aeromedical specialist are discussed.
T. R 8
- 10,389
Konecni, E.B. PHYSIOLOGIC FACTORS IN AIRCRAFT ACCIDENTS IN THE U.S. AIR FORCE. *J. Aviat. Med.*, Dec. 1957, 28(6), 553-558.
- 10,389
To investigate physiologic factors in aircraft accidents, 618 major aircraft accident records (1955, 1956) were searched for both physical and physiological factors listed as primary or contributing causes of these accidents. Comparisons of frequencies and type were made between the two years and for occurrence in aircraft type. The significance of the following factors was evaluated and discussed: hypoxia, vertigo/disorientation, fatigue, g forces and vibration, decompression, physical disturbances, hyperventilation, hypoglycemia, carbon monoxide poisoning, and air sickness.
T. R 8
- 10,391
Conrad, R. & Hills, B.A. SELF-PACING PERFORMANCE AS A FUNCTION OF PERCEPTUAL LOAD. *J. exp. Psychol.*, Jan 1957, 53(1), 52-54. (Applied Psychology Research Unit, Cambridge, England).
- 10,391
To investigate performance on a self-paced multi-channel sensorimotor task as a function of perceptual load (number of signal sources were 8, 10, 12, 14, and 16), eighteen subjects were tested. The task was to judge in advance which channel would provide the next signal and to respond accordingly, the interval between signals being near random. The subjects were instructed to drive at the rate which would give them the best score: correct responses and errors were integrated and result continuously presented on a clock invisible to the subject. Driving rate was the total number of signals per minute. The data were studied by analysis of variance techniques.
T. R 10
- 10,392
Smith, W.M. & Gulick, W.L. DYNAMIC CONTOUR PERCEPTION. *J. exp. Psychol.*, Feb. 1957, 53(2), 145-152. (Princeton University, Princeton, N.J.).
- 10,392
To study the perception of contour of a moving stimulus in relation to how long the stimulus was seen before or after it moved or both, five subjects observed the stimulus (black concentric and eccentric hands on large white disk) through an aperture (horizontal or vertical) and reported contour if stimulus appeared with sharp edges and homogeneous blackness throughout. Velocities of movement up to 30 degrees per second and varied durations of exposure of fixed stimulus before and after movement were used and the time to make the judgment recorded. The data were analyzed for most effective conditions for maintenance of contour. A theoretical exploration of the results is proposed.
T. R 13

10,393

Alluisi, E.A., Paul, F., Jr. & Fitts, P.M. AN INFORMATION ANALYSIS OF VERBAL AND MOTOR RESPONSES IN A FORCED-PACED SERIAL TASK. *J. exp. Psychol.*, March 1957, 53(3), 153-158. (Ohio State University, Columbus, Ohio).

10,393

To determine whether the rate of information transmission in a forced-paced serial task is a function of rate of stimulus presentation, uncertainty per stimulus or joint effect of both (rate of information presentation) ten highly practiced subjects responded to Arabic numeral with both verbal and motor (key pressing) responses. Three levels of stimulus complexity (1, 2, and 3 bit per stimulus) were combined with three rates of presentation (1, 2, and 3 stimuli per second). The data (correct responses) were analyzed for absolute and relative rates of information transmission as functions of rate and complexity. Interaction effects are discussed. T. I. R 10

10,394

Poulton, E.C. ON THE STIMULUS AND RESPONSE IN PURSUIT TRACKING. *J. exp. Psychol.*, March 1957, 53(3), 189-194. (Applied Psychology Research Unit, Cambridge, England).

10,394

To determine what visual information is required for pursuit tracking and the nature of the response with and without this information, 30 subjects manipulated a hand control to keep a pointer in line with an input pointer moving in the vertical dimension. In different conditions the input pointer, the response pointer, both pointers, and neither pointers could be seen only intermittently (intervals of from 0.2 to 4.7 seconds), while other pointer(s) could be seen all the time. Both simple and complex sinusoidal inputs were compared (error scores). Tracking for alternate periods of eyes open and shut was compared with normal tracking. T. G. R 8

10,395

Nicely, Patricia E. & Miller, G.A. SOME EFFECTS OF UNEQUAL SPATIAL DISTRIBUTION ON THE DETECTABILITY OF RADAR TARGETS. *J. exp. Psychol.*, March 1957, 53(3), 195-198. (Harvard University, Cambridge, Mass.).

10,395

To investigate some factors in the decline in a radar operator's performance during a prolonged watch, isolated target pips were introduced on a simulated radar display that was speckled with a background of random noise. Ten subjects reported the position of the target in terms of numbers on a clock face over an observation period of 90 minutes. In one quadrant, targets appeared approximately once in every five rotations. In all others only about once for every 30 rotations. Photographic records were made of the display and used for a repetition of the experiment. The data (percent targets detected) were analyzed as functions of location and time during the watch. T. G. R 2

10,396

Attneave, F. PHYSICAL DETERMINANTS OF THE JUDGED COMPLEXITY OF SHAPES. *J. exp. Psychol.*, April 1957, 53(4), 221-227.

10,396

To determine what physical characteristics of shape influence judgments of complexity, 168 subjects observed 72 stimuli and rated them on a seven-category scale (extremely simple to extremely complex). The shapes were constructed by a method in which certain physical characteristics were systematically varied and the rest randomly determined: matrix grain, curvedness, symmetry, number of turns (angles or curves), square of perimeter divided by area, and angular variability (arithmetic mean of algebraic differences, in degrees, between successive turns in contour). Ratings were scaled (method of graded dichotomies) and analyzed for the contributions of the six variables to judged complexity. T. I. R 11

10,397

Gerathewohl, S.J., Strughold, H., & Taylor, W.F. THE OCULOMOTORIC PATTERN OF CIRCULAR EYE MOVEMENTS DURING INCREASING SPEED OF ROTATION. *J. exp. Psychol.*, April 1957, 53(4), 249-256.

10,397

To record and analyze the basic pattern of guided circular eye movements with regard to increasing velocity, nine subjects attempted to keep their eyes fixated on a target attached to the periphery of a rotating disc. Photographic records were made of eye movements: 1) at a constant rotational speed of 15 rotations per minute, 2) during gradually increasing speeds from 20 to 45 rotations per minute, and 3) from 40 to 85 rotations per minute over periods of 30 seconds. All experiments included clockwise and counterclockwise rotations. The number and extent of saccadic deviations from the prescribed pursuit pattern were used as indices of accuracy in visual tracking. T. I. R 10

10,398

Conklin, J.E. EFFECT OF CONTROL LAG ON PERFORMANCE IN A TRACKING TASK. *J. exp. Psychol.*, April 1957, 53(4), 261-266.

10,398

To study the effect of delay between the control and display on tracking activity, lag was introduced by two different electrical filter networks--a single network (asymptotic lag) and two networks in cascade. Three skilled subjects performed on both a pursuit and compensatory display for four different target courses with delays of 0, 0.25, 1.0, 4.0, and 16.0 seconds. The criterion of tracking efficiency was the ratio of the root mean square error of the signal to that of the subject. The data were analyzed for effects of the experimental variables. The results are discussed in terms of the part predictive behavior of the operator plays in skilled performance. T. G. R 12

10,399

Teichner, W.F. EFFECTS OF FOREPERIOD, INDUCED MUSCULAR TENSION, AND STIMULUS REGULARITY ON SIMPLE REACTION TIME. *J. exp. Psychol.*, April 1957, 53(4), 277-284.

10,399

To study the effects on reaction time of several factors, four experiments were performed. In Experiment I, constant, regularly presented foreperiod-load combinations were used with a ten- or thirty-second foreperiod. Experiments II and III were split plots conducted with mass trials--foreperiods varied from two to eleven seconds, tension loads from five to 35 pounds. In one the magnitude of tension was constant with foreperiods varying irregularly; the other was the reverse. In Experiment IV, both tension magnitude and foreperiod length were presented irregularly. The data were analyzed for effect of foreperiod, induced muscular tension, and stimulus regularity. T. G. R 11

10,400

Chernikoff, R. & Taylor, F.V. EFFECTS OF COURSE FREQUENCY AND AIDED TIME CONSTANT ON PURSUIT AND COMPENSATORY TRACKING. *J. exp. Psychol.*, May 1957, 53(5), 285-292.

10,400

To study the interaction among display mode (pursuit versus compensatory), aided tracking time constant, and frequency of target course input on tracking performance, three studies were run. Aiding time constants of zero, 0.5, and infinity for both modes were compared on three target courses composed of frequencies chosen to cover a wide range of tracking difficulty (the studies differed only in course input). In each study six subjects were given three trials daily for eighteen sessions on all six combinations of time constants and display modes. The data (integrated error scores) were studied by analysis of variance techniques for interaction effects of the variables. T. G. R 10

10,401
Carvey, W.D. & Mitnick, L.L. AN ANALYSIS OF TRACKING BEHAVIOR IN TERMS OF LEAD-LAG ERRORS. *J. exp. Psychol.*, June 1957, 52(6), 372-378.

10,401

To make a comparison between the performance of a human operator in a continuous control system with that of the mathematically simplest mechanisms that might be substituted to perform the operator's task with zero error, six subjects performed a one-dimensional compensatory tracking task. Two types of input (constant rates of 3.33, 6.67, and 13.33 centimeter per second and constant accelerations of .22, .44, and .88 centimeter per square second) were practiced over a period of 25 days. Performance scores, (integrated error and total lead- or lag-error), were analyzed as a function of practice. Implications for study of the human transfer function are discussed.
T. G. I. R 7

10,402

Miller, I. PERCEPTION OF NONSENSE PASSAGES IN RELATION TO AMOUNT OF INFORMATION AND SPEECH-TO-NOISE RATIO. *J. exp. Psychol.*, June 1957, 52(6), 388-393. (Purdue University, Lafayette, Ind.).

10,402

To investigate relations between auditory perception and two variables: average rate of input information expressed in patterning of speech (cliche-ness, belongingness) and speech-to-noise ratio, S/N. The subjects (13) learned a nonsense vocabulary by means of repeated auditory and visual presentations to criterion of two perfect trials. The items were then arranged in passages representing four information rates (one, two, three and four bits per item) and presented auditorily together with white noise at S/N's of -13, -6, +1, and +8 decibels. The mean number of items correctly reproduced were analyzed as functions of the two variables.
T. G. R 9

10,403

Kunnappas, T.M. THE VERTICAL-HORIZONTAL ILLUSION AND THE VISUAL FIELD. *J. exp. Psychol.*, June 1957, 52(6), 405-407. (University of Stockholm).

10,403

To investigate the effect of complete darkness (no boundary to the visual field on the vertical-horizontal illusion—over-estimation of vertical as compared to horizontal), 20 subjects observed an L-shaped stimulus pattern and adjusted the length of the vertical line to apparent equality with the horizontal line. The method of average error was employed for judgments made in dark and in light. The data (length of vertical line which appears equal to the horizontal) were analyzed for differences between light and dark conditions. The results were discussed in terms of a new attempt to explain the illusion in terms of shape of visual field.
T. I. R 10

10,404

Poulton, E.C. LEARNING THE STATISTICAL PROPERTIES OF THE INPUT IN PURSUIT TRACKING. *J. exp. Psychol.*, July 1957, 54(1), 28-32. (Applied Psychology Research Unit, MRC, Cambridge, England).

10,404

To determine the subject's ability to learn, and use knowledge of the statistical properties of input in pursuit tracking and to compare effectiveness of visual information acquired about the course before tracking with visual-kinesthetic information acquired during tracking, 16 subjects were required to trace with a pencil courses which consisted of constant slopes separated by sudden discontinuities in direction to meet a time standard. Half the courses were patterned (systematic trends useful for prediction); the others were random. Vision was restricted in various degrees. The data (median time, seconds; mean error, millimeters) were analyzed in terms of experimental variables.
T. R 3

10,405

Schutz, H.G., & Pilgrim, P.J. DIFFERENTIAL SENSITIVITY IN GUSTATION. *J. exp. Psychol.*, July 1957, 54(1), 41-48.

10,405

To determine differential sensitivity to the four primary taste qualities (salt, sweet, sour, and bitter) at five levels of intensity, the method of single stimuli was used with ten subjects. Intensity levels were spaced approximately logarithmically between the absolute thresholds and the strongest solution (selected on basis of subjects' free comments). Threshold determinations were based on 50 responses per stimulus for each level of intensity of each quality (two sessions on two consecutive days). The judgment data were converted to difference thresholds and analyzed for relative order of sensitivities, relation to intensity, and individual differences. The results are compared to those in the literature.
T. G. R 22

10,406

Leibowitz, H. & Chivetti, P. EFFECT OF REDUCED EXPOSURE DURATION ON BRIGHTNESS CONSTANCY. *J. exp. Psychol.*, July 1957, 54(1), 49-53. (University of Wisconsin, Madison, Wisc.).

10,406

To investigate the effect of exposure time on brightness constancy, luminance matches were obtained between a "gray" test object viewed over a range of ambient illuminance values (.0051, .047, .403, 25.4, and 1,522 footcandles), three background conditions (black, reflectance 0.85 per cent; gray, same reflectance as test object 43 per cent; white, reflectance 62 per cent) and for two exposure conditions (continuous and .0002 seconds). The data (expressed as mean log luminance of the photometric field in foot-lamberts which matches the test field) were analyzed as function of luminance levels with exposure duration and background as parameters. Results are discussed in terms of role of simultaneous contrast in brightness constancy.
T. G. R 10

10,407

Wiggins, J.S. TWO DETERMINANTS OF ASSOCIATIVE REACTION TIME. *J. exp. Psychol.*, Aug. 1957, 54(2), 144-152. (Indiana University, Bloomington, Ind.).

10,407

To investigate two factors that are held to be of importance in the formation of verbal associations - frequency with which the verbal stimulus has been paired with one or more verbal responses and the number of response alternatives - differing response hierarchies were established to a single stimulus. Pairs of nonsense syllables were presented visually and responded to orally by 270 subjects during a training series in which the two factors were varied systematically. The reaction times for giving a response on a final test trial were analyzed for effect of the two factors on word association processes.
T. I. R 15

10,408

Gibson, J.J. & Gibson, Eleanor, J. CONTINUOUS PERSPECTIVE TRANSFORMATIONS AND THE PERCEPTION OF RIGID MOTION. *J. exp. Psychol.*, Aug. 1957, 54(2), 129-136. (Cornell University, Ithaca, N.Y.).

10,408

To study various factors in the perception of rigid motion from continuous perspective transformations, twenty subjects were presented with two-second cycles of four patterns (irregular texture and form, and regular texture and form) at five degrees of transformation (semi rotation of 15, 30, 45, 60, and 70 degrees). The subjects observed the stimuli on the visibly flat surface of a translucent screen and judged the amount of change of slant by means of a protractor. The same patterns were presented motionless at the end of transformation sequence to 30 control subjects. Judgments of slant were analyzed as a function of change of slant in optical stimulus and for effects of form and texture.
T. G. I. R 16

10,409

Garvey, W.D. OPERATOR PERFORMANCE AS A FUNCTION OF STATISTICAL ENCODING OF STIMULI. *J. exp. Psychol.*, Aug. 1957, 54(2), 103-114.

10,409

To determine the relative advantage of statistical encoding of stimuli during different stages of practice, 30 subjects (five matched groups) were given 29 trials of 750 stimuli on a display-control system (ten by ten matrix of lights and a corresponding matrix of push buttons). Based upon preliminary studies of an operator's "channel characteristics", five different encoding procedures were established one of which was designed for maximum flow of information, the others deviated in a systematic manner. One group was assigned to each program. Efficiency of performance was measured in terms of mean transmission time per signal and analyzed in terms of relative advantages of the different coding patterns.
G. I. R 5

10,410

Engen, Trygg & Tulvay, U. SOME SOURCES OF ERROR IN HALF HEAVINESS JUDGMENTS. *J. exp. Psychol.*, Sept. 1957, 54(3) 208-212. (Brown University, Providence, R.I.).

10,410

To investigate possible sources of error in fractionation judgments, half-heaviness judgments were obtained by the method of constant stimuli and the method of adjustment. In a series of three experiments the following factors were studied: sophistication of subjects, the context provided by range of comparison weights, preliminary practice, and method of obtaining judgments. Errors in psychophysical judgments were analyzed as affected by the foregoing variables. The findings are discussed in relation to previous studies.
T. G. R 8

10,411

Klerner, E.T. SIMPLE REACTION TIME AS A FUNCTION OF TIME UNCERTAINTY. *J. exp. Psychol.*, Sept. 1957, 54(3), 195-200.

10,411

To study the role of time uncertainty in simple reaction time (RT), two test series (one RT and one prediction) were given to five subjects. Ten RT tests, each with a different mean foreperiod (0.5 to 8.0 seconds) and/or foreperiod variability (0.0 to 1.82 seconds) were given - once in practice and five experimental trials. Using intervals equal to mean foreperiods of RT tests and same number of trials, each subject attempted to predict the occurrence of the stimuli (single runs of each at a given interval). Total time uncertainty (foreperiod variance plus prediction variance) was converted to an informational measure and analyzed for relation to reaction time.
T. G. R 4

10,412

Briggs, G.E., Fitts, P.M. & Bahrick, H.P. EFFECTS OF FORCE AND AMPLITUDE CUES ON LEARNING AND PERFORMANCE IN A COMPLEX TRACKING TASK. *J. exp. Psychol.*, Oct. 1957, 54(4), 262-268.

10,412

To assess the influence of force and amplitude cues from a control column on learning and performance in a two-dimensional compensatory tracking task, four groups of subjects served for 60 training and 30 transfer trials. Group I trained with a control in which the force-displacement relation was known to permit good performance; this relation was varied: Group II, one-fourth force, same displacement; Group III, same force, one-fourth displacement; Group IV, one-fourth force and displacement. The transfer trials were on the control column of Group I. Tracking proficiency (time on target over final three seconds of each trial) was analyzed for comparative improvement over training trials and percent transfer for each group was calculated.
T. G. R 11

10,413

Jenkins, N. EFFECTS OF VARIED DISTANCE ON SHORT-RANGE SIZE JUDGMENTS. *J. exp. Psychol.*, Nov. 1957, 54(5), 327-331. (University of New Brunswick, Fredericton, Canada).

10,413

To study the trend in size judgments at two short viewing distances, judgments of a standard object twenty feet away were obtained by means of a comparison series at distances of two and ten feet from four groups of 12 subjects each. Equidistance judgments at ten feet were obtained--two groups made these judgments before and two after the disparate distances. The data (mean size judgments) were studied by analysis of variance for effects of the different variables. The findings are discussed in relation to other studies in the literature.
T. R 9

10,414

DeW, Margaret, E. & Gordon, Jesse, E. THE INTERACTION OF ASSOCIATION VALUE AND STIMULUS CONFIGURATION IN SIZE ESTIMATION. *J. exp. Psychol.*, Nov. 1957, 54(5), 332-335. (University of Wisconsin, Madison, Wisc. & Montana State University, Missoula, Mont.).

10,414

To investigate the effect of association value (pleasantness, unpleasantness) and stimulus configuration (curved-line, angular-line) in perception of size, forty subjects each made five size estimations by varying a blank stimulus until it matched a standard. Concepts selected by each subject as pleasant or unpleasant were then associated with either curved-line or angular-line designs. Two other groups associated nonsense syllables or had no associations. Size estimations were again made. The data were studied by analysis of variance for effects of associations, designs and their interactions.
T. G. R 4

10,415

Liberman, A.M., Harris, Katherine S., Hoffman, H. S., & Griffith, B.C. THE DISCRIMINATION OF SPEECH SOUNDS WITHIN AND ACROSS PHONEME BOUNDARIES. *J. exp. Psychol.*, Nov. 1957, 54(5), 358-368.

10,415

To investigate the relation between phonemic identifications of certain synthetic speech sounds and the extent to which the sounds can be discriminated as being different, two-formant approximations to consonant-vowel syllables (b, d, g) were prepared. They varied in the extent and direction of the second-formant transitions. These sounds were presented (1) singly and in random order for identification of b, d, or g; and (2) in ABX groups for matching of X with A or B (A and B differed by two or three steps). The data (per cent identification and per cent correct discriminations) were compared for discrimination ability within and across phoneme boundaries.
G. I. R 6

10,416

Stevens, S.S. & Galanter, E.H. RATIO SCALES AND CATEGORY SCALES FOR A DOZEN PERCEPTUAL CONTINUA. *J. exp. Psychol.*, Dec. 1957, 54(6), 377-411. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

10,416

Ratio scales of subjective magnitude are compared with category rating-scales on several judgmental continua. Two classes of continua (prothetic and metathetic) are distinguished and the way in which each class behaves relative to the type of scale is described using experimental data from various sources. The continua examined include apparent length, duration, numerosness, area, weight, loudness, brightness and lightness in Class I and visual position, inclination, proportion, and pitch in Class II.
G. R 75

10,417

Rosenzweig, M.R. & Postman, L. INTELLIGIBILITY AS A FUNCTION OF FREQUENCY OF USAGE. *J. exp. Psychol.*, Dec. 1957, 54(6), 412-422. (University of California).

10,417

To determine whether intelligibility of words masked by noise varies with the frequency of usage of the words, parallel experiments were performed in English and French. Stimulus words, homogeneous in syllabic length, were selected in four ranges of frequency. Seven randomly ordered lists were presented at progressively decreasing signal-to-noise ratios (from -12 decibels to quiet). There were 109 English and 60 French subjects. The first correct transcription of each word was considered the threshold value. Meaningful, nonsense, and failure to respond were also recorded. These data were studied for effect of word frequency. Practical applications of the results are discussed. T. G. P 17

10,418

Teichner, W.H. CUTANEOUS DISCRIMINATION OF RADIANT HEAT. *J. exp. Psychol.*, Dec. 1957, 54(6), 438-444.

10,418

To investigate stimulus-response relations involved in cutaneous thermal subjective responses to radiant heat exchange, the method of single stimuli was utilized. Six subjects responded to randomly arranged stimulus combinations of heat intensity and exposure time by assigning each to one of five subjective response categories (no sensation, warmth, heat, pricking pain, and burning pain). The data were analyzed in terms of the relation of the responses to heat intensity, exposure time, dosage and skin temperature. The results are compared to those in the literature. T. G. R 9

10,419

Goldstein, A.G. JUDGMENTS OF VISUAL VELOCITY AS A FUNCTION OF LENGTH OF OBSERVATION TIME. *J. exp. Psychol.* Dec. 1957, 54(6), 457-461. (University of Missouri).

10,419

To determine whether exposure to moving visual stimuli for various duration times would result in different apparent velocities, 24 subjects were required to reproduce the speed of a moving band of stripes by moving a stylus across an electrical contact bar. Physical velocities of approximately 2.4, 4.8, or 14.3 centimeters per second were viewed for 2, 8, 15, 22, 30, and 60 seconds. Perceived velocity (time in seconds of the arm movement response) was analyzed as a function of observation time. An explanation of the results in terms of negative after effects is proposed. G. R 9

10,420

Tiffany, W.R., & Hanley, C.N. ADAPTATION TO DELAYED SIDETONE. *J. Speech Hearing Disorders*, June 1956, 21(2), 164-172. (University of Washington).

10,420

To study adaptation to the distorting effects of delayed sidetone, differences among subjects as well as differences with subjects over successive readings were investigated. Twenty normal hearing subjects were subjected to 80 decibel sidetone delayed 0.18 seconds during 24 readings of a 45 word prose passage. Twelve successive readings were given the first week and twelve the following. Measures of reading time, reading fluency (number of syllable and word repetitions or omissions) and ratings of speech effectiveness (obtained before experiment started) were analyzed and discussed in relation to use of delayed sidetone as a clinical test for auditory malingering. G. R 5

10,421

Black, J.W., & Polhurst, G.C. INTELLIGIBILITY AS RELATED TO THE PATH OF AIRBORNE SIDE-TONE. *J. Speech Hearing Disorders*, June 1956, 21(2), 173-178. (USN School of Aviation Medicine, Pensacola, Fla.).

10,421

To find whether systematic alterations to the path of airborne side-tone might affect intelligibility, the following variables were investigated: (1) binaural application of ear defenders, (2) monaural application of ear defenders with open ear alternately facing or away from reflecting surface, (3) conditions of (2) with normal room noise, and (4) large convex and concave acoustic reflectors positioned one foot from head. Twelve panels of 15 subjects participated in each of the four conditions; 12 subjects in each panel read speaker lists from multiple-choice intelligibility tests for a round robin administration and the remaining three served as listeners. Intelligibility scores served as index of voice change. T. P 11

10,423

Diehl, C.F., & McDonald, E.T. EFFECT OF VOICE QUALITY ON COMMUNICATION. *J. Speech Hearing Disorders*, June 1956, 21(2), 233-237. (University of Kentucky & Pennsylvania State University).

10,423

To study the effect of voice quality on communication, a 14-minute lecture was presented to six matched groups (35 subjects each) by means of phonograph recordings. The lecture varied for each group only in voice quality types (hoarse, harsh, breathy, nasal quality, and freedom from these) produced by one speaker. Subjects completed a response sheet composed of simple recall-type completion questions based on the lecture and a rating scale for judging the voice quality of the lecturer. Mean comprehension scores were compared to determine effect of voice quality on communication effectiveness and ratings were analyzed. T. R 4

10,424

House, A.S., & Stevens, K.N. ANALOG STUDIES OF THE NASALIZATION OF VOWELS. *J. Speech Hearing Disorders*, June 1956, 21(2), 218-232. (Massachusetts Institute of Technology).

10,424

To investigate the phenomenon of nasality on three levels of discourse - acoustical, articulatory, and perceptual, an electrical analog of the nasal structures (nose and naso-pharynx) was designed and coupled with an electrical analog of the vocal tract already available. The activities of these systems were observed in a series of physical studies and then manipulated to produce vowel-like stimuli to be used in perceptual tests. Twenty-four untrained subjects and ten professional linguists made both relative and absolute judgments as to the nasality of the sounds. Results of the listening tests and descriptions of the physical characteristics of the sounds are presented. T. G. I. R 26

10,425

Feldman, E.W. SPEECH ARTICULATIONS PROBLEMS ASSOCIATED WITH PLACEMENT OF ORTHODONTIC APPLIANCES. *J. Speech Hearing Disorders*, March 1956, 21(1), 34-38. (University of Pittsburgh).

10,425

To examine the effect on speech of the insertion of orthodontic appliances, 32 patients (age range nine to eighteen) wearing bite plates or labio-lingual appliances were studied. Three articulation tests were given - previous to, one hour after, and one to three weeks after insertion of the appliance. The tests were transcribed by two judges, either from direct speech or from a tape recording. Articulation errors for each test were compared for short term and long term effects of the appliances. Further comparisons were made between groups wearing the two different types of appliances. Need of speech therapy for such patients is discussed. T. R 3

10,426
Jerger, J.P. RECOVERY FROM AUDITORY FATIGUE.
J. Speech Hearing Disorders, March 1956, 21(1),
36-45. (Northwestern University).

10,426
To investigate the pattern of recovery of the auditory threshold for varying levels of intense stimulation (from 80 to 110 decibels), eight young adults were tested. In each session (one for each intensity level) the subject traced his threshold for a 4000 cycle per second (CPS) short tones for two minutes, listened to a 3000 cps tone for two minutes at one intensity level, then resumed threshold tracing for ten minutes. Threshold shift (in decibels) was analyzed as a function of post-exposure time for each intensity of the fatiguing tone. The bounce phenomenon is discussed and some explanatory suggestions are advanced.
T. G. R 8

10,427
Lightfoot, C., Carhart, R., & Goeth, J.H.
MASKING OF IMPAIRED EARS BY NOISE. J. Speech Hearing Disorders, March 1956, 21(1), 56-70.

10,427
To investigate the masking effects of white noise on ears with different types and degrees of hearing loss, pure-tone and speech thresholds, in quiet and in two levels of white noise (60 and 80, 80 and 95 decibels), were obtained on 31 normally hearing and 59 hypacusic (impairment primarily of either conductive or perceptive mechanism) subjects. Masking discrepancies, based upon the amount of masking and the effective level of the masking noise, were calculated from the threshold data and were analyzed in terms of spectral characteristics of signal and type of hearing loss. The "critical band" concept is discussed in relation to the results.
T. G. R 10

10,428
Hanley, C.W. FACTORIAL ANALYSIS OF SPEECH PERCEPTION. J. Speech Hearing Disorders, March 1956, 21(1), 76-87. (University of Washington).

10,428
To determine, by the method of factor analysis, the underlying common abilities or unities of the area of speech perception for listeners having normal hearing for pure tones, 105 such subjects were given 32 tests under controlled conditions. Tests were selected which might demonstrate one or more sources of hypothesized variance. Test scores were analyzed for consistencies indicating factors that were operating. The factors were tentatively identified and discussed in relation to need for further study.
T. R 7

10,429
Peters, R. EFFECT OF ACOUSTIC ENVIRONMENT UPON SPEAKER INTELLIGIBILITY. J. Speech Hearing Disorders, March 1956, 21(1), 88-93. (USN School of Aviation Medicine, Pensacola, Fla.).

10,429
To investigate the effect upon speaker intelligibility of various acoustic signals heard by the speaker while reading, signals were selected to represent conditions that might confront speakers in communication systems (same, similar, unrelated and nonsense words; five-syllable phrases; and babble). Thirty-six subjects each read speaker lists taken from multiple-choice intelligibility tests while simultaneously hearing each of the acoustic signals. Percent intelligibility scores were obtained from panels of 12 to 15 listeners and studied by analysis of variance techniques.
T. G. R 9

10,430
Fairbanks, G., Guttman, N., & Miron, M.S. EFFECTS OF TIME COMPRESSION UPON THE COMPREHENSION OF CONNECTED SPEECH. J. Speech Hearing Disorders, March 1957, 22(1), 10-19.

10,430
To investigate the relationship between comprehension of spoken messages and the rate at which they were heard, a pair of independent message-test units were prepared. The messages were read by an experienced speaker at 141 words per minute and compressed automatically in time by 0, 30, 40, 50, and 70 per cent. Groups of 36 subjects, equalized for technical ability, were assigned to each of the above conditions and tested for factual comprehension. One group was tested without hearing the material. Comprehension was analyzed as a function of message time. Listener aptitude and message effectiveness were evaluated.
T. G. R 6

10,431
Fairbanks, G., Guttman, N., & Miron, M.S. AUDITORY COMPREHENSION OF REPEATED HIGH-SPEED MESSAGES. J. Speech Hearing Disorders, March 1957, 22(1), 20-22.

10,431
To investigate the effectiveness of increasing auditory comprehension by repetition at high speeds, two relatively long technical messages were read by an experienced reader at 141 words per minute recorded and compressed automatically in time by 50 per cent. Four groups of 36 subjects, equalized for technical ability, were assigned to each of the following conditions: one reading of one of the messages at zero or 50 per cent compression; two repetitions at zero or 50 per cent compression. Factual comprehension was tested. Mean percentages of correct scores were analyzed for differences due to single and double presentations at the two compression rates.
T. R 2

10,432
Fairbanks, G., Guttman, N., & Miron, M.S. AUDITORY COMPREHENSION IN RELATION TO LISTENING RATE AND SELECTIVE VERBAL REDUNDANCY. J. Speech Hearing Disorders, March 1957, 22(1), 23-32.

10,432
To examine the possibility that auditory comprehension might be increased by selective verbal redundancy combined with high-speed messages, a recorded technical message at 141 words per minute together with a test of factual comprehension were available from a previous experiment. The test yielded two sets of items matched for difficulty. For one set only, the content was augmented by non-repetitive restatement of sampled fact, recorded and spliced into the original. Both versions were heard by independent groups of subjects at zero and 30 per cent time compression. Comprehension test scores were studied by appropriate analyses of variance.
T. R 3

10,433
O'Neill, J.J. RECOGNITION OF INTELLIGIBILITY TEST MATERIALS IN CONTEXT AND ISOLATION. J. Speech Hearing Disorders, March 1957, 22(1), 87-90. (USN School of Aviation Medicine, Pensacola, Fla.).

10,433
To investigate the effects of context and isolation on the relative recognition of intelligibility test items, 39 subjects listened to 50 sentences (part of a standard intelligibility test) and 291 words (same words taken out of context). Five speech-to-noise ratios were used: 0, -12, -6, +6, +12 decibels. Comparisons were made of the recognition of words in context and in isolation at the various speech-to-noise ratios. The stability of intelligibility scores of individual words was further analyzed.
T. R 4

- 10,434
Hedgecock, L.D. RECRUITMENT IN EARS WITH ABRUPT LOSS OF ACUITY FOR HIGH FREQUENCIES. *J. Speech Hearing Disorders*, March 1957, 22(1), 91-97. (Mayo Clinic, Rochester, Minn.).
- 10,435
House, A.S. ANALOG STUDIES OF NASAL CONSONANTS. *J. Speech Hearing Disorders*, June 1957, 22(2), 190-204. (Massachusetts Institute of Technology).
- 10,436
Flanagan, J.L. DIFFERENCE LIMEN FOR FORMANT AMPLITUDE. *J. Speech Hearing Disorders*, June 1957, 22(2), 205-212. (Massachusetts Institute of Technology).
- 10,437
Black, J.W. MULTIPLE-CHOICE INTELLIGIBILITY TESTS. *J. Speech Hearing Disorders*, June 1957, 22(2), 213-235. (USN School of Aviation Medicine, Pensacola, Fla.).
- 10,438
Morrison, Helen, M., & Black, J.W. PREDICTION OF MISSING WORDS IN SENTENCES. *J. Speech Hearing Disorders*, June 1957, 22(2), 236-240. (Ohio State University).
- 10,439
Tolhurst, G.C. EFFECTS OF DURATION AND ARTICULATION CHANGES ON INTELLIGIBILITY, WORD RECEPTION AND LISTENER PREFERENCE. *J. Speech Hear. Disord.*, Sept. 1957, 22(3), 328-334. (USN School of Aviation Medicine, Pensacola, Fla.).
- 10,440
Black, J.W., Morrill, S.H., & Malloy, Margaret, M. THE PITCH OF SIDE-TONE. *J. Speech Hearing Disorders*, Sept. 1957, 22(3), 339-342. (USN School of Aviation Medicine, Pensacola, Fla.).
- 10,441
Davis, R., & Usher, J. WHAT IS ZERO HEARING LOSS? *J. Speech Hear. Disorders*, Dec. 1957, 22(5), 662-690.
- 10,434
To investigate the relative performance of the two ears of 22 patients with unilateral Meniere's disease accompanied by a marked loss of acuity for high frequencies in the opposite ear, audiometric measure were made: a pure-tone audiogram, a test of binaural loudness balance, a determination of the difference limen for intensity at ten and forty decibels above threshold, and a series of speech-reception tests. The data were analyzed for evidence of recruitment in both ears and for the comparability of results from the various tests. The validity of the difference limen as a test of recruitment is discussed.
G.R 10
- 10,435
To investigate the production of nasal consonants, electrical analogs of the nasal and vocal tracts were used to simulate the articulation of the three nasal consonants of American English - m/, n/, and ng/. The coupled analogs were manipulated to produce synthetic sounds that were used to construct perceptual tests. The tests were administered to trained listeners. Results of the listening tests and a description of the physical characteristics of the sounds are presented and discussed.
T.G.I.R 19
- 10,436
To determine the just-discriminable differences for the amplitude of the second formant (F2) of a synthetic vowel sound (E), pairs of sounds were produced by a 'terminal analog' electrical synthesizer. Four listeners judged whether the quality of the second sound of each pair was the same as or different from the first. Two patterns of fundamental frequency were examined: 120 cycles per second monotone and linear inflection from 95 to 105 cycles per second at one sound pressure level of 70 decibels. Percentages of judgments called different were analyzed as function of magnitude of change in F2 amplitude. The use of the results in speech transmission systems is discussed.
G.R 7
- 10,437
This report describes the construction of 23 equivalent multiple-choice intelligibility tests, Forms C and D, which supplement existing tests, Forms A and B. The possible "listener choices" are grouped on two answer forms. The materials from which the tests may be reproduced are presented together with instructions for the speakers and listeners.
T. G. I. R 16
- 10,438
To quantify the relative contributions of controlled amounts of context upon the predictability of missing words in sentences, from one to six words were omitted from each of 130 sentences. The remaining portions, both with and without indications of where words had been deleted and with residual words in original and scrambled order, were presented to more than 700 subjects. Each one worked only once with words from one sentence in an attempt to reconstruct the original. Two sets of scores, number of original words supplied and original "idea" preserved, were derived and analyzed in terms of experimental conditions.
T. R 8
- 10,439
To study durational aspects and articulation differences of speech, two procedures were followed: 1) multiple-choice intelligibility tests were recorded by a single voice in three manners (normal, prolonged, and staccato) with rate and sound pressure level constant; word reception scores and preferences were obtained (12 panels of listeners, 12-15 per panel) in 114 decibels of noise, and 2) the same speaker recorded alternate test forms with three degrees of precision (precise, normal, and slovenly). Subjects heard the recorded test items and repeated them to panels of listeners; other listeners responded to the recording. Judgments were later made of paired items (as recorded and as repeated) as to articulation.
T. G. I. R 9
- 10,440
To test the correctness with which a speaker hears the pitch of his voice, 32 subjects (29 trained musicians) recorded vowels at four sound level pressures (75, 85, 95, and 105 decibels). The vowels were played back at distorted pitches and subjects attempted to correct the pitch by altering speed of playback mechanism as they revocalized the vowels. Mean fundamental frequencies of the sustained vocalization and of the matched variable stimulus were determined and compared for each of the four levels of sound pressure.
T. R 3
- 10,441
This article reviews the problem of audiometric reference level for zero hearing loss and is based on papers and discussions of a symposium on the subject given at the 1955 Armed Forces-National Research Council on Hearing and Bio-Acoustics. The bases of the present American standard and the new British standard for audiometric reference zero are reviewed and compared. The influence of masking noise, age, and previous noise exposure on the audiogram is discussed. Methods for determining sound pressure at the ear and the problems of accuracy are pointed out. Finally, a reassessment of the problem involved in establishing an International Standard is presented.
T. G. I. R 11

10,442

Stearns, Dorothy, & Hooley, Catherine E. PSYCHOLOGICAL SCALING METHODS APPLIED TO AUDIOMETRIC DEFICIENCIES. *J. Speech Hearing Disorders*, Dec. 1957, 22(5), 810-822. (State University of Iowa).

10,443

To evaluate and compare the usefulness of several psychological scaling methods (equal appearing intervals, successive intervals, paired comparisons, and constant sums) applied to short segments of the continuous speech of children with defective articulation, test items of such speech, five seconds in length, were recorded. The segments represented a range in articulation from normal to severely defective. Independent groups of 100 or 125 observers were used for judging the samples. Correlations between sets of calculated scale values, demonstrations of linear or non-linear relationships between sets of values and internal consistency measures were used for evaluation of methods.

G. R 6

10,443

Usher, J.P. PROBLEMS IN MILITARY AUDIOMETRY: A CHABA SYMPOSIUM. I. INTRODUCTION TO THE PRESENTATIONS. *J. Speech Hearing Disorders*, Dec. 1957, 22(5), 729-730.

10,443

This paper presents the background for this symposium. Since the Armed Forces are establishing programs for more accurate testing of hearing of candidates for military service many problems have arisen. The papers in the symposium are devoted to a discussion of these problems.

10,445

Hooley, G. PROBLEMS IN MILITARY AUDIOMETRY: A CHABA SYMPOSIUM. III. DIAGNOSTIC AUDIOMETRY. *J. Speech Hearing Disorders*, Dec. 1957, 22(5), 734-735. (Syracuse University).

10,445

This paper deals with methods of assessing hearing loss so that the exact type of loss and the probable cause for it can be determined. Information derived from the necessary tests for diagnostic audiometry are necessary, not only for treatment but also for establishing any claim for service-connected injury.

10,446

Hirsch, I.J. PROBLEMS IN MILITARY AUDIOMETRY: A CHABA SYMPOSIUM. IV. A CLASSIFICATION OF HEARING TESTS. *J. Speech Hearing Disorders*, Dec. 1957, 22(5), 736-743. (Washington University).

10,446

This paper examines the reasons why a military agency should test hearing and proceeds to classify presently available hearing tests according to these military requirements. A simplified scheme for the selection and employment of appropriate tests is presented and discussed.

10,447

Carhart, R. PROBLEMS IN MILITARY AUDIOMETRY: A CHABA SYMPOSIUM. V. REVIEW OF THE REPORT BY THE WORKING COMMITTEE ON AUDIOMETRY. *J. Speech Hearing Disorders*, Dec. 1957, 22(5), 744-747. (Northwestern University).

10,447

The Working Group on Military Audiology reviewed a number of questions presented by the three Armed Services and concluded that the goals in testing and research needs were common to all the Services. The functions of military audiology were defined, special problems in testing were recognized, and steps for the improvement of testing were proposed. The Glorig screening method was evaluated and recommendations made concerning automatic self-recording techniques.

10,448

Webster, J.C. PROBLEMS IN MILITARY AUDIOMETRY: A CHABA SYMPOSIUM. VI. AUTOMATIC AUDIOMETRY. *J. Speech Hearing Disorders*, Dec. 1957, 22(5), 748-749. (Navy Electronics Lab., San Diego, Calif.).

10,448

This paper reviews the problems presented by automatic audiometry and lists the audiometers now in operation (Navy): Binyon, Holmes, Brown, Dickster, West, Glorig, and Navy audiometers. The basis for choice among these machines is discussed.

10,449

Glorig, A. PROBLEMS IN MILITARY AUDIOMETRY: A CHABA SYMPOSIUM. VII. PRACTICAL LIMITATIONS IN MILITARY AUDIOMETRY. *J. Speech Hearing Disorders*, Dec. 1957, 22(5), 750-751.

10,449

The most important limitations in military audiometry are given as personnel, equipment, and test environment. A plan for correcting these limitations is proposed and discussed.

10,450

The CHABA Council. PROBLEMS IN AUDIOMETRY: A CHABA SYMPOSIUM. VIII. AUDIOMETRY IN THE ARMED FORCES. *J. Speech Dis.*, Dec. 1957, 22(5), 752-756.

10,450

This report represents the official statement of the CHABA Council concerning the status of audiometry in the military services as of the year 1955. Purposes and objectives are reviewed and the various kinds of audiometry discussed. Recommendations are presented concerning the use of monitoring audiometry and the need for the Armed Services to establish audiometric standards that their personnel must meet so that specifications can be developed.

10,451

Kyars, C.K. NOISE BANDS VS. PURE TONES AS STIMULI FOR AUDIOMETRY. *J. Speech Hearing Disorders*, Dec. 1957, 22(5), 757-760. (USM Medical Research Lab., New London, Conn.).

10,451

To compare the relative efficiencies of noise bands and pure tones in general audiometry, a group of 12 patients with partially defective hearing was examined with tones of 500, 1000, 2000, and 4000 cycles per second and with bands of noise centered at the same frequencies. Test adjustments were made with each stimulus. The acuity data were analyzed by correlational methods and test-retest reliability calculated by comparing first and last five adjustments. The practical uses for a phonograph disc containing the noise bands are discussed.

10,452

Warren, J.M. & Pinneau, S.R. INFLUENCE OF FORM ON JUDGMENT OF APPARENT AREA. *Percept. Mot. Skills*, 1955, 5, 7-10. (University of Oregon, Eugene, Ore.).

10,452

This experiment was designed to determine the effect of form on apparent visual area. Thirty-two subjects were presented with a series of cards on which were printed circles, squares, crosses, and triangles of varied areas and asked to match them against a standard circle of 600 square millimeters. The method of constant stimuli was utilized to obtain the judgments. The results are presented and discussed in terms of the accuracy of subjective judgment as a function of the particular forms.

T. R 4

10,453

Smith, P.A., & Smith, K.A. EFFECTS OF SUSTAINED PERFORMANCES OF HUMAN MOTIONS. *Percept. Mot. Skills*, 1955, 5, 23-29. (University of Wisconsin).

10,452

This study was designed to assess the effects of sustained movement on various components of human action and to investigate the role of the muscular cycle in the definition of duration of various movements. A panel control task was utilized to assess the component movements of manipulation and travel of 23 female subjects under conditions of initial and sustained (eight weeks) practice. Data on muscular cycle were obtained. An electronic action analyzer was employed to obtain the relevant measures of movement. The results are treated in terms of the relative effects of phase of muscular cycle and amount of practice on the duration of the component movement.
T. G. R 5

10,454

Bartley, S.H., Clifford, J.T., & Calvin, A.D. EFFECT OF VISUAL IMAGERY ON TACTILE AND KINESTHETIC SPACE PERCEPTION. *Percept. Mot. Skills*, 1955, 5, 177-184. (Michigan State University)

10,454

In order to assess the role of visual imagery in tactile and kinesthetic space perception, ten normal vision were compared with ten congenitally blind children on performance of a size-judging test in which some 90 pairs of forms were varied in terms of size (small, medium, and large). Another variable was distance of form from the subject (5 inch, 10 inch, and 13 inch). The sighted subjects were blindfolded. The location of the control and variable stimuli was fixed in one part of the experiment and varied in another. The resultant data are analyzed in terms of the relative effectiveness of tactile and kinesthetic cues where visual imagery is varied.
T. L. R 4

10,455

Bartley, S.H. LIGHT IN DECIBELS. *Percept. Mot. Skills*, 1955, 5, 199-200.

10,455

In this article the author presents a brief discussion of a proposal to use a decibel scale to measure light. The consequences following from the adoption of such a procedure are outlined. The necessity of accounting for the retinal aperture and Stiles-Crawford effect is noted and results in a proposed assessment unit labeled as the "relative retinal decibel". An illustration of the decibel values for retinal illumination is presented.
T. R 3

10,456

Slater - Kessel, A.T. ESTIMATION OF MOVEMENT AS A FUNCTION OF THE DISTANCE OF MOVEMENT PERCEPTION AND TARGET DISTANCE. *Percept. Mot. Skills*, 1955, 5, 201-204. (Indiana University).

10,456

This study was designed to determine the effects of perceptual display distance and target distance upon estimation of movement. A three by three factorial design was utilized in the assessment of nine groups of subjects estimating the movement of a moving marker to a target marker under nine experimental conditions (i.e., movement display versus target distances of 2 5/8, 5 1/4, and 7 7/8 inches). The results are presented and discussed in terms of degree of absolute and constant error as a function of variation in target and display distances.
T. R 1

10,457

Moucrieff, R.W. OLFACTORY ADAPTATION AND ODOR INTENSITY. *Amer. J. Psychol.*, March 1957, 70, 1-20. (Chichester, England).

10,457

This article presented the results of a series of experiments on the relation between olfactory adaptation and odor-intensity. The general methodology consisted of presenting Ss with a series of test or diluted solutions of a variety of odorants either prior to or following presentation of an undiluted or control odorant. The results were discussed in terms of the definition and determination of odor-intensity, the adapting effect of odor-intensity, and the relation between odor-intensity and olfactory threshold concentration.
T. G. R 11

10,458

Dinnerstein, Dorothy, & Wertheimer, M. SOME DETERMINANTS OF PHENOMENAL OVERLAPPING. *Amer. J. Psychol.*, March 1957, 70, 21-37. (Sania Street College of Education, University of Colorado).

10,458

Several experiments are reported covering the phenomenal overlapping of visual planes with the primary goal of defining some of the determinants of this function. The general procedure consisted of presenting a series of overlapping forms (e.g., squares, square and crosses, line patterns, and so forth) to groups of subjects instructed to describe the content and designate the surfaces appearing to go behind the other surfaces. The distributions of descriptions for the various figures are analyzed and discussed in terms of the role of symmetry, simplicity, and similarity as determinants of phenomenal overlapping.
T. L. R 7

10,459

Kleiner, E.T. RHYTHMIC DISTURBANCES IN A SIMPLE VISUAL MOTOR TASK. *Amer. J. Psychol.*, March 1957, 70(2), 55-63. (Operational Application Lab., ARDC, Bolling AFB, Washington, D.C.).

10,459

This study was designed to investigate several factors involved in the rhythmic disturbances experienced in reaction-time tests. Five subjects were trained on a five-light-five-key task with single light-flashes. In the experimental test three classes of stimuli and three classes of response were utilized with all tests made with a stimulus-repetition rate of two per-second. The results are analyzed and discussed in terms of the relative degree of rhythmic disturbance as a function of the various modifications of stimulus and/or response employed in the study.
T. G. R 3

10,460

Andrews, B., Gerall, A.A., Green, R.P., & Murphy, D.P. PERFORMANCE IN FOLLOWING TRACKING AS A FUNCTION OF THE SENSITIVITY OF THE AIRPLANE - TYPE CONTROL STICK. *J. Psychol.*, April 1957, 43, 169-179. (University of Rochester).

10,460

This study was designed to assess the effect of control stick sensitivity upon performance of a following tracking task and to determine the transfer effects of change in control sensitivity. Utilizing the Rochester Generalized Tracking Apparatus, 64 subjects were required to perform a following tracking task by manipulating an airplane stick control varied in sensitivity to provide the following display - control movement ratios: 1 to 1, 1 to 1, 15 to 1. The results are analyzed in terms of mean time on target as a function of sensitivity ratios under both training and transfer trials. Accuracy of tracking as a function of control sensitivity is discussed.
T. G. R 15

10,461

Bartley, S.H., Paczewitz, G., & Valsi, E. BRIGHTNESS ENHANCEMENT AND THE STIMULUS CYCLE. *J. Psychol.*, April 1957, 43, 187-192. (Michigan State University).

10,461

This study was designed to assess the relation of brightness enhancement to the pulse-to-cycle-fraction (PCF) of intermittent retinal stimulation. With two trained observers serving as subjects, the PCF of an intermittent target, a disk-ring combination was varied from 0.2 to 0.9 for two different photic pulse rates, 10.6 and 32 cycles per second, and the effect on brightness enhancement determined. The effects of shortening the pulse on brightness enhancement are discussed in terms of the implication concerning the neurophysiology of the optic pathway.
G. R 16

10,462
Einfestetter, F.R., & Primm, D.W. COLORS AND THE COLOR BLIND. *J. gen. Psychol.*, Oct. 1957, 57, 229-240. (Catholic University of America).

10,462
An experiment is reported in which an attempt is made to determine the relations between the conceptual patterns of color experiences for normal and color-blind subjects. Eleven "green blind" and 25 normal subjects were required to rate 15 stimuli, i.e., four colors, the names of these colors, and eight symbolic concepts of colors, on Osgood's semantic differential. Realizing the Osgood-Oser distance function, the similarities between the color-blind and normal experiences of the different colors were analyzed. Primary differences in color experience are discussed.
T. F. & 5

10,463
Baker, P., & Krets, P. RELIABILITY OF TIME ESTIMATES. *Percept. Mot. Skills*, March 1957, 7(1), 23-24. (Michigan State University).

10,463
To study the reliability of time estimates, 55 subjects estimated five different time intervals: 15, 30, 60, 120, and 240 seconds. Verbal reports were given of estimated lapses of time from the sounding of a click and the work stop. Two sessions were held one week apart, and in each session there were two identical series of time intervals. The stability of the time estimates within a session and between sessions were studied by correlational methods.
T. R 1

10,464
Wilcox, R.C. SUBLIMINAL STIMULATION VS. PSYCHO-PHYSICAL THRESHOLDS. *Percept. Mot. Skills*, March 1957, 7(1), 29-35.

10,464
This is a review of the experimental literature on subliminal stimulation with reference to the question of whether the experiments provide consistent evidence that threshold levels can be established below those obtained by psychophysical procedures. The survey is organized around the types of behavior observed in testing - guessing, perception of illusions, and conditioning. The need for empirical determination of the degree of similarity among definitions is stressed.

10,465
Ammons, R.E., & Ammons, C.E. MOTOR SKILLS BIBLIOGRAPHY: XVII. PSYCHOLOGICAL ABSTRACTS, 1947, VOLUME 21. *Percept. Mot. Skills*, 7(1), 41-44. (University of North Dakota).

10,465
References to the literature on motor skills which appear in the *Psychological Abstracts*, 1947, Volume 21, are listed alphabetically by author. Foreign titles are omitted.
R 96

10,466
Ammons, C.E., & Ammons, R.E. MOTOR SKILLS BIBLIOGRAPHY: XVIII. PSYCHOLOGICAL ABSTRACTS, 1948, VOLUME 22. *Percept. Mot. Skills*, June 1957, 7(2), 81-84. (University of North Dakota).

10,466
References to the literature on motor skills which appear in the *Psychological Abstracts*, 1948, Volume 22, are listed alphabetically by author. Foreign titles are omitted.
R 94

10,467
Bartley, S.E. LIGHT ADAPTATION AND BRIGHTNESS REASCENDING. *Percept. Mot. Skills*, June 1957, 7(2), 85-92. (Michigan State University).

10,467
This paper discusses the relations of light adaptation to brightness enhancement. The existence of several kinds of end-reaction found in dealing with intermittent stimulation is pointed out and their interrelations examined. The discussion is organized around types of investigational procedures: use of brief presentations of target, use of intermittent presentations, manipulation of duration, manipulation of PCF (pulse-to-cycle fraction), manipulation of rate, and manipulation of intensity.
G. L. R 24

10,468
Wilson, E.T. EFFECTS OF SIZE AND SHAPE DIFFERENCES IN STIMULI ON DISJOINTIVE REACTION TIME. *Percept. Mot. Skills*, June 1957, 7(2), 93-96. (Duke University).

10,468
To compare the effects on asymptotic reaction time of increasing differences in size and shape alone and of various combinations of such differences, four subjects were studied. The pre-exposure field contained two alternate stimuli on the left and right of a fixation point. Upon presentation of one stimulus in the center of the exposure field, the subject pressed either a left or right button to indicate its pre-exposure position. The standard stimulus (0.50 by 0.50 black square) was in left position throughout with the variable in the right. Average reaction time and amount of information transmitted as affected by stimulus differences were analyzed.
T. G. R 7

10,469
Coffey, C.W., & Shepp, R.E. VERBAL CONTEXT AND PERCEPTUAL RECOGNITION TIME. *Percept. Mot. Skills*, Sept. 1957, 7(3), 215-216. (University of Maryland).

10,469
To investigate the effect of synonym context on perceptual recognition time, 21 subjects were asked to recognize stimulus words that were presented for brief exposures following the presentation of standard words bearing either no relation or some degree of synonym relation to the stimulus words. Mean recognition times (in seconds) were analyzed for differences due to stimulus conditions. Evidence from related studies is examined in relation to these results.
T. R 6

10,470
Kristofferson, A.E. WORD RECOGNITION, MEANINGFULNESS AND FAMILIARITY. *Percept. Mot. Skills*, Sept. 1957, 7(3), 219-220. (University of Michigan).

10,470
To explore the use of a new approach to the study of the relations between word recognition, meaningfulness (m) and familiarity (f), a set of verbal materials scaled for m and f on the basis of response measures were used for stimuli. Recognition thresholds for words selected over the entire range of m values were measured by the ascending method of limits and tachistoscopic presentation. Threshold data (in seconds) are presented to illustrate the type of effect gained. No analysis is made since the data are few.
T. R 5

10,471
Kottenhoff, H., Lindahl, L.E.E., & Mable, S.E.R. OPTICAL AND MECHANICAL DEVICES FOR TESTING SUSCEPTIBILITY TO MOTION SICKNESS. *Percept. Mot. Skills*, Sept. 1957, 7(3), 221-222. (University of London).

10,471
This paper describes briefly some inexpensive devices for effective stimulation of proprioception and vision to produce motion sickness. Field-distorting size lenses and lenses with prisms that reverse the visual field contents and their motions are reported. It is planned to use these lenses with (1) a manually rotated chair, (2) a rocking chair, and (3) a chair, which may be revolved or kept stationary, fixed to a platform capable of movement in two directions.
R 9

10,472

Ammons, R.B., & Ammons, C.E. MOTOR SKILLS BIBLIOGRAPHY: XIX. PSYCHOLOGICAL ABSTRACTS, 1942, VOLUME 23. *Percept. Mot. Skills*, Sept. 1957, 7(3), 231-234. (University of North Dakota).

10,473

References to the literature on motor skills which appear in the *Psychological Abstracts*, 1949, Volume 23, are listed alphabetically by author. Foreign titles are omitted.

R 9

10,473

Foldvary, T.J., Matogosh, P., & Westheimer, G. PRECISION OF EXTREMITY RESPONSES OF THE CONTROL-MOTOR SYSTEM. *Percept. Mot. Skills*, Dec. 1957, 7(4), 247-250. (The Ohio State University).

10,473

To trace the course of changes in reaction time of eye movements with periodically repeated presentation of a visual stimulus, two subjects were instructed to move their eyes in synchrony with the alternation of a pair of alternately exposed (every second) light spots. Two other subjects were instructed to change fixation after the new stimulus appeared. Five one-minute sessions were given on five successive days; eye movements were recorded photographically. Latencies (interval between stimulus change and concomitant eye movement) were analyzed in terms of the precision that can be expected of such responses.

G. B 3

10,47

Ammons, C.E., & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: XI. PSYCHOLOGICAL ABSTRACTS, 1950, VOLUME 24. *Percept. Mot. Skills*, Dec. 1957, 7(4), 275-276. (Montana State University).

10,474

References to the literature on motor skills which appear in the *Psychological Abstracts*, 1950, Volume 24, are listed alphabetically by author. Foreign titles are omitted.

B 99

10,475

Higham, T.W. BASIC PSYCHOLOGICAL FACTORS IN COMMUNICATION. *Occup. Psychol.*, Jan. 1957, 31(1), 1-10. (Routledge & Co., Ltd., York, England).

10,475

This paper discusses some problems of effective communication between individuals and groups and examines the basic psychological factors involved. Creation of an atmosphere for favorable reception of information is seen to involve basic mental processes, in particular perception and attitude formation. To understand the accuracy with which the information is received the processing of comprehension and recall need to be studied. The importance of the personal factor is stressed.

B 27

10,475

Brown, Ruth, A. AGE AND 'FACED' WORK. *Occup. Psychol.*, Jan. 1957, 31(1), 11-20. (Suffield Unit for Research into Problems of Aging, Psychological Lab., Cambridge, England).

10,476

To discover the nature of the difficulties that arise in 'paced work' and at what ages they become apparent, a grid-matching apparatus was used. The task was to position a pointer on one grid to match a target on the corresponding grid over a series of trials. Two groups of subjects (64, 130) ranging in age from 20 to over 70 performed the task under both paced and unpaced work conditions in counterbalanced order. Each phase of the work cycle was recorded as well as successful attempts and errors. The data were analyzed in terms of age differences. Aspects of the work cycle which changed with age are discussed with regard to production line work in industry.

T. G. R 4

10,477

Provine, K.A., Stockbridge, W.C.W., Forrest, B.W., & Anderson, S.A. THE REPRESENTATION OF AIRCRAFT BY PICTORIAL SIGNS. *Occup. Psychol.*, Jan. 1957, 31(1), 21-32. (Ministry of Supply Clothing & Equipment Physiological Research Establishment, Farnborough, England).

10,477

To discover the best set of pictorial symbols to represent the activities of hostile and friendly aircraft, two methods of matching signs to words were tried. First, a set of verbal descriptions was ranked in order of merit for each of 23 symbols; a rank correlation analysis yielded a series of signs to fit the symbols. Second, from the subjects' introspections another series was constructed. The two series were then tested against each other in a learning situation (123 subjects). A shortened version of the second series was tested in a like manner against a series based on understandable but arbitrary principles. Number of trials and errors during learning were analyzed for the various comparisons.

G. I. B 1

10,475

Gibbs, C.B. THE WORKER AND HIS TOOLS. *Occup. Psychol.*, Jan. 1957, 31(1), 36-43.

10,475

The methods and aims of psychology applied to the worker and his tools are stated and discussed. Some examples from this approach are given. The implications of the approach for both engineering and psychology are considered.

10,475

Amsett, J., and Fay, H. KNOWLEDGE OF RESULTS AND 'SKILLED PERFORMANCE'. *Occup. Psychol.*, April 1957, 31(2), 69-79. (Institute of Experimental Psychology, University of Oxford).

10,479

This paper presents a reassessment of some of the problems of knowledge of results in light of an approach to motor skills which regards the operator performing a task as a communication channel receiving signals from both his internal and external environment and on the basis of these signals regulating his responses. The perceptual approach to skills is considered in terms of this approach. Some different kinds of knowledge of results are outlined - directional indicator, suggested feedback - and some training problems raised by them are discussed. The relation of motivation to knowledge of results is discussed.

B 6

10,480

Taylor, P.V. SIMPLIFYING THE CONTROLLER'S TASK THROUGH DISPLAY QUICKENING. *Occup. Psychol.*, April 1957, 31(2), 120-125. (USN Research Lab., Washington, D.C.).

10,480

The process of 'quickenings' a display in certain kinds of control tasks that involve time lags between operator response and machine response is defined and discussed. The advantages of a quickened display by giving the operator immediate knowledge of results is illustrated by citing findings from experimental tests.

G. I. R 3

10,481

Holding, D.H. THE EFFECT OF INITIAL POINTER POSITION ON DISPLAY-CONTROL RELATIONSHIPS. *Occup. Psychol.*, April 1957, 31(2), 126-130. (Suffield Department of Industrial Health, King's College (Newcastle-upon-Tyne), University of Durham).

10,481

To investigate the effect of the position from which a display indicator begins its travel on the direction in which the control is moved by an operator unfamiliar with the equipment, settings were made on a vertical scale by means of a rotary knob. Half the settings were made upwards and half downwards with the initial position at nine different distances along the scale. There were 360 subjects in 18 groups of 20; each subject made only one setting at one pointer position. Direction of rotation was recorded and analyzed in terms of dominant display-control relationships for each position.

G. I. R 5

10,482

Siddall, G.J., Holding, D.H., & Draper, J. ERROR OF AIM AND EXTENT IN MANUAL POINT TO POINT MOVEMENT. *Occup. Psychol.*, July 1957, 31(3), 155-195. (Ministry of Supply, Clothing and Stores Experimental Establishment, Farnborough, England).

10,482

To compare the magnitudes of errors of aim with errors of extent in simple discrete movements, 18 subjects were required to draw four lines in succession from a starting point to a target as fast as possible. Distance between points was 30 centimeters; four targets, requiring movements from left to right, right to left, outwards from front of body and inwards toward body, were used. Errors in extent and deviations to left and right of target, and durations of movement were recorded and analyzed for differences in type of errors and for effects of direction and speed. Implications for equipment design are discussed.

T. 2 15

10,493

Berlyne, D.E. CONFLICT AND CHOICE TIME. *Brit. J. Psychol.*, May 1957, 48(2), 105-119. (Psychology Dept., Univ. of Aberdeen).

10,493

To explore the usefulness of reaction time (RT) as a convenient measure of conflict or the study of thought processes, three experiments were carried out testing the effects of four variables: (1) the number, (2) the sameness to equality in strength, (3) the absolute strength, and (4) the degree of incompatibility, of competing response tendencies. Two types of choice RT were recorded: forced-choice, one stimulus was presented at a time, each with its appropriate responses; and free-choice RT, two or more stimuli were presented together and responses made to any one of them. The data were studied by analysis of variance methods and these findings are discussed in relation to theoretical models of behavior.

T. 2 15

10,494

Marill, C. THE PSYCHOLOGICAL REFRACTORY PHASE. *Brit. J. Psychol.*, May 1957, 48(2), 93-97. (Massachusetts Institute of Technology)

10,494

To investigate the latency of responses upon rapid re-stimulation, a reaction time experiment was performed in which three subjects were presented individually with two lights and two handkeys. A flash of the left light was a signal to press the left key; the right light to press the right key. Trials were given in which both lights flashed; intervals between flashes were randomly selected from nine possible values ranging from zero to 600 milliseconds, the various intervals occurring with equal probability. Nine sessions of 100 trials each were completed. Median reaction times for first and second responses were analyzed as a function of the stimulus interval.

G. R 14

10,485

Beauvois, J.T., & Foss, B.M. INDIVIDUAL DIFFERENCES IN REACTING TO DELAYED AUDITORY FEEDBACK. *Brit. J. Psychol.*, May 1957, 48(2), 85-89. (Department of Psychology, Birkbeck College).

10,485

To investigate some individual differences that might be related to susceptibility to speech impairment due to delayed auditory feedback (artificial stutter), 30 subjects performed the following tasks: (1) reading a 400-word message and repeating two short nursery rhymes under normal and delayed feedback (1/5 second) conditions; (2) star tracing; (3) mirror writing; (4) Einstellung test; and (5) imagery rigidity. The last four tests were included to test for perseveration tendencies and ability to ignore distraction or use it in a novel way. Time scores for the auditory feedback test and other appropriate performance scores were analyzed for relationships.

T. R 7

10,492

Broadbent, D.E. IMMEDIATE MEMORY AND SIMULTANEOUS STIMULI. *Quart. J. exp. Psychol.*, Feb. 1957, 9(1), 1-11.

10,492

To investigate some aspects of immediate memory for simultaneous stimuli, two sets of three digits were presented simultaneously, one to one ear and one to the other, and the subject asked to write them down beginning with those on an ear chosen by the experimenter. In one condition the order was indicated before presentation, in another after presentation of the digits. A second experiment required the subject to write first six digits presented to the right ear and then two presented to the left. Conditions varied the time of presenting the left digits and the number of irrelevant stimuli accompanying them. Per cent correct recalls were analyzed for effects of recall order, and of delay. Theoretical implications are discussed.

T. 2 11

10,493

Provine, R.A. SENSORY FACTORS IN THE VOLUNTARY AFFILIATION OF PRESSURE. *Quart. J. exp. Psychol.*, Feb. 1957, 9(1), 28-41. (Unit of Research on Climate and Working Efficiency, Medical Research Council, Department of Human Anatomy, University of Oxford).

10,493

To assess the extent of sensory control of voluntary movements of the forearm and finger when the contractions of the muscles concerned are approximately isometric, a series of experiments were performed on groups of ten or twelve subjects. Records were obtained of the accuracy of reproducing a given pressure with the ulnar border of the hand at different pressure values (157.5 to 3,750 grams), rates (0.25 to 7.5 seconds), area of skin involved (0.63 to 1.265 centimeters), and with finger anesthetized or unanesthetized. Mean errors in applying pressures were analyzed for effect of experimental conditions and the results discussed in relation to other studies as to sensory factors involved.

T. 2 31

10,494

Sutton, G.G. THE ERROR POWER SPECTRUM AS A TECHNIQUE FOR ASSESSING THE PERFORMANCE OF THE HUMAN OPERATOR IN A SIMPLE TASK. *Quart. J. exp. Psychol.*, Feb. 1957, 9(1), 42-51.

10,494

This paper is concerned with the measurement of performance of a human operator in a closed loop control system. It is suggested that a power spectrum of the fluctuations of tracking error (or error spectral density curve) would give a useful picture of performance. The equipment and technique for this method are described. The typical spectrum of an operator attempting to maintain a fixed force with visual error information is presented as an example of the technique. The implications of the shape of the curve are discussed.

G. I. R 6

10,495

Ingham, J.G. THE EFFECT UPON MONAURAL SENSITIVITY OF CONTINUOUS STIMULATION OF THE OPPOSITE EAR. *Quart. J. exp. Psychol.*, Feb. 1957, 9(1), 52-60.

10,495

To study the effect upon monaural sensitivity of continuous stimulation of the opposite ear and the effect of stimulus intensity and attention upon stimulus interaction, a test stimulus (1000 cycle per second tone) was presented to the left ear (48 subjects). Threshold intensities were measured while a tone of 400 cycles per second was presented to the right ear as follows: occasional pips to facilitate control of attention, continuous tone of two and thirty decibels above threshold. Subjects were directed to count number of pips or to ignore second stimulus. Threshold data were studied by analysis of variance. Several explanations of the results are offered.

T. G. R 17

10,496

Piercy, M. EXPERIMENTAL DISORIENTATION IN THE HORIZONTAL PLANE. *Quart. J. exp. Psychol.*, May 1957, 9(2), 65-77.

10,496

To explore some factors relevant to constancy of perception of direction in the horizontal plane, 28 subjects were examined on a visual matching task for their ability to maintain orientation following a voluntary rotary body movement through 180 degrees. The task was performed in a dark room with luminous arrows: in two conditions, one additional visual cue (luminous circle) was used. Each subject was examined with respect to eight different directions. Gross errors of 90 and 150 degrees were analyzed for each direction and visual field conditions. Some explanations of the findings are offered and the relevance of the results to normal human orientation is discussed.

T. L. 26

10,497

Davis, R. THE HUMAN OPERATOR AS A SINGLE CHANNEL INFORMATION SYSTEM. *Quart. J. exp. Psychol.*, Aug. 1957, 9(3), 119-129. (Institute of Experimental Psychology, University of Oxford).

10,497

To study the manner in which information is channelled in the human operator, reaction time to stimuli separated by short intervals were obtained. Two practised subjects responded to pairs of stimuli (auditory followed by visual) by pressing a key with left hand for the first stimulus and another key with the right hand for the second. Foreperiod varied between 1.5 and 2.5 seconds and interval between first and second stimuli varied from 50 to 500 milliseconds. Control series of simple reaction times preceded each of 20 experimental sessions. The pattern of delays was analyzed and compared to that found when only one stimulus mode is used. Tentative explanations of the findings are offered in terms of a central refractory time.

G. I. R 10

10,498

Yelson, R. THE PERCEPTION OF A ROTATING SHAPE. *Quart. J. exp. Psychol.*, Aug. 1957, 9(3), 130-137. (Psychological Lab., University of Cambridge).

10,498

To study perception of a rotating shape in relation to shape constancy, twelve subjects performed a matching task. Test objects were four-inch outline squares and rectangles (4.00 times 3.06, 4.00 times 2.00 inch). In one condition the slant of the comparison square was adjusted to match the standard shapes, in the other a key was pressed when the regularly rotating comparison square matched the standards (set in frontal parallel plane). Three rates of rotation were used - one revolution in 32, 60, and 180 seconds. Both stationary and rotating matches were made in the two conditions. The data were compared for effects of the various experimental conditions on shape constancy.

T. R 5

10,500

Whittingham, H. MEDICAL RESEARCH ON FLIGHT TIME FATIGUE. *PPFC 1037*, Jan. 1958, 8pp. Flying Personnel Research Committee, Air Ministry, London, England.

10,500

This report briefly reviews some medical research done by British workers in connection with certain variables conducive to time fatigue, which might be such a degree as to be detrimental to safety. The points where it could be detrimental are: 1. The variables considered were: a. duration of flight, b. time of commencing flight, c. rest and recuperation, d. sleep, e. food, f. alcohol, g. fatigue, h. dehydration, i. hypoxia, j. hypothermia, k. hyperthermia, l. hypoglycemia, m. hypotension, n. hypertension, o. hyperventilation, p. hypervolemia, q. hypovolemia, r. hypoxemia, s. hypoxia, t. hypothermia, u. hyperthermia, v. hypoglycemia, w. hypotension, x. hypertension, y. hyperventilation, z. hypervolemia.

T. L. 26

10,501

Schlanderer, P.F., Hammel, H.L., Andersen, C.L., & Loring, J. METABOLIC ADAPTATION TO COLD IN MAN. *J. Appl. Physiol.*, Jan. 1958, 12(1), 1-6. (Institute of Biophysics, University of Oslo, Blindern, Norway).

10,501

This experiment studied the process of metabolic adaptation to cold in the human organism. Eight subjects spent six weeks on a mountain plateau in Norway. During the day they could exercise and they wanted to the problem of keeping warm pertained largely to sleeping hours when temperature was at least degrees fairly constantly. It was assumed acclimation would be either (1) metabolic - the men would sleep with an increased heat production and a normally warm surface, or (2) insulative - they would sleep with a basal heat production and a cold surface. Results on the following measurements are discussed in terms of the differences between the control (non-acclimated) and experimental groups: skin and rectal temperature, oxygen consumption, heat flow, shivering, sleep, and so forth. T. G. R 21

10,502

Kohn, J. & Devlin, B.M. SOCIAL ADAPTATION TO A STAGNANT COLD STRESS. *J. Appl. Physiol.*, Jan. 1958, 12(1), 9-12. (Arctic Research Lab., Seattle, Wash.).

10,502

This experiment studies differences in peripheral cooling, whole body cooling, and metabolic rates between Negroes and Caucasians at 17 degrees Centigrade. The subjects (seven Negroes, Caucasians and six Eskimos) fasted prior to experimentation with the exception of intake of small calorie amounts of food to reduce strain of fasting. Values were obtained for 30 minutes and followed by a two-hour cold exposure period. During this latter period rectal, average skin and extremity temperatures, body metabolism, sweating rates, and electromyogram were obtained at 5-minute intervals. Results are discussed in terms of the differences among these measurements as indicative of social and ethnic factors.

G. R 9

10,503

Miller, A.T., Jr. & Bluth, C.S. LACK OF INSULATING EFFECT OF BODY FAT DURING EXPOSURE TO INTERNAL AND EXTERNAL HEAT LOADS. *J. Appl. Physiol.*, Jan. 1958, 12(1), 17-19. (University of North Carolina)

10,503

This experiment assessed the insulating effect of subcutaneous fat. Subjects (14 normal weight and 14 obese) performed under three experimental conditions: (1) resting exposure to heat for 90 minutes, (2) treadmill walking in the heat at three miles per hour, zero grade, for 45 minutes, and (3) treadmill walking at normal ambient temperature (25 degrees Centigrade) at four miles per hour, ten percent grade, for 60 minutes. Data were obtained on skin and rectal temperature, heart and sweat rate, blood pressure, and body fat contents. The results are discussed in terms of the differences in these measurements for the normal weight and obese groups as indicative of relative recovery rates and metabolic costs of work with different dispositions of subcutaneous fat. T. R 8

10,504

Baker, E.P., Rehn, G.V., & Arnold, J.E. COMPARISON OF DEPENDABLE TO PREDICTABLE TIME AND DEPENDABLE BODY HEAT RECOVERY. *J. Appl. Physiol.*, Jan. 1958, 12(1), 37-41. (Physiology of Exercise Lab., University of Kansas).

10,504

This experiment attempts to determine the interrelationships of certain simple tests of physical fitness and certain bodily measurements. Fifty male subjects ranging from varsity athletes to sedentary individuals participated in a battery of tests. In the first day data were obtained relative to weight, height, birth of chest during inspiration and expiration, vital capacity, leg length and Ruffe Pulse-Rate test. In the second day data relative to the flammeter and Harvard Steptest were received. Coefficients of correlation between these various tests were obtained and results are discussed in terms of the interrelationships of these tests.

T. L. 26

10,505

Isakaki, I. HEARING. *Annual Rev. Physiol.*, 1957, 12, 417-438.

10,505

The author presents a review of the literature and summary of the experimental findings pertinent to the function of the cochlea in addition. Included in this treatment are the following broad aspects: electro-anatomy of the cochlea, cochlear microphonics, pattern of motion of the cochlear partition, etc. An extensive bibliography is included.

R 142

10,506

Teichner, W.H. ASSESSMENT OF MEAN BODY SURFACE TEMPERATURE. *J. Appl. Physiol.*, March 1958, 12(2), 169-176. (USA Quartermaster Research & Engineering Center, Natick, Mass.).

10,506

This experiment examined the minimum number of points required to obtain the mean weighted skin temperature. Subgroups of 323 soldiers, each wearing a 13-point thermocouple harness, were assigned to 14 different ambient conditions of wind and low temperature. The Quartermaster Corps 10-point mean weighted skin temperature was the standard. Three analyses were conducted: (1) a comparison of five other methods for obtaining a mean skin temperature in terms of the precision with which they estimated the 10-point mean, (2) an analysis of the relation between the 10-point mean and each of the individual points to determine which points might be eliminated without loss of precision, and (3) an analysis of the degree to which a single point might provide an estimate of the 10-point mean. I. G. R 11

10,507

Buskirk, E.R., Impietro, P.F. & Bass, D.E. WORK PERFORMANCE AFTER DEHYDRATION: EFFECTS OF PHYSICAL CONDITIONING AND HEAT ACCLIMATIZATION. *J. Appl. Physiol.*, March 1958, 12(2), 189-194. (USA Quartermaster Research & Engineering Center, Natick, Mass.).

10,507

This experiment studies the effects of physical conditioning and heat acclimatization upon physical performance during dehydration. Three groups of five men each were dehydrated overnight (110.5 degrees Fahrenheit) on two occasions. Three weeks prior to this one group was acclimatized to heat and physically conditioned, a second was physically conditioned, and a third remained sedentary. Performance consisted of grade walking and running on a treadmill. Indicators of performance response were: pulse rate, rectal temperature, and maximal oxygen intake. Results are discussed in terms of the relative effects of physical conditioning and acclimatization upon physical performance.

I. G. R 11

10,508

Grossmann, E.E., & Thornfeldt, P.R. RED GLASS X-RAY SPECTACLES. *Am. Arch. Ophthalmol.*, Sept. 1957, 52(3), 465-467. (Dept. of Ophthalmology, US Veterans Hospital, Wood, Miss.).

10,508

This brief article describes the development and relative effectiveness of optically ground spectacles designed to provide rapid dark adaptation by the employment of an accurately ground red glass, the Corning Red Glass. Relative merits of these spectacles are noted in comparison with the more common dark adaptation aid, the red plastic shield. The Corning Red Glass is said to have suitable application to persons requiring corrective lenses.

G. I.

10,509

Dill, D.B., Horvath, S.V. & Craig, F.M. RESPONSES TO EXERCISE AS RELATED TO AGE. *J. Appl. Physiol.*, 1958, 12 2, 195-196. (USA Chemical Warfare Labs., Army Chemical Center, Md.).

10,509

This experiment studies metabolic and circulatory responses to exercise in relation to age. One subject, aged 66, performed on a treadmill while measurements were made of oxygen consumption and heart rate. The data were then compared with the subject's past performance during different age periods. Results are discussed in terms of the level of running efficiency at different age levels. Recommendations for further experimentation are presented.

I. R 5

10,510

Robinson, S., Robinson, D.L., Mountjoy, R.J. & Bullard R.M. INFLUENCE OF FATIGUE ON THE EFFICIENCY OF MEN DURING EXHAUSTING RUNS. *J. Appl. Physiol.*, March 1958, 12(2), 197-201. (Medical School, Indiana University).

10,510

The purpose of the present experiment was two-fold: (1) to determine in runners the oxygen requirement at different periods of exhausting runs at constant speed and (2) to determine oxygen requirements and study the effects on fatigue when the running pace is varied (i.e., slow beginning pace with fast finish, and vice versa) during exhausting runs of fixed distance and time. Four college men participated in a series of running experiments (1) at constant speed, (2) with first part faster and last part slower than average speed, and (3) the reverse of the second variation. Data were obtained on basal oxygen consumption prior to run, during each minute of run, and so forth. Results are discussed in terms of the relationship between changes in oxygen consumption and the progressive development of fatigue. I. G. R 10

10,511

Grande, F., Anderson, J.T. & Keys, A. CHANGES OF BASAL METABOLIC RATE IN MAN IN SEMISTARVATION AND REFEEDING. *J. Appl. Physiol.*, 1958, 12(2), 230-238. (Physiological Hygiene Lab., University of Minnesota).

10,511

The results of two experiments on the physiological effects observed in subjects subsisting on a hypocaloric carbohydrate diet while maintaining a fairly high level of physical activity are reported in this study. Twenty-five male subjects performed under control, semistarvation, and recovery conditions during which measurements were made of basal heat production, total body water, extracellular fluid space and nitrogen balance. Results are discussed in relation to existing theories, e.g., changes in the various measurements are due (1) to a reduction of the metabolic activity of the body cells or (2) to the loss of actual tissues inherent to the loss of weight of the body.

I. G. R 37

10,512

Balke, B., Ellis, J.P. Jr. & Wells, J.G. ADAPTIVE RESPONSES TO HYPERVENTILATION. *J. Appl. Physiol.*, 1958, 12(2), 265-277. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,512

This experiment studied the possible existence and nature of adaptive mechanisms to hyperventilation. A standardized hyperventilation test procedure was used to determine the response to mechanically induced hyperventilation in terms of psychomotor performance, cardiovascular and respiratory functions, and so forth. Normal control patterns were established on six subjects who were retested under the following experimental conditions: 1) after two weeks' training in hyperventilation, 2) after eight weeks' training for physical conditioning, 3) under conditions of extreme fatigue, 4) after acclimatization at 14,000 feet, and 5) after return to sea level. Changes in hypoxic tolerance under these conditions and the potential of biochemical compensatory mechanisms in hyperventilation are discussed. I. G. R 11

10,513

Jampolsky, A., Flom, Bernice C., & Freid, A.N. FIXATION DISPARITY IN RELATION TO HETEROPHORIA. *Arch. Ophthalmol.*, Jan. 1957, 43(1), 97-106. (Dept. of Surgery, Stanford University School of Medicine).

10,513

This study was designed to evaluate the magnitude and direction of fixation disparity under conditions approximating the normal visual situation. Fifty-seven subjects with 20/20 visual acuity in each eye were presented (monocularly) with a series of polarized lines at the fixation area. Fixation disparity was determined by a vernier acuity technique. Both distance and near fixation disparity measurements were obtained. Adjustment of two vernier line segments against a field of printed material comprised the primary task. Heterophoria measurements were obtained and related to near and distance fixation disparity. Hypotheses are offered to explain the relation between heterophoria and fixation disparity.

G. I. R 22

- 10,514
Chandler, J.R. A SIMPLE AND RELIABLE TUNING-FORK TEST FOR RECRUITMENT. *A.M.A. Arch. Otolaryng.*, Jan. 1958, 67(1), 67-69. (School of Medicine, University of Miami).
- 10,514
This article presents a simple test for recruitment in cases where one ear is normal or near-normal. A standard tuning fork is utilized and the process takes approximately 30 to 45 seconds. Although judgments are made subjectively, its proven value and simplicity are felt to be sufficient to warrant its use in clinical evaluations.
R 3
- 10,515
Markle, D.W. & Aber, W. A CLINICAL EVALUATION OF MONAURAL AND BINAURAL HEARING AIDS. *A.M.A. Arch. Otolaryng.*, May 1958, 67(5), 606-608.
- 10,515
A clinical evaluation of monaural and binaural hearing aids was done on ten clinical otosclerotic subjects (presented as "ideal" hearing aid candidates) at the Hearing and Speech Center, New York University-Bellvue Medical Center. Two loudspeakers were placed four feet away from the subject in center of room at 45 degree angles to left and right respectively. One delivered a signal, noise, or signal and noise at calibrated levels; the other produced recorded noise at calibrated levels. Hearing aids were set by the subject to a comfortable listening level for 50 decibels of connected discourse. Test material consisted of spondee words and phonetically-balanced word lists. Comparisons are made between the two types of aids at various signal noise ratios.
T. I.
- 10,516
O'Neill, J.J. & Grimm, W.A. THE SAMPLING PROBLEM IN A HEARING SURVEY. *A.M.A. Arch. Otolaryng.*, Jan. 1958, 67(1), 69-70. (Speech and Hearing Clinic, Ohio State University; Hearing and Vision Conservation Unit, Ohio Dept. of Health).
- 10,516
A critique of sampling techniques utilized in obtaining hearing acuity data from large random samples of population (Milwaukee Fair survey, and so forth) is presented. A statistical analysis of data gathered at the Lake County Fair in Ohio is made and correlated with data gathered under similar circumstances. The effectiveness of these approaches is discussed in terms of their statistical accuracy. Suggestions for the improvement of these techniques are offered.
R 5
- 10,517
Palva, T. POST-STIMULATORY FATIGUE IN DIAGNOSIS. *A.M.A. Arch. Otolaryng.*, Feb. 1958, 67(2), 228-238. (Dept. of Otolaryngology, University of Turku, Finland).
- 10,517
This paper presents a study on post-stimulatory auditory fatigue in normal subjects and in cases with various types of hearing loss. Utilizing a self-recording Bakesy type audiometer, subjects were instructed to record pre-stimulatory thresholds during a one-minute period until a stable threshold was obtained. A 30-decibel sensation level tone was then turned on for three minutes and, following this the subject recorded a second threshold. Frequencies ranging from 250 to 6000 cycles per second were used with six normal and 40 hard-of-hearing subjects. The results are presented and discussed in terms of the role of recruitment in recovery and the relation between frequency and amount of post-stimulatory fatigue.
T. G. R 19
- 10,518
Ogle, K.N. & Well, M.P. STEREOSCOPIC VISION AND DURATION OF STIMULUS. *AMA Arch. Ophthalmol.*, June 1958, 52(6), 4-17.
- 10,518
To understand the processes underlying stereoscopic depth perception, an experiment was conducted to study the relationship between exposure time and stereoscopic acuity. Comparisons were made of stereoscopic thresholds (three subjects) obtained by the following methods: 1) constant stimuli, 2) forced choice, two-category type, and 3) one-category constant stimuli. The effects of the following variables upon the thresholds were examined: 1) differences in the luminance of the stimulus with constant short exposure time, 2) changes in duration of exposure of the test object, and 3) the constant disparity of reference and test lines. Involuntary eye tremors as a basis for the results is hypothesized.
T. G. I. R 27
- 10,519
Schweitzer, N.M.J. & Bowman, M.A. DIFFERENTIAL THRESHOLD MEASUREMENTS ON LIGHT REFLEX OF HUMAN PUPIL. *AMA Arch. Ophthalmol.*, April 1958, 52(4), 541-550.
- 10,519
Differential thresholds were obtained for perception and pupil reflex (one subject) under conditions of varying brightness and color. Both the entoptic and direct observation (through an infrared converter) methods were used. Variables considered were: 1) the relationship between area of test spot and background brightness in a) the pupil reflex and b) the foveal region, 2) the effect of increasing background brightness on the visual and pupil reflex thresholds, and 3) the ratio between brightness content of the test flash and the energy content of the background as it affects perception and visual reflex. The effect of these variables upon the light reflex system of the pupil was discussed.
G. R 5
- 10,520
Blodgett, H.C., Jeffress, L.A. & Taylor, R.W. RELATION OF MASKED THRESHOLD TO SIGNAL-DURATION FOR VARIOUS INTERAURAL PHASE-COMBINATION. *Amer. J. Psychol.*, March 1958, 71(1), 283-290. (University of Texas).
- 10,520
This series of experiments attempts to test the hypothesis that in the relationship between signal-duration and the masked threshold of tones, the central mechanism which determines the improved detection under antiphasic conditions is less adversely affected by short durations than the peripheral mechanisms responsible for nonaural detection. Three subjects responded to a series of signals (a 500 cycle per second tone) which was presented against a continuous noise masker. Different stimulus combinations (eight) used at each duration of the signal were noise and signal presented binaurally with no interaural phase reversal, noise and signal presented to the same single ear, and so forth.
T. G. R 14
- 10,521
Dimick, F.L. & Wienke, R.E. HOW RED IS RED? *Amer. J. Psychol.*, March 1958, 71(1), 298-304. (USN Medical Research Lab., Naval Submarine Base, Conn.).
- 10,521
This experiment studies the effect of the cancellation of green produced by a stimulus at 562 mμ in determining the relative redness of stimuli in the long-wave end of the spectrum. Observations of a bipartite field into the right half of which yellow light was presented were made by six subjects who then (1) adjusted the red and green components in the left half until this combination matched the right half, (2) with the green of the above match held constant, adjusted the red only, and (3) reversed (2). Discussion concerns the amount of red of the several wavelength bands used at three brightness-levels necessary to cancel a fixed amount of green and the use of anomaloscope in measuring red-green ratios.
T. G. I. R 6

10,522

Genelli, A. THE VISUAL PERCEPTION OF MOVEMENT. *Amer. J. Psychol.*, March 1958, 71(1), 291-297. (Catholic University of Milan, Italy.).

10,522

This article represents a preliminary paper on movement-perception and the variables affecting it. The experiment reported examines the perception of an object accomplishing a movement of translation. By photographing a black disc on a white rectangle with a motion-picture camera used as a still camera and moving the disc along the rectangle, photographing anew for each movement. It is possible to obtain a sequence of exposures which can be manipulated in various ways. Subjects were instructed to fix a central point in the rectangle or follow the movements of the object. Aspects of movement-perception discussed are: the interrelation of speed and direction, perception and assessment of speed and direction, and so forth. Implications for further experimentation are indicated. R 7

10,523

Gulford, J.P. A SYSTEM OF THE PSYCHOMOTOR ABILITIES. *Amer. J. Psychol.*, March 1958, 71(1), 164-174. (University of Southern California).

10,523

This article presents a system of psychomotor abilities which attempts to break down these abilities into gross and discrete parts, present their most appropriate attributes (for example, strength, impulsiveness, speed, flexibility) and list some tests which are most relevant to each ability. The authors feel that this system brings together at one glance much of the experimental work done in this field and highlights those areas which have received little attention. The format is a column-row one and each cell is thought of as an hypothesis to a general theory. The authors explain how their system can be utilized in terms of future research. T. R 14

10,524

Helson, H. & Wilkinson, A.E. A STUDY OF THE MITTE-KONIG PARADOXICAL FUSION-EFFECT. *Amer. J. Psychol.*, March 1958, 71(1), 316-320. (University of Texas).

10,524

The purpose of this experiment was to test the hypothesis that the Mitre-Konig paradoxical fusion-effect is a contrast-effect and to gain further information on this phenomenon. Subjects (15) were presented with outline-circles, one a complete circle, the other with a gap of varying widths, and responded as to the presence or absence of the gap. Size of gap, width of outline, and reflectance of variance were varied within each stimulus presentation. Data were analyzed by analysis of variance and the results are discussed in terms of their relevance to the contrast-effect hypothesis, their addition to information regarding underlying physiological mechanisms, and their implications for contrast and angular separator aspects of visual acuity. T. I. R 2

10,525

Jones, F.W. SCALES OF SUBJECTIVE INTENSITY FOR ODOORS OF DIVERSE CHEMICAL NATURE. *Amer. J. Psychol.*, March 1958, 71(1), 305-310. (University of California at Los Angeles).

10,525

This experiment subjectively scales the intensities of n-butanol, sec-butanol, iso-butanol, ethyl acetate, cyclohexane, and pyridine by the method of magnitude-estimation. Thirty-six Ss in separate groups gave two judgments at each level of concentration of each substance. Results are presented and discussed in terms of their fit into a simple exponential curve obtained by Stevens in an experiment on nonpolar substances and their effect upon existing stimulus-receptor interaction data. G. R 4

10,527

Corso, J.F. ABSOLUTE THRESHOLDS FOR TONES OF LOW FREQUENCY. *Amer. J. Psychol.*, June 1958, 71(2), 367-374. (Pennsylvania State University).

10,527

Two experiments are discussed which determine 1) the monaural threshold for low frequencies (5 to 200 decibels) and 2) the effect on the results of two- and five-decibel size steps in the method of limits. Stimulus frequencies of 5, 25, 50, 75, 100, 125, 150, 175 and 200 decibels were used in each experiment. In Experiment I the stimuli were presented to each subject (15 in all) individually by the serial order of the method of limits with the steps between successive trials in increments of five decibels. In Experiment II the increments were two decibels. The absolute thresholds obtained at the nine frequencies are presented. The results are compared with those of earlier investigations and are discussed with relation to those findings. T. G. R 13

10,528

Mulholland, T.B. THE "SWING DISK" ILLUSION. *Amer. J. Psychol.*, June 1958, 71(2), 375-382. (Clark University).

10,528

This experiment studies the effect upon the "swinging disk" illusion of 1) reflectance of the background and 2) accessory auditory stimulation. The stimulus object, shaped like a "T", had a white and black disk at either end of the crossbar. Five subjects reported 30 times on the motion perceived under each of 24 conditions--12 values of background-reflectance each presented with "tone" and "no-tone". The tone (steady) was at 600 decibels. Results are reported in terms of: types of motion perceived, statistical tests used, sequence of reports of motion, frequency of motions reported, effect of brightness background on the perception of the illusion, and so forth. G. R 7

10,529

Coombs, C.H. & Komorita, S.S. MEASURING UTILITY OF MONEY THROUGH DECISIONS. *Amer. J. Psychol.*, June 1958, 71(2), 383-399. (University of Michigan).

10,529

In this experiment three subjects had to determine which of three bets they most and least preferred in four series of eight bets. The probability of winning or losing each bet was always 50 per cent. The intuition was to obtain metric relations from the first three series and test the additivity condition on the fourth series. The results are discussed in terms of their support of a hypothesis that an ordered metric scale for measuring the utility of money can be obtained and can adequately predict gambling-choice behavior. T. I. R 9

10,530

Cohen, W. COLOR-PERCEPTION IN THE CHROMATIC GANZFELD. *Amer. J. Psychol.*, June 1958, 71(2), 390-394. (University of Buffalo).

10,530

This experiment studies the appearance of color and changes resulting from adaptation when a small differentiated area is present in the Ganzfeld. One red, one blue and two green filters provided chromatic illumination. Sixteen subjects participated in two tasks. In Task I they were asked to compare two situations, each presented for 20 seconds, with a five second interval between each item of a pair and 15 seconds between pairs. In Task II subjects reported on the same phenomenon for three minutes with two minute rest intervals. Subjects' reports on fog density, distance, distinctiveness of figure, hue and saturation are reported and discussed with respect to the homogeneous and inhomogeneous Ganzfeld. T. R 9

10,531
Krus, D.M., Wagner, S. & Werner, H. STUDIES IN VICARIOUSNESS: EFFECT OF MUSCULAR INVOLVEMENT ON VISUAL THRESHOLD. *Amer. J. Psychol.*, June 1958, 71(2), 395-398. (Clark University).

10,531
Two experiments are presented which examined the effects of muscular involvement on visual threshold. In Experiment I one group of subjects participated in a pushing exercise for 20 seconds and then fixated on a screen, six feet away while the control group only fixated on the screen. Both groups were to report the recognition of the figure exposed, as soon as possible. In Experiment II visual words, rather than pictured objects, were presented at 1/25 second, rather than being present constantly, and the intensity of the stimulus was systematically increased for each successive presentation. Results were subjected to an analysis of variance. The relationship between muscular involvement and perceptual sensitivity is discussed.
T. I. P 1

10,532
Lotsof, E.J. EXPECTANCY FOR SUCCESS AND DECISION-TIME. *Amer. J. Psychol.*, June 1958, 71(2), 416-419. (University of California at Los Angeles).

10,532
The relationship between decision-time and expectancy of success is studied in this experiment. Subjects (67) were put into three groups. Their task was to decide which one of two red lights on a panel would go on. The percentage of times they would choose correctly was predetermined by the experimenter (25, 50 and 75 percent respectively for the three groups). Decision-time represented the period from the extinguishing of the red light to the pressing of the buzzer signifying a choice made. Results were treated by analysis of variance. Discussion is related to the hypothesis that decision-time shortens as the expectancy for a positive reinforcement grows.
T. P 6

10,533
Jones, F.M. SUBJECTIVE SCALES OF INTENSITY FOR THE THREE ODORS. *Amer. J. Psychol.*, June 1958, 71(2), 423-425. (University of California at Los Angeles).

10,533
The method of magnitude-estimation was used to scale subjective intensities of several concentrations of benzene, heptane, and octane. A seven-step scale was constructed for each substance and each S (36) estimated the relative intensity of each sample in comparison with the standard intensity of the same substance. The results are presented and discussed in terms of their compliance with the exponential form found for judgments of intensity in other senses.
T. G. R 3

10,534
Kohler, W. & Adams, Pauline A. PERCEPTION AND ATTENTION. *Amer. J. Psychol.*, Sept. 1958, 71(3), 489-503. (Swarthmore College).

10,534
Several experiments studied the relationships between attention and 1) articulation and 2) satiation. Subjective descriptions were obtained of a dotted pattern 1) used as a background "covered" by figures (20 subjects), and 2) presented directly (10 subjects). A word and its mirror-image were observed under similar conditions in two experiments (40 subjects in each). The importance of organizational versus elementary visual factors to articulation is discussed. Subjects (19) judged distance of objects when two test objects were imposed before two satiation objects. The last experiment (42 subjects) substituted kinesthetic attention for visual. The influence of attention upon satiation in visual and kinesthetic areas is discussed.
T. I. R 2

10,535
Onley, Judith M. & Volkman, J. THE VISUAL PERCEPTION OF PERPENDICULARITY. *Amer. J. Psychol.*, Sept. 1958, 71(3), 504-516. (University of Rochester, Rochester, N.Y. & Mount Holyoke College, South Hadley, Mass.).

10,535
Perception of perpendicularity is studied under conditions free from visual and postural or gravitational cues. The stimulus lines were presented in three ways: (1) as a cross, (2) as a T, and (3) as an L. Four subjects participated in each part. The subjects' task was to adjust the variable line exactly perpendicular to the reference line, which varied in slant (60 inclinations for the T and L, 40 for the cross). The results are presented in terms of the accuracy and consistency of adjustments for the group, and individual differences in adjustment.
T. G. I. R 7

10,536
Brozek, J. & Taylor, H.L. PSYCHOLOGICAL EFFECTS OF MAINTENANCE ON SURVIVAL RATINGS. *Amer. J. Psychol.*, Sept. 1958, 71(3), 517-528. (University of Minnesota).

10,536
This experiment studied the effects of a brief, severe restriction of food (1,010 calories per day) on the individuals' sensory, manipulative, and personality areas. Thirteen subjects took part in control, dietary restriction, and refeeding periods covering 65 days. Carbohydrate was the only food substance taken during the restriction, although adequate vitamin and salt supplements were given. Tests of sensory functions, motor and manipulative abilities, and personality variables were administered. The results are discussed in terms of changes within these categories. Methodological suggestions and implications for research are given.
T. R 26

10,537
Smith, O.W. JUDGMENTS OF SIZE AND DISTANCE IN PHOTOGRAPHS. *Amer. J. Psychol.*, Sept. 1958, 71(3), 529-538. (Cornell University).

10,537
To study the effects of distance of subjects from a photograph upon judgments of size, subjects judged the height and distance of objects under three viewing conditions: 1) when stimulus and standard objects (varying in height and distance from camera) were photographed against a rolling field, 2) when visual cues of the photograph had been eliminated, and 3) when the "abstracted" photographs were viewed from varying distances. Fifty-two subjects, divided into five groups, were used. The results consider the effects of viewing conditions upon size and height judgments, the relationship between distance, size, and height judgments, and so forth.
T. R 11

10,538
Adams, Pauline A. & Haire, M. STRUCTURAL AND CONCEPTUAL FACTORS IN THE PERCEPTION OF DOUBLE-CUBE FIGURES. *Amer. J. Psychol.*, Sept. 1958, 71(3), 548-556. (Stanford University & University of California).

10,538
This experiment studies the effect on perception of double-cubes of 1) the type of figure observed and 2) the joinings of the cubes. Ninety-five versions of the double-cube figure were used (shifted-cube, perpendicular gap, and so forth). Each of 67 subjects was shown a series of from nine to sixteen cards. Their task was to report their first impression of figured position, positions during reversal, versions perceived, and ease of perception. The results are concerned with the influence on perception of the relative position (up or down), the manner of joining, and corner-cube figures. Individual differences and consistencies are also discussed.
T. I. R 1

10,539
Gaydos, H.F. SENSITIVITY IN THE JUDGMENT OF SIZE BY FINGER-SPAN. *Am. J. Psychol.*, Sept. 1958, 71(3), 557-562. (USA Quartermaster Research & Engineering Center, Matlack, Mass.).

10,539
The method of adjustment was used in a series of three experiments in which subjects matched a variable cylinder to a standard by surrounding the stimulus-objects with thumb and forefinger. In Experiment I (50 subjects) 25, 50, and 100 millimeter standard lengths were used. Lengths of 35.4 and 70.8 millimeters were added for the second experiment (50 subjects) and a 17.7 millimeter length was added for the final experiment (20 subjects). The variable was two 20 millimeter diameter disks. The results are treated by analysis of variance and discussed in terms of their relation to Weber's law. T. G. R 6

10,540
Lyman, J. & Groth, Hilde. PREHENSION FORCE AS A MEASURE OF PSYCHOMOTOR SKILL FOR BARE AND GLOVED HANDS. *J. appl. Psychol.*, Feb. 1958, 42(1), 18-21. (University of California at Los Angeles).

10,540
An exploratory experiment was performed which attempted to distinguish some of the variables affecting prehension force. The task of the six subjects was to grasp a cylinder with thumb and first two fingers, place it in a specified location, release it, grasp it again and place it in its original location. The variables which were manipulated were weight (18.1, 45.4, 118.0, 30.5, and 426.4 grams), direction (0, 30, 60, 90, 120, 150, and 180 degrees), distance (9.0, 30.8, and 52.5 centimeters as measured from the center), and hand coverings (bare, latex surgeons' gloves, and leather army glove). The results discuss the effect of these variables on prehension force. G. I. R 4

10,541
Solom, A.R. AN EVALUATION OF TWO ATTITUDINAL APPROACHES TO DELEGATION. *J. appl. Psychol.*, Feb. 1958, 42(1), 36-39. (University of Maryland).

10,541
Two problems were presented to 456 subjects in an attempt to evaluate the effectiveness of two methods of delegating responsibility. The subjects, in groups of approximately 40 each, were given lectures on material appropriate to the problem. The groups were then broken down into smaller role-playing components in which one member was a supervisor and the others subordinates. Data as to how the problem was handled, the satisfaction of the leader and subordinates with the solution, and so forth, were obtained. The effectiveness of the full versus the limited method of responsibility designation is discussed. T. P 19

10,542
Loeb, M. & Jeantheau, G. THE INFLUENCE OF NOXIOUS ENVIRONMENTAL STIMULI ON VIGILANCE. *J. appl. Psychol.*, Feb. 1958, 42(1), 47-49. (USA Medical Research Lab., Fort Knox, Ky.).

10,542
The effects of heat, noise, and vibration, singly and combined, on vigilance are studied in this experiment. The task of the 12 subjects was to detect randomly occurring, obscure signals. During the experimental sessions the following combinations were used: (1) Control, temperature 65-75 degrees Fahrenheit, ambient noise level 65-75 decibels re .0002 dyne per square centimeter, no vibrations; (2) Noise and vibration, temperature the same, noise 115 to 125 decibels, considerable vibrations; (3) heat, noise, and vibration, same as (2) but temperature 110-125 degrees; (4) heat same as in (3) but all other conditions were the same as in the control period. The effects and interrelations of heat, noise, and vibration on vigilance are discussed. T. J. R 11

10,543
Teichner, W.H. REACTION TIME IN THE COLD. *J. appl. Psychol.*, Feb. 1958, 42(1), 54-59. (USA Quartermaster Research & Development Center, Natick, Mass.).

10,543
This experiment tests the effects of ambient temperature, windspeed, and wind chill on reaction times. Reaction time measurements of 620 subjects, divided into 14 groups, were obtained after 45 minutes of exposure to the various conditions and again, following mild exercise, after 65 minutes of exposure. Also obtained were mean area-weighted skin temperatures from ten body areas. The results discuss the effects of the varying windspeeds, mild exercise, temperature, and wind chill on reaction times. T. G. R 6

10,544
Torrance, E.P. SENSITIZATION VERSUS ADAPTATION IN PREPARATION FOR EMERGENCIES: PRIOR EXPERIENCE WITH AN EMERGENCY RATION AND ITS ACCEPTABILITY IN A SIMULATED SURVIVAL SITUATION. *J. appl. Psychol.*, Feb. 1958, 42(1), 63-67. (Survival Methods Branch, Air Force Personnel & Training Research Center, Lackland AFB, Tex.).

10,544
An experiment was undertaken to determine whether a previous introduction to a "meat bar" survival ration elicited a more favorable reaction to it. The subjects (416) were supplied with eight meat bars (permincan) plus a supplementary diet during a seven-day simulated survival exercise. The subjects included an inexperienced group, men previously acquainted with the meat bar who (1) liked it, and (2) disliked it. Data included a hedonic rating scale, meat bar consumption, supplementary diet consumption, physiological reactions to eating the meat bar, and so forth. The results are discussed in terms of adaptation versus sensitization in emergency preparation. T. R 12

10,545
Alluisi, E.A. & Martin, H.B. AN INFORMATION ANALYSIS OF VERBAL AND MOTOR RESPONSES TO SYMBOLIC AND CONVENTIONAL ARABIC NUMERALS. *J. appl. Psychol.*, April 1958, 42(2), 79-84. (Laboratory of Aviation Psychology, Ohio State University).

10,545
This experiment studied the relative efficiency of conventional Arabic numerals versus a straight line symbolic set by comparing the information-handling performance of 48 subjects. Both motor response and verbal response procedures were used. Data were collected from responses during two days of trial, and the ten subjects continued for ten more days in order to obtain the effects of longer-term practice. The results discuss the amounts of information handled during the presentation of the two symbolic forms, the effectiveness of motor versus verbal response to these symbols and the effects of longer-term practice upon productivity. T. G. I. R 15

10,546
Jenkins, M.L. THE SUPERIORITY OF GLOVED OPERATION OF SMALL CONTROL KNOBS. *J. appl. Psychol.*, April 1958, 42(2), 97-98. (Lehigh University).

10,546
An experiment was performed which tested the effectiveness of gloved versus bare hand operation of control knobs. Twenty subjects participated in a task which consisted of making 40 least turns of the knob to left or right and 40 linear scale settings under each set of conditions. The variables manipulated were knob position, knob orientation, knob diameter, and gloved-barehand operation. The results discuss the effect of the gloved-barehand factor under all the conditions. T. R 3

10,547

Conklin, J.E. & Lindquist, O.R. RECOVERY FROM UNUSUAL AIRCRAFT ATTITUDES UNDER THE INFLUENCE OF VERTIGO. *J. appl. Psychol.*, April 1958, 42(2), 136-138.

10,547

This experiment studies the effect of the conventional aircraft attitude indicator versus the moving drone concept on recovery performance from unusual attitudes under the influence of vertigo. Two pilots participated in six experimental sessions each. The subject was rotated to induce vertigo before each recovery trial. Head positions and rotation directions were mixed for eight combinations. The results discuss the transfer of effects from an outside-in to an inside-out display and recovery performance with the moving drone display and moving horizon indicator.

T. G. R 4

10,548

Bamford, H.E., Jr. & Ritchie, M.L. COMPLEX FEEDBACK DISPLAYS IN A MAN-MACHINE SYSTEM. *J. appl. Psychol.*, June 1958, 42(3), 141-147.

10,548

This experiment studies the effects of an integrated roll and turn indicator, which combined distinct and anticipatory indication, upon the performance of the man-machine system of which it is an integral part. Nine pilots participated in a task in which they had to maintain a constant heading and altitude in simulated flight, during the following conditions: (1) reference in which non-emergency flight was simulated with the full instrument panel available to the subject; (2) control was similar to reference except that the attitude indicator had "failed"; and (3) experimental differed from control in that the integrated roll and turn indicator took over. The effects of these three conditions on performance are discussed.

T. I. R 3

10,549

Spar, R.S. NUMERAL FORM AS A VARIABLE IN NUMERAL VISIBILITY. *J. appl. Psychol.*, June 1958, 42(3), 158-162. (Vanderbilt University).

10,549

Data from prior experiments indicating which numerals are most frequently confused with which were used as a basis for developing three new sets of numerals in which unique elements were maximized. A set by McLaughlin plus a conventional set of numerals were added to make up the stimulus variables. Subjects (100) provided 20 replications of the five conditions. Results discuss the visibility of each numeral in the five sets and the factors of boldness, stroke width, and so forth, which aid visibility.

T. I. R 9

10,550

Kay, B.R. INTRA-INDIVIDUAL DIFFERENCES IN SENSORY CHANNEL PREFERENCE. *J. appl. Psychol.*, June 1958, 42(3), 166-167. (University of New Hampshire).

10,550

This experiment investigates the existence of individuals who favor one sensory modality (vision or audition) over another in learning and remembering situations. Nineteen pairs of minimally-associated words were presented to six groups of subjects (524 in all), in both visual and auditory form. Discussion concerns the effect the existence of atypical people will have on mass education programs, on programs which attempt to influence every individual in the group, and so forth.

T. R 5

10,551

Benson, P.H. & Peryam, D.R. PREFERENCE FOR FOODS IN RELATION TO COST. *J. appl. Psychol.*, June 1958, 42(3), 171-174. (USA Quartermaster Food & Container Institute, Chicago, Ill.).

10,551

Preference rating for meat dishes were gathered from 1950-1954 by the Quartermaster Corps. The preferences stated by a group of subjects (varying in size from 1500 to 4000) for each meat item were compared with the cost of these items, and a regression curve was fitted to a plot of the preference ratings and cost estimates. An interpretation of the meaning of the curve is included as well as conditions, such as frequency of serving, which might alter its use. Uses for a preference-cost analysis are discussed.

T. G. R 6

10,552

Schultz, H.G. & Kammetzky, J. RESPONSE SET IN MEASUREMENT OF FOOD PREFERENCE. *J. appl. Psychol.*, June 1958, 42(3), 175-177. (USA Quartermaster Food & Container Institute, Chicago, Ill.).

10,552

An experiment was designed to determine the set used by survey respondents in rating foods according to preference. Naval enlisted men (305) were divided into three groups and each group was presented with a questionnaire rating 54 foods under one of the following sets of instructions: (1) circle the reply which tells how much you like or dislike each food item (based on a nine-point like-dislike preference scale); (2) rate the "best serving" of each food ever eaten; and (3) rate the "poorest serving" ever eaten. The results discuss the effect the various instructions have upon subjects' responses as well as the type of set which determines the responses.

T. R 2

10,553

Greek, D.C. & Small, A.M., Jr. EFFECT OF TIME LIMITATION ON MAKING SETTINGS ON A LINEAR SCALE. *J. appl. Psychol.*, Aug. 1958, 42(4), 222-226. (Lehigh University).

10,553

This experiment studies the cursor positioning performance on a linear scale as a function of (1) reduced time intervals, (2) control ratio, (3) direction of initial cursor displacement from target, and (4) distance of cursor travel. Twelve subjects were asked to make settings as quickly and accurately as possible. Measurements were taken of the error (size of the final discrepancy between target and cursor) time in travelling to the approximate location of the target, and time for final adjustments. The results are discussed in terms of a time pressure-control ratio interaction hypothesis.

T. G. R 6

10,554

Groth, Hilde & Lyman, J. EFFECTS OF SURFACE FRICTION ON SKILLED PERFORMANCE WITH BARE AND GLOVED HANDS. *J. appl. Psychol.*, Aug. 1958, 42(4), 273-277. (University of California at Los Angeles).

10,554

To assess the effects of surface friction upon prehension force, speed of performance and rate of output, 12 subjects participated in a manipulative task (moving a cylinder from one lighted area to another). Each subject participated under all of the following conditions: 1) bare hand, 2) wiped with alcohol, b) coated with wax - benzene paste, c) coated with silicone grease, and 2) gloved hand (leather) a) untreated, b) and c) same as above. The results are treated by analysis of variance and are related to three hypotheses which predicted relationships between friction and effort, speed and output rate.

T. G. I. R 10

10,555

Mozell, M.M. & White, D.C. BEHAVIORAL EFFECTS OF WHOLE BODY VIBRATION. *J. Aviat. Med.*, Oct. 1958, 29(10), 716-724. (USC Aviation Medical Acceleration Lab., NADC, Penn.).

10,555

To study the effect of whole body vibration on ability to: 1) read digits of an aircraft mileage indicator and 2) do a tracking task, eight subjects (17 to 38 years) read 7 inch white on black numerals (0.25 milliamperes) while vibrating at 0, 8, 13, 18 and 23 cycles per second, four with double amplitude of 0.05 inch, four with 0.1 inch; five subjects also ran at 10, 20, 30, 40, 50 cycles per second; next all subjects kept a trace line in center of oscilloscope by manipulating a control stick at each of first set of frequencies at three amplitudes. Errors on each task were analyzed by analysis of variance.

T. G. R 6

10,554
Green, A.C. IMPACT THRESHOLDS OF BRAIN CONCUSSION.
J. Aviat. Med., Oct. 1958, 29(10), 723-732. (Cross
Research Laboratories, Inc., Longwood, Calif.).

10,555
This analysis of resonance-cavitation theory of head
concussion was aimed at: 1) establishing impact thresh-
olds of brain concussion, 2) determining the physical
factors involved, 3) developing instrumentation tech-
niques for determination of cavitation thresholds in hu-
man cadavers. These aims were accomplished and impact
experiments were conducted on simulated skulls to dem-
onstrate the technique and apply the data to the formula
developed for computing impact threshold for concussion
condition.
G. I. R. 2

10,557
Blument, S. PREVENTION OF DEGENERATIVE VISUAL DEFECTS
IN AGING AIRLINE PILOTS. *J. Aviat. Med.*, Oct. 1958,
29(10), 733-738.

10,557
To determine causes of defective vision in airline
pilots in the pre and presbyopic years, and to explore
the possibility of avoiding it in the proper early selec-
tion of pilots, two groups (one with and one without de-
fects) of pilots were studied. Both groups were examined
as to degree of hyperopia and available accommodative
amplitude periodically during their years of duty. The
findings are related to initial hyperopic reserve and op-
timum refraction at an earlier age.
T. C. R. 2

10,558
Moseley, H.G. & Zoller, A.F. REACTION OF EXERTION TO
FORCES AND DIRECTION OF ACCELERATION IN AIRCRAFT
ACCIDENTS. *J. Aviat. Med.*, Oct. 1958, 29(10), 739-
749.

10,558
A review of all major cargo and transport type air-
craft accidents in the United States Air Force during a
two year period was made in order to determine the path
that such aircraft follow during actual crashes and to
relate this to variations in aircraft altitude and to
force of occupants. This path, the deceleration course,
was analyzed in terms of lateral deviation, pitch, roll
and yaw for the two major categories of accident—take
off and other than take off. Injuries were analyzed in
terms of the important related factors for these two cat-
egories. Also measures to alleviate such injuries are
suggested.
T. I. R. 2

10,559
Neely, S.E. & Shannon, R.H. VERTEBRAL FRACTURES IN
SERVICES OF MILITARY AIRCRAFT ACCIDENTS. *J. Aviat.
Med.*, Oct. 1958, 29(10), 750-753.

10,559
The most frequent type of major non-fatal injury,
vertebral fracture, was examined and analyzed in terms of
the role seats and seat cushions play and in terms of the
force factors involved. Suggestions for counteracting the
apparent causes of vertebral injury are set forth.
T.

10,560
Bergess, B.F., Jr. EFFECT OF HYPOXIA ON TOLERANCE TO
POSITIVE ACCELERATION. *J. Aviat. Med.*, Oct. 1958,
29(10), 754-757.

10,560
To determine the effects of breathing low concentra-
tions of oxygen on tolerance to positive acceleration,
four trained centrifuge subjects received positive ac-
celeration from 2.5 G up to the point they did not per-
form their task of turning off peripheral lights, while
breathing oxygen-nitrogen mixtures simulating altitudes
from about 16,000 to 21,000 feet (9.5, 10.0, 10.5, 11.0,
11.5 and 21 percent oxygen). Individual variations in
tolerance and general symptoms of hypoxia with accelera-
tion stress are noted.
T.

10,561
Bendure, S. & Flannery, H.A. SPATIAL REPERCUSSIONS
DURING ACCELERATION. *J. Aviat. Med.*, Oct. 1958,
29(10), 758-762.

10,561
To observe the effects of several patterns of posi-
tive, negative and transverse acceleration on the spatial
vestibulogram and the standard electrocardiogram, be-
tween four and eight trained centrifuge young men were
accelerated. The results are compared to the findings of
other researchers and related to probable incidence of
vascular disability.
T. R. 6

10,562
Rutledge, H.C. EFFECTS OF HYPERVENTILATION ON SPEECH
AND HEARING. *J. Aviat. Med.*, Oct. 1958, 29(10),
763-766.

10,562
To determine the effect of hyperventilation on audi-
tory acuity and speech intelligibility, eight healthy
young adult males wearing an oxygen mask, read lists into
a microphone under three conditions: 1) in resting state,
2) after five minutes hyperventilation, 3) after 13 min-
utes hyperventilation. These lists were played back to
24 listeners who marked what they heard on a score sheet.
Auditory thresholds for a 4000 cycle per second tone were
taken during each condition. Continuous electroencephalo-
graphic and electrocardiographic recordings as well as
occasional reflex measures and carbon dioxide levels were
taken also. Analysis of variance was employed to test
the significance of the speakers, listeners, conditions
variables.
T. G. I. R. 12

10,563
Wood, C.C. HUMAN FACTORS ENGINEERING IN AIRCRAFT
CONCEPT ENGINEERING'S VIEWPOINT. *Ergonomics*, Aug. 1958,
1(4), 294-300.

10,563
The six essential features of effective human
factors engineering are set forth and discussed. These
are: 1) application of information obtained from
research, 2) requirement for objective quantitative in-
formation, 3) incorporation of information during the
design stage, 4) use of system effectiveness and cost
as decision criteria, 5) consideration of effectiveness
and cost in terms of operational use, 6) human factors
engineering in system support activities.

10,564
Kraft, J.A. INDUSTRIAL APPROACHES TO HUMAN ENGINEER-
ING IN AMERICA. *Ergonomics*, Aug. 1958, 1(4), 301-306.

10,564
Examples are presented of some of the numerous ways
in which human engineering programs are introduced,
staffed and developed within industry. The scope of
these programs in the aircraft industry is outlined and
the future prospects of human engineering studies are
touched upon briefly.

10,565
Lehmann, G. PHYSIOLOGICAL MEASUREMENTS AS A BASIS
OF WORK ORGANIZATION IN INDUSTRY. *Ergonomics*, Aug.
1958, 1(4), 328-344.

10,565
Three methods of work-load measurement are described:
1) an exact time-study covering the whole working day and
including details of all accessory operations and all
rest pauses, 2) measurement of energy cost of work by
use of respirometer, 3) measurement of pulse rate by
Müller pulse counter. A number of examples of the use of
these methods in several forging shops and in a motor car
factory are presented. These include instances of under-
and overloading with reasons and remedies for some.
G. I. R. 8

10,566
Lifson, K.A. PRODUCTION WELDING IN EXTREME HEAT.
Ergonomics, Aug. 1958, 1(4), 345-346.

10,566
This is a brief study aimed at measuring decrement in
productivity of heavy labor performed in extreme heat by
comparing daily productivity figures for a group of
welders with daily temperature maxima during an unusually
hot summer. Correlation between temperature and produc-
tivity was made.

10,567

McKinnon, D. STUDY OF THE INFLUENCE OF VIBRATION ON MAN. *Ergonomics*, Aug. 1958, 1(4), 347-355.

10,568

To study the influence of horizontal and vertical mechanical vibrations (up to 150 cycles per second) on the human body in standing and sitting positions, physical and physiological methods as well as subjective assessments were employed. Resonance phenomena are described and a strain scale is given for these vibration excitations. Using these techniques, a man sitting on a seat in a rail-car is described.

G. I. R 8

10,569

Dale, M.C.A. FAULT-FINDING IN ELECTRONIC EQUIPMENT. *Ergonomics*, Aug. 1958, 1(4), 354-365.

10,568

The literature on fault-finding in electronic equipment is reviewed with emphasis on describing the task. Listing sources of difficulty and discussing methods employed. Some experiments were performed to analyze the problem in detail: 1) how naive subjects search for fault in complex flow system, 2) comparing strategies of searching under various conditions, and so forth. The results are discussed in terms of the variables which affect searching, and in terms of similarity to problem-solving in general. Practical implications, including training, are indicated.

T. I. R 35

10,569

Schneider, A.E. HUMAN-FACTORS ENGINEERING - A WORKING PROGRAM. *Arch. Industr. Health*, April 1958, 20(4), 22-23. (International Business Machines Corp., Fairport, N.Y.).

10,569

This article describes a course in "human engineering" established for department representatives most likely to influence the design of future machines. This resulted in establishment of a Human Factors Engineering Committee, whose major function was the integration of human factors engineering into design procedures. Activity of the committee is described, typical applications are given, and areas expected to be covered in the future are listed.

10,570

Prasinos, K. DESIGNING FOR SAFETY. *Arch. Industr. Health*, May 1958, 20(5), 70-73. (Modern Materials Handling, Boston, Mass.).

10,570

Safety principles, e.g., principle of preventing contact, preventing injury or damage, of control, which serve as starting points for engineers, designers, and so forth, are presented and discussed in relation to the types of equipment, e.g., fixed-barrier guards, quick-stopping devices, and so forth which fulfill the demands of these principles. Several illustrations of the various devices mentioned are included.

T. I. R 3

10,571

Brouha, L. MEASURING HUMAN EFFORT. *Arch. Industr. Health*, June 1958, 20(6), 81-83. (E. I. du Pont de Nemours & Company, Wilmington, Del.).

10,571

Physiologic measures (e.g., heart rate, blood pressure, oxygen consumption, and so forth) taken during work and recovery from work are discussed with regard to their role as accurate indicators of the physiologic cost of various jobs. Methods of obtaining such physiologic measurements in the field are described and certain areas where these measurements would be most useful are designated: (1) the evaluation of cardiac cost, (2) the determination of stress effects of clothing, (3) the evaluation of stress reduction obtained by improved working conditions, and (4) the evaluation of situations leading to fatigue (by measurement of recovery time) and the prediction of the onset of fatigue.

10,572

Hamington, E.P. & Taylor, T.V. GUIDANCE FOR FINGER CONTROL. *Arch. Industr. Health*, Oct. 1958, 20(10), 54-57. (ONR Research Lab., Washington, D.C.).

10,572

This report discusses the changes made in a closed-loop control system which will reduce or eliminate the necessity for the human operator to sense or compare derivative information in order to make the system stable. The role of the human operator in a third-order control system (three cascaded integrators) is broken down into the various analog processes performed. Improvements in the system by transfer of analog differentiation to the machine, ("differentiating") are discussed and appropriate illustrations included.

T. R 5

10,573

Salter, A.C. VIBRATION TOLERANCE. *Arch. Industr. Health*, July 1958, 20(7), 38-41. (Sottron Research Lab., Milwaukee, Wis.).

10,573

This article reviews the present data available on man's tolerance to vibration. Available threshold data is presented in graphical form. General evidence of the physiologic damage and cost of vibration as reported by medical surveys is also included. Discussion revolves around the problem of insulation from vibration with specific and general recommendations made concerning the design of equipment (primarily suspension seating) to reduce vibration.

G. R 10

10,574

Hallowell, D., Hoople, G. & Farrick, E.O. THE MEDICAL PRINCIPLES OF MONITORING AUDIOMETRY. *Arch. Industr. Health*, Jan. 1958, 17(1), 1-20.

10,574

Monitoring audiometry as an essential feature of any effective conservation program is discussed in terms of the medical principles on which it is based. A general plan for disposition of cases of hearing loss consistent with these medical principles is presented. Its central features include: (1) reference audiograms, (2) routine monitoring audiometry, (3) a diagnostic center or qualified otologist, and (4) "hearer limits" of hearing that make referral to such medical authority mandatory. A discussion and clarification of terms and concepts is also included as well as medical data relevant to a hearing conservation program.

T. R 13

10,576

Grimaldi, J.V. A GLANCE BACKWARD, THEN A LOOK TO THE FUTURE - IN SAFETY. *Arch. Industr. Health*, May 1958, 17(5), 377-382.

10,576

This paper presents a brief historical review of the role private industry has played in promoting industrial safety. Comparisons between safety plans used in some present-day industries are made and related to their accident rate and net returns. The need for continued management effort in industrial safety planning is emphasized.

10,577

Henry, J.P. SOME CORRELATIONS BETWEEN PSYCHOLOGIC AND PHYSIOLOGIC EVENTS IN AVIATION BIOLOGY. *J. Aviat. Med.*, March 1958, 29(3), 171-179. (European Office, Air Research and Development Command, Brussels, Belgium).

10,577

Recent discoveries in neurophysiology have imparted a greater understanding of the role played in psychological events by the reticular activating system and such temporal lobe structures as the amygdala, hippocampus and pyriform cortex. Attention, sleep, and such emotional responses as the "breakoff phenomenon", "freezing", and "fainting" are discussed in this article in terms of their relationship to the integrating role of the central internuncial system and the occurrence of differential subcortical inhibition. It is hoped that the analysis presented in this article will help to explain the limitations shown by some operators in the performance of their duties, and thus aid in the development of more ideal man-machine systems.

10,570
 Meloy, C.O. & Morgan, J.E. STRESSES AFFECTING THE
 PILOT DURING POST-STALL MANEUVERS OF HIGH PERFORMANCE
 AIRCRAFT. *J. Aviat. Med.*, March 1958, 29(3),
 180-184. (Chance Vought Aircraft, Dallas, Tex.).

10,578
 The stall-spin type of accident is a major problem
 in current high-performance aircraft. Positive evi-
 dence exists that pilot error is a basic factor in
 such accidents. This article presents representative
 data on high performance aircraft which indicates that
 such aircraft exhibit post-stall flight characteristics
 which can exceed the pilot's ability to perceive,
 judge, and cope with the situation. Disorientation and
 other physiologic reactions are discussed in relation
 to malfunctions of equipment, larger forces, greater
 rotation rates, and more severe accelerations. Also
 discussed are recommendations for research to provide
 the design parameters necessary for safe flight.
 T. R. 5

10,579
 Lewis, S.T. & Stapp, J.P. HUMAN TOLERANCE TO AIR-
 CRAFT SEAT BELT RESTRAINT. *J. Aviat. Med.*, March
 1958, 29(3), 187-196. (USAF Aero Medical Field
 Lab., Holloman AFB, N.M.).

10,579
 Prior to the tests reported in this article, no ex-
 periments had been reported on human tolerance to crash
 forces with lap belt restraint only. Three devices
 were used for this study: (1) an aircraft seat hinged
 by cables to form a swing-pendulum, (2) a 120-foot
 track along which a sled was propelled by an ejection
 seat catapult and decelerated by water inertia brakes,
 and (3) a rubber shock cord catapult decelerated by
 friction brakes. Human subjects were decelerated in
 these devices in the forward-facing position while re-
 strained by a lap belt three inches in width. The rate
 of onset, magnitude and duration of force for 30 trials
 are tabulated and analyzed, and the implications for
 air-transport crash protection are discussed.
 T. R. 4

10,580
 Zeller, A.E. HUMAN FACTORS IN SELECTED MULTI-ENGINE
 JET AIRCRAFT ACCIDENTS. *J. Aviat. Med.*, March 1958,
 29(3), 197-205. (USAF Directorate of Flight Safety
 Research, Norton AFB, Calif.).

10,580
 This report, based upon almost ten years of USAF
 experience with multi-engine jet aircraft, stresses
 the importance of considering human parameters in at-
 tempting to improve the overall reliability of the man-
 machine complex in future manned flight. By means of
 tables and graphs, comparisons are drawn between the
 causes of multi-engine jet and comparable non-jet ac-
 cidents. Pilot error, pilot age and experience, air-
 craft performance and its concomitant demands on the
 pilot, and unsafe conditions in major accidents are
 some of the variables analyzed. Traffic control and
 integration of the information presented to the pilot
 with higher performance of the aircraft with regard to
 altitude, speed and range are also discussed.
 T. G.

10,581
 Taylor, A.A. PREVENTIVE MEDICINE ASPECTS OF FLIGHT
 FEEDING. *J. Aviat. Med.*, March 1958, 29(3), 206-
 211. (Air Research and Development Command, Andrews
 AFB, Washington, D.C.).

10,581
 This report discusses the role of food during flight
 as it relates to preventive medicine. Research has
 shown that improper food intake during flight, together
 with anxiety, irritation, fatigue, monotony, drowsiness
 and discomfort decrease flying safety. However, these
 physical and psychological stresses were found to be
 greatly alleviated by the intake of the appropriate food
 and drink. Preventive medicine, in this case, deals
 not only with the physiologic role of food, but its emo-
 tional value as well. Nutrition, sanitation, size of
 meals, time interval between meals, and palatability are
 taken into account. Two new meal systems, developed to
 meet current flight feeding needs, are described and
 their merits discussed.
 T. R. 6

10,582
 Klein, S.J. & Gell, C.F. ATTENTION HUMAN ENGINEERING
 IS A SCIENTIFIC SPECIALTY. *J. Aviat. Med.*, March
 1958, 29(3), 212-219. (USAF Air Crew Equipment Lab.,
 NAE, Philadelphia, Penn.).

10,582
 The goal of human engineering is to improve opera-
 tor efficiency and safety by minimizing the stresses in-
 duced by the machines created by the engineer. Since
 the increasing complexity of modern aircraft threatens
 to exceed the operator's capacities, this article sug-
 gests a bilateral approach to human engineering in which
 specialists in the medical, biologic, and physiologic
 sciences would work in close cooperation with design
 engineers, thus improving operator safety, efficiency,
 morale, and confidence in his equipment. It is empha-
 sized that human engineering is a scientific specialty
 because its data must be derived from experimentation.
 Conditions are described which have led to a shortage of
 such specialists and a solution is proposed to allevi-
 ate the shortage. R. 12

10,583
 Webb, H.S., Miller, E.E. & Seale, L.H. FURTHER
 ATTEMPTS IN CODING AIRCRAFT ACCIDENTS. *J. Aviat.
 Med.*, March 1958, 29(3), 220-225. (USAF School of
 Aviation Medicine, Naval Air Station, Fla.).

10,583
 The complete accident reports of 38 pilot-caused
 accidents of students in the carrier qualification phase
 of basic training were coded by three aviation psycholo-
 gists. Code categories consisted of the following five
 causative factors: (1) errors in speed-distance per-
 ception; (2) applied faulty technique; (3) failed to
 take corrective action; (4) confusion; and (5) faulty
 division of attention. After each of the four coding
 sessions the coding process, the codes, and the acci-
 dents themselves were discussed and the differences in
 coding resolved. The results were tabulated and com-
 pared with previous attempts at accurate coding.
 T. R. 6

10,584
 Simons, D.G. PILOT REACTIONS DURING "WARRIOR II"
 BALLOON FLIGHT. *J. Aviat. Med.*, Jan. 1958, 29(1),
 1-16. (USAF Aero Medical Field Lab., Holloman AFB,
 N.M.).

10,584
 To investigate the human factor problems of
 flight under space equivalent conditions, the author
 piloted a solo balloon flight which lasted thirty-two
 hours and reached an altitude of more than 100,000
 feet. The conditions encountered are discussed in
 terms of (1) the sealed cabin atmosphere and its
 attendant problems, (2) reactions to isolation in a
 space environment, (3) the effects of heavy primary
 cosmic radiation on a human subject, and (4) the
 effects of various emotional and psychological factors
 on the pilot's efficiency and productivity. The sig-
 nificance of these factors with regard to future
 manned satellites is briefly discussed.
 T.

10,585
 Sealey, J.R. RELATION BETWEEN TIME OF DAY AND AIR-
 CRAFT LANDING ACCIDENTS. *J. Aviat. Med.*, Jan. 1958,
 29(1), 33-36. (Royal Canadian Air Force Institute
 of Aviation Medicine, Toronto, Ontario, Canada).

10,585
 In order to determine whether any association ex-
 ists between time of day and aircraft accidents, a
 year's study was made on one type of aircraft at one
 flying school. It was decided to restrict this study to
 landing accidents, thus avoiding much of the extraneous
 variability involved in computing rates according to ac-
 cidents per unit of flying time. An accident was defined
 as any deviation from a normal landing. Accident rates
 were computed for each half-hour of the day. These and
 the corresponding landing frequency were graphed, and
 the relationship between them analyzed, the results
 being expressed per one thousand landings. A possible
 relationship between accidents and a state of relative
 hypoglycemia in pilots is also briefly discussed.
 T. G.

10,586

Baker, B. & Mills, J.G. CERVICAL ALTITUDE TOLERANCE FOLLOWING PHYSICAL TRAINING AND ACCLIMATIZATION. *J. Aviat. Med.*, Jan. 1958, 29(1), 40-47. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,586

To determine the physiologic flexibility of human beings regarding hypoxic tolerance, six subjects were tested in a low pressure chamber before and after physical conditioning training, and after acclimatization to an altitude of 14,000 feet. Psychometer and writing tests were employed to determine the critical hypoxic threshold. The psychometer test scores obtained at various levels of simulated altitude were correlated with control scores taken at ground level. "Ceiling studies", in which the subject remained at a simulated altitude of 50,000 feet for three minutes, breathing 100 per cent oxygen under a mask pressure of 30 mm Hg, were conducted to investigate the combined effects of pressure breathing tolerance and hypoxic tolerance at very high altitudes. T. G. R 7

10,587

Erwin, J.L. & Burke, R.E. THE EFFECT OF POSITIVE ACCELERATION ON VISUAL REACTION TIME. *J. Aviat. Med.*, Jan. 1958, 29(1), 48-50. (USAF Aviation Medical Acceleration Lab., MACC, Dayton, Ohio, Tenn.).

10,587

To investigate the relations of both G tolerance and reaction time to test light incidence under positive acceleration, centrifuge experiments were conducted in which the subject attempted to maintain fixation on a red center light during runs of 2G, 2.5G, and 2.6G. A visual signal, consisting of a white light in the far periphery of the subject's left eye, was turned on and off at random intervals during each run. The criterion of visual impairment which was used as a criterion of G tolerance consisted of the subject's failure to respond to the visual signal within an interval of 1.5 seconds after its onset. The results of these and successive runs are analyzed and graphed, and the subjective reports of the testees discussed. T. G. R 12

10,588

Menzies, G.W. & Witmer, R.G. NOISE PROBLEMS IN MILITARY HELICOPTERS. AN EVALUATION OF EAR PROTECTION IN H225-1 AIRCRAFT. *J. Aviat. Med.*, Jan. 1958, 29(1), 51-65. (US Marine Corps Air Station, Va.).

10,588

To determine the effect of noise level on the combat efficiency of troops being transported by military helicopters, hearing tests were performed on 33 subjects before and after 157 flights in an H225-1 helicopter. The subjects, all with normal hearing, were tested primarily in terms of hearing loss, but mental and physical effects of exposure to noise were also recorded and evaluated. Various types of protective devices were worn during the flights. Results, obtained by audiometer and microphone tests, questionnaires, and interviews, are presented and discussed in terms of the relative hearing loss incurred when a particular protective device was employed. T. G. R 1 R 1

10,589

Hess, J.L. & Lombard, C.F. THEORETICAL INVESTIGATIONS OF DYNAMIC RESPONSE OF MAN TO HIGH VERTICAL ACCELERATIONS. *J. Aviat. Med.*, Jan. 1958, 29(1), 66-75. (Douglas Aircraft Co., El Segundo, Calif.).

10,589

This article employs the mathematical theory of deformity to determine the safety of higher ejection velocities in the design of upward-ejecting jettisonable seats for future aircraft. Since the structural strength of the spine is the chief limiting factor, a homogeneous elastic rod was used as a mathematical model to represent the spinal column. Oscillograph records of ejection tests on human subjects were obtained, and the acceleration of the free end of the elastic rod was computed as a function of time, assuming the prescribed acceleration of the other end to be equal to the acceleration of the seat bucket as taken from the oscillograph. Comparisons of experimental and theoretical accelerations are shown in graphs and tables. G. R 2

10,590

Pappas, J.M. SUPPORT OF UPPER BODY AGAINST ACCELERATIVE FORCES IN AIRCRAFT. *J. Aviat. Med.*, Jan. 1958, 29(1), 76-86. (Douglas Aircraft Co., El Segundo, Calif.).

10,590

This article, based on an analysis of the structural support and mass distribution of the upper part of the body, offers general principles to be applied in the design of a harness to support the upper part of the aviator's body against increasing vertical forces. The objectives of such support are: (1) to lessen the dynamic response between the central and lateral masses of the body in order to lessen the compressive impact loads on the lumbar spine; and (2) to permit the use of greater thrust, higher velocities, and higher trajectories in upward ejection seats. The results of preliminary tests on the suggested harness are recorded and compared with test results of the standard military harness. G. R 9

10,591

Holmstrom, F.M.G. COLLAPSE DURING RAPID DECOMPRESSION. REPORT OF THREE CASES. *J. Aviat. Med.*, Feb. 1958, 29(2), 91-96. (7112th Central Medical Group, USAF in Europe, APO 633, New York, N.Y.).

10,591

Safe limits of tolerance to rapid decompression have been defined by taking actual measurements of the peak intrathoracic pressures sustained by subjects undergoing rapid decompression. Although the ability of the lungs to withstand sudden pressure changes is a major factor in such tolerance, the limits as defined are valid only when gas in the lungs is free to escape through open airways. This article discusses three new cases showing unusual reactions to rapid decompression, each characterized by varying degrees of neurological and vasomotor collapse. The varying intensities of symptoms suggests a qualitative relationship to the intrapulmonary pressure sustained. T. G. R 11

10,592

Speelman, C.R. & Cherry, J.C. MIDDLE EAR PERCEPTION OF PRESSURE AND PAIN IN DESCENT FROM ALTITUDE. *J. Aviat. Med.*, Feb. 1958, 29(2), 106-110. (Medical Div., CAA, Washington, D.C.).

10,592

To determine whether the sensory apparatus for the perception of descent from altitude adapts to slowly-developing pressure differentials, experiments simulating descent were performed on nine subjects who were instructed not to yawn or make any movements that might ventilate the middle ear. Beginning at a simulated altitude of between 8,000 and 9,000 feet, descents were made at rates which varied between 300 and 14,000 feet per minute. Both rates and amounts of descent were employed in a random manner and were interspersed with several control runs to check the accuracy of the subjects' responses. Two of the subjects were then tested to determine the threshold pressure change for persistent pain. The results are graphed and briefly analyzed. G. R 6

10,593

Talbot, J.V. UNEXPLAINED AIRCRAFT ACCIDENTS IN THE U.S. AIR FORCES IN EUROPE. *J. Aviat. Med.*, Feb. 1958, 29(2), 111-116. (7112th Central Medical Group, USAF in Europe, APO 633, New York, N.Y.).

10,593

This report presents data and opinions about aircraft accidents in the United States Air Force in Europe, based upon a questionnaire survey of Air Force flyers who received physiologic training at the 7112th Central Medical Group. The questionnaire covered the following six areas of interest: hypoxia, spatial disorientation, hyperventilation, rapid or explosive decompression, decompression sickness, and personal protective equipment. The tabulated results are compared with the results of a previous study by Nuttal and Sanford. A probable relationship between these hazards and the high incidence of cause-undetermined aircraft accidents is also discussed. T. R 4

10,594
Tiller, P.R. & Goshier, H.R. EFFECTS OF ACTIVITY ON METABOLIC RATE OF SUBJECTS WEARING THE AVIATOR'S FULL PRESSURE SUIT. *J. Aviat. Med.*, Feb. 1958, 29(2), 117-121. (USAF Air Crew Equipment Lab., HMC, Philadelphia, Penn.).

10,594
Because previous pressure suit studies were primarily concerned with heat stress due to environmental conditions, this experiment was conducted to determine the metabolic rates and oxygen consumption of subjects wearing: (1) a summer flight suit, (2) pressure suit unpressurized, and (3) pressure suit pressurized while performing a simple simulated pilot task in a mock-up of the F71 aircraft cockpit. Two states of activity - sitting-resting versus simple pilot task - were used. Three male subjects were exposed to all test conditions twice, for a total of 16 trials. Room temperature was 65 degrees Fahrenheit. DeLisle's formula was used to determine oxygen consumption and metabolic rate. Results are recorded on bar graphs comparing basal and work conditions.
G. I. R 7

10,595
Sealer, H.W. A NEW AVIATION OXYGEN MASK WITH ALTITUDE-CONTROLLED SUSPENSION ADJUSTMENT. *J. Aviat. Med.*, Feb. 1958, 29(2), 130-135. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

10,595
The necessity for prolonged oxygen pressure breathing in current and future flight requires a leakproof and comfortable oxygen mask. This report describes the development of such a mask, the MC-1, in accord with quite rigid specifications which required a single mask size to fit all faces, a single built-in, pressure-compensated, combined inhalation-exhalation valve, and a noise-cancelling microphone. In order to have a comfortable mask seal at any altitude and pressure, a manually adjusted harness was developed as well as an altitude-controlled harness tension compensating system. During its development, cold-chamber and centrifuge tests were performed on the MC-1 mask. The results of those tests and their implications are briefly discussed.
I.

10,596
Roth, J.G., Cohen, S.L., Silverman, A.J., Johnson, G.E., et al. BIOELECTRIC MEASURES DURING FLIGHT. A PRELIMINARY REPORT. *J. Aviat. Med.*, Feb. 1958, 29(2), 139-144. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

10,596
Preliminary experiments were conducted to determine the feasibility of in-flight bioelectric measurements. A JC-131B (Convair) aircraft was modified to permit the installation of a Galvanic Skin Response apparatus, an Electroencephalograph, and a pen and ink oscillograph. Although the components were too large for operational bombers and fighters, it was hoped that the design of smaller components would be aided by the results of this experiment. It is believed that bioelectric measures will provide greater insight into the stresses and requirements for successful operation of high performance aircraft.
I. R 6

10,597
Carlson, L.D., Hsieh, A.C.L., Fullington, F., & Eisner, R.W. IMMERSION IN COLD WATER AND BODY TISSUE INSULATION. *J. Aviat. Med.*, Feb. 1958, 29(2), 145-152. (School of Medicine, University of Washington).

10,597
This experiment arose as an attempt to explain the wide variation in survival times during cold water immersion. Nine subjects, who had previously been immersed in water at 33 degrees Centigrade for an hour, were immersed to the neck in water which was gradually lowered over a period of twenty minutes. Rectal temperature was measured with a thermistor probe, respiration was measured by a flowmeter and a paramagnetic oxygen analyzer. Expired gas was collected in a Douglas Bag and analyzed by the Scholander technique. Skin fold measurements, specific gravity, and the percentage of fat were measured for each subject, and correlated with the data from the experiments in terms of Burton's caloric equations.
T. G. I. R 16

10,598
Dandane, A., Hofstetter, H.W., & O'Connor, J.P. CRITICAL FLICKER FREQUENCY IN LIGHT- AND DARK-ADAPTATION. *J. Gen. Psychol.*, Jan. 1958, 56, 11-16. (Dept. of Psychology, Catholic University of America).

10,598
This experiment examined the hypothesis, derived from Hecht's biochemical theory of vision, that critical flicker frequency (CFF) in the dark-adapted state is lower than in the light-adapted state. This hypothesis was analyzed in terms of inter-individual differences with a primary variable being manifest anxiety as defined by Taylor. Seventy-eight subjects, (19 to 22 years of age) representing the two extremes on the Taylor anxiety scale, were tested for CFF frequencies in a photographic dark room on three ascending and descending trials of a Stratostat under dark and light-adapted conditions. Results are discussed in terms of a correlation between CFF and Taylor scores and related to Hecht's biochemical theory.
T. R 21

10,599
Auble, D. & Britton, Nancy. ANXIETY AS A FACTOR INFLUENCING ROUTINE PERFORMANCE UNDER AUDITORY STIMULI. *J. Gen. Psychol.*, Jan. 1958, 56, 211-214. (Dept. of Psychology, Western College for Women).

10,599
This experiment studies the relationship of anxiety to performance under auditory stimuli. Subjects, 174 women divided into low and high anxiety groups on the basis of the Taylor Anxiety Scale, were subdivided into experimental (high anxiety) or control groups (low anxiety) of eight persons each. Recordings played at an average of 80 decibels represent the auditory stimuli. A routine clerical number and time check task was used. A pretest measure of performance was obtained for each subject under quiet conditions. Differential conditions of quiet and noise were then introduced with a reward given for subjects showing greatest improvement over initial performance. Results are discussed in terms of the interrelation between noise and anxiety as factors effecting performance.
R 4

10,600
Jones, F.P., O'Connell, D.N., & Hanson, J.A. COLOR-CODED MULTIPLE-IMAGE PHOTOGRAPHY FOR STUDYING RELATED RATES OF MOVEMENT. *J. Psychol.*, April 1958, 45, 247-251. (Institute for Applied Experimental Psychology, Tufts University).

10,600
This report presents a method for studying certain human movements as patterns of response by recording both the stimulus and response by multiple-image photography and coding the pattern with color. This method provides an exact second of the latency, direction and rate of movement for each trajectory within the pattern. The movement of a board with the field represents a stimulus pattern, with the beginning of the movement serving as a signal to the subject. An aluminum wheel with five apertures rotates in front of the camera in synchrony with the flashes. All phases of the action are recorded as a single time-space pattern in which direction of movement and time relations between the trajectories are indicated by the sequence of colors.
G. I. R 1

10,601
Smith, O.W. & Smith, P.C. INTERACTION OF THE EFFECTS OF CUES INVOLVED IN JUDGMENTS OF CURVATURE. *Amst. J. Psychol.*, Sept. 1957, 1XX(3), 361-375. (Cornell University).

10,601
This experiment tests the effects of the interactions of variables of stimulation upon judgments of the curvature of a three-dimensionally curved object. Eleven subjects were randomly assigned within a factorial design permitting a total of 132 observations. The variables were: monocular versus binocular vision, number of spots on the surface of the semicylinder (three patterns consisting of 135, 45, and 9 block spots of mixed round and elliptical shapes); and position (two distances of observation at 116.3 centimeters and 232.6 centimeters). The results are discussed in terms of the relation between ocularity, position, number of surface elements, distance, and so forth, and the judgment of curvature.
T. G. I. R 8

10,602

Burton, R.M. INTER-EYE DIFFERENCES IN COLOR PERCEPTION. *Amer. J. Psychol.*, Sept. 1957, LXX(3), 386-394. (Color Technology Div., Eastman Kodak Co., Rochester, N.Y.).

10,602

This report discusses a method for determining the differences in color sensitivity of the two eyes of an observer, dealing specifically with intrinsic differences in color sensitivity when both eyes are adapted to the same illumination. Data used were incidental to two previous studies reporting on the effects of chromatic adaptation on color appearance. A binocular system technique was so used that a test color could be presented to one eye adapted to a standard illumination while a variable matching color could be presented to the other eye adapted to the same or a different illumination. Data from ten subjects on the two tests were used. Equations are obtained and presented to show how color appearances to one eye may be predicted from a knowledge of what the other eye sees. T. G. R. 9

10,603

Caslin, J.E. THE INFLUENCE OF FIGURAL INSPECTION ON THE AUTOKINETIC ILLUSION. *Amer. J. Psychol.*, Sept. 1957, LXX(3), 395-402. (Minneapolis-Honeywell Aeronautical Div.).

10,603

This report presents two experiments assessing the influence of figural inspection on the autokinetic illusion and is designed to test several specific deductions derived from Kohler and Wallach's cortical satiation theory. Six subjects were used in the first experiment and 96 in the second. The independent I-figure variables studied were size, filled, outlined I-figures and the orientation of I-figures. Twelve stimulus-figures were used. Quantitative measures of latency, direction, extent and rate of autokinetic movements were obtained by recording the subjects' open-loop pursuit-tracking responses. Results are presented and discussed in terms of the relation between I-figure variables and autokinetic movement. T. I. R. 8

10,604

Cohen, W. SPATIAL AND TEXTURAL CHARACTERISTICS OF THE GANZFELD. *Amer. J. Psychol.*, Sept. 1957, LXX(3), 403-410. (University of Buffalo).

10,604

This experiment describes the "mode of appearance" and spatial characteristics of the Ganzfeld (entire visual field). Special apparatus was designed to eliminate physical microstructure and to prevent the subject's face obstructing uniform stimulation of the entire retina. Both a uniform and differential Ganzfeld could be manipulated and a spot introduced into the field. Subjects (13) were involved in two tasks: (1) to compare two situations with respect to fog density, distance, distinctiveness of figure, hue, and saturation, and (2) to report on the effects of adaptation by remaining in the experimental situation three minutes. Results are discussed in terms of how changes in stimulus-distribution of the several variables determine the subject's perception of the Ganzfeld. T. I. R. 10

10,605

Nachman, H. THE INFLUENCE OF SIZE AND SHAPE ON THE DISCRIMINATION OF VISUAL INTENSITY. *Amer. J. Psychol.*, June 1957, LXX(2), 211-218. (University of Colorado).

10,605

Two experiments were designed to test a theory reported by Hecht and associates which suggests that differential thresholds are determined by boundary dimensions of a stimulus rather than by its area. In Experiment I the differential thresholds for 24 rectangles of different dimensions were obtained for each of two subjects. Half of these rectangles were so selected that their boundary dimensions would lead to predictions of equal thresholds although their total area differed considerably. Experiment II involved testing the same predictions on one subject for figures composed of two rectangles. Results are discussed in terms of their predictability by the Hecht theory, the Graham theory, and by theories which relate the differential threshold to the area of stimulus. T. G. I. R. 13

10,605

Jones, F.M. AN ANALYSIS OF INDIVIDUAL DIFFERENCES IN OLFACTORY THRESHOLDS. *Amer. J. Psychol.*, June 1957, LXX(2), 27-322. (University of California at Los Angeles).

10,606

This experiment attempts to determine the way in which the human organism classifies odors, using as the method of determination the analysis of individual differences in olfactory thresholds. A factor analysis was made of the absolute olfactory thresholds for 20 substances and 84 Ss, obtained by means of a controlled-blast technique. The results are discussed in terms of the nature of individual differences in olfactory thresholds, the probable receptors involved, and the relevance of existent odor-classification schemes to the actual process of odor classification. T. R. 18

10,607

Reag, C.M. CHARACTERISTICS OF NEURAL IMPAIRMENT IN HYPOXIA. *Amer. J. Psychol.*, June 1957, LXX(2), 243-247. (Office of Naval Research, Washington, D.C.).

10,607

This experiment on the effect of hypoxia on performance was designed to test the hypothesis that there is a steady state of efficiency following the initial decline with hypoxia and that it persists until the time of collapse. This steady state is interspersed with "blocks" (i.e., periods of inadequate performance). Ten subjects each performed on the Conceptual Reasoning Test over a 14-day period, at sea level and at 13,000, 16,000, 17,000 and 18,000 feet above sea level. Results are presented as an evaluation of performance from normalcy to unconsciousness under constant degrees of stress and discussed in terms of their applicability to the steady state of efficiency hypothesis. T. R. 8

10,608

Gulick, W.L. & Stake, R.E. THE EFFECT OF TIME ON SIZE-CONSTANCY. *Amer. J. Psychol.*, June 1957, LXX(2), 276-279. (Princeton University).

10,608

This experiment studied the effects of limited exposure time on size constancy. Twelve subjects made estimates of size of triangles at 20, 30, 40, 50 and 60 feet with cues to distance limited to accommodation, convergence, and binocular retinal disparity. The role of time in size constancy was investigated by obtaining these size estimates at exposures of 0.1, 0.8, and 4.0 seconds. Data are examined by analysis of variance. The results are discussed in terms of the relationship between exposure time and size constancy. G. R. 2

10,609

Smith, O.W. & Gibson, J.J. APPARATUS FOR THE STUDY OF VISUAL TRANSLATORY MOTION. *Amer. J. Psychol.*, June 1957, LXX(2), 291-294. (Cornell University).

10,609

This article describes an apparatus for use in the study of visual translatable motion. It was designed to fulfill specifications such as: the dimensions of the moving field should be so large that a stimulus-field of wide visual angle may be used when desired; the range in the speed of movement should be large; the velocity of the surface should be variable by continuous rather than discontinuous steps, and so forth. Some problems which this apparatus might handle are (1) the effects on the accuracy of reproduction of velocity of the direction of the moving fields, the mode of observation used in comparison, and so forth, (2) the investigation of constant errors when the subject matches the variable and standard fields, and many others. T. R. 2

10,610

Rock, I. & Neisser, W. THE EFFECT OF RETINAL AND PHENOMENAL ORIENTATION ON THE PERCEPTION OF FORM. *Amer. J. Psychol.*, Dec. 1957, LXX(4), 493-511. (New School for Social Research).

10,610

This article presents four sets of experiments (totaling eight) designed to study the relative importance of retinal and environmental orientation in form perception. Experiments I-III used a technique in which the subjects (15) were required to indicate from a tilted position whether single figures looked like those seen previously from an upright position. Experiments IV-VI investigated the part played by difficulty in recognition. Forty subjects had to identify complex figures in both upright and tilted positions. Experiments VII-VIII investigated the role of retinal orientation with orientation in the environment held constant. Results are presented and discussed in terms of the differential role of retinal, environmental, and phenomenal factors in form perception. T. R 8

10,611

Bilodeau, E.A. PATTERNS OF INTERNAL CONSISTENCY IN MULTIPART SKILLED PERFORMANCES. *Amer. J. Psychol.*, Dec. 1957, LXX(4), 550-559. (Tulane University).

10,611

This experiment was designed to analyze events within a psychomotor tracking task ranging from one to four parts by systematically varying the number of components defining the task. An experienced subject, who had shown a stable level of performance during practice, attempted to keep centered all uncovered meter pointers all of the time. The task was broken down into the following: attending to one meter, two meters, three meters and, finally four meters. Results are reported and discussed in relation to: (1) knowledge of the functional relationship between performance on a part and the number of components and (2) the rules of compositions of an aggregate of individual parts of a task.

T. I. R 3

10,612

Clausen, J. & Vanderbilt, Christa. VISUAL BEATS CAUSED BY SIMULTANEOUS ELECTRICAL AND PHOTIC STIMULATION. *Amer. J. Psychol.*, Dec. 1957, LXX(4), 577-585. (The Training School at Vineland).

10,612

To determine the conditions necessary to produce visual beats the following variables were studied in six experiments: 1) the relationship between frequency and intensity of the light source, 2) the relationship between stimulus intensity and beat frequency, 3) at frequencies from 5 to 45 cycles per second, the minimal intensity of the electrical stimulus, 4) the minimal luminance level of the photic stimulus, and 5) the interaction between intensities of electrical and photic stimulation. One experiment was concerned with 1) varying the frequency difference between the two sources and 2) establishing multiples of the basic frequency necessary to produce beats.

G. R. 5

10,613

Weinstein, S. THE PERCEPTION OF DEPTH IN THE ABSENCE OF TEXTURE-GRADIENT. *Amer. J. Psychol.*, Dec. 1957, LXX(4), 611-615. (New York University).

10,613

This experiment tests the Gibson hypothesis that the perception of depth is impossible in the absence of a "retinal gradient of texture." Sixty subjects were tested under the following conditions: 1) 30 were tested with the gradient photographs, 2) 15 were tested with nongradient photographs, and 3) 15 were tested as in 2 but were not given any practice trials preceding the testing. Testing was done under normal illumination. The subject was to choose the stake in the comparison array which he considered equal to the target stake in height. A mixed analysis of variance evaluated the effects of three variables and their interactions: 1) presence or absence of the gradient, 2) the stake size, and 3) distance of target stake.

G. I. R 2

10,614

Verplanck, W.S. & Blough, D.S. RADIOLIZED STIMULI AND THE NON-INDEPENDENCE OF SUCCESSIVE RESPONSES AT THE VISUAL THRESHOLD. *J. Gen. Psychol.*, Oct. 1958, 58, 263-272. (Dept. of Psychology, Harvard University).

10,614

This experiment studied the dependence of responses on both the preceding stimulus and the preceding response to visual stimuli near the absolute threshold. Four subjects each were presented with four ascending-descending series of 91 stimuli on eight experimental days. Each stimulus was presented at one of six fixed brightnesses. Data are presented and discussed in terms of the probability of sighting the visual stimulus as a function of: (1) stimulus brightness alone, (2) preceding response, (3) the preceding brightness, and (4) both the preceding stimulus and the preceding response. Threshold curves were obtained for both ascending and descending thresholds.

G. R 8

10,615

Venables, P.H. APPARATUS FOR PRESENTATION OF STIMULI AND MEASUREMENT OF RESPONSE TIMES IN REACTION TIME EXPERIMENTS. *J. Gen. Psychol.*, Oct. 1958, 58, 295-298. (Social Psychiatry Research Unit, Medical Research Council, London, England).

10,615

This article illustrates and describes apparatus which has been developed in relation to reaction time experiments. This design includes a delay "flip-flop" which gives time for clock-reading before reset for the next "on" signal. A feature of particular importance for testing abnormal subjects is a latch relay which prevents subsequent operation of the time clock by the subject making a later movement of the key after his initial response. The apparatus also allows for remote control if only one experimenter is available.

I. R 1

10,616

Nuttall, J.B. THE PROBLEM OF SPATIAL DISORIENTATION. *J. A.M.A.*, Feb. 1958, 166(5), 431-438. (Aviation Medicine Div., Office of the Surgeon General, Washington, D.C.).

10,616

Eighteen cases of spatial disorientation due to illusions of attitude and motion are summarized in this article and used to illustrate the frequency with which this type of disorientation causes aviation accidents. The following factors contributing to the illusions of attitude and motion are considered: (1) misinterpretation of gravitational forces, (2) erroneous sensations of rotation, and (3) Coriolis acceleration, or the illusion caused by head movement. The recommendations which are made concern the more thorough indoctrination of pilots in the causes of spatial disorientation and the necessity for better cockpit designs.

R 6

10,617

Glorig, A. & House, H.P. NEW, PRACTICAL CONCEPT OF HEARING TESTING FOR USE OF THE GENERAL PHYSICIAN. *J. A.M.A.*, April 1958, 166(14), 1719-1721. (School of Medicine, University of Southern California).

10,617

This article discusses a rapid, simple auditory screening test which is presented in terms of its usefulness in mass screening situations, e.g., schools, military. Audiograms of approximately 4500 persons were studied and two procedural tests evolved from the significance of these data: (1) a single frequency screening test (at 4000 cycles per second), and (2) a double-frequency screening test (2000 and 4000 cycles per second). Both tests are discussed in terms of their usefulness in different types of mass screening situations.

I.

10,618

Mitt, R.K., Morveth, S.H. & Spurr, C.B. INFLUENCE OF VARYING DEGREES OF PASSIVE LIMB MOVEMENTS ON RESPIRATION AND OXYGEN CONSUMPTION OF MAN. *J. appl. Physiol.*, 1958, 12(2), 297-300. (College of Medicine, State University of Iowa, Ames, Iowa).

10,618

This experiment attempts a delineation of the role which hyperpnea resulting from "passive" movements of the limbs plays in hyperpnea of active exercise by clarifying the following: 1) the relationship between the number of moving joints and the increase in minute volume, and 2) the persistence or possible decay in the potency of the stimulus and the energy cost of "passive" movements. Ten subjects participated in 17 experiments in which passive movements of wrist, shoulder, elbow, hip, knee, ankle, and combinations of these six were made by trained operators. Measurements of respiratory minute volumes, oxygen and carbon dioxide consumption were made and differences among these rates related to the effects of the various limb manipulations.

T. G. R 9

10,619

Benzinger, T.H., Huebscher, R.G., Minard, D. & Kitzinger, Charlotte. HUMAN CALORIMETRY BY MEANS OF THE GRADIENT PRINCIPLE. *J. appl. Physiol.*, 1958, 12(2), S1-S28. (USN Medical Research Institute, Bethesda, Md.).

10,619

This article describes the application of the gradient principle of calorimetry for use with human subjects. The following were considered as essential to the building of the calorimeter: 1) complete coverage with measuring sites of uniform characteristics in a uniform distribution, 2) the use of a large number of measuring sites to lessen errors introduced by the uneven spatial distribution of heat flow, 3) the use of solid material to establish a reproducible thermal resistance and gradient-response, and 4) the use of thin layers to insure isothermal characteristics of the measurement and a rapid response. "Cold" uses to which this equipment has been put include determination of changes of heat loss with the onset of convection, heat loss during hyperventilation, and so forth. G. R. 29

10,620

Tampietro, P.F., Bass, D.E. & Buskirk, E.R. HEAT EXCHANGES OF NUDE MEN IN THE COLD: EFFECT OF HUMIDITY, TEMPERATURE AND WINDSPEED. *J. Appl. Physiol.*, 1958, 12(3), 351-356. (USA Quartermaster Research & Engineering Center, Natick, Mass.).

10,620

This experiment studies the effects of several environmental conditions on body heat exchanges in order to determine whether it is possible to infer a physiological basis for the subjective sensation of chill in cold-wet conditions. Six male subjects were exposed nude in a constant temperature room to various combinations of the following: dry bulb (60 and 50 degrees Fahrenheit), relative humidity (95 and 30 percent), windspeed (ten and 21 miles per hour). Measurements were made of skin and rectal temperature, and oxygen consumption. The results are discussed in terms of the interactions between the three environmental conditions, the physiological changes observed under these varying conditions, and the effects of the various exposures on heat production, heat debt, and so forth. T. G. R 8

10,621

Kreider, M.B., Buskirk, E.R. & Bass, D.E. OXYGEN CONSUMPTION AND BODY TEMPERATURES DURING THE NIGHT. *J. Appl. Physiol.*, 1958, 12(3), 361-366. (USA Quartermaster Research & Engineering Center, Natick, Mass.).

10,621

This experiment studies the changes in metabolic rate and heat exchange of 19 men sleeping under comfortable, ambient conditions (78-82 degrees Fahrenheit). Measurements of rectal temperature, mean weighted skin temperature, and oxygen consumption were made frequently during the sleeping period. The results are presented in terms of intra- and inter-individual variations in metabolic activity. Attempts are made to relate these variations to basic physiologic mechanisms.

T. G. R 20

10,622

Gaydos, H.F. EFFECT ON COMPLEX MANUAL PERFORMANCE OF COOLING THE BODY WHILE MAINTAINING THE HANDS AT NORMAL TEMPERATURES. *J. Appl. Physiol.*, 1958, 12(3), 373-376. (USA Quartermaster Research & Engineering Center, Natick, Mass.).

10,622

This experiment studies the effect of normal hand temperature on complex manual performance while the rest of the body has been maintained at subnormal temperature levels. During the experimental sessions 12 subjects performed with their hands in a warming box (90-100 degrees Fahrenheit). Knot-tying and block-stringing tasks were administered three times: (1) when the subject first entered the room, (2) when his mean weighted skin temperature had dropped to between 81-82 degrees Fahrenheit, and (3) when the latter had dropped to between 78-79 degrees Fahrenheit. Changes in performance are related to the various temperatures involved as well as to underlying physiological mechanisms.

G. R 6

10,623

Gaydos, H.F. & Dusek, E.R. EFFECTS OF LOCALIZED HAND COOLING VERSUS TOTAL BODY COOLING ON MANUAL PERFORMANCE. *J. Appl. Physiol.*, 1958, 12(3), 377-380. (USA Quartermaster Research & Engineering Center, Natick, Mass.).

10,623

This experiment studies the effects of localized cold on complex manual performance. Sixteen male subjects performed knot-tying and block-stringing tasks under two experimental conditions: (1) with the remainder of the body exposed to comfortable ambient temperatures, the hands and wrists alone were exposed to cold and (2) with the subject fully clothed, except for bare hands, the subject performed entirely in a cold environment. The experimental equipment was so designed that the subjects had to rely entirely upon their sense of touch during performance. Results are discussed in terms of changes of performance under the two experimental conditions.

G. R 3

10,624

Randall, W.C., Peiss, C.N. & Rawson, R.O. SIMULTANEOUS RECRUITMENT OF SWEATING AND PERCEPTION OF WARMTH IN MAN. *J. Appl. Physiol.*, 1958, 12(3), 385-389. (Strich School of Medicine & Graduate School of Loyola University).

10,624

This experiment investigates the discrepancies between recruitment of sweating and sensation of warmth as reported by 13 nude male subjects. Skin temperatures and sweat responses were recorded simultaneously from four to eight cutaneous regions. Control observations were made while the subject was resting in a cool environment (14-18 degrees Centigrade). The temperature was then slowly raised. In a second experiment the subject was chilled and then he abruptly stepped into the climate chamber heated to 45-50 degrees Centigrade. The results, representing subjects' responses and recordings of skin temperature and sweat rates, are related to various hypotheses concerning the underlying psychological mechanisms (e.g., the hypothesis of separate receptors). G. R 15

10,625

Gregory, R.L. & Wallace, Jean G. A THEORY OF NERVE DEAFNESS. *The Lancet*, Jan. 1958, 1, 83-84. (Psychological Lab., Cambridge, Mass.).

10,625

This article examines the hypothesis that nerve deafness is due to raised neural noise by comparing differential intensity discrimination over a wide range of intensities and frequencies in (1) nerve-deaf ears showing various degrees of impairment and (2) the normal ear in the presence of white noise masking. Data, in the form of curves relating intensity of the tone pip to the continuous tone, for both types of ears, are presented. Recommendations are made based on the theoretical findings for improvements in hearing aids to compensate for the effects of nerve deafness.

G. R 8

10,626
Burch, W.R. & Greiner, T.H. DRUGS AND HUMAN FATIGUE: GSR PARAMETERS. *J. Psychol.*, Jan. 1958, 45, 3-10.

10,626
Three experiments on drug simulated fatigue and human fatigue attempted to demonstrate the adequacy of the galvanic skin reflex (GSR) response as a measure of fatigue. Both specific and non-specific responses were obtained for a single subject given pentobarbital to the point of sleep and then aroused with Metrazol. Three subjects participated in a 56-hour, prolonged confinement run during which time their GSR responses were recorded, subjective evidence of their state of consciousness was obtained, and observations of their psychomotor performance were made. GSR responses were also obtained from 15 subjects who participated in a 30-hour prolonged wakefulness test in which two drugs (amphetamine and cortisone) were tested for their anti-fatigue action.

10,627
Barthol, R.P. THE MOVEMENT OF GROUND OVER FIGURE: A NEW FORM OF APPARENT MOVEMENT. *J. Psychol.*, Jan. 1958, 45, 85-91.

10,627
In this article a new kind of movement (apparent movement of the ground rather than the figure) is described along with the apparatus and experimental conditions which gave rise to it. Individually tested subjects (206) were seated 14 feet from two neon lights three inches apart, told about the phi phenomenon, and asked to tell what they saw including any changes which occurred. Phi apparatus was begun at "slow" and gradually moved to "fast" until simultaneity was reported. Discussion is concerned primarily with investigating the aspects of the apparatus and experimental procedure which gave rise to this phenomenon as well as its implications for existing theories of perception.
T. R 6

10,628
Adlerstein, A.M. THE HUMASCOPE: A MODIFIED STEREOSCOPE. *J. Psychol.*, Jan. 1958, 45, 109-113.

10,628
This article describes the Humascope, a modified stereoscope, which was developed to verify and further investigate findings by Engel that two different faces viewed stereoscopically are reported as being "more pleasant" in the composite view. Certain areas in which this apparatus might be used are: research in social values, aesthetics, perceptual defense and vigilance, object choice and its relation to personality variables, and the capacity of the organism to resolve and distort rapidly moving visual input.
T. R 3

10,629
Corso, J.F. & Cohen, A. METHODOLOGICAL ASPECTS OF AUDITORY THRESHOLD MEASUREMENTS. *J. exp. Psychol.*, Jan. 1958, 55(1), 8-12. (The Pennsylvania State University).

10,629
The two experiments reported here study the effects of methodology on auditory threshold measurements. In Experiment I, which studied the magnitude of inter- and intra-subject variability in measurements of the intensive auditory threshold, 38 subjects were given audiometric tests by the method of limits on both ears. Frequencies were from 250 to 8000 cycles per second (cps) in each of three experimental sessions. In Experiment II, which examined the effects of practice on threshold values, the right ears of ten subjects were tested ten times at 125 cps in each of two testing sessions. Data are treated by analysis of variance. Results are compared with those of past studies and discussed in terms of the effect which the methodology has upon the thresholds obtained. T. R 17

10,630
De Soto, C. TWO-CATEGORY JUDGMENTS OF SEQUENCES OF STIMULI OF TWO VALUES. *J. exp. Psychol.*, Jan. 1958, 55(1), 34-38. (University of Wisconsin).

10,630
In this experiment attempts were made to relate two-category judgments to some sequences of stimuli restricted to two values. Selected descriptions of items of human behavior, drawn from the high and low ends of a previously scaled group of items, were judged by 128 subjects as "more" or "less bizarre." Data were treated by analysis of variance. Results are discussed in terms of the hypothesis that the subjects recenter their judgment scale by a continual re-averaging of the stimuli presented so that during a run of stimuli of the same value their judgment scale will gradually be recentered on this stimulus value.
G. R 9

10,631
Faust, W.L. FACTORS IN INDIVIDUAL IMPROVEMENT IN SOLVING TWENTY-QUESTIONS PROBLEMS. *J. exp. Psychol.*, Jan. 1958, 55(1), 39-44. (Pomona College).

10,631
This experiment investigates the changes in the types of questions asked during solution of Twenty Questions problems which are related to improvement in solving these problems. Twenty subjects were so assigned that each of five lists of four questions was undertaken by four subjects. Data are presented in the following ways: the change in the number of questions asked from Day I to Day V; the relation between the amount and the kind of recurring questions asked and improvement in solving the problems; the number of questions asked which elicited useful information; and the percentage of questions asked which elicited "yes" answers. The results are discussed in terms of their relation to ways of learning solutions to problems.
T. R some

10,632
Thompson, R.F., Voss, J.F. & Brogden, W.J. EFFECT OF BRIGHTNESS OF SIMULTANEOUS VISUAL STIMULATION ON ABSOLUTE AUDITORY SENSITIVITY. *J. exp. Psychol.*, Jan. 1958, 55(1), 45-50. (University of Wisconsin).

10,632
Auditory thresholds (to a tone of 1000 cycles per second) were obtained during the simultaneous presentation of eight conditions of a visual stimulus for two experimental groups given different instructions as to the presentation of the lights and the manner of reporting on same. Auditory thresholds were also obtained from a control group in order to check on practice effects. Each subject in the two experimental groups had three thresholds taken for each of the eight light conditions. One experimental group was told to respond to the light or "yes" the other, to respond to the light and the tone. The effects of instructions upon subjects' responses and the relevance of their data to the literature on intersensory facilitation and inhibition is discussed.
T. G. R 5

10,633
Becker, S.W. & Siegel, S. UTILITY OF GRADES: LEVEL OF ASPIRATION IN A DECISION THEORY CONTEXT. *J. exp. Psychol.*, Jan. 1958, 55(1), 81-85. (The Pennsylvania State University & Center for Advanced Study in the Behavioral Sciences).

10,633
The experiment reported on here tests two hypotheses drawn from Lewin's integrated definition of level of aspiration. Twenty-three students elected to gamble for their mid-term grade in lieu of an examination. By selecting from a series of alternative gambles they supplied data from which their levels of aspiration were derived. Further validation of their aspiration levels is obtained through an interview. Results are discussed in terms of their substantiation of the hypotheses: 1) if a subject aspires for less than a mark of C, he will be satisfied with a C, and 2) there will be a positive correlation between the level of aspiration obtained during the interview and that given by their scales of utility of grades.
T. I. R 11

10,634

Kruse, G.K. SOME INFORMATIONAL ASPECTS OF FORM DISCRIMINATION. *J. exp. Psychol.*, Feb. 1958, 55(2), 143-149. (Case Institute of Technology).

10,634

Distance thresholds were determined for the discrimination of a specially constructed set of 16 forms. Threshold values (eight subjects) were obtained for both the complete set of forms and for each set of binary discriminations (large square vs. large circle, semicircles facing either up or down, and so forth). In Experiment II six subjects were: (1) asked to ignore the dimension with the most difficult discrimination and (2) led to expect a set of alternatives including a more difficult discrimination than was really necessary in order to examine the effect on threshold values of varying the subjects' perceptual set. Experiment III tested the effect upon the results of elimination of the most difficult dimension from the total task.

T. G. R 5

10,635

Sheriff, M., Taub, D. & Nevlund, C.I. ASSIMILATION AND CONTRAST EFFECTS OF ANCHORING STIMULI ON JUDGMENTS. *J. exp. Psychol.*, Feb. 1958, 55(2), 150-155. (University of Oklahoma & Yale University).

10,635

This experiment tested two hypotheses: 1) when a standard is placed at the end points of a series of graded stimuli (weights) this causes a displacement of judgments of the series stimuli in the direction of the standard, and 2) when the standard is placed at increasing distances from either end of the series, the judgment distribution will be away from the standard and will tend to be constructed. Six subjects judged weights on a six-point scale by the method of single stimuli, with anchoring stimuli at the top level of the series and without anchoring stimuli (standards). A second experiment introduced anchors at the lower end of the original stimulus series and at increasing distances from it. Results are discussed in terms of their relation to assimilation and contrast effects. G. R 14

10,636

Sidowski, J.B., Morgan, R. & Eckstrand, G. INFLUENCE OF TASK COMPLEXITY AND INSTRUCTIONS UPON SIMPLE AND DISCRIMINATION REACTION TIMES. *J. exp. Psychol.*, Feb. 1958, 55(2), 163-166. (San Diego State College & USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

10,636

To study the effect of task complexity and instructions upon simple and discrimination reaction times, 48 subjects reacted to a stimulus light with one of three responses varying in task complexity: 1) removing finger from a key, 2) releasing the key and manipulating one switch, and 3) releasing the key and operating all three panel switches. All subjects performed similarly; however, one group (24 subjects) was told the experiment was to test reaction times while the other half were told it was to test the speed of total movement. Mean reaction time measures are given. Movement time measures are treated by analysis of variance. Results are discussed in terms of the relation between these measures and 1) task complexity, 2) instructions, and 3) reaction type (simple or discrimination). T. G. R 8

10,637

Shore, M.F. PERCEPTUAL EFFICIENCY AS RELATED TO INDUCED MUSCULAR EFFORT AND MANIFEST ANXIETY. *J. exp. Psychol.*, Feb. 1958, 55(2), 179-183. (Boston University).

10,637

To test the relationship between the effect of effort and drive level on visual recognition three groups of six males were chosen from their scores on the Taylor Manifest Anxiety Scale (low, medium, and high anxiety). The subjects were asked to recognize non-effective resolution targets shown at varying speeds as well as describe whatever they saw after each exposure if it differed from the targets. After each response the subject was to indicate his confidence in his judgment. A dynamometer, which the subject squeezed as hard as he could after each session, was used to induce graded series of muscular effort conditions. The results are discussed in terms of the interaction between drive level and effort on perceptual efficiency, and various hypotheses considered in explanation of these interactions. T. G. R 11

10,638

Klemmer, E.T. TIME SHARING BETWEEN FREQUENCY-CODED AUDITORY AND VISUAL CHANNELS. *J. exp. Psychol.*, March 1958, 55(3), 229-235. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

10,638

This experiment tests the hypothesis that relative degradation due to time-sharing is correlated with differences in channel difficulty. Seven subjects participated in a high-speed key-pressing task in which they: (1) responded to a frequency-coded auditory channel (tone coded); (2) responded to a frequency-coded visual channel (color coded); (3) alternated regularly between visual and auditory channels; (4) alternated randomly between them; and (5) responded to simultaneous visual and auditory channels presenting redundant stimuli. Mean reaction times were taken during all tests. Some questions answered by the data follow: Are frequency-coded lights or tones more difficult? How does rapid alternation between channels affect performance? Which channel suffers more from alternation? T. G. R 3

10,639

Nembrough, J.R. INTERACTION BETWEEN TOTAL STIMULUS INFORMATION AND SPECIFIC STIMULUS INFORMATION IN VISUAL RECOGNITION. *J. exp. Psychol.*, March 1958, 55(3), 297-301. (University of Utah).

10,639

This experiment investigates the effect of stimulus interaction upon perceptual behavior by examining: 1) the interaction of the specific stimulus information values among themselves, and 2) the interaction of the total stimulus information and specific stimulus information values. Thirty-six subjects, performing in three groups of 12 each, were presented tachistoscopically with 2-, 4-, 5-, 6-, and 7-word series for a total of 40 exposures each. Subjects recorded a word only if certain of its identity. The results were evaluated by a missed-score measure. Discussion revolved around reaction time as a linear function of the total number of alternatives, and the presence or absence of an interaction among the stimuli themselves, and between total and specific stimulus information. T. G. R 6

10,640

Smith, O.W. DISTANCE CONSTANCY. *J. exp. Psychol.*, April 1958, 55(4), 388-389. (Cornell University).

10,640

This experiment studies a type of distance constancy problem - judging a far small extent as longer or shorter than a standard, near extent - which had not been studied previously. The standard stimulus, a white sheet of oilcloth, had its far edge 25 feet in front of the subject's position. The variable stimulus, 25 feet of the same oilcloth, had its back edge 125 feet from the subject and was exposed to the subject in lengths which were multiples of three inches. Each subject (23) made a series of such judgments. An approximation method to determine the validity of the subjects' judgments was used. Results are discussed in terms of the reliability of this method in determining distance constancy. R 1

10,641

Brackmann, J. & Collier, G. THE DEPENDENCE OF PROBABILITY OF RESPONSE ON SIZE OF STEP INTERVAL IN THE METHOD OF LIMITS. *J. exp. Psychol.*, May 1958, 55(5), 423-428. (Sacramento State College & University of Missouri).

10,641

This experiment studies the effect of the size of the step interval between successive stimulations upon the probability of a response at visual threshold. Four trained subjects participated in three experiments determining absolute thresholds in which three variations of the method of limits were used. For each absolute threshold determination (four) one of four step-intervals was used. The results are related to the hypothesis that if the amount of association is a decreasing function of the difference in magnitude between successive stimuli then the error of habituation might result from this association and the size could be manipulated by varying the size of the step interval. T. G. R 22

10,642
Finkbeiner, A.A. **PERFORMANCE ANALYSIS OF MOVEMENT REACTION.** *J. exp. Psychol.*, May 1958, 55(3), 429-438. (Ohio University).

10,643
This study represents a replication of Rosen and Judson's experimental work on static, postural, and movement reactions, with three added features: 1) emphasis is on the manner in which the movement is made, and 2) an attempt is made to ascertain the relationship between the types of movements identified and performance on a complex task performed under different conditions of difficulty. Seven types of movement (flex control sensitivity, rate-control, reaction time, and so forth) were studied in 21 tasks (two-hand coordination, pursuit, conclusion, motor judgment, and so forth). All of the tasks were given to 284 subjects. Results are discussed in terms of the identifiable features and their common ability requirements.
T. G. R 16

10,643
Joffe, J.M. & Shepherd, A.L. **PERFORMANCE ON SEVERAL COMPLEX-SIMILAR RELATIONSHIPS AS A FUNCTION OF AGE AND SEX.** *Psychol. Monographs*, Dec. 1958, 71(4), 339-348. (University of Toronto).

10,643
To test the hypothesis that differential learning from everyday life would affect directional control-display movements so that a) level of performance for males would be superior to that of females, b) performance levels for tasks consistent with everyday experience would be superior to that on novel tasks, and, c) differences in performance would increase with age, three groups of female subjects at each age level (5, 10, and 20 years) were randomly assigned to three tasks on the Toronto Complex Coordinator (described in a previous study: see *Canadian Journal of Psychology*, 1955, 9, 231-261). Results are compared with those from the previous study. Identical except for sex of subjects.
T. G. R 4

10,644
Rothberg, J. & Roach, Virginia. **EFFECTS OF PREVIOUSLY ASSOCIATED ANNOYING STIMULI (AUDITORY) ON VISUAL RECOGNITION IMPAIRMENT.** *J. exp. Psychol.*, May 1958, 55(3), 490-498. (Cornell University).

10,644
This experiment studies the effects of a previously associated annoying auditory stimulus on visual recognition brightness contrast thresholds when the latter are obtained through non-tachistoscopic methods. Twenty subjects were presented with four geometric figures, two of which were paired with the annoying stimulus. After this training period, the annoying stimulus was removed and the four figures were presented with 12 others. Subjects were to report when they recognized the initial four figures. The back-lighting of each pattern started at a minimum brightness and was increased in small steps until the concealed training figures were identified.
R 6

10,645
Tulving, E. **THE RELATION OF VISUAL ACUITY TO CONVERGENCE AND ACCOMMODATION.** *J. exp. Psychol.*, June 1958, 55(6), 530-534. (Harvard University).

10,645
This experiment attempts to relate the phenomenon of visual acuity being less for very close targets than for far ones to convergence-accommodation theory. Seven subjects participated in a task in which they had to fuse two separate fixation points and then present the acuity target to themselves by pressing a key. Sixty judgments of each of five angles of convergence were determined for each subject. In a second part of the experiment practice sessions were introduced in making judgments under the two extreme convergence angles. The results are discussed in terms of the effect of convergence, accommodation, and practice in the experimental task upon acuity.
G. R 11

10,645
Shaw, H.A. **PERIPHERAL DEVELOPMENT OF THE HUMAN VISUAL SYSTEM.** *J. exp. Psychol.*, June 1958, 55(6), 617-629. (University of Pennsylvania).

10,645
This experiment was designed to ascertain whether the difference between the Manual and the spatial manual threshold is a function of sensation or statistical noise. Absolute manual thresholds were determined for two subjects by using a modified series of limits with discrete stimuli and compared with another not determined by the same method but with continuous stimuli to each one of a single subject. The results are discussed in terms of the effect of methodology, the validity of the inference in sensitivity of the Manual threshold over the spatial manual threshold, and the effect of incorporation over the stimulus.
T. R 4

10,647
Baker, G.S. **SPATIOTEMPORAL DECISION MAKING: WILD'S MODEL AND EXTENSION OF PERFORMANCE.** *J. exp. Psychol.*, June 1958, 55(6), 638-645.

10,647
This experiment examines the possibility of the Wild sequential probability ratio test being used as a model to describe the human decision process. Eight subjects were allowed to gather as large a sample as desired before deciding from which of several populations their sample came. The distance between the means of the parent population and the number of parent populations from which the subjects had to choose were varied. The results are discussed in terms of the effectiveness of the Wild model as a predictor for decision-making processes, the interrelation between hit, miss, and criteria scores, and the relation between sample size and the difficulty of the problem.
T. G. R 12

10,648
Garvey, H.D., Sweeney, J.S. & Birmingham, N.P. **DIFFERENTIAL EFFECTS OF "DISPLAY LAG" AND "CONTROL LAG."** *J. exp. Psychol.*, July 1958, 56(1), 8-10. (WPA Research Lab., Washington, D.C.).

10,648
This experiment studies the relation between the position of a low-pass filter and the subject, and the effect that location has upon system performance. Eight subjects performed a tracking task using a five-inch cathode ray tube display and a position-control joystick. Four conditions of lag with time constants of .10, .24, .45, and .74 seconds and one no lag condition were used. The lag conditions were inserted as either display or control. The results compare the effectiveness of these two types of lag, discuss the importance of filter position in a human-operated tracking system, and discuss the operator's role in this system.
G. I. R 3

10,649
Gross, L.W. **CHANGES IN DISTRIBUTION OF MUSCULAR TENSION DURING PSYCHOMOTOR PERFORMANCE.** *J. exp. Psychol.*, July 1958, 56(1), 70-77. (Carnegie Institute of Technology).

10,649
Two experiments were designed to study the relationship between changes in the distribution of muscular tension and changes in proficiency of performance. An arm-hand steadiness task and a tapping-sliding task were used in both experiments to evaluate task differences. In Experiment I, 12 subjects received practice for five days on both tasks. On days III and IV, a 57-pound pack was attached to each subject. Muscle-action potentials were recorded from five separate body locations. In Experiment II, 60 subjects performed the same tasks with other tasks introduced which were designed to produce a decrease in the proficiency of the tasks. Task effects, load and fatigue effects, and generalized tension as related to proficiency of performance are the main topics
T. R 12

10,650

Flanagan, E.A. A RELATIONSHIP BETWEEN INCLUSIVE
EXPERIENCE AND ABILITY LEVEL IN PSYCHOMOTOR LEARNING.
J. Gen. Psychol., July 1958, 26(1), 70-81.
(Wash. University).

10,651

This experiment studies the relationship between ac-
tivation and ability level in a psychomotor task. Each
of 400 subjects received training at the Complex Condi-
tioned Test after which they were then divided into high
and low ability groups. Half of the low and high abili-
ty subjects formed a "motivated" group while the other
half was used as controls. Motivation was induced by
verbal exhortations to improve and discussion of the im-
portance of the results to each subject. The results are
discussed in terms of the effect of incentive motivation
upon psychomotor performance for both the high and low
ability groups.

T. G. R 7

10,652

Harvey, C.M. RECOGNITION OF NOVEL VISUAL CONFIG-
URATIONS WITH AND WITHOUT EYE MOVEMENTS. J. Gen.
Psychol., Aug. 1958, 26(2), 120-130. (Indiana
Research Medical Lab., Toronto, Canada).

10,653

Four experiments explore the recognition of novel
visual figures with eye movements and with a single
brief fixation. Experiments I-III examine the amount of
viewing time necessary to recognize these objects when
presented the second time I as originally shown, and in
a reversed position (24 subjects); II as originally
shown in a negative (black-white) state (24 subjects);
III as originally shown and negative (black-white) in
original and reversed (left-right) positions (48 sub-
jects). Experiment IV studied the effects of single
glances and continuous viewing time on recognition of
structured or unstructured figures. A discussion of
the effects of the various positions, times, and types
of eye movements upon recognition is presented.

T. I. R 7

10,654

Marrie, J.D., Philis, A.G., Kiffman, H.S. & Elmer,
R.M. THE INTERACTION OF PITCH AND LOUDNESS DISCRIM-
INATIONS. J. Gen. Psychol., Sept. 1958, 26(3), 232-
238. (Naval Medical Research Lab., Naval Submarine
Base, Conn.).

10,655

This experiment examines the interaction of pitch
and loudness discriminations when both cues are present
in the same stimulus. Five subjects made 120 judgments
as to whether a third tone was closer to the first or
second of two previous tones. The standard was a 125-
cycles per second (cps) tone one second in duration at
ten decibels sensation level. The second stimulus was
either 0, .5, .75, 1, or 1.25 cps greater in frequency
and either 0, .4, .8, 1.2, or 1.6 decibels higher in in-
tensity. The third stimulus was identical with either
the first or second stimulus. The results are discussed
in terms of the nature of the interaction of the cues,
and the joint discrimination probabilities of the com-
bined pitch and loudness cues.

T. G. R 8

10,656

Murray, E.J., Williams, M.L. & Lubin, A. BODY TEM-
PERATURE AND PSYCHOLOGICAL RATINGS DURING SLEEP DEP-
RIVATION. J. Gen. Psychol., Sept. 1958, 26(3), 271-
273. (USA Walter Reed Army Institute of Research,
Walter Reed Army Hospital, Washington, D.C.).

10,657

This experiment compares psychological ratings of
sleepiness with body temperature measurements. Subjects
(15) were deprived of sleep for 98 hours, during which
time oral temperatures were taken 41 times for each sub-
ject. Each time the subject's temperature was taken he
rated himself as to both sleepiness and fatigue. Ob-
servers (15 in all) also gave ratings. The results are
discussed in terms of the correlations between the sub-
jective scales and body temperature, both of these and
hours of sleep deprivation, and subjects' ratings versus
the observers' ratings of sleepiness and fatigue.

R. G. R 4

10,658

Colbert, E.C. FACILITATION OF REVERSE-IMAGE WORD IDENTIFI-
CATION BY REVERSE-IMAGE PERCEPTUAL SET. J. Gen. Psychol.,
Oct. 1958, 26(4), 344-348. (University of Washington,
Seattle, Wash.).

10,659

The role of perceptual set in the rapidity of identi-
fication of reversed words was tested in three experi-
ments the hypothesis being that mirror image words seen
on a field which itself is seen as reversed are easier to
identify than mirror image words appearing on a non-re-
versed field. In Experiment I (17 subjects) a non-re-
versed field was presented and then abruptly reversed
with a mirror image word appearing on it. In Experiment
II the field was reversed more slowly by widening it
through a semicircle before the mirror image word ap-
peared on it. In both experiments, 17 control subjects
were used. Experiment III compared the recognition of
mirror image words vs. the same words read from a mirror.

T. I. R 3

10,660

Amoss, R.B. & Amoss, C.M. MOTOR SKILLS BIBLIOGRAPHY:
VII. PSYCHOLOGICAL ABSTRACTS, 1958, VOLUME 25.
Psychol. Mon. Skills, 1958, 2(1), 31-64. (Montana
State University).

10,661

This is a motor skills bibliography of 98 titles
collected from the Psychological Abstracts for 1958.

R 9

10,662

Forsyth, D.M. & Chapuis, A. COUNTING REPEATED LIGHT
FLASHES AS A FUNCTION OF THEIR NUMBER, THEIR RATE OF
PRESENTATION, AND RETINAL LOCATION STIMULATED. J.
Gen. Psychol., Nov. 1958, 26(5), 385-391. (The Johns
Hopkins University).

10,663

This experiment investigates the ability to estimate
the number of repeated light flashes as a function of 1)
the number of flashes presented (1-20), 2) the rate of
presentation (2.5, 5, 10, 15, 22.5, and 30 cycles per
second) and 3) the retinal location stimulated (0, fovea,
2.5, 5, 10, 20, and 40 degrees). Thirty subjects made
720 judgments, that is, one trial each for the 1 to 20
flashes at every one of the 36 combinations of frequency
and retinal displacement. Results are analyzed in terms
of the slopes of the obtained curves of mean estimated
number versus the three major variables and their inter-
actions as well as the variability of judgments.

T. G. R 9

10,664

Esman, W.B. BI-DIRECTIONAL GENERALIZATION TO AUDITORY
STIMULI. Psychol. Mon. Skills, Dec. 1958, 2(4),
p. 306. (USA Medical Service School, Fort Sam Houston,
Tex.).

10,665

The present study is concerned with investigating
generalization where approach and avoidance conditions
exist within the same stimulus dimension. Sixty-eight
subjects were conditioned to respond to the central tone
in the middle piano octave. A correct response was sig-
nalled by a bell. Sixty-eight subjects were conditioned
to avoid this tone, the stimuli and reinforcement being
presented in the same manner. A modified sequential an-
alysis of response frequencies under both approach and
avoidance conditions was performed and the results are
discussed.

R 3

10,666

Kremer, G.L. A THRESHOLD-METHOD FOR MEASURING THE
ATTENTION-DEMAND VALUE OF STIMULI. Amer. J. Psychol.,
March 1958, 71(1), 111-122. (Washington University).

10,667

This article presents a method designated as the
"double ramp method" designed to determine the attention
value of stimuli. The method is based on the magnitude
of the stimulus necessary to obtain a constant response
while the subject is involved in a task demanding his
constant attention. The details and rationale of the
method are presented fully, including reasons as to why
conventional threshold determination methods are inade-
quate. Recommendations are made for use in setting up
military warning systems and for use in education, es-
pecially in learning problems with children who have dif-
ficulty in the "attention-span" areas.

R 32

10,659
Zigler, H.J. & Wolf, E. SCOTOPIC AND SCOTOPIC-SCOTOPIC SENSITIVITY. *Brit. J. Psychol.*, March 1958, 49(1), 108-116. (Gallun College & The Bates Foundation).

10,659
Two subjects participated in this experiment in which both scotopic and mesopic scotopic sensitivity were studied. A two-degree-square test-field was presented for 0.04 seconds at the center, and 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 25, and 30 degrees from the center to the right, left, above, and below fixation. Data are presented in the form of threshold-sensitivity curves for the horizontal and vertical meridians. Thresholds were also obtained for the blind spots in both eyes. Discussion of the data is in terms of the compensation effects of the various fields and the theoretical implications of the differences in mesopic sensitivity along the horizontal and vertical meridians.
T. G. I. R 11

10,660
Ponzo, L.S. & Ponzo, R. IMPOSSIBLE OBJECTS: A SPECIAL TYPE OF VISUAL ILLUSION. *Brit. J. Psychol.*, Feb. 1958, 49(1), 31-33. (University College, London, England & Bedford College, London, England).

10,660
This article discusses a two-dimensional drawing which can be so drawn as to give the impression of a three dimensional object which may be used to induce contradictory perceptual impressions. The effect of an impossible structure is achieved by falsely connecting parts which individually are acceptable as representations of an object normally situated in three-dimensional space.
T. G. I. R 2

10,661
Leonard, J.A. PARTIAL ADVANCE INFORMATION IN A CHOICE REACTION TASK. *Brit. J. Psychol.*, May 1958, 49(2), 89-96. (Applied Psychology Research Unit, MRC, Cambridge, England).

10,661
This experiment studied the effect of partial advance information on performance of a sensory-motor task. One subject had to respond to 48 signals, each new signal appearing 1.5 seconds after a correct response. The control conditions were a six-choice and a three-choice task and the experimental conditions were a three-choice task preceded at varied amounts of time by a two-choice one. Data represented reaction times and correct responses. The results are discussed in terms of the influence of the duration period on performance. Recommendations for future investigations are included.
T. G. I. R 9

10,662
Talland, G.A. THE EFFECT OF SET ON ACCURACY OF AUDITORY PERCEPTION. *Brit. J. Psychol.*, May 1958, 49(2), 117-130. (Massachusetts General Hospital, Harvard Medical School).

10,662
Two experiments are presented on the facilitatory effects of set on accuracy of auditory perception. Experiment I (54 subjects) examined: 1) explicit, implicit, and counter set, and 2) single and double set, both under conditions of complete and partial confirmation. Experiment II (24 subjects) examined: 1) the number of correct responses obtained under conditions of complete and partial confirmation, 2) the differential effects (distributed, delayed, or spaced) of partial confirmation, and 3) the possible emergence of an implicit set if suggested by presenting padding words. In the control series (36 subjects) word count rating as a predictor of auditory intelligibility was tested. The facilitatory effects of set, padding, and differences between double and single set are discussed.
T. R 18

10,664
Machworth, H.M. & Machworth, J.F. VISUAL SEARCH FOR SUCCESSIVE RESEMBLANCE. *Brit. J. Psychol.*, Aug. 1958, 49(3), 218-221. (Applied Psychology Research Unit, MRC, Cambridge, England).

10,664
Two experiments examine the relationship between display load and speed in decision making. In experiment I (20 subjects) 20 conditions were examined - five demands speeds of decision and four levels of display load. In experiment II (24 subjects) 12 conditions were examined - two speeds and six levels of load. In the discussion the demands made by the order search task are examined as well as the relationship between speed and load, search time and load in static displays and so forth. Recommendations are made for improvements in control panel displays, as utilized in various systems.
T. G. I. R 13

10,665
Eysenck, H.J. & Slater, P. EFFECTS OF PRACTICE AND REST ON FLUCTUATIONS IN THE MULLER-LYER ILLUSION. *Brit. J. Psychol.*, Aug. 1958, 49(3), 246-256. (Institute of Psychiatry, University of London, London, England).

10,665
This experiment tested 50 subjects for 60 trials on the Muller-Lyer illusion in order to determine the effects of practice and rest. The trials were given in a series of ten with the first 40 following without interruption, the next ten following a 30 second pause for fixation, and the last ten following a 30-minute rest period. Data are presented in terms of the mean from trial to trial on each individual and the mean variations between individuals. The results are discussed in terms of the effects of practice and rest on these fluctuations, the various theories which might explain the fluctuations, and the significance of personality variables.
T. G. I. R 14

10,666
Baker, C.H. ATTENTION TO VISUAL DISPLAYS DURING A VIGILANCE TASK. I. BIASING ATTENTION. *Brit. J. Psychol.*, Nov. 1958, 49(4), 279-288. (Applied Psychology Research Unit, MRC, Cambridge, England).

10,666
This report presents five experiments designed to study (1) visual search behavior in a radar-like situation, and (2) methods of biasing search behavior in attempts to compensate for "peripheral blindness." Each of sixteen subjects searched the display for the appearance of a light and pressed a switch whenever the light was seen. The light appeared at random time intervals during a 64-minute period at one of 16 positions. The condition in each experiment varied as follows: (1) a blank display (no sweepline), (2) a full sweepline, (3) small dot at half radius of sweepline and green light one inch above display, (4) a box sweep. The results discuss the existence of "peripheral blindness" and the effects of the various display conditions on percentage of misses.
T. G. I. R 9

10,667
Cohen, J., Deauxley, E.J. & Hansel, C.E.M. SKILL AND CHANCE: VARIATIONS IN ESTIMATES OF SKILL WITH AN INCREASING ELEMENT OF CHANCE. *Brit. J. Psychol.*, Nov. 1958, 49(4), 319-323. (Department of Psychology, University of Manchester, England).

10,667
Two experiments are presented which assess the influence upon estimates of success in performance of (1) the subjective evaluation of the degree of skill required to succeed in a task, and (2) subjective chance. In experiment I, 38 subjects reported their estimates of their success for each dart thrown at a target which varied in size (1) when all darts were known to be sharp, and (2) when their chances of drawing a blunt dart were varied. In experiment II, eleven subjects threw a red bead, from a population of varying red and green beads, into beakers of varied sizes. The results are discussed in terms of the relationship between a subject's evaluation of his skill and the chance involved in drawing an implement which might influence his skill.
T. R 5

10,666

Goldstone, S., Boardman, H.K. & Isaac, M.T. EFFECT OF QUINALBARIUM, DEXTRO-AMPHETAMINE, AND PLACEBO ON APPARENT TIME. *Brit. J. Psychol.*, Nov. 1958, 51(4), 324-328. (Department of Psychiatry, Baylor University College of Medicine).

10,666

This experiment studies the effects of quinalbaram (saccharin), dextro-amphetamine, and placebo on subjective determinations of time. Ninety subjects were divided into groups of 30 and given one of these three items. Their task was to determine whether audible durations of time were more or less than 1.0 second. They were tested by a method of limits technique prior to, 30 minutes following, and 60 minutes following drug administration. The results are correlated with those of similar experiments and related to the effects of these drugs on personal standards of time.

J. R 14

10,669

Flynn, J. & Riddle, W. LIGHTING: A KEY TO SPATIAL CHARACTER. *Architectural Rec.*, Nov. 1958, 124(5), 232-242. (General Electric Lamp Division & General Electric Lighting Institute).

10,669

This article discusses the use of light as a building material to be integrated with other materials in order to emphasize the utility of the latter. The qualities, functions, and characteristics of light are discussed as well as the techniques necessary to use light most effectively. Several illustrations of effects achieved by different lighting systems on the same material are included as well as some which show the effects of similar lighting systems in different buildings.

1.

10,670

Hardy, H.C. FOLDING PARTITIONS APPRAISED FOR NOISE. *Architectural Rec.*, Oct. 1958, 124(4), 220-223. (Consultant in Acoustics, Chicago, Illinois).

10,670

This article discusses the use of folding partitions as room dividers in areas where it might be necessary to have both halves of a room used for meetings at the same time. Data gathered from field studies or the performance of various types of partitions in various localities is presented and discussed. The amount of noise reduction required for partitions and the effects of acoustical absorption are also discussed. Conditions necessary to obtain maximum efficiency from the partitions are included.

G. I.

10,671

Margaria, R. WIDE RANGE INVESTIGATIONS OF ACCELERATION IN MAN AND ANIMALS. *J. Aviat. Med.*, Dec. 1958, 29(12), 855-871. (University of Milan, Italy).

10,671

This article discusses many aspects of the problem of accelerative forces on man and animals. The viewpoint presented is that much more information can be gathered with less troublesome experimental situations than the gravity-free or free-fall situation. Several examples of simpler data-gathering circumstances are included. Discussion also considers protection from acceleration forces, disadvantages of a gravity-free condition, sensitivity of the labyrinth to gravitation, and effects of gravitation upon various animals. The author includes several experiments conducted under non-free-fall conditions, especially underwater studies.

G. I. R 17

10,672

Reidman, S., Blanchard, H.G., Clarke, H.P. & Moore, F. EFFECT OF WATER IMMERSION ON HUMAN TOLERANCE TO FORWARD AND BACKWARD ACCELERATION. *J. Aviat. Med.*, Dec. 1958, 29(12), 872-878. (Aero Medical Lab., Wright-Patterson AFB, Ohio).

10,672

To determine the magnitude of protection and technical problems associated with acceleration of subjects immersed in water, subjects were studied under the following conditions: 1) five subjects, erect position, 25 accelerations in the forward position; 2) same as 1) but accelerations were in a backward position; and 3) six subjects, spine tilted forward at a 35 degree angle. The results are discussed in terms of magnitude and direction of tolerance, limitations such as chest pain, dyspnea, and blackout, the effectiveness of various breathing masks, e.g., full face, and semi-face (eyes uncovered), and respiratory rate.

T. G. I. R 8

10,673

Webb, H.G., Jr. SOME EFFECTS OF ACCELERATION ON HUMAN SUBJECTS. *J. Aviat. Med.*, Dec. 1958, 29(12), 879-884. (Aviation Medical Acceleration Lab., USN Air Development Center, Johnsville, Penn.).

10,673

This article discusses the various physiological and psychological effects of acceleration gathered from experiments on subjects from 18 to 40 years of age. Observations cover a two-year period. Included are: 1) effects upon the circulatory system (petechiae, thrombosis of external hemorrhoids, and so forth); 2) pain in extremities (during and after experimental participation); 3) cardiac effects; 4) effects upon the nervous system (blackout); and 5) other effects (fatigue and irritability, chest pain, and so forth). Recommendations for prevention of some effects are presented.

T. R 11

10,674

Liderer, L.G. & Putnam, L.E. COMPARISON OF DROWSINESS INDUCED BY BONAMINE AND MAREZINE. *J. Aviat. Med.*, Dec. 1958, 29(12), 885-890. (George Washington University).

10,674

The extent to which Bonamine and Marezine induce drowsiness is studied. Second-year medical students (100) were divided into four groups. Marezine (50 milligrams), Bonamine (25 and 50 milligrams), and placebo were given to each of the four groups on four different days, with two- to four-day intervals. Subjects were to report effects on each system (gastrointestinal, central nervous system, and so forth). Subjects participated in their normal routine during the experiment. A statistical analysis of the results is included.

T. G. R 13

10,675

Fletcher, Dorothy E., Collins, C.C. & Brown, J.L. EFFECTS OF POSITIVE ACCELERATION UPON THE PERFORMANCE OF AN AIR-TO-AIR TRACKING TASK. *J. Aviat. Med.*, Dec. 1958, 29(12), 891-897. (Aviation Medical Acceleration Lab., USN Air Development Center, Johnsville, Penn.).

10,675

The effects of different levels and durations of positive acceleration on the human centrifuge are studied in this experiment. Four subjects each participated in 72 runs of 141-seconds. The subjects' task was to keep the target aircraft centered during each run, center the target at the 91st second, then press a button on the control stick as soon as possible. The three variables which were manipulated during the runs were 1) the presence of either a centrally-located or a right-hand control stick; 2) the introduction of one of the following during the missile guidance phase of each run: 1, 2, 3, or 4 G of acceleration, and 3) the introduction of one of nine different patterns of acceleration in the target acquisition phase. The results discuss the interrelations of these variables.

G. I. R 4

10,676

Wren, J. L. & Collins, C. C. AIR TO AIR TRACKING DURING CLOSED LOOP (CROSSFIRE) OPERATION. *J. Aviat. Med.*, Nov. 1958, 29(11), 794-804. (Aviation Medical Acceleration Lab., USAF Air Development Center, Johnsville, Penn.).

10,676

To evaluate performance of a simulated air-to-air tracking task during acceleration, five subjects practiced this task in a static centrifuge, then participated in dynamic acceleration runs of one minute each. The centrifuge was operated in the facing-forward and reverse directions at two and one-half G. Subjects were also instructed to fly in a coordinated fashion and attain an altitude of approximately 8000 feet. Both errors in tracking and flight coordination are included in the results. Differences between performance in (1) a tracking task and (2) flight coordination under static and dynamic centrifuge conditions are discussed. Recommendations for further discriminating experiments are included.

T. G. I. R 4

10,677

Thiessen, G. J. & Shaw, E. A. G. EAR DEFENDERS FOR NOISE PROTECTION. *J. Aviat. Med.*, Nov. 1958, 29(11), 810-814. (Division of Applied Physics, National Research Council, Ottawa, Canada).

10,677

This article discusses a commercially-available cover type ear defender which protects against vibrations from low-frequency sounds. Data are presented which outline the requirements for ear defenders in general. An illustration of the commercial model is included as well as details of its construction. Recommendations for use with ear phone combinations are made.

G. I. R 2

10,678

Ritter, R. M., Sells, S. B. & Mabane, J. C. MEASUREMENT OF BEHAVIORAL EFFECTS ATTRIBUTED TO CERTAIN ATARACTIC AND ANALEPTIC DRUGS. *J. Aviat. Med.*, Nov. 1958, 29(11), 821-826. (Departments of Medical Psychology & Neuropsychiatry, USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,678

To determine whether meprobamate, pipradol, or methyphenidylacetate have any significant effect upon affective disposition or efficiency, 225 subjects participated in the following experiment. The subjects were presented with the Manifest Affect Battery and Forms I of four efficiency tests; the three drugs plus placebo and no-treatment (control) were dispensed to the subjects (now in groups of 45); a short break was followed by a sports film presentation, readministration of the affect tests and Forms II of the efficiency tests, and a third administration of the affect tests. The results are discussed in terms of observed shifts in affect, changes in affect and efficiency as determined by the tests, and type and variability of change for each substance administered. G. R 7

10,680

Smith, O. W. & Gruber, H. PERCEPTION OF DEPTH IN PHOTOGRAPHS. *Percept. Mot. Skills*, Dec. 1958, 8(4), 307-313. (Cornell University, Ithaca, N.Y. & University of Colorado, Boulder, Colo.).

10,680

To determine the empirical function describing the relation between distance of viewing a photograph of a three-dimensional scene and the depth apparent in it, a photograph was viewed monocularly with the field of view restricted to the photograph by twenty subjects who made five judgments at each of six distances (1.0 to 2.8 meters). The apparent depth in the scene at each distance of observation was compared by means of ratio-judgments with the apparent depth in the scene which had been photographed.

10,681

Ammons, R. B. & Ammons, C. H. MOTOR SKILLS BIBLIOGRAPHY: XXIV. PSYCHOLOGICAL ABSTRACTS, 1954, VOLUME 28, FIRST HALF. *Percept. Mot. Skills*, Dec. 1958, 8(4), 315-318. (Montana State University).

10,681

This is a motor skills bibliography of 99 titles culled from the first half of the Psychological Abstracts for 1954.

R 99

10,682

Ammons, R. B., Ammons, C. H. & Morgan, R. L. SUBSKILLS IN ROTARY PURSUIT AS AFFECTED BY RATE AND ACCURACY REQUIREMENTS AND BY DISTRIBUTION OF PRACTICE. *J. Gen. Psychol.*, April 1959, 58(Second Half), 259-275. (Montana State University, Missoula, Mont. & USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

10,682

This is a report on a study of changes in rotary pursuit performance due to duration of practice (eight minutes), introduction of rest periods (zero or 50 seconds), increased accuracy requirements (one-fourth or three-fourths inch targets), and increased rate requirements (40 or 60 revolutions per minute). Motion picture recordings were investigated as a technique for studying the changes in performance. Results with 64 subjects are evaluated and certain conclusions about subskills in motor performance and the technique of study used are presented.

G. I. R 15

10,684

Whitney, R. J. THE STRENGTH OF THE LIFTING ACTION IN MAN. *Ergonomics*, Feb. 1958, 1(2), 101-128. (Department of Human Anatomy, University Museum, Oxford University, Oxford, England).

10,684

To examine the strength of the lifting action, light male subjects lifted a horizontal bar placed in a frontal plane by using a steady, maximum lifting force. Both underhand and overhand closed grasps were studied as well as the effects of the distance of foot placement from the frontal plane, three levels of grasp height above the ground, and derrick (bending over from the waist with legs straight) and knee action lifting methods. The appendices include a detailed definition and description of lifting operations and a discussion on the statics of an isometric lifting operation.

T. G. I. R 26

10,685

Astrand, Irma. PHYSIOLOGICAL METHODS FOR ESTIMATING THE PHYSICAL WORK CAPACITY IN WORKERS ESPECIALLY OF THE OLDER AGE GROUPS. *Ergonomics*, Feb. 1958, 1(2), 129-136. (Department of Physiology, Central Gymnastic Institute, Stockholm, Sweden).

10,685

A submaximal test, which is a modification of the Harvard Step-test, was developed for estimating the physical work capacity and its reliability was tested by comparing it with work on the Krogh bicycle ergometer. Sixty subjects (male and female 20-30 years of age) worked on both the step test and bicycle. Measurements of heart rate, pulse rate, and oxygen intake were made. Step height, number of steps per minute, and subject's body weight were used as indicators of the working intensity of the step test. Physiological measurements were also taken from 25 male subjects (40-65 years of age) with less severe tests. Situations in which this test could be used are discussed.

T. G. R 5

10,686

Karvonen, M. J. USE OF COMPETITIVE TESTS AS A METHOD OF PERFORMANCE RESEARCH. *Ergonomics*, Feb. 1958, 1(2), 137-150. (Institute of Occupational Health, Helsinki, Finland).

10,686

Participants in a national woodcutting contest in Finland provided data in the following areas: 1) anthropometry, 2) consumption and selection of food, 3) time and motion studies, 4) haematological changes, 5) determinations of energy expenditure, and 6) composition of thermal sweat. Discussion concerns the interrelationship among some of these variables as well as practical consequences which result from the data obtained.

T. G. I. R 16

10,687
Grinn, G. RESEARCH ON HUMAN FACTORS IN ROAD TRANSPORT. *Ergonomics*, Feb. 1958, 1(2), 151-162. (Road Research Laboratory, Harmondsworth, Middlesex, England).

10,687
This article presents figures for automobile accident casualties and then attempts to define those areas in which research on human factors in road travel might be most fruitful. These areas include: (1) perception, (2) communication of information to the driver, (3) vehicle control, (4) comfort, (5) protection of occupants, and (6) behavior of drivers. Present research in some of these areas is discussed and recommendations for research in specific areas within these larger fields are made.
T. I. R 12

10,688
Moore, R.I. HEADLIGHT DESIGN. *Ergonomics*, Feb. 1958, 1(2), 163-176. (Road Research Laboratory, Department of Scientific and Industrial Research, Harmondsworth, Middlesex, England).

10,688
A brief history of automobile headlight design is given in this article. This is followed by a comparison of the Anglo-American and Continental lamps and a discussion of the pros and cons of the polarized headlight system. The many problems of headlight design are considered and data from experimentation in this area included.
G. I. R 10

10,689
Bailey, A.W. SIMPLIFYING THE OPERATOR'S TASK AS A CONTROLLER. *Ergonomics*, Feb. 1958, 1(2), 177-181. (USN Research Lab., Washington, D.C.).

10,689
Two experiments are reported which evaluate the usefulness of applying the display quickening technique to helicopter instrumentation. In the preliminary experiment, in which the hovering equation for pitch was simulated on an analog computer, the subject's task was to stabilize pitch attitude while subjected to simulated sudden wind disturbances during hovering. A second experiment compared a "conventional", "integrated", and "quickened" display system in an attempt to assess their relative contributions to hovering accuracy. The longitudinal, lateral, and heading equations of motion for a helicopter were simulated on an analog computer in this experiment.
G. I. R 3

10,690
Marrell, K.F.H., Laurie, W.D. & McCarthy, C. THE RELATIONSHIP BETWEEN DIAL SIZE, READING DISTANCE AND READING ACCURACY. *Ergonomics*, Feb. 1958, 1(2), 182-190. (Department of Psychology, University of Bristol, Bristol, England).

10,690
To gather more information on the optimum size of dial to be used at different reading distances, six subjects read from five dial sizes (2, 3, 4, 6, and 8 inch diameter) at distances of 2, 6, 9, 12, 18, and 24 feet from the dials. The results discuss the scores of the readings after the first seven trials. Also tested was the hypothesis that dials could be read after practice from distances greater than those at which they could read the numerals on the dials.
T. G. R 8

10,691
Lehmann, G. PHYSIOLOGICAL BASIS OF TRACTOR DESIGN. *Ergonomics*, May 1958, 1(3), 197-206. (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, Germany).

10,691
This paper is concerned with the principles underlying the design and positioning of tractor controls and seats so that performance and efficiency will be improved. Energy consumption and electrical skin capacity of the operator were measured during tractor driving with a number of different types of seats. In addition, a study of positioning relative to the operator of brake, clutch pedals, footrest, steering column and wheel was made. A standard tractor was modified according to derived principles and tests were repeated to evaluate the effects of the changes made.
G. I. R 2

10,692
Müller, E.A., Vetter, K. & Elmal, E. TRANSPORT BY MUSCLE POWER OVER SHORT DISTANCES. *Ergonomics*, May 1958, 1(3), 222-225. (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, Germany).

10,692
In this study of the efficiency of different ways of transporting loads by muscle power over short distances, the energy expenditure for piling up loads and shifting loads in a horizontal plane was measured. The height above the ground from which the load is moved and the size of the units in which the load is moved were also varied. Implications for house-building are mentioned.
G. R 3

10,693
Lundervold, A. ELECTROMYOGRAPHIC INVESTIGATIONS DURING TYPEWRITING. *Ergonomics*, May 1958, 1(3), 226-233. (The Neurological Clinic, Department of Neurophysiology, University of Oslo, Norway).

10,693
This study investigated the effects on typewriting of degree of practice, type of equipment, working position, temperature, lighting, and noise. The influence of these factors was evaluated by electromyographic recordings of muscle contractions.
G. I. R 2

10,694
Platonov, K.K. MAN IN FLIGHT. FTS 9381/V, 1957, 286pp. USAF Technical Documents Liaison Office, Wright-Patterson AFB, Ohio.

10,694
The principal questions of aviation medicine with which the pilot must be acquainted are discussed in this book. The book is intended for students of aeroclubs and flying schools, and for flight personnel of the regular military units of the Soviet Army Air Force. It should also be useful to physicians serving aviation units. The various chapters treat the history of aviation medicine, the influence of altitudes on man in flight, the effects of speed and accelerations, all-weather flights, vibrations and noise, night flying, conditions for preserving flying efficiency, and the qualities of a pilot.
G. I.

10,695
Fosberry, R.A.C. MEASUREMENTS OF VISIBILITY FROM THE DRIVING SEAT OF MOTOR VEHICLES. *Ergonomics*, May 1958, 1(3), 240-250. (The Motor Industry Research Association, Lindley, Warwickshire, England).

10,695
The work described in this paper is the measurement of visibility from the driver's seat of a fairly wide range of vehicles. Two lamps were positioned to correspond with the eyes of the average driver and visibility was measured by the shadows cast by structural members of the vehicle on a forward screen and by the light reflected back by the mirror. The chief points of comparison between vehicles are the extent of forward and rearward vision.
I.

10,696
Siegel, A.I. & Brown, F.R. AN EXPERIMENTAL STUDY OF CONTROL CONSOLE DESIGN. *Ergonomics*, May 1958, 1(3), 251-257. (Applied Psychological Services, Wayne, Penn.).

10,696
This study was concerned with a systematic evaluation of the best angular orientation for the side panels of a computer control console which could be used by a single operator or a pair of operators. Eleven single operators and six pairs went through 12 operating programs on a mock-up: three for each of four side panel angles (35, 45, 55, and 65 degrees). Preference ratings were obtained in addition to measurements of number and distance of seat movements, number of body movements and arm extensions, and frequency of visual block.
T. R 3

10,697
 McKenzie, R.M. ON THE ACCURACY OF INSPECTORS.
Ergonomics, May 1958, 1(3), 258-272. (Social
 Sciences Research Center, University of Edinburgh,
 Edinburgh, Scotland).

10,697
 This is a discussion of factors which may possibly
 account for inefficiency and inaccuracy in a production
 inspector. Factors such as basic individual abilities,
 working conditions (training and instruction, physical
 conditions, and lay-out of the job), and interpersonal
 or social relations are discussed in some detail.
 T. R 16

10,699
 Beck, R.D. REMARKS ON THE TEST OF SIGNIFICANCE FOR THE
 METHOD OF PAIRED COMPARISONS. *Psychometrika*, Dec.
 1958, 23(4), 323-334. (University of Chicago).

10,699
 In this paper, a three-component model for compara-
 tive judgment which allows for individual differences in
 preference is proposed. An implication of the model is
 that errors in the observed proportions due to sampling
 individuals in paired comparisons experiments are corre-
 lated. It is shown that bounds may be set for the cor-
 relation effect which make a valid test possible in some
 cases and provide useful standard errors for the esti-
 mated values.
 T. G. R 10

10,700
 Gafo, J. THE SINGLE LATIN SQUARE DESIGN IN
 PSYCHOLOGICAL RESEARCH. *Psychometrika*, Dec.
 1958, 23(4), 369-378. (Wilkes College).

10,700
 To exhaust all possibilities in single Latin square
 design and permit an evaluation of the behavior of each
 test of significance, the components of variance included
 within each mean square under four conditions: 1) zero,
 2) one, 3) two, or 4) three random variates model are il-
 lustrated and discussed as they relate to use of the de-
 sign and criticisms which have been made of its use in
 psychological research.
 T. R 10

10,701
 Brayfield, A.H. & Crockett, W.H. EMPLOYEE ATTITUDES
 AND EMPLOYEE PERFORMANCE. *Psychol. Bull.* Sept.
 1955, 52(5), 396-424. (Kansas State College).

10,701
 This review summarizes empirical studies of relation-
 ships between employee performance and employee attitudes.
 Studies were analyzed in several ways: 1) those involving
 performance on the job, and those involving absence from
 the job; 2) in terms of research design, those relating
 attitudes of individuals to performance as individuals,
 and those which relate attitudes of members of group to
 performance as groups; and 3) those employing a single
 index of attitudes and those using multiple indices.
 Limitations of design were discussed, including problems
 of sampling, criterion measures, procedural problems and
 so forth. Implications for future research are noted.
 R 62

10,702
 Karpinos, B.D. HEIGHT AND WEIGHT OF SELECTIVE
 SERVICE REGISTRANTS PROCESSED FOR MILITARY SERVICE
 DURING WORLD WAR II. *Hum. Biol.*, Dec. 1958, 30(4),
 292-321. (Office of the Surgeon General, Department
 of the Army, Washington, D.C.).

10,702
 This findings presented in this paper are based on an
 analysis of height-weight data abstracted from about one
 half-million physical examination forms selected at ran-
 dom from five million forms on men processed for military
 service in World War II. Frequency distributions of
 height and weight and quartiles for this group (age range
 18-37) are given as well as mean heights and weights and
 modes of weight. Comparisons are made for white and
 negro examinees and height and weight are discussed as a
 function of geographic distribution, size of community,
 and occupation. Finally, comparison is made with World
 War I data and for registrants with and without tubercu-
 losis.
 T. G. R 12

10,704
 Gafo, J. & Gifford, E.C. COMPONENTS OF VARIANCE IN
 ANTHROPOMETRY. *Hum. Biol.*, May 1958, 30(2), 123-127.
 (USAF Air Crew Equipment Lab., Philadelphia, Pa.).

10,704
 The purpose of this study is stated as being that of
 determining the morphological features which are impor-
 tant in determining aircraft work space dimensions and the
 arrangement of equipment. Eleven features (including
 height, weight, and arm reach) were selected as the ones
 most likely to be critical and each of three anthropome-
 trists measured 14 subjects three times using standard
 anthropometric techniques. An analysis of variance tech-
 nique was used to assess the percentage of total variance
 contributed by each component of variance (inter-subject,
 intra-subject, and intra-anthropometrist).
 T. R 4

10,706
 Milks, S.S. & Balke, B. INCREASED TOLERANCE TO PRESSURE
 BREATHING BY UTILIZING ADEQUATE BREATHING MECHANICS.
J. Aviat. Med., April 1958, 29(4), 301-306. (USAF
 School of Aviation Medicine, Randolph AFB, Tex.).

10,706
 In an attempt to study individual tolerance to pres-
 sure breathing without the use of counterpressure, three
 investigations were conducted. The first investigation
 was carried out on four subjects who were placed in a
 respirator and then subjected to an increase in the
 intrapulmonary pressure by lowering the pressure in the
 tank. A second series of experiments was performed on
 six subjects by enclosing the head of each subject in a
 leak-proof helmet which was attached to the blower unit
 of a respirator. The third series of experiments was
 performed on three subjects, using the pressure helmet
 in conjunction with an abdominal bladder. Pulse rate and
 blood pressure measurements were recorded at varying
 pressures for ten minute intervals in each series.
 T. R 10

10,707
 Marbarger, J.P., Kemp, W.E., Kadetz, W., & Hansen, J.
 STUDIES IN AEROEMBOLISM. *J. Aviat. Med.*, April 1958,
 29(4), 291-300. (Aeromedical and Physical Environment
 Lab., Univ. of Illinois, Chicago, Ill.).

10,707
 This study reports on the incidence of decompression
 sickness in fifteen healthy male subjects who partici-
 pated in a total of 75 flights in a low-pressure chamber
 to simulated altitudes of 12,000 feet, 18,000 and finally
 38,000 feet. The total volume of expired air exhaled
 by each subject was recorded by a continuous flowmeter.
 Nitrogen content in venous blood of each subject was es-
 timated before the experiment, and after denitrogenation.
 Susceptibility to altitude pains were tested at 38,000
 feet with subjects breathing 100 percent oxygen immedi-
 ately following denitrogenation, and the data compared
 with the response of each subject to the same altitude
 without a prior period of denitrogenation.
 T. R 13

10,708
 Moseley, H.G. AIRCRAFT ACCIDENT INJURIES IN THE
 U.S. AIR FORCE. *J. Aviat. Med.*, April 1958, 29(4),
 271-282. (Directorate of Flight Safety Research,
 Norton AFB, Calif.).

10,708
 This article is based on a review of the major air-
 craft accidents in the United States Air Force during
 the years 1953 and 1955. The review is primarily con-
 cerned with the phenomenon of the crash and the trauma to
 the aircraft occupants. The cases were evaluated in
 terms of the following categories: (1) fatalities, (2)
 major injuries, (3) cause of injuries, (4) seat reten-
 tion, (5) seat belts, (6) shoulder harnesses, and (7)
 body position. Alternate instead of consecutive years
 were chosen to determine whether there were any changes
 in injury patterns. The installation in aircraft of
 certain safety features is proposed as a result of the
 information gleaned from this survey.

10,709

Knight, L.A. AN APPROACH TO THE PHYSIOLOGIC SIMULATION OF THE NULL-GRAVITY STATE. *J. Aviat. Med.*, April 1958, 29(4), 283-286. (Mq. Military Air Transport Service, Scott AFB, Ill.).

10,709

While studying the physiological effects of prolonged weightlessness the similarities between the condition of a body floating in space and that of a body floating in water were noted, and the conclusion was drawn that weightlessness is the absence of external forces acting on the body. It was assumed that a physiologic condition approaching that observed in the null-gravity state could be simulated by obscuring vision, immersing the subject in water to eliminate tactile and proprioceptive cues, and positioning him in the supine, head-down orientation. A preliminary experiment (three subjects acquainted with conditions of null-gravity) was conducted to investigate the matter of spatial orientation during immersion in water, and to establish values for the threshold of sensitivity of the otolith organ to change in position. R 4

10,710

Sarnoff, C.A. & Mehana, J.C. EPISODIC PSYCHOGENIC G FORCE INTOLERANCE. *J. Aviat. Med.*, April 1958, 29(4), 287-290. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,710

This report presents three cases in which G force intolerance occurred in the absence of the usual predisposing factors. Each patient was given an evaluation which included: a complete neurological examination, complete flying physical examination, psychiatric interview, roentgenograms of the skull, and an electroencephalogram including rest, photic stimulation, hyperventilation and sleep records. The amount of sleep, alcohol intake, and the state of nutrition at the time of G intolerance were determined for each patient. Since none of the patients exhibited abnormal physical or neurological findings, psychogenic factors such as: the degree of parental stability, the emotional stability of the patient, and presence of life stresses were studied. T. R 5

10,711

Von Beckh, H.J. MULTI-DIRECTIONAL G PROTECTION IN SPACE FLIGHT AND DURING ESCAPE. A THEORETICAL APPROACH. *J. Aviat. Med.*, May 1958, 29(5), 335-342. (USAF Aero Medical Field Lab., Holloman AFB, N.M.).

10,711

The re-entry phase of orbital and space projects, as well as changes in direction of the flight paths of supersonic atmospheric crafts require vehicle designs which will be capable of producing appreciable G loads for extended periods of time. Since protection by anti-G suits cannot be greatly increased, this report proposes a device called the "anti-G capsule", which is pivoted about the lateral axis of the craft, and which automatically assumes positions that would render the resultant of all acting accelerations perpendicular to the heart-head line of the occupant. This device would also be designed to serve as an ejection capsule, affording G protection during and after escape from aircraft or space vehicle within the atmosphere. T. R 22

10,712

Herrick, R.M., Meyers, J.L., & Burke, R.E. DISCRIMINATIVE BEHAVIOR FOLLOWING REPEATED EXPOSURE TO NEGATIVE ACCELERATION. *J. Aviat. Med.*, May 1958, 29(5), 343-349. (USN Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Penn.).

10,712

This report describes the first in a series of animal experiments designed to obtain quantitative information regarding the effect of repeated exposure to negative acceleration on discriminative behavior. For this experiment, rats were trained to make a simple light-dark discrimination and then, on successive days, were exposed for three minutes to a given negative G. Fifty-five minutes later they were tested on the discrimination. After five days at the given G level, the negative G was increased one G unit. This procedure continued until death occurred. The data at each level were compared with the animal's performance prior to exposure. Also discussed is the possibility of increasing tolerance to higher negative G by repeated exposure. T. G. R 6

10,713

Simons, D.G. & Archibald, E.R. SELECTION OF A SEALED CABIN ATMOSPHERE. *J. Aviat. Med.*, May 1958, 29(5), 350-357. (USAF Aero Medical Field Lab., Holloman AFB, N.M.).

10,713

This report discusses the various physiologic variables to be considered in the design of a manned sealed cabin to operate at space equivalent altitudes. This sealed cabin should operate entirely from self-contained sources without attempt to pressurize from ambient air and be designed for zero leakage. Among the factors discussed are: selection of oxygen supply, carbon dioxide and water vapor removal systems, and determination of the cabin atmosphere pressure and composition based on a flight duration of 24 hours. Environmental control equipment should be designed to maintain an atmosphere that provides for no performance decrement rather than comfort or survival. The basic considerations that govern selection of cabin environment used in Operation Meridian ascents (1957) are presented. G. I. R 10

10,714

Readman, C.H. & Limburg, C.C. HUMAN FACTORS IN WEAPON SYSTEM DEVELOPMENT. *J. Aviat. Med.*, May 1958, 29(5), 366-370. (USAF Human Factors Division, Directorate of Research & Development, Department of the Air Force, Washington, D.C.).

10,714

The human factor is often the weak link in weapon system development and performance. To deal with this problem, this article proposes an increase in multidimensional studies relating human factors to combat capability and readiness in a realistic configuration of equipment within an operational environment. Among the subjects discussed are: the reliability and availability of personnel; the timely assembly of compatible units of equipment in a suitable operational environment; and the importance of management in designing new organizational patterns and administrative systems to cope with increasingly complex weapon systems. T. G. R 2

10,715

Ross, M.D. & Lewis, M.L. THE STRATO-LAB BALLOON SYSTEM FOR HIGH ALTITUDE RESEARCH. *J. Aviat. Med.*, May 1958, 29(5), 375-385. (Office of Naval Research & Bureau of Aeronautics, Navy Department, Washington, D.C.).

10,715

This report discusses the Navy Balloon research system, Strato-Lab, which provides a zero velocity constant level platform for personnel to make high altitude observations. The Strato-Lab program involves three systems: a low-altitude system, having a gondola, for flights up to an altitude of about 12,000 feet; an intermediate altitude system, with cold weather equipment and a suitable oxygen supply in the gondola, for altitudes up to 42,000 feet; and the high altitude system which employs a sealed cabin to provide the necessary artificial atmosphere. The implications of Strato-Lab are discussed in relation to aviation medicine research and the evaluation of certain military components, techniques, and equipment. T. G. I. R 15

10,716

Finkelstein, Beatrice & Pippitt, R.G. EFFECT OF ALTITUDE AND OXYGEN UPON PRIMARY TASTE PERCEPTION. *J. Aviat. Med.*, May 1958, 29(5), 386-391. (USAF Aero Medical Lab., Wright Air Development Center, Dayton, Ohio).

10,716

To determine whether taste perception levels, taste identification levels, or the ability to identify tastes are affected by altitude or breathing pure oxygen, ten healthy subjects were subjected to tests comparing their taste perception at ground level with that at 25,000 feet while breathing 100 percent oxygen. Distilled water solutions of chemically pure sodium chloride, lactic acid, caffeine citrate, and sucrose were used. All solutions were colorless and odorless. Varying intensities of the dilutions were used. The experiment was designed to yield the following comparisons: 1) the level at which taste was first perceived; 2) the level at which positive identification of taste occurred; and 3) the ability to identify the taste correctly. T. G. R 2

10,717
Ades, M.W., Graybiel, A., Merrill, S.M., Tolhurst, G.C. et al. NON-AUDITORY EFFECTS OF HIGH INTENSITY SOUND STIMULATION ON DEAF HUMAN SUBJECTS. *J. Aviat. Med.*, June 1958, 29(6), 454-467. (USN School of Aviation Medicine, Pensacola, Fla. & University of Texas Southwestern Medical School).

10,717
Because the levels at which the non-auditory effects of sound occur are well above those known to be damaging to hearing, completely deaf subjects were used in this experiment. The subjects were exposed to pure tone and wide-band noise at sound pressure levels up to 170 decibels. By noting the words used by the subjects in describing their sensations, a scale of subjective values was developed to determine the subjects' responses to vibration, tickle, warmth, pain, and dizziness; thresholds for each type of sensation were determined for some subjects at each test frequency. Frequency-intensity curves showing the thresholds of nystagmus are presented, as well as subjects' subjective reports on the associated dizziness and observation of apparent movement when fixating on a luminous vertical line. T. G. I. R 7

10,718
Diamond, S. THE EFFECT OF UNILATERAL ACQUIRED MYOPIA ON DEPTH PERCEPTION IN AIRLINE PILOTS. *J. Aviat. Med.*, June 1958, 29(6), 468-474.

10,718
The increasing demands of high performance aircraft make a high degree of stereoscopic acuity an essential requirement in the aircraft operator. In order to determine the extent to which unilateral visual loss affects the stereoscopic threshold, this study reviews the depth perception findings in five pilots before and after the onset of myopia in one eye. The data used were the standard Howard-Dolan findings at a testing distance of 20 feet gleaned from the pilot records of periodic examinations. The findings discussed include: deviations (maxima and minima) and averages of five test determinations, expressed in millimeters and in arc seconds of parallax disparity. Because these findings occurred over a number of years, the mutual decrease of depth perception with age was considered. T. G. R 17

10,719
Beischer, D.E. POTENTIALITIES AND RAMIFICATIONS OF LIFE UNDER EXTREME ENVIRONMENTAL CONDITIONS. *J. Aviat. Med.*, July 1958, 29(7), 500-503. (USN School of Aviation Medicine, Pensacola, Fla.).

10,719
In preparation for the time when man takes his first step onto another planet, this article suggests that we re-evaluate life from the standpoint of heredity and environment to determine how living matter will cope with the shock of leaving its birthplace and facing the possible extreme conditions of another world. The author suggests that we scan the potentialities of life on our own planet, as we find them today and as they have developed during the last billion years. The knowledge thus gained should then be supplemented by laboratory experiments. Citing some of the unusual environmental conditions that exist on this planet, the author discusses their implications to such a study. R 1

10,720
Gerathwohl, S.J. & Stallings, H.D. EXPERIMENTS DURING WEIGHTLESSNESS: A STUDY OF THE OCULO-AGRAVIC ILLUSION. *J. Aviat. Med.*, July 1958, 29(7), 504-516. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,720
To investigate the phenomenon known as the "oculo-agraivic illusion", an observer was placed in the rear seat of an F-94C-type aircraft, which was then flown through various maneuvers including: turns, push-overs, pull-ups, and aileron rolls. These maneuvers produced accelerations of different directions and magnitudes. Parabolas and double parabolas were performed to produce short periods of weightlessness because the oculo-agraivic illusion can be best observed in the zero-gravity state. The observers experienced strong visual after-images, and their descriptions of these after-images were recorded during the maneuver. By this means, the apparent motion and displacement of the after-images were correlated with their associated maneuver. G. I. R 18

10,721
Beeson, E.E. DESIGN CONSIDERATIONS OF A BALLOON-BORNE PRESSURIZED CAPSULE FOR HIGH ALTITUDE BAILOUT STUDY. *J. Aviat. Med.*, July 1958, 29(7), 516-525. (Balloon Department, Mechanical Division of General Mills, Inc., Minneapolis, Minn.).

10,721
This report describes the design of a pressurized balloon-capsule system which could carry a two-man crew to a "jumping-off altitude" of 90,000 feet, and which could, if necessary, return them safely to earth by controlled parachute descent. Safety was the primary concern of the design. In line with this view, the following factors are discussed: (1) optimum configuration for stable parachute descents; (2) the capsule as a pressure cell; and (3) the capsule suspension system. Because of the need for an "artificial climate", the design also encompasses the factors of: (1) oxygen supply and capsule pressurization; (2) humidity control; (3) carbon dioxide absorption; and (4) capsule temperature control. A complete communications system is an integral part of this design as well. I. R 4

10,722
Muttali, J.B. TOXIC HAZARDS IN THE AVIATION ENVIRONMENT. *J. Aviat. Med.*, Sept. 1958, 29(9), 641-649. (Office of the Surgeon General, Washington, D.C.).

10,722
This article, which discusses some of the toxic hazards in flight that constitute a serious threat to the safety of air operations, is based on a review of base aircrew effectiveness reports and reports of aircraft accidents. Among the hazards discussed are: carbon monoxide and exhaust fumes, contaminated oxygen, oil pyrolysis smoke and fumes, fuel fumes, and electrical fire, smoke, and fumes. Some miscellaneous hazards are also mentioned. Tables are included in this report, showing: (1) the infrequent reporting of toxic hazard incidents; (2) the actual involvement of these hazards in a survey of 332 major aircraft accidents; and (3) the frequency of reported symptoms related to each of the hazards. T. R 5

10,723
Berry, C.A. THE ROLE OF PHYSICAL STANDARDS IN JET AND ROCKET AIRCRAFT FLIGHT. *J. Aviat. Med.*, Sept. 1958, 29(9), 631-640. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

10,723
Physical standards for flying personnel--their history, major purposes and development--are presented. Separate discussions of the standards for the cardiovascular system, pulmonary system, neuropsychiatric system, weight and vision also are included, which revise some of the older standards. The problem of revision in light of new developments is considered. The special requirements for space flight are speculated upon briefly. R 26

10,724
Mullinax, P.E. Jr. & Beischer, D.E. OXYGEN TOXICITY IN AVIATION MEDICINE. *J. Aviat. Med.*, Sept. 1958, 29(9), 660-667. (Grace-New Haven Hospital, New Haven, Conn. & USN School of Aviation Medicine, Pensacola, Fla.).

10,724
This is an analysis of the data on oxygen toxicity in man that may be of importance in aviation. The discussion covers: 1) mechanisms of toxicity--lungs, blood, central nervous system; 2) symptoms and signs of toxicity--cardiorespiratory system (substernal stress, nasal congestion, lower respiratory changes) and neuromuscular disturbances (deterioration of performance, constitutional symptoms), and 3) safe limits of exposure to oxygen. T. I. R 26

10,725

Mumchies, M. PERFORMANCE AS A FUNCTION OF CONTROL-DISPLAY RELATIONS, POSITIONS OF THE OPERATOR, AND LOCATIONS OF THE CONTROL. *J. appl. Psychol.*, Oct. 1958, 42(5), 311-316. (University of Toronto, Canada).

10,725

To investigate the interaction between control-display relations, position of the control, and position of the operator as they affect performance, 24 groups of male subjects practiced for five minutes on the Toronto Complex Coordinator. Each group worked on only one combination of control position, body orientation, and control-display relation. The results are given in terms of the number of matches made by each group and in terms of an analysis of variance of the effects of four tasks, three positions of the operator, and two positions of the control.

T. G. I. R 3

10,726

Groth, Hilde, & Lyman, J. ADEQUACY OF THE RESIDUAL SENSORY CUES FOR PSYCHOMOTOR PERFORMANCE OF ARM-AMPUTEES. *J. appl. Psychol.*, Oct. 1958, 42(5), 323-328. (University of California at Los Angeles).

10,726

To investigate the extent of the usefulness of remaining sensory cues for prosthesis performance on two visuo-motor tasks, 15 unilateral amputees and 20 non-amputees performed a manipulation task and a pursuit tracking task. The amputees consisted of eight below-elbow amputees with cineplastic control and three above-elbow amputees with harness control. Mean performance and variability of amputees and non-amputees was estimated in order to evaluate three possible sources of performance decrement in the amputees: a) inadequate sensory information, b) increase in duration of mechanical motions, and c) increase in "central integration time" due to the complexity added by the prosthesis.

T. R 9

10,727

Tinker, M.A. LENGTH OF WORK PERIODS IN VISUAL RESEARCH. *J. appl. Psychol.*, Oct. 1958, 42(5), 343-345. (University of Minnesota).

10,727

To provide additional information on the effect of length of work periods in visual research, work periods of 1, 5, and 10 minutes were used while investigating the relative efficiency of speed of perception in reading under 5, 25, and 200 foot-candles of light for 180 college students. Results are given in terms of the effect of illumination level on speed of reading with the various lengths of reading time.

T. R 3

10,728

Fine, B.J. THE COMPARATIVE EFFECTIVENESS OF SOME PSYCHOLOGICAL AND PHYSIOLOGICAL MEASURES IN RANKING THE IMPACT OF DIVERSE ENVIRONMENTAL CONDITIONS. *J. appl. Psychol.*, Oct. 1958, 42(5), 353-356. (QM Research and Engng. Center Labs., Natick, Mass.).

10,728

To study the use of subjective rating scales as substitutes for the more complex physiological measurements in evaluating the impact of various environmental conditions, two investigations were performed. Both studies compared the effectiveness of a subjective rating scale with two physiological measures (mean weighted skin temperature and average increase in metabolic rate) in ranking eight environmental conditions (varying in ambient temperature, humidity, and wind speed) from warmest to coldest.

T. R 12

10,729

Buffa, E.S. & Lyman, J. THE ADDITIVITY OF THE TIMES FOR HUMAN MOTOR RESPONSE ELEMENTS IN A SIMULATED INDUSTRIAL ASSEMBLY TASK. *J. appl. Psychol.*, Dec. 1958, 42(6), 379-383. (University of California at Los Angeles).

10,729

To attempt to resolve previous experimental findings on the problem of additivity of motor response elements and extend the applicability of this additivity concept to more complex motion patterns, 16 male subjects performed a light manual assembly task requiring 16 motion elements. Three variables: completeness of cycle, visual discrimination (use of only marked components), hands used were tested. The results were handled by analysis of variance and discussed in terms of validity of the additivity concept.

T. I. R 11

10,730

Earch, A.M. JUDGMENTS OF SPEED ON THE OPEN HIGHWAY. *J. appl. Psychol.*, Dec. 1958, 42(6), 362-366. (Michigan State University).

10,730

To determine the accuracy with which judgments of speed could be made by a passenger car driver while decelerating and the influence of increasing amounts of exposure to a given speed on these judgments, 44 males (22 to 52 years) with considerable driving experience made speed judgments while decelerating after driving at varying amounts (5 seconds, and 8 minutes 35 seconds) of constant speed of 35 or 50 miles per hour. Accuracy and consistency of judgments were analyzed by analysis of variance and correlation techniques. The results were discussed in terms of speed adaptation.

T. R 6

10,731

McFarland, R.A., Warren, B.A. & Karis, C. ALTERATIONS IN CRITICAL FLICKER FREQUENCY AS A FUNCTION OF AGE AND LIGHT:DARK RATIO. *J. exp. Psychol.*, Dec. 1958, 56(6), 529-536. (Harvard School of Public Health and Northeastern University).

10,731

To establish more precisely the nature of the relationship between foveal critical flicker frequency (CFF) and chronological age, binocular CFF thresholds were obtained on 108 males, age 13 to 89 years, using light-dark ratios (square wave) in which the light portion was 2, 5, 10, 25, 40, 50, 75, 90, 95, and 98 percent. The circular test area (mean luminance 21.19 millilamberts) subtended 36 minutes of arc and the surround (23.6 and 0.04 millilamberts), 17 degrees. The threshold curves were fitted with straight lines and the slopes compared.

T. G. R 14

10,732

Kunnapas, T.M. INFLUENCE OF HEAD INCLINATION ON THE VERTICAL HORIZONTAL ILLUSION. *J. Psychol.*, Oct. 1958, 46(Second Half), 179-185. (Department of Psychology, University of Stockholm, Sweden).

10,732

To investigate how the inclination of the head to the horizontal position influences the vertical-horizontal illusion, 20 subjects adjusted either the vertical or horizontal line of the test figure (an L) until it appeared equal to the standard horizontal line under two head position conditions: vertical and horizontal (85 degrees to the right). Six subjects also did this with the head inclined horizontally to the left. The data were examined by analysis of variance and the results were discussed in terms of previous findings by the author.

T. I. R 6

10,733

Jones, F.P. & O'Connell, D.N. POSTURE AS A FUNCTION OF TIME. *J. Psychol.*, Oct. 1958, 46(Second Half), 287-294. (Institute for Applied Experimental Psychology, Tufts University).

10,733

This is a description of the technique and methodology employed in recording, by "geometric chronophotography," changing postural patterns. The procedure for analysis of such data is explained and illustrated by two examples.

G. I. R 13

- 10,734
Engel, E. BINOCULAR FUSION OF DISSIMILAR FIGURES. *J. Psychol.*, July 1958, 46(First Half), 53-57. (Department of Psychiatry, College of Medicine, State University of New York at Syracuse).
- 10,734
This is a summary of the observations of over 100 persons viewing two different faces in a stereogram arrangement, first binocularly then monocularly, and with and without glasses (when used). Resulting impressions and alterations thereof under the different viewing conditions are discussed in relation to differential acuity of the two eyes, eye dominance and learning.
I. R 7
- 10,735
Bartley, S.H. SOME FACTORS INFLUENCING CRITICAL FLICKER FREQUENCY. *J. Psychol.*, July 1958, 46(First Half), 107-115. (Department of Psychology, Michigan State University).
- 10,735
This is an analysis of contradictory findings of various investigators on the relation of the light-dark ratio in the intermittency cycle to critical flicker frequency. The variable, target intensity, was discussed in terms of this problem and some hypotheses set forth. Also, the neurophysiological evidence for more than one such light-dark ratio was presented.
G. I. R 11
- 10,736
Gerall, A.A. & Green, R.F. EFFECT OF TORQUE CHANGES UPON A TWO-HAND COORDINATION TASK. *Percent. Mot. Skills*, Dec. 1958, 8(4), 287-290. (University of Rochester).
- 10,736
This paper reports on an attempt to determine the effect on performance of a continuous tracking task of altering the force required to rotate the controls. One group of thirteen subjects was required to work against two pounds of coulomb friction during original practice and fourteen pounds during transfer. A second group of thirteen subjects had the same frictional loadings but in reversed order. The change in mean time-on-target for the two groups during original practice and transfer periods is plotted and the results are discussed in some detail.
G. R 7
- 10,737
Duncan, C.P. FIGURAL DISPLACEMENT WITH QUASI-CIRCULAR STIMULI. *Percent. Mot. Skills*, Dec. 1958, 8(4), 295-305. (Northwestern University, Evanston, Ill.).
- 10,737
Changes in apparent size, during inspection of both a circular and certain quasi-circular figures were studied. Four groups of 100 subjects inspected either an outline circle, a dot rotating continuously in a circular path, a dot moved stepwise around a circular path, or a stationary dot. Comparison stimuli were a series of complete outline circles which varied in diameter. Total inspection time was varied by requiring half the subjects to fixate the stimuli at all times except when making a size judgement, while the remaining subjects looked at the stimuli only when making a judgement. Results are related to neural satiation theory.
T. G. R 7
- 10,738
Bilodeau, Ina McD. & Bilodeau, E.A. TRANSFER OF TRAINING AND PHYSICAL RESTRICTION OF RESPONSES. *Percent. Mot. Skills*, June 1958, 8(2) 71-78. (Tulane University).
- 10,738
This paper is concerned with the effects of physical restriction of potential responses upon transfer of training. On a two-hand tracking device, subjects practised a coordinated tracing within the confines of a walled pathway. In this way, the range of errors which the subjects could commit was drastically reduced. A control group, practicing without walls, was free to commit and then to correct error responses. Transfer of skill was measured after training with and without response restriction.
G. I. R 4
- 10,739
Ammons, R.B. & Ammons, C.M. MOTOR SKILLS BIBLIOGRAPHY. XIII. PSYCHOLOGICAL ABSTRACTS, VOLUME 26. *Percent. Mot. Skills*, June 1958, 8(2), 99-102. (Montana State University).
- 10,739
This is a motor skills bibliography of 99 titles culled from the Psychological Abstracts for 1952.
R 99
- 10,740
Conklin, J.E. EFFECT OF VISUAL SURROUND ON TRACKING PERFORMANCE. *Percent. Mot. Skills*, June 1958, 8(2), 115-118. (Systems Development Corporation, Santa Monica, Calif.).
- 10,740
The effects of display scale and illumination on tracking performance were measured in this study using an electronic pursuit apparatus. A target and cursor having the same dimensions were presented on a five-inch cathode ray tube. Control scale was held constant while the display scale varied between one-half inch and four inches. The cursor moved one-half inch for 20 degrees of arm rotation in the one-half inch display and four inches for the larger display. The two conditions of illumination were complete darkness and dim illumination. A single trained subject tracked 150 one-minute trials for five days.
T. G. R 5
- 10,741
Jerome, C.W. SPECTRAL LUMINOSITY OF FLUORESCENT LAMPS. *Illum. Engng.*, Jan. 1958, LIII(1), 41-46.
- 10,741
To explain the basic principles involved in the computation of brightness from spectral energy curves and to show the results for usual fluorescent lamp colors, the spectral energy distributions and spectral luminosities for standard and deluxe colors and for the cool whites are given. An adaptation is presented of the "visibility paper" principle for weighting spectral distributions according to Council of the Illuminating Engineering Society X and Z tristimulus value functions which by emphasizing differences in these regions makes evaluation of their color rendition easier. Usefulness of these data to the lighting engineer in evaluating lamps for particular applications is discussed. Discussion from the floor is appended.
G. R 5
- 10,742
Wendt, H.W. ON FATIGUE AND/OR MOTIVATION. *Percent. Mot. Skills*, June 1958, 8(2), 121-122. (University of Mainz, Germany).
- 10,742
This brief article discusses the difficulties inherent in the study of fatigue, pointing out that it might be both theoretically and practically useful to consider fatigue from the viewpoint of attitudes and motivation.
- 10,743
Adair, H. & Bartley, S.H. NEARNESS AS A FUNCTION OF LATERAL ORIENTATION IN PICTURES. *Percent. Mot. Skills*, June 1958, 8(2), 135-141. (Michigan State University, Ann Arbor, Mich.).
- 10,743
This is one of a series of studies on space perception. To test the supposition that objects in the left field and right portions of the visual field do not have equal properties when viewed as objects in three dimensional space, 20 observers each made a total of 72 observations. Four prints of each of five scenes were used: one four by four, one eight by eight, and two which were mirror images of the first two. Observations were monocular, and observer was to adjust the metric distance of the large print so it appeared to be at the same distance as the smaller print which was placed at a fixed metric distance. Results are discussed as they relate to previous studies.
T. G. I. R 13

10,744

Rohracher, H. MUSCULAR MICRO-ACTIVITY ("MICROVIBRATION") AS AN INDICATOR OF PSYCHOLOGICAL TENSION. *Percent. Mot. Skills*, Sept. 1958, 8(3), p. 150. (University of Vienna, Austria).

10,744

This note describes the author's finding of micro-activity in the muscles ("microvibration") and states relationships found when the subject is asleep, awake and relaxed, and under stress, emotional tension, and when imagining a variety of movements.

R 6

10,745

Kottenhoff, H. & Lindahl, L.E.H. VISUAL AND EMOTIONAL FACTORS IN MOTION SICKNESS: PRELIMINARY COMMUNICATION. *Percent. Mot. Skills*, Sept. 1958, 8(3), 173-174. (Froese Hospital, Oestersund, Sweden).

10,745

To test the hypothesis that locomotor nystagmus is the pathogenic "visual" factor in motion sickness, 12 adults and 16 children fixated a rotating Barany drum for five minutes, and were rhythmically rocked and rolled while wearing visual-field-inverting spectacles. Mann-Whitney tests were used in comparing results for adults and children. Forty-nine other subjects tested on the moving chairs also were given tests of personality and of psycho-galvanic reflex.

R 7

10,746

Cleutat, V.J. & Noble, C.E. ABILITY VS. PRACTICE IN TWO-HAND COORDINATION. *Percent. Mot. Skills*, Sept. 1958, 8(3), p. 226. (Louisiana State University & Montana State University).

10,746

This note describes an experiment to investigate whether learning rate of two-hand irregular pursuit skill varies importantly with initial level of ability within the investigated period. Two hundred eighty-eight subjects who received at least 40 continuous 30 second trials were stratified into six homogeneous ability groups on the basis of total score received in the first five minutes of practice. Analysis of variance was performed on the results, which were discussed as they relate to other findings in this area.

T. R 2

10,747

Ammons, C.H. & Ammons, R.B. MOTOR SKILLS BIBLIOGRAPHY: XXIII. PSYCHOLOGICAL ABSTRACTS, 1953, VOLUME 27. *Percent. Mot. Skills*, Sept. 1958, 8(3), 262-266. (Montana State University).

10,747

This bibliography covers titles in this area abstracted for *Psychological Abstracts*, 1953, Volume 27.

R 96

10,748

Barron, C.I., Collier, D.R., Jr. & Cook, T.J. OBSERVATIONS ON SIMULATED 12-SECOND DECOMPRESSIONS TO 32,000 FEET. *J. Aviat. Med.*, Aug. 1958, 29(8), 563-574. (Lockheed Aircraft Corporation, Burbank, Calif.).

10,748

To study the effects of relatively slow decompressions such as might occur in larger transport aircraft, 154 subjects were exposed to 12 second decompressions in 29 separate chamber flights. The decompressions involved a change in pressure altitude encompassing a range of 8,000 to 32,000 feet. Exposure varied from 10 seconds, including time of decompression and stay at altitude, to 60 seconds. Descent involved change of 4,000 feet the first minute and 7,000 feet the second, with chamber leveled at 14,000 feet. Some subjects wore A-13A pressure demand masks. Results are tabulated on the basis of subjective response and observation by instructors. Frequency of hypoxia is also given.

T. G. I. R 2

10,749

Stall, Alice M. & Mosely, J.D. PHYSIOLOGIC AND PATHOLOGIC EFFECTS IN CHIMPANZES DURING PROLONGED EXPOSURE TO 40 TRANSVERSE G. *J. Aviat. Med.*, Aug. 1958, 29(8), 575-586. (USN Aviation Medical Acceleration Lab., NADC, Johnsville, Penn.).

10,749

To learn more of the effects of accelerative forces, five chimpanzees were exposed to 40 transverse G for periods up to 60 seconds in length. Electrocardiographic and respiration measurements were made during exposure and pathological effects were noted during autopsy 16 to 44 hours after exposure. The condition of the animals after exposure was evaluated clinically also. Certain conclusions in regard to preferential position during exposure to acceleration are also given.

G. I. R 1

10,750

Miller, E.F., II. EFFECT OF BREATHING 100 PER CENT OXYGEN UPON VISUAL FIELD AND VISUAL ACUITY. *J. Aviat. Med.*, Aug. 1958, 29(8), 598-602. (USN School of Aviation Medicine, Naval Air Station, Fla.).

10,750

To test for decrease in field of vision or in visual acuity during prolonged breathing of 100 percent oxygen, six male subjects were studied under conditions approaching those experienced in actual flight. A tangent screen, perimeter, and Glason acuity meter were used to examine each subject before and after each hour of a four hour test run. A control study was made by having the subjects breathe air instead of 100 percent oxygen during one test run. Significance of differences between results under the two conditions, as well as changes in thresholds as a function of breathing oxygen are discussed.

G. R 4

10,751

Miller, J.W. & Ludvig, E. VISUAL DETECTION IN A UNIFORMLY LUMINOUS FIELD. *J. Aviat. Med.*, Aug. 1958, 29(8), 603-608. (USN School of Aviation Medicine, Naval Air Station, Fla.).

10,751

In order to study, in a more quantitative fashion, responses of the human being to visual isolation, a new technique was devised whereby subjects are presented with a totally homogeneous visual field in which either stationary or moving targets may be employed. Provision is made for moving these targets over a wide range of angular velocities. Some preliminary results are presented on target acquisition time as a function of both size and location of the target.

I. R 5

10,752

Lund, M.W. MAN'S ABILITIES IN A MILITARY SYSTEM. *Research Reviews*, Oct. 1957, 16-19. (USN Engineering Psychology Branch, ONR, Washington, D.C.).

10,752

This paper gives consideration to man's abilities within a military system setting. Man's effectiveness as a receiver, as a computer or evaluator, and as a controller is evaluated.

10,753

Phoebus, C.P. ACCOMMODATING THE SPACE MAN. *Research Reviews*, June 1958, 6-12. (USN Medical & Allied Sciences, ONR, Washington, D.C.).

10,753

This article discusses problems which must be solved before space ships can be built which accommodate man's needs sufficiently to permit weeks or months of flight. These problems arise primarily because of the continuously closed environment, hence are discussed in the light of experience with submarine design. Problem areas include: respiratory mechanisms, food and waste, radiation, psychological factors, information from human engineering studies, the crew, acceleration and deceleration, environmental temperature, waste disposal and weightlessness.

R 1

10,754
Goff, L.C. SELF-CONTAINED DIVING AND UNDERWATER
SWIMMING. Research Review, Sept. 1957, 14-20.
(Naval Medical Science Division, ONR, Washington,
D.C.).

10,754
This paper gives a little of the history of the
development of underwater breathing apparatus, followed
by a brief discussion of the problems the underwater
swimmer encounters and techniques of underwater swimming.
G. I.

10,755
Schuster, R.E. RESPIRATORY PATTERN AND RESPIRATORY RE-
SPONSE TO CO₂. J. Appl. Physiol., July 1958, 11(1), 1-
14. (Naval Medical Research Lab., New London, Conn.).

10,755
To estimate the combined carbon dioxide (CO₂) and
oxygen effects on respiration, 65 subjects were exposed
to various concentrations of CO₂ (1.5, 3.3, 5.4, and 7.5
percent CO₂) for 15 minutes followed by a recovery period
of 15 minutes. Individual differences in the response
to CO₂ were related to the respiratory pattern of the
individual for air. On the basis of differences in the
response to 5.4 percent and 6.5 percent CO₂, subjects
were classified in a high and low ventilation group and
characteristics of the groups discussed. Possible use
of the respiratory response to CO₂ as a selection test
for underwater swimmers and pilots is discussed.
T. G. R 14

10,756
Clark, G.M. ACOUSTICS AND LIGHTING. Illum. Engng., Feb.
1958, 111(2), 99-102.

10,756
To acquaint the illuminating engineer with certain
basic concepts of acoustical engineering the author de-
fines and illustrates application of: noise reduction
coefficients, absorption coefficients, loudness reduction
reverberation time, and noise isolation. Tables showing
typical absorption and noise reduction coefficients for
luminous compared with acoustical ceilings, and for vari-
ous room surfaces, and showing acoustical characteristics
of six different lighting and acoustical systems are given.
Knowledge of these terms has become necessary due to
competition of illuminating and acoustical engineers
for ceiling space, and in order that unnecessary compro-
mise of good lighting will not be made by illuminating
engineers.
T. G. I. R 6

10,757
Craig, F.N. & Cummings, E.G. BREATH HOLDING DURING
EXERCISE. J. Appl. Physiol., July 1958, 11(1), 30-34.
(USA Chemical Warfare Labs., Army Chemical Center, Md.).

10,757
The product of intensity of exercise, measured by
oxygen uptake, and of voluntary breath holding time was
measured for one subject under the following nine condi-
tions: sitting, standing, walking at 1.5, 2.5, and 3.0
miles per hour on the level, walking at 3.0 miles per
hour on grades of six and 12 percent, and running on
the level at six and nine miles per hour. Measurements
were made either on the last step of the walk or run or
during it. Carbon dioxide concentration and breath
holding time are analyzed as a function of grade of work.
T. G. I. R 16

10,758
Froese, G. EFFECT OF BREATHING O₂ AT ONE ATMOSPHERE ON
THE RESPONSE TO COLD IN HUMAN SUBJECTS. J. Appl.
Physiol., July 1958, 11(1), 66-74. (University of
Western Ontario, London, Canada).

10,758
To see whether breathing O₂ decreases the O₂ con-
sumption during exposure to cold, ten subjects were
measured when dressed normally at usual room temperature
(25 degrees Centigrade) and at room temperature of ten
degrees Centigrade when covered with blankets or after
being exposed for 20 minutes in shorts only. Movements
of a suspended bed were recorded as well as measurements
of air and O₂ breathing and electromyograph readings.
The results are evaluated in terms of the effects of
breathing O₂ on responses to cold.
T. G. R 12

10,759
Astrand, P.O. & Astrand, I. HEART RATE DURING SUB-
MAXIMAL WORK IN MAN EXPOSED TO PROLONGED HYPOXIA.
J. Appl. Physiol., July 1958, 11(1), 75-80. (Uni-
versity of California at Berkeley & White Mountain
Research Station, Big Pine, Calif.).

10,759
This report describes some changes in heart rate
which were observed during a general study of the respi-
ratory response to exercise at altitude. Heart rate was
recorded on four subjects who performed on a bicycle
ergometer while breathing air or oxygen at sea level,
during four weeks at 14,250 feet, during four weeks re-
acclimatization to sea level, and during simulation of
14,250 feet (acute hypoxia).
T. G. R 8

10,760
Hall, J.F., Jr., Kearney, A.P. & Polite, J.W. RDY
COOLING IN WET AND DRY CLOTHING. J. Appl. Physiol.,
July 1958, 11(1), 121-128. (SAF Aero Medical Lab.,
Wright Patterson AFB, Ohio).

10,760
The feasibility of using "wet" survival suits, which
have certain advantages, for personnel who may, in an
emergency, be exposed to extremely cold water, was in-
vestigated in this study. Skin, rectal, and extremity
temperatures of five subjects were measured before im-
mersion in cold water (zero degree Centigrade) and ex-
posure to air temperatures ranging from -4.4 degrees to
-28.9 degrees Centigrade while resting in a life raft.
Body cooling curves were plotted for wet-clothed and
dry-clothed subjects under these conditions. Finally,
the data are used to predict tolerance (or potential
rescue) times, with the two types of clothing, as a
function of air temperature at water temperature of
zero degree Centigrade.
T. G. I. R 7

10,761
Bartlett, R.G., Jr., Brubach, H.F., Tribble, R.C. &
Specht, H. RELATION OF INCREASED AIRWAY RESISTANCE
TO BREATHING WORK AND BREATH VELOCITY AND ACCELERATION
PATTERNS WITH MAXIMUM AND NEAR MAXIMUM BREATHING EFFORT.
J. Appl. Physiol., Sept. 1958, 11(2), 194-204. (Na-
tional Institutes of Health, Bethesda, Md.).

10,761
This is a study of the oxygen cost of breathing, the
mechanical work done in breathing, the efficiency of
breathing, and breath patterns at various resistance
levels with maximum breathing effort. The efficiencies
were calculated from two different viewpoints of the
breathing mechanism as a machine for doing work. Breath
velocity patterns, volume patterns, and acceleration
patterns were derived. Finally, oxygen cost of external
work, peak pressures and velocities, and changes in
functional residual capacity are discussed.
G. R 9

10,762
Shepard, R.H., Varnauskas, E., Martin, H.E., White,
H.A., et al. RELATIONSHIP BETWEEN CARDIAC OUTPUT AND
APPARENT DIFFUSING CAPACITY OF THE LUNG IN NORMAL MEN
DURING TREADMILL EXERCISE. J. Appl. Physiol., Sept.
1958, 11(2), 205-210. (The Johns Hopkins University).

10,762
In this study, two methods for estimating pulmonary
diffusing capacity, (steady-state O₂ method of Lillenthal
and Riley and steady-state CO method of Filly) were com-
pared by applying them simultaneously in three male sub-
jects at different levels of treadmill exercise with and
without hypoxia. Cardiac output (indicator dilution) was
estimated at the same time. Results are presented to
show the relation between apparent diffusing capacity of
the lung and cardiac output.
T. G. R 15

10,763

Schlander, P.F., Hassel, H.T., Hart, J.S., Lefkowitz, B.M., et al. COLD ADAPTATION IN AUSTRALIAN ABORIGINES. *J. appl. Physiol.*, Sept. 1958, 13(2), 211-218. (University of Otago, Otago, New Zealand; University of Pennsylvania School of Medicine, National Research Council, Ontario, Canada, & University of Adelaide, Adelaide, Australia).

10,763

To study cold acclimation in the Pitjandjara, a desert tribe of Australian Aborigines, a field investigation was conducted. Oxygen consumption and rectal and skin temperatures were taken every half hour through the night (a) while the natives rested naked on the ground near camp fires and (b) while they rested naked without fires in a single-blanket sleeping bag. Air temperatures dropped to zero degrees Centigrade in the early morning. Comparison was made with white controls in order to reveal possible differences in reaction to cold.

T. G. R 22

10,764

Wyndham, C.M. & Morrison, J.F. ADJUSTMENT TO COLD OF BUSHMEN IN THE KALAHARI DESERT. *J. appl. Physiol.*, Sept. 1958, 13(2), 219-225. (Applied Physiology Lab., Transvaal and Orange Free State Chamber of Mines, Johannesburg, South Africa).

10,764

This is a study of cold adaptation in Kalahari Bushmen under natural conditions at an air temperature of ten degrees to 12 degrees Centigrade. Changes in core and surface temperatures were traced while the subjects were exposed, naked or naked under a cloak, at rest for two and one-half hours. The results are interpreted with respect to certain hypotheses about physiological versus intellectual adaptation in different ethnic groups.

T. G. R 10

10,765

Atams, T. & Heberling, E.J. HUMAN PHYSIOLOGICAL RESPONSES TO A STANDARDIZED COLD STRESS AS MODIFIED BY PHYSICAL FITNESS. *J. appl. Physiol.*, Sept. 1958, 13(2), 226-230. (USAF Arctic Aeromedical Lab., Seattle, Wash.).

10,765

The effects of a standardized cold stress were measured on five adult male Caucasian volunteers before and after an extended physical training program designed to increase the levels of physical fitness. Rectal, average skin and extremity temperatures, and whole body metabolic rates were determined at five-minute intervals throughout a one-hour exposure of the nude subjects to an ambient temperature of 50 degrees Fahrenheit (ten degrees Centigrade). Physical fitness scores were measured, using a treadmill, to ascertain the efficacy of the training program inserted between cold-room exposures.

G. R 20

10,766

Keen, E.N. & Sloan, A.W. OBSERVATIONS ON THE HARVARD STEP TEST. *J. appl. Physiol.*, Sept. 1958, 13(2), 241-243. (University of Cape Town, Cape Town, South Africa).

10,766

To investigate factors (other than physical fitness) which have been claimed to influence the results of the Harvard step test was the purpose of this study. The test was applied to two groups of healthy young men (medical students and physical education students). The correlations between the fitness index and stature, weight, length of leg, bi-iliac diameter, and resting pulse rate were determined.

T. R 11

10,767

Illuminating Engineering Society. LIGHTING FOR SELLING. *Illum. Engng.*, April 1958, LIII(4), 169-171.

10,767

Emphasizing good lighting as a selling technique, illuminating engineers were responsible for design and installation of lighting systems for five different kinds of stores (jewelry, automobile, rug, hardware, women's specialty). Various problems which were encountered (room too long, need for good color rendition for fabrics, distinct areas to be treated) are described and solutions are given: kinds of lights and footcandle power, wall color, accessories, and so forth.

I.

10,769

Reed, D.J. & Kellogg, R.M. CHANGES IN RESPIRATORY RESPONSE TO CO₂ DURING NATURAL SLEEP AT SEA LEVEL AND AT ALTITUDE. *J. appl. Physiol.*, Nov. 1958, 13(3), 325-330. (University of California & White Mountain Research Station, Big Pine, Calif.).

10,769

This is a study of a) the effect of natural sleep on breathing at sea level and altitude and b) changes in response to carbon dioxide (CO₂) during sleep at sea level and at altitude. The responses of three male subjects were studied at sea level, during four weeks at an altitude of 14,250 feet, and after their return to sea level. Making responses were used as a control and the measurement of the response to CO₂ was made possible by using graded CO₂ mixtures containing sufficient oxygen to preclude hypoxia.

G. R 18

10,771

Kronfeld, D.S., Macfarlane, M.V., Harvey, Nancy, Howard, Beth, et al. STIMULOUS EXERCISE IN A HOT ENVIRONMENT. *J. appl. Physiol.*, Nov. 1958, 13(3), 425-429. (University of Queensland, Brisbane, Australia).

10,771

The effects of strenuous exercise in a hot environment were studied by having carmen work at a rate of 0.36 horse-power for six minutes on a rowing ergometer in a psychrometric chamber at 80 and 112 degrees Fahrenheit. The four subjects were weighed before and after exercise. Blood pressure, pulse rate and respiratory rate were measured before and after exercise. Urine and blood samples were also analyzed for effects of exercise in the heat. Results with these indicators, as well as performance itself, are discussed.

T. G. R 18

10,772

Driver, Audrey, F.M. PHYSIOLOGICAL CHARACTERISTICS IN RELATION TO CLIMATIC PREFERENCE. *J. appl. Physiol.*, Nov. 1958, 13(3), 430-434. (University of Hong Kong, Hong Kong, China).

10,772

This is an attempt to trace the physiological differences between those who like living in the tropics and those who prefer a cooler environment. Basal metabolic rate, oral temperature, blood pressure and sweating rate were determined for eight Chinese males during the tropical summer of Hong Kong. Differences in these measures for those with each type of climatic preference were evaluated statistically.

T. G. R 21

10,773

Simonson, E. EFFECT OF LOCAL COLD APPLICATION ON THE FUSION FREQUENCY OF FLICKER. *J. appl. Physiol.*, Nov. 1958, 13(3), 445-448. (University of Minnesota Medical School, Minneapolis, Minn.).

10,773

The effect of local cold application (immersion of one arm in ice water) on monocular flicker fusion frequency (FFF) was studied in 106 healthy older men. Two brightness levels differing by one to ten and two ambient light ratios (zero and 95 per cent) were used. Light-dark ratio (50 to 50), size of the test patch (1.5 degrees of visual angle), and surrounding illumination (one foot-candle) were kept constant.

T. R 11

10,774

McKenna, A.E. THE EXPERIMENTAL APPROACH TO PAIN. *J. appl. Physiol.*, Nov. 1958, 13(3), 449-456. (Universite de Louvain, Louvain, Belgium).

10,774

Pain thresholds were obtained by using a modification of the Hardy-Wolff-Goodell method of stimulation by thermal radiation and response was measured, not only by the judgment of the subjects, but also by electroencephalogram, electrocardiogram, and psychogalvanic reflexes and changes in respiration. The validity of the experimental approach in the difficult area of pain research is questioned.

T. G. R 21

10,775
Greene, L.C. & Hardy, J.B. SPATIAL SUMMATION OF PAIN. *J. appl. Physiol.*, Nov. 1959, 13(3), 457-464. (USN Aviation Medical Acceleration Lab., NAAC, Johnsville, Penn. & University of Pennsylvania, Philadelphia, Penn.).

10,775
To study spatial summation for pain, three approaches were used with five subjects: (1) cutaneous pain threshold was determined on the forehead over areas from 2.5 square centimeters (cm^2) to 15 cm^2 by recording skin temperatures during exposure to thermal radiation, (2) time and temperature at which pain occurred from immersion in cold water was compared for one hand and both hands and, (3) a needle scratch method was attempted. The three methods are discussed as indicators of spatial summation of pain.
T. G. R 23

10,776
Beetham, W.P. Jr. & Buskirk, E.R. EFFECTS OF DEHYDRATION, PHYSICAL CONDITIONING AND HEAT ACCLIMATIZATION ON THE RESPONSE TO PASSIVE TILTING. *J. appl. Physiol.*, Nov. 1958, 13(3), 465-468. (USA Quartermaster Research and Engineering Command, Natick, Mass.).

10,776
This paper is on the effects of dehydration on the response to passive tilt after physical conditioning, with and without heat acclimatization. Pulse rate and blood pressure response to passive tilting were measured for 15 young male subjects who were dehydrated overnight in a hot, dry atmosphere after a rigorous program of physical conditioning in addition to acclimatization to heat, physical training alone, or a sedentary schedule. Results and related observations are presented and discussed.
T. G. R 15

10,777
Dempster, W.T. ANALYSIS OF TWO-HANDED PULLS USING FREE BODY DIAGRAMS. *J. appl. Physiol.*, Nov. 1958, 13(3), 469-480. (University of Michigan).

10,777
This study examines the assumption that the magnitude of pull forces exerted by the body is a reflection of muscular strength. A nude subject was photographed while making a number of maximum effort, two-handed isometric pulls (standing, braced, and seated) on a dynamometer that could be attached above, forward, or below. Free body diagrams were constructed on the enlarged photos and analyzed for evidence regarding the functions which the limb and trunk muscles perform in this type of activity.
T. G. R 15

10,778
Putnam, R.C. & Bower, K.D. DISCOMFORT GLARE AT LOW ADAPTATION LEVELS. PART III. MULTIPLE SOURCES. *Illumi. Engng.*, April 1958, 111(4), 174-183.

10,778
To obtain data for evaluation of discomfort glare under roadway lighting conditions evaluations were made by 14 observers who (1) made BCD measurements (borderline brightness between comfort and discomfort) of a circular source above the line of vision, (2) responded to BCD brightness of a single source above the line of vision for background brightness from 0.001 to 1.0 footlambert, (3) responded to simulated incandescent and fluorescent street lighting source at 10, 20, and 30 degrees above the horizontal line of sight, and (4) responded when simulated incandescent and fluorescent sources were combined to get the effect of multiple sources. Results are presented graphically and discussed in terms both of group trends and individual differences. Detailed comments of five discussants are appended. T. G. R 34

10,779
Berger, Eda, Graham, C.H. & Hsia, Y. SOME VISUAL FUNCTIONS OF A UNILATERALLY COLOR-BLIND PERSON. I. CRITICAL FUSION FREQUENCY IN VARIOUS SPECTRAL REGIONS. *J. opt. Soc. Amer.*, Sept. 1958, 48(9), 614-622. (Department of Psychology, Columbia University).

10,779
As a demonstration of the way in which vision functions in the unilaterally deuteranopic individual, critical fusion frequency in various spectral regions was determined for both eyes of a subject of this type. Functions for a centrally fixated 28 minute field were obtained in ten spectral regions (ranging from one having a spectral centroid at 52 mμ to one at 682 mμ) and for white light. Measurements extended over a range of approximately 5.5 log millilamberts. Some measurements with a one degree green and a two degree white field are also reported.
T. G. R 27

10,780
Berger, Eda, Graham, C.H. & Hsia, Y. SOME VISUAL FUNCTIONS OF A UNILATERALLY COLOR-BLIND PERSON. II. BINOCULAR BRIGHTNESS MATCHES IN VARIOUS SPECTRAL REGIONS. *J. opt. Soc. Amer.*, Sept. 1958, 48(9), 622-627. (Department of Psychology, Columbia University).

10,780
As one of a series of studies on a unilaterally deuteranopic individual, binocular brightness matches were obtained in eight spectral regions, ranging from one having a spectral centroid at 452 millimicrons to one with a centroid at 681 millimicrons. The measurements were made at photopic luminance levels by means of a polarization photometer in which the field of view of each eye subtended 1.8 degrees.
T. G. R 7

10,781
Ogilvie, J.C. & Taylor, M.H. EFFECT OF ORIENTATION ON THE VISIBILITY OF FINE WIRES. *J. opt. Soc. Amer.*, Sept. 1958, 48(9), 628-629. (Defence Research Medical Labs., Toronto, Canada).

10,781
To study the effect of orientation on the visibility of fine wires, three subjects were tested monocularly with each eye with two wires which were 15.7 and 18.3 microns in diameter, subtending 0.81 and 0.94 seconds of arc at the eye, in 18 meridians from vertical (0) through horizontal (90) to vertical (180 degrees). Percent correct responses for the wires in the various positions are given and an analysis of variance of percentage visibility in the 18 orientations.
T. G. R 7

10,782
Lordahl, D.S. & Archer, E.J. TRANSFER EFFECTS ON A ROTARY PURSUIT TASK AS A FUNCTION OF FIRST-TASK DIFFICULTY. *J. exp. Psychol.*, Nov. 1958, 56(5), 421-426. (University of Wisconsin).

10,782
To investigate the effects of varying first task difficulty on transfer to a second task, two pursuit-rotor experiments were run simultaneously, i.e., two methods of varying difficulty were used (speed of rotation of target varied and radius of target orbit varied). In the speed experiment, three groups practiced with different speeds on the first day (40, 60, and 80 revolutions per minute) and transferred to 60 rpm the second day. Radius was constant at 5.0 inches. In the radius experiment, speed was held at 60 rpm and three groups practiced with radius 2.0, 3.5, or 5.0 inches the first day and 3.5 inches the second day. Time on target is presented for the various conditions.
T. G. R 6

10,783
Archer, E.J. EFFECT OF DISTRIBUTION OF PRACTICE ON A COMPONENT SKILL OF ROTARY PURSUIT TRACKING. *J. exp. Psychol.*, Nov. 1958, 56(5), 427-436. (University of Wisconsin).

10,783
This investigation was concerned with the frequency and duration of noncircular movements in a rotary pursuit task as a function of inter-trial interval and sex of the subject. 45 men and 45 women participated in this experiment. Time on target was measured as well as frequency and time of noncircular movements before and after rest for both groups and intercorrelations were obtained.
T. G. I. 6

10,784

Snodde, A.F. LEARNING AND PERFORMANCE IN A TRACKING TASK UNDER TWO LEVELS OF ACHIEVEMENT INFORMATION FEEDBACK. *J. exp. Psychol.*, Oct. 1958, 56(4), 297-304. (Ohio State University, Columbus, Ohio).

10,784

The present experiment was designed to assess performance effects and learning effects in a compensatory tracking task as a function of the method used in providing cumulative information as to achievement level. A transfer design was used, differentiating high and low information feedback schedules of the training phase into eight experimental subgroups in the transfer phase. On transfer trials, one-half of the subjects continued to receive the same type of information while one-half changed; one-half continued the same target course while one-half changed. The high and low information conditions differed in the amount of information presented, the sensory mode of presentation, and the temporal characteristics of presentation. Comparison of groups is made. T. G. R 30

10,785

Archer, E.J. & Namikas, G.A. PURSUIT ROTOR PERFORMANCE AS A FUNCTION OF DELAY OF INFORMATION FEEDBACK. *J. exp. Psychol.*, Oct. 1958, 56(4), 325-327. (University of Wisconsin).

10,785

This is a study of pursuit rotor performance as a function of delay of information feedback. Five groups of fifteen men each learned a rotary pursuit task for 45 trials. During the first 30 trials, subjects heard a 1000 cycles per second tone after being on target continuously for one of five durations. These delay of information feedback intervals were .0, .2, .4, .8, and 1.6 seconds. During the last fifteen trials no tone was heard. The effects are analyzed and an explanation in terms of different motivational effects of information feedback is offered. G. R 3

10,786

Collier, G. & Kubzansky, P. THE MAGNITUDE OF BINOCULAR SUMMATION AS A FUNCTION OF THE METHOD OF STIMULUS PRESENTATION. *J. exp. Psychol.*, Oct. 1958, 56(4), 355-361. (University of Missouri & Boston City Hospital, Harvard Medical School).

10,786

The method of limits and single brightness procedures of stimulus presentation were compared for their effect on binocular summation. In addition, two methods of producing the viewing conditions, shutters and eyepatches, were compared to test for the effect of knowledge of viewing conditions on results. Six subjects provided threshold data under the various conditions. T. R 8

10,787

O'Brien, Vivian. CONTOUR PERCEPTION, ILLUSION AND REALITY. *J. opt. Soc. Amer.*, Feb. 1958, 48(2), 112-119. (Applied Physics Laboratory, The Johns Hopkins University).

10,787

This paper provides an analysis of contour perception. Simple experiments were performed using 1) true contours--objects with slanted edge, and 2) false contours--mach ring at single knee and contours from a plateau in intensity. In addition, the dependence of contrast on edge was investigated. The experimental results are discussed in relation to a possible mechanism for contour perception. T. G. I. R 20

10,788

Bedford, R.E. & Wyszecki, G.W. WAVELENGTH DISCRIMINATION FOR POINT SOURCES. *J. opt. Soc. Amer.*, Feb. 1958, 48(2), 129-135. (Division of Applied Physics, National Research Council, Ottawa, Canada).

10,788

This study provides wavelength discrimination curves obtained with 1 minute, 12 minute, and 1 degree fields and various intensities. In order to obtain high-intensity levels in the blue region, a high-pressure xenon arc was used as a source. Two normal trichromats served as subjects. A scanning technique was used in preference to strict fixation. The resulting curves are compared with those obtained under different conditions by previous investigators. T. G. I. R 2

10,789

Slater, P.H. & Weinstein, W. LIGHT TRANSMITTED BY VERY SMALL PINHOLES. *J. opt. Soc. Amer.*, March 1958, 48(3), 146-149. (Imperial College of Science and Technology, London, England).

10,789

This article provides formulas describing the loss of light flux by diffraction when an optical system is illuminated by a pinhole of unresolvable size. Experimental confirmation of this theory of light loss is also provided. G. I. R 5

10,790

Kinney, Jo Ann S. COMPARISON OF SCOTOPIC, MESOPIC, AND PHOTOPIC SPECTRAL SENSITIVITY CURVES. *J. opt. Soc. Amer.*, March 1958, 48(3), 185-190. (USN Medical Research Lab., New London, Conn.).

10,790

Spectral sensitivity curves for five observers under various conditions were determined and compared in this investigation. The conditions included the absolute scotopic threshold of the ten-degree periphery, brightness matches in the peripheral location to a standard set at 2, 3, 3.5, 4, and 5 log units above absolute threshold, and brightness matches in the fovea to the standard set at 4 log units above threshold. The stimulus subtended two degrees and was surrounded either by complete darkness or by a white screen illuminated to the same level as the standard. G. R 8

10,791

Alpern, M. VARIABILITY OF ACCOMMODATION DURING STEADY FIXATION AT VARIOUS LEVELS OF ILLUMINANCE. *J. opt. Soc. Amer.*, March 1958, 48(3), 193-197. (The University of Michigan).

10,791

To study variability of accommodation during steady fixation at various levels of illuminance, the variability of the dioptric power of the eye was measured with a stigmator for four observers over a range of intensities from 2.5 to 3.0 log trolands in one-half logarithmic steps. Two different viewing conditions (constant and variable size test letters) were studied. Results were compared with those obtained when the refraction of one eye was measured objectively (with a coincidence optometer) while the other eye fixated the chart. T. G. R 12

10,792

Burnham, R.W. VISUAL SELECTION OF COLOR FILM NEUTRALS. *J. opt. Soc. Amer.*, April 1958, 48(4), 215-224. (Color Technology Division, Eastman Kodak Co., Rochester, N.Y.).

10,792

This study was undertaken to compare a visual technique for selecting color film neutrals with a standard physical technique. The general procedure was to select neutral color film areas by a color matching technique and then to determine the colorimetric specifications of those areas. Observations are reported for twenty-nine observers. T. G. R 8

10,793

Harker, G.S. INTERRELATION OF MONOCULAR AND BINOCULAR ACUITIES IN THE MAKING OF AN EQUIDISTANCE JUDGMENT. *J. opt. Soc. Amer.*, April 1958, 48(4), 233-240. (USA Medical Research Lab., Fort Knox, Ky.).

10,793

This laboratory experiment was undertaken to demonstrate that the depth acuity for panel test objects is complex and can be considered to be a combination of the acuities for monocular (or congruent) and binocular (or disparate) stimulations. The data of the study consist of equivalent-parallax-angle acuities determined from the standard deviation of 16 equidistance settings made under each combination of surface slope, monocular and binocular viewing, and viewing distance. T. G. I. R 28

10,794
Sawyers, C.L. & Wyszczek, G. L/Y RATIOS IN TERMS OF CIE-CHROMATICITY COORDINATES. *J. opt. Soc. Amer.*, June 1958, 48(6), 389-392. (National Research Council, Ottawa, Canada).

10,794
This is a continuation of previous work which obtained a correlate for lightness (L) in terms of Council of the Illuminating Engineering Society-tristimulus values for colors of approximately constant luminous reflectance (Y). L was expressed by a second degree equation with X, Y, Z as variables. In the present study about 100 samples were selected to cover the gamut of existing surface colors. The lightness-equivalent neutrals were estimated by three subjects for these colors. L/Y ratios were expressed by a second degree equation with chromaticity coordinates x, y as variables.
T. G. R 3

10,795
Enoch, J.M. SUMMATED RESPONSE OF THE RETINA TO LIGHT ENTERING DIFFERENT PARTS OF THE PUPIL. *J. opt. Soc. Amer.*, June 1958, 48(6), 392-405. (Ohio State University).

10,795
This study attempts to discover the variables which might account for the discrepancies in the data found in the literature on the summated response of the retina to light entering different parts of the pupil. The effects of the following variables were checked experimentally: viewing conditions, Stiles-Crawford effect, and blur of the retinal image.
T. G. I. R 16

10,796
Bedford, R.E. & Wyszczek, G.W. LUMINOSITY FUNCTIONS FOR VARIOUS FIELD SIZES AND LEVELS OF RETINAL ILLUMINANCE. *J. opt. Soc. Amer.*, June 1958, 48(6), 406-411. (National Research Council, Ottawa, Ontario, Canada).

10,796
In this study, luminosity functions were measured for four normal trichromats for three field sizes (one degree, 12 minutes, 1.5 minutes) at various levels of retinal illuminance. Individual variability is measured and the curves obtained are compared with those provided by previous investigators.
T. G. I. R 16

10,797
Hillmann, Beverly M. RELATIONSHIP BETWEEN STIMULUS SIZE AND THRESHOLD INTENSITY IN THE FOVEA MEASURED AT FOUR EXPOSURE TIMES. *J. opt. Soc. Amer.*, June 1958, 48(6), 422-428. (USN Medical Research Lab., New London, Conn.).

10,797
The purpose of this study was to make an experimental determination of absolute visual thresholds in the human fovea. An apparatus permitting independent variation of area and exposure time, and having a fixation device that minimally affects the adaptation level of the region under investigation was used. Seven stimulus areas, ranging from one minute to one degree in diameter were presented to four subjects at durations of 1.1, 3.8, 10, and 48.0 milliseconds.
T. G. I. R 11

10,798
Levi, L. ACCURATE METHOD FOR CORRECTION OF SLANT RANGE DISTORTION IN HIGH-ALTITUDE RADARS AND A CONTRIBUTION TO THE OPTICS OF REFLECTING CONICAL SURFACES. *J. opt. Soc. Amer.*, Oct. 1958, 48(10), 680-686. (Fairchild Camera and Instrument Corporation, Syosset, N.Y.).

10,798
An optical method for the correction of slant range distortion in high-altitude radar recordings is presented. The line image of the scan is converted into a circular disk by rotation about the zero slant range point and an appropriate line from this disk is selected. The method is strictly geometrical and readily accommodates altitude changes. A reflecting cone is employed as an optical element and the laws of reflection and image formation for this element are formulated. A simple method for testing the quality of the conical surface is also given.
I.

10,799
Nachias, J. BRIGHTNESS AND VISUAL ACUITY WITH INTERMITTENT ILLUMINATION. *J. opt. Soc. Amer.*, Oct. 1958, 48(10), 726-730. (Swarthmore College).

10,799
The purpose of this study was to determine whether interrupted light facilitates visual acuity. The paper presents data on perceived brightness and visual acuity obtained under essentially identical conditions of steady and intermittent illumination, using long exposures (up to 45 seconds) as well as brief ones (250 milliseconds). Flicker frequencies down to eight cycles per second and light-time fraction to 0.083 were sampled. The results are presented and discussed in relation to previous studies.
T. G. I. R 14

10,800
Blough, Patricia McBride. DIFFERENCE LIMEN AS A FUNCTION OF RETINAL ECCENTRICITY AND BACKGROUND BRIGHTNESS. *J. opt. Soc. Amer.*, Oct. 1958, 48(10), 731-735. (Department of Psychology, Tufts University).

10,800
The purpose of this experiment was to obtain difference limens at several combinations of background brightness and retinal eccentricity. Background brightnesses were 0.0001, 0.001, 0.01, 1, and 10 foot-lamberts; retinal locations were the fovea and 2, 6, and 10 degrees in the nasal portion. Monocular difference limens were determined using a one degree test stimulus superimposed at the center of a 27 degree background. The technique of threshold determination was the ascending series of the method of limits. Curves describing log A (delta) B versus log background brightness are presented and discussed.
T. G. R 19

10,801
Glasser, L.G., McKinney, A.H., Reilly, C.D. & Schnelle, P.D. CUBE-ROOT COLOR COORDINATE SYSTEM. *J. opt. Soc. Amer.*, Oct. 1958, 48(10), 736-740. (Engineering Department, E.I. du Pont de Nemours & Co., Inc., Wilmington, Del.).

10,801
A visually uniform color-coordinate system, based on simple mathematical formulas, is described. The system resembles the Adams chromatic-value system but replaces the quintic-parabola function with a cube-root function. For colors having reflectances greater than 0.5 per cent, the color spacing obtained agrees with Munsell spacing also. The cube-root equations can be solved directly in terms of differences in colorimeter readings or tri-stimulus values.
T. G. R 10

10,802
Boshoff, M.C. GLOSS SCALE FOR PAINT SURFACES. *J. opt. Soc. Amer.*, Oct. 1958, 48(10), 741-746. (National Physical Laboratory of the Council for Scientific and Industrial Research, Pretoria, South Africa).

10,802
This paper describes a system whereby just noticeable differences in gloss can be expressed in terms of differences in specular luminance factors. The number of just noticeable gloss differences was determined graphically for paint specimens with specular luminance factors varying from 0.5 to 40.0. For the specification of gloss, a system is proposed in which gloss units are equivalent to just noticeable gloss differences.
T. G. I. R 6

10,803
Dillon, D.J. & Zegers, R.T. QUANTAL DETERMINATION AND STATISTICAL EVALUATION OF ABSOLUTE FOVEAL LUMINOSITY THRESHOLDS AND OF THRESHOLD VARIABILITY. *J. opt. Soc. Amer.*, Dec. 1958, 48(12), 877-883. (Fordham University).

10,803
Foveal luminosity thresholds for 31 stimulus wavelengths of light were obtained from five observers and expressed in radiometric units. The wavelengths ranged from 400 mμ to 700 mμ at intervals of 10 mμ. Flash duration and test patch size were 50 milliseconds and one degree of arc. Each observer sat for ten experimental sessions. One complete luminosity curve based upon five determinations at each stimulus wavelength was determined at each session. Variability values, in terms of coefficients of variation, were computed for each observer, session, and wavelength. These values were based on quantal determinations at the cornea.
T. G. I. R 12

10,804
Luria, S.M. ABSOLUTE THRESHOLD FOR EXTREMELY WIDE
FIELDS. *J. opt. Soc. Amer.*, Dec. 1958, 48(12): 884-
886. (USM Medical Research Lab., New London, Conn.).

10,804
To see whether threshold falls with an increase in
the size of the stimulus beyond ten degrees, the absolute
visual threshold for an area 40 by 100 degrees of visual
angle at a color temperature of 2050 degrees Kelvin was
obtained for seven observers. Thresholds were obtained
under two conditions: (1) turning the light on and
2) turning the light on and off before a judgment was
made. In addition to comparing results for these condi-
tions, rank order correlations were obtained between
threshold and size of the dark adapted pupil and between
threshold and age.
T. R 29

10,805
Diamond, A.L. SIMULTANEOUS BRIGHTNESS CONTRAST AND
THE PULFRICH PHENOMENON. *J. opt. Soc. Amer.*, Dec.
1958, 48(12): 887-898. (University of Hawaii, Hono-
lulu, Hawaii).

10,805
To see whether the Pulfrich phenomenon would occur if
the brightness of the moving object were reduced in one
eye by an inducing field, eight observers were used. The
results are discussed from the viewpoint of their impli-
cations about the physiological mechanism for brightness
reduction by an inducing field and that involved in
brightness reduction by a filter.
T. G. I. R 6

10,806
Newhall, S.M., Burnham, R.W. & Evans, R.M. COLOR
CONSTANCY IN SHADOWS. *J. opt. Soc. Amer.*, Dec. 1958,
48(12): 976-984. (Color Technology Division, Eastman
Kodak Company, Rochester, N.Y.).

10,806
The purpose of this study was to make evaluations of
color constancy, both over-all and by attributes, of ten
color samples viewed one at a time under a standard shadow.
The shadow was an obvious one of daylight quality
which fell on the color sample and part of a surrounding
white field. In some trials there was shadow, in some
none, and in some sample luminance was simply reduced
proportionately. The color samples (in the surface mode
of appearance) were matched with a colorimeter (the field
of which was also perceived in the surface mode). Match
data were converted to the Munsell system of notation and
constancy ratios obtained for hue, saturation, and
brightness. An estimate of over-all color constancy was
also made.
T. G. I. R 17

10,807
Corso, J.F. PROPOSED LABORATORY STANDARD OF NORMAL
HEARING. *J. acoust. Soc. Amer.*, Jan. 1958, 30(1),
14-23. (Department of Psychology, Pennsylvania State
University).

10,807
To determine whether differences found between pre-
sent references for normal hearing may be related to e-
quipment and testing conditions, audiometric measurements
were made on three groups of otologically normal subjects:
18-24 years old. Two groups (72 and 49 subjects) were
tested on an ADC audiometer equipped with ANB-H1A ear-
phones and a five decibel step testing procedure in the
method of limits; one group (39 subjects) was tested on
a Beltone Audiometer equipped with Permaflex PDR-8 ear-
phones and a two decibel step testing procedure. Tests
of significance were applied to differences in mean
threshold values and variances between groups and between
sexes. Results of this study are compared graphically
with those of other selected studies.
T. G. R 34

10,808
Shaw, E.A.G. & Thiesse, G.J. IMPROVED CUSHION FOR
EAR DEFENDERS. *J. acoust. Soc. Amer.*, Jan. 1958,
30(1), 24-26. (Division of Applied Physics, National
Research Council, Ottawa, Canada).

10,808
This paper is primarily concerned with the physical
properties of a cushion for circumaural ear defenders as
mechanical devices. Evidence is presented for advantages
claimed for the defender described here over other types.
The cushion developed was required to meet two apparently
contradictory conditions: (1) high adaptability to head
contours to provide good air seal and (2) sufficient
"spring" to minimize cup vibration. Elementary theory is
summarized as a theory of cushion behavior applicable to
the new cushion is presented. Experiments leading to
design of this cushion are described. Flesh impedance
and some practical aspects of ear defender design are
discussed.
T. G. I. R 24

10,809
Dolansky, L.O. STUDIO FOR LISTENING TESTS. *J. acoust.
Soc. Amer.*, March 1958, 30(3), 175-181. (Electronic
Research Project, Northeastern University).

10,809
To demonstrate that environmental conditions may af-
fect scores obtained in problems of speech analysis and
synthesis articulation, tests were administered to six
male students in a conference room and in the especially
designed studio room described. Design problems and con-
struction of the room are given in some detail and in-
cludes: reverberation time and frequency response of the
studio, transmission of sound into the room through walls
and ducts, and the quieting of noise in the adjacent room.
The formula for computing reverberation time (T) is de-
rived. Curves of reverberation time obtained under five
different methods of measurement (e.g. white-noise) are
presented. Room response was measured using two differ-
ent methods. Results are given of articulation tests
used to compare influence of the two rooms. T. G. I. R 9

10,810
Hawley, M.E. NOISE SHIELD FOR MICROPHONES USED IN
NOISY LOCATIONS. *J. acoust. Soc. Amer.*, March 1958,
30(3), 188-190. (Radio Corporation of America, Moores-
town, N.J.).

10,810
This paper describes a rubber noise shield developed
to improve speech to noise ratio at a military microphone.
Approach to the development of the shield was empirical.
A succession of models were sculptured in plasticarve
from which latex models were then made. Experiments were
conducted to test: (1) optimum size, shape and location of
the vent, (2) need for inclusion of damping material and,
(3) methods of measuring noise exclusion performance.
Graphs of noise exclusion-frequency characteristics are
given.
G. I. R 5

10,811
Moser, H.M. & Oyer, H.J. RELATIVE INTENSITIES OF
SOUNDS AT VARIOUS ANATOMICAL LOCATIONS OF THE HEAD AND
NECK DURING PHONATION OF THE VOWELS. *J. acoust. Soc.
Amer.*, April 1958, 30(4), 275-277. (Department of
Speech, Ohio State University).

10,811
To determine the relative intensities of the signal
from sixteen anatomical locations on head and neck, each
of three subjects (of thin, medium and stocky build),
intoned each of the twelve vowel sounds, sustained at a
specified level for five seconds. Although the present
investigation was concerned solely with the plotting of
anatomical locations according to the intensity of the
signal, the investigators view this as a preliminary step
to certain aspects of instrument development, e.g., posi-
tion of microphone on speaker's body.
T. G. I. R 4

10,813

von Békésy, G. FUNNELING IN THE NERVOUS SYSTEM AND ITS ROLE IN LOUDNESS AND SENSATION INTENSITY ON THE SKIN. *J. Acoust. Soc. Amer.*, May 1958, 30(5), 399-412. (Harvard University).

10,813

This article reports a series of experiments designed to establish rules for estimation of the funneling action (when stimulation produces both summation and inhibition in the sense organ simultaneously) on the skin. The vibration loudness produced by a point vibrator was compared with the loudness produced by stimulation of larger areas of the skin; difference limen for amplitude variation was investigated under different conditions, and lateral spread of skin sensations was determined. These phenomena were compared with analogous sensation in hearing (rotating tones - Dreighton) and in vision (Mach's law of contrast). Characteristics of a good observer and methods by which he may be trained are also discussed. G. I. R 15

10,814

Griffith, J.W., Arner, W.J. & Wenzler, O.F. PRACTICAL DAYLIGHTING PREDICTION. *Illus. Engng.*, April 1958, LIII(4), 185-190.

10,814

This paper describes a simplified method for predicting the work plane distribution of daylight through clear glass fenestration applicable to overcast sky or clear sky conditions with no sun on the fenestration. Tables are given for using the technique where sun is on the fenestration. The method permits prediction of multilateral daylight design by investigating each fenestration independently. It is based on the total illumination on the fenestration from above and from below the horizon; the prediction equation is given. Some data on reliability were included. Discussion of the paper is appended. T. R 7

10,815

Solomon, L.N. SEMANTIC APPROACH TO THE PERCEPTION OF COMPLEX SOUNDS. *J. Acoust. Soc. Amer.*, May 1958, 30(5), 421-425. (USN Electronics Lab., San Diego, Calif.).

10,815

To test experimentally whether or not complex tones have identifiable attributes other than pitch and loudness, 50 Navy Sonarman with median sonar experience of one year rated recordings of 20 passive sonar sounds. A multi-dimensional scaling technique (The Semantic-Differential) was used which required subjects to rate each of 20 sounds on each of 50 scales. When factor analyzed the resultant 50 times 50 correlational matrix yielded eight factors, seven of which are described. Once isolated, clusters of sounds having the "same connotative meaning" may then be analyzed physically to determine the physical correlate of psychological judgments of similarity. The author is currently engaged in this task. T. R 21

10,817

O'Neill, J.J. & Dreher, J.J. MASKING OF ENGLISH WORDS BY PROLONGED V. EL SOUNDS. *J. Acoust. Soc. Amer.*, May 1958, 30(5), 539-543. (OSU Research Foundation, Columbus, Ohio).

10,817

To test the hypothesis that, when a word is heard against a masking noise or the same character as the vowel it contains, maximum masking will result, 110 monosyllabic words and 72 spondee words were tape recorded by three male speakers. The speakers also intoned in trio ten seconds of each of nine vowels, recorded as masking agents. Test word and masking tapes were played back in combination to nine listening panels of 302 Air Force ROTC Cadets. Analysis of effectiveness of the masking agent was made both by a half-octave band analysis and by a series of spectrographic displays. Most and least intelligible test words were also analyzed for possible language dimensions associated with resistance or susceptibility to masking. G. R 12

10,818

Fairbanks, G. TEST OF PHONEMIC DIFFERENTIATION: THE RHYME TEST. *J. Acoust. Soc. Amer.*, July 1958, 30(7), 596-600. (Speech Research Lab., University of Illinois).

10,818

A completion-type test to meet the need for experimental material in which 1) the spoken word would be the stimulus unit, 2) response is recognition of the word, 3) response would depend on the initial consonant and on consonant-vowel transition, and 4) the task would bear valid relation to discrimination demands of real speech. Results were analyzed for relations between word recognition, V/M ratio and power of the phonemic factor. Method of choosing stimulus words is given in detail and suggestions for other uses are made. T. R 4

10,819

Broadbent, D.E. EFFECT OF NOISE ON AN "INTELLECTUAL" TASK. *J. Acoust. Soc. Amer.*, Sept. 1958, 30(9), 824-827. (Applied Psychology Research Unit, MRC, Cambridge, England).

10,819

To investigate the (a) effect of noise on tasks requiring complex thought, and (b) whether aftereffects were obtained following a period of working in noise, 18 men were divided into three equal groups (QQ, QM, NQ) and asked to perform simple arithmetic problems under varying conditions on two successive days: QQ performed in 70 decibel noise both days, QM had 70 decibel noise the first day and 100 decibel noise the second day, NQ had 100 decibel noise the first day and 70 decibel noise the second day. Groups were compared in terms of differences in trend (calculating time). Individual differences in error scores were related to intelligence. Personality differences (introversion-extroversion) were related to deterioration scores (calculating time). G. R 12

10,820

Hirsh, I.J. & Burgeat, M. BINAURAL EFFECTS IN REMOTE MASKING. *J. Acoust. Soc. Amer.*, Sept. 1958, 30(9), 827-832. (Central Institute for the Deaf, St. Louis, Mo.).

10,820

To investigate the way in which remote masking (low-frequency tones masked by a high-frequency band of noise) responds to changes in phase of signals presented to the two ears, four trained listeners responded to a series of tones presented under each of seven phase conditions in two experiments (wide-band and narrow-band noise). Relations between thresholds for pure and for masked tones obtained under each of the phase conditions are discussed as they relate to high frequency band of noise and are compared with results obtained under ordinary masking by wide band noise. A second paper is planned in which individual differences which were found for remote masking will be discussed. T. G. R 7

10,821

Hirsh, I.J. MONAURAL TEMPORARY THRESHOLD SHIFT FOLLOWING MONAURAL AND BINAURAL EXPOSURES. *J. Acoust. Soc. Amer.*, Oct. 1958, 30(10), 912-914. (Central Institute for the Deaf, St. Louis, Mo.).

10,821

To ascertain whether temporary threshold shift (TTS) and recovery curve for a single ear would be different depending upon whether that ear alone or both ears simultaneously were exposed to sound, three series of experiments were undertaken. In the first two experiments both ears of each of ten subjects were used. The first series was concerned with TTS for 1000 cycles per second after one minute exposure to a continuous pure tone of the same frequency at 20, 80, and 100 decibels. The second series was concerned with TTS at 1400 cycles per second at 100 decibels. The third series (nine subjects) involved three minute exposure to white noise at 110 decibels and subsequent TTS at 4000 cycles per second. G. R 11

10,822

Kirk, R.E. DIFFERENCE LINES FOR TONE DIMINUTION. *J. Acoust. Soc. Amer.*, Oct. 1958, 30(10), 915-918. (Baldwin Piano Company, Cincinnati, Ohio).

10,822

To assess the discriminatory capacity of observers for tone diminution, two tones whose diminution rates were independently adjustable were alternately presented to seven subjects, each of whom made a minimum of 20 judgments for each standard and comparison rate (seven diminution rates between 6 1/2 and 9% decibels per second were used). The method of constant stimuli was used in determining the difference lines. Relations between diminution rate, fundamental frequency and tonal complexity were explored. The data were analyzed by an unweighted least squares method. An equation is given which describes the relationship between difference lines and diminution rate.

T. G. I. R 5.

10,823

Tanner, W.P., Jr. WHAT IS MASKING? *J. Acoust. Soc. Amer.*, Oct. 1958, 30(10), 919-921. (Electronic Defense Group, University of Michigan).

10,823

Is masking a unitary concept which applies to a phenomenon which remains constant under varied conditions? To determine the change in detectability of a tone 1) through the introduction of additional white noise, 2) in the presence of an additional pure tone, and 3) when the observer knows that it might have been a different tone, three masking experiments were undertaken using white noise, alternate frequency, and pure tone for masking. A masking index is presented which makes comparison possible over the three types of experiment. The "temporal forced choice" method is employed in all three experiments. Results are discussed in terms of differences observed in the masking under the three conditions.

G. I. R 9.

10,824

Ward, W.D., Giorgi, A. & Sklar, D.L. DEPENDENCE OF TEMPORARY THRESHOLD SHIFT AT 4KC ON INTENSITY AND TIME. *J. Acoust. Soc. Amer.*, Oct. 1958, 30(10), 944-954. (Research Center, Subcommittee on Noise in Industry, Los Angeles, Calif.).

10,824

To explore behavior of Temporary Threshold Shift (TTS) as a function of: a) exposure, b) recovery time, c) initial threshold, d) intensity of noise level, e) on-fraction (R), f) frequency of test tone, and g) two level noise, 13 subjects were tested over nine sessions. TTS's were calculated in reference to the median pre-exposure threshold determined from all nine sessions. Equations for relations which hold under the various conditions are given. Certain consistent individual differences among subjects are discussed, and comparisons between TTS in auditory and other sense modalities are made. Results are considered a first step toward determination of laws governing growth and disappearance of TTS; suggestions are given for future studies.

T. G. I. R 22.

10,825

Pickett, J.M. & Pollack, I. PREDICTION OF SPEECH INTELLIGIBILITY AT HIGH NOISE LEVELS. *J. Acoust. Soc. Amer.*, Oct. 1958, 30(10), 955-963. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

10,825

The present study extends previously reported work on speech intelligibility in white noise, at levels from 25-130 decibels over a wide range of speech-to-noise (S/N) ratios. Additionally, the effects of high sound levels on prediction of speech intelligibility are considered. Each of four talkers read 25-word lists in two separate tests (total of 1000 words) to five experienced listeners under each of five combinations of speech and noise spectra (speech frequency-emphasis of 0 decibels and +6 decibels per octave; random noise spectra with slopes of 0, +6, and -12 decibels per octave). Results are discussed in terms of additional corrections that might be applied to intelligibility prediction procedures.

G. R 9

10,826

Trittipoe, W.J. RESIDUAL EFFECTS OF LOW NOISE LEVELS ON THE TEMPORARY THRESHOLD SHIFT. *J. Acoust. Soc. Amer.*, Nov. 1958, 30(11), 1017-1019. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

10,826

To measure temporary threshold shifts (TTS) following two conditions of high level noise exposure: 1) a control condition in which high level noise is preceded by silence and 2) the experimental condition where high level noise is preceded by different noise levels which alone would not produce TTS, four listeners were fully trained and exposed (one ear at a time) to the noise conditions. Pre-exposure tests were run to establish that the highest pre-exposure noise levels produced no apparent TTS after several minutes post-exposure time. Results are presented in a series of graphs, and are discussed as they relate to the problem, to the meaning of back-to-normal recovery following exposure, and in terms of certain individual differences.

G. I. R 1.

10,827

Veniar, Florence A. SIGNAL DETECTION AS A FUNCTION OF FREQUENCY ENSEMBLE. I. *J. Acoust. Soc. Amer.*, Nov. 1958, 30(11), 1020-1024. (Electronic Defense Group, University of Michigan, Ann Arbor, Mich.).

10,827

To explore the detectability of auditory signals as a function of 1) signal ensemble size (number of signals of different frequencies that are equally likely to occur and which the observer must try to detect) and 2) ensemble frequency range, four observers completed approximately sixteen runs (100 trials equaled a run) for each condition used. All trials were two-interval forced-choice, presented binaurally. The data obtained was compared with predictions made on the basis of three models: 1) a narrow-band scaling model, 2) a multiple-band model, 3) the null hypothesis. Predictions obtained by the various models are compared, using non-parametric statistics. Effect of pattern on performance also is tested.

T. R 6

10,828

Wainwright, W.N. COMPARISON OF HEARING THRESHOLDS IN AIR AND IN WATER. *J. Acoust. Soc. Amer.*, Nov. 1958, 30(11), 1025-1029. (USN Underwater Sound Lab., Fort Trumbull, Conn.).

10,828

To compare hearing thresholds in air and in water two subjects were tested for aural acuity in both air and water. Equipment used to make the measurements under water is described in detail. Underwater hearing thresholds were obtained for the same two subjects when fitted with an underwater hearing aid. Effects of open as compared with closed circuit self-contained underwater breathing apparatus on hearing thresholds are presented. Results of the experiments are compared with those reported or predicted by other investigators, and suggestions are made for improvements to underwater conversation.

G. I. R 4

10,829

Hoffman, H.S. STUDY OF SOME CUES IN THE PERCEPTION OF THE VOICED STOP CONSONANTS. *J. Acoust. Soc. Amer.*, Nov. 1958, 30(11), 1035-1041. (Pennsylvania State University).

10,829

To investigate the contribution which each of three cues (frequency shift or transition of the second formant; transition of the third formant; burst frequency) make to the perception of the voiced stop consonants /b/, /d/, and /g/, synthetic speech sounds containing one cue, all possible combinations of two cues, and all possible combinations of the three cues were presented to 26 subjects from whom 52 judgments were obtained for each of the 336 stimuli. Effects on perception of the consonants were inferred from shifts in response curves which were plotted for the various combinations investigated. The data also were analyzed to determine whether cues retain their separate effects when combined, and these effects are discussed in terms of certain vector-like properties.

G. I. R 8

10,830
Veniar, Florence A. SIGNAL DETECTION AS A FUNCTION OF FREQUENCY ENSEMBLE. II. *J. Acoust. Soc. Amer.*, Dec. 1958, 30(12), 1075-1078. (Electronic Defense Group, University of Michigan).

10,830
This second investigation of the detection of a signal in noise as a function of signal ensemble size and of ensemble frequency range extends ensemble size to eight, and signals used cover a greater frequency range. Three observers were used. Experimental conditions were so presented as to include at least one run (100 trials) of every ensemble size in every experimental session (eight runs). The data are compared with predictions made on the basis of three models: a Narrow Band Scanning Model; a Multiple-Band Scanning Model; and the null-hypothesis. Results are discussed in terms of effect of increased ensemble size and increased signal frequency range on performance, and in terms of adequacy of the models to handle the data.
R 2

10,831
Veniar, Florence A. EFFECT OF AUDITORY CUE ON DISCRIMINATION OF AUDITORY STIMULI. *J. Acoust. Soc. Amer.*, Dec. 1958, 30(12), 1079-1081. (Electronic Defense Group, University of Michigan).

10,831
To: 1) compare discrimination of four signals closely spaced on the frequency scale with discrimination of four signals widely separated and 2) determine the effect of auditory cue on discrimination of auditory stimulus as a function of frequency difference between cues and subsequent stimuli, three subjects were used in three experiments. Using a forced-choice method three cue-tones and five stimulus frequencies were independent variables; percent of correct discriminations was the dependent variable. Results are discussed as they relate to theoretical presence of a narrow-band scanning mechanism in the auditory system, and are compared with results from previous studies reported by the same author.
T. I. R 3

10,832
Pickett, J.M. & Pollack, I. INTELLIGIBILITY AT HIGH VOICE LEVELS AND THE USE OF A MEGAPHONE. *J. Acoust. Soc. Amer.*, Dec. 1958, 30(12), 1100-1104. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

10,832
To test whether 1) for a given vocal output at the mouth, the field voice level will be raised by the megaphone, 2) for a given field voice level, the microphone will permit a lower vocal output, thus reducing deterioration of intelligibility with shouting, and 3) due to high-frequency emphasis the megaphone may further improve intelligibility against some ambient noise spectra, a) two male talkers each recorded 400 words at conversational voice level. Recordings were played back under various conditions to two listeners, b) twelve male talkers each recorded 25 words at six voice levels with and without the megaphone. These recordings were played to three new listeners. Results are compared with those from previous studies, and implications for protection of the voice are discussed. G. I. R 3

10,833
Pollack, I. & Tecce, J. SPEECH ANNUNCIATOR WARNING INDICATOR SYSTEM: PRELIMINARY EVALUATION. *J. Acoust. Soc. Amer.*, Jan. 1959, 30(1), 58-61. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

10,833
To explore the potential usefulness of a speech annunciator as a warning signal indicator system, six operators were employed in three experimental sessions using a counterbalanced experimental design among three warning signal indicators (none, buzzer, and speech) and three warning signal densities. Each operator was given two tasks: a self-paced tracking test and the guarding of 24 "Magic Eye" tubes. In a second experiment the speech indicator system was tested in a situation where there were additional speech communications. In a third experiment a buzzer was added to the speech annunciator. Effectiveness of speech and speech-plus-buzzer indicators are compared with effectiveness of a master buzzer warning indicator.
T. I. R 6

10,834
Crüger, E.M. & Huggins, W.H. CREATION OF PITCH THROUGH BINAURAL INTERACTION. *J. Acoust. Soc. Amer.*, May 1958, 30(5), 413-417. (The Johns Hopkins University).

10,834
To investigate the perception of pitch-like sound which occurs under certain conditions of binaural interaction as a function of a) band center, b) band width, and c) intensity, six subjects each were required to make forced-choice discriminations as to direction of change in pitch after each of 40 combinations of conditions (four pairs of band centers, five half band widths, two intensity levels, which were partially counterbalanced and randomized). Data for heterophasic noise are plotted as a function of the experimental variables, intensity, half band width and band center. Implications of the results for pitch perception models are presented.
G. I. R 4

10,835
McPhail, R.G. ANALYSIS OF LIGHT DISTRIBUTIONS FROM LINEAR SOURCE STREET LUMINAIRES. *Illum. Engng.*, April 1958, LIII(4), 193-202.

10,835
This paper presents a method for analysis of the light distribution from linear light sources using rectangular coordinates as an improvement over the present method which is based on circular coordinates. The latter system was judged suitable for describing the distribution from point sources in round luminaires. Problems incident to the determination of optimum distribution of illumination on a street are raised. Eight discussants consider pros and cons of the method in some detail.
G. I. R 3

10,836
Illuminating Engineering Society. LAMPS FOR AIRCRAFT LIGHTING. *Illum. Engng.*, April 1958, LIII(4), 211-212.

10,836
This is a table (revision of one published in 1950) which lists 55 lamps (landing, taxiing, interior and so forth) by application, gives trade numbers, Air Force, Navy or military standard numbers, and essential design data. It does not include all lamps available or used in aircraft lighting.

10,837
Illuminating Engineering Society. RECOMMENDED LIGHT CHARACTERISTICS OF POLYSTYRENE USED IN ILLUMINATION. *Illum. Engng.*, May 1958, LIII(5), 284-286.

10,837
This is a report of a subcommittee of The Light Control and Equipment Design Committee whose purpose was 1) to establish measuring methods and terminology acceptable to both lighting and plastics industry, 2) to recommend light characteristics for various plastics so correlation of measurable data would be made from materials conforming to basic recommendations, and 3) to determine and correlate data applicable to the prediction of behavior of plastics in lighting luminaires. Characteristics of thermoplastic polystyrene are considered here. Methods of testing, and recommendations for determining illumination characteristics are given.
T. I.

10,838
Comery, E.W. NEW DESIGN APPROACHES TO RESIDENTIAL LIGHTING. *Illum. Engng.*, June 1958, LIII(6), 291-299.

10,838
This paper discusses an overall method of design approach characterized by the author as closely related to a subjective appraisal. Goal of the design is a lighting plan closely integrated with the plan of living of the family and with structure of the house. Design approach and size, shape, placement, texture and color of the physical forms of the lighting elements (lamp base, shade, and so forth) are discussed. Principles are then illustrated with photographs and discussion of three living-dining rooms.
I.

10,839

Spencer, D.E. LUMINOUS CEILINGS WITH INCANDESCENT LAMPS. *Illum. Engng.*, June 1958, **LIII**(6), 300-306.

10,839

This paper discusses the use of luminous ceilings in the home, and compares incandescent and fluorescent lights in terms of advantages and disadvantages for this purpose. Luminous ceilings planned as part of renovation of a traditional home, and one placed in a modern kitchen are pictured and described. Tables showing distribution of light are included.

T. I.

10,840

Carson, T. CONTROL OF DAYLIGHTING WITH REFLECTING JALOUSIES. *Illum. Engng.*, June 1958, **LIII**(6), 337-340.

10,840

To (1) re-distribute light entering to the work plane 30 inches from the floor, (2) reduce brightness contrasts that existed in the field of view, (3) provide a convenient means of reducing total light in the room to permit use of visual aid equipment, and (4) reduce heat flow through the window wall of a lecture room reflecting-jalousies were installed in the window wall, outside of existing fenestration. Tables showing the comparative distribution of light between diffusing and non-diffusing glass conditions are included. Comments of a discussant are appended.

T. I.

10,841

Crouch, C.L. NEW METHOD OF DETERMINING ILLUMINATION REQUIRED FOR TASKS. *Illum. Engng.*, Aug. 1958, **LIII**(8), 416-422.

10,841

Previous methods of establishing levels of illumination required for various tasks and conditions are reviewed. The Blackwell Method of Determining Illumination Requirements for Visual Tasks is described in detail. Examples of the kinds of problems submitted by schools and industry to the Illuminating Engineering Society Committees are given and discussed in the hope they may aid the Committees in arriving at revised illumination recommendations based on the new Blackwell method.

G. I.

10,842

Illuminating Engineering Society. RECOMMENDATIONS FOR QUALITY AND QUANTITY OF ILLUMINATION. *Illum. Engng.*, **LIII**(8), 422-424.

10,842

A table which classifies 56 practical visual tasks (ten-point texttype, sample of ink writing, dark-raised threads on silk) in terms of difficulty as these relate to degrees of contrast is given which includes for each task: required brightness, reflectance, and required illumination. Instructions for use of the data are given, and an illustration of use of the method is included.

T.

10,843

Cornsweet, T.N., Fowler, H., Rabedeau, R.G., Whalen, R.E., et al. CHANGES IN THE PERCEIVED COLOR OF VERY BRIGHT STIMULI. *Science*, Oct. 1958, **128**(3329), 898-899. (Yale University).

10,843

To study the time course of perceived color changes at different wavelengths and light intensities, four subjects viewed a 15-degree circular field up to three minutes and indicated the color changes by a key press. (Both broad and narrow band stimulation with various parts of the visible spectrum were employed.) The time course of these hue changes was plotted as a function of stimulus intensity. The findings are compared to those in the literature and discussed briefly in terms of photochemistry.

G. R. 2

10,844

Muller, H.J. APPROXIMATION TO A GRAVITY-FREE SITUATION FOR THE HUMAN ORGANISM ACHIEVABLE AT MODERATE EXPENSE. *Science*, Oct. 1958, **128**(3327), p. 772. (Indiana University, Bloomington, Ind.).

10,844

This brief report describes in some detail relatively simple equipment which can be constructed to permit studies of the effects of weightlessness on the human organism. The relatively small cost of the apparatus recommends it for pilot studies in this area. The author suggests other questions which would be opened for investigation such as effects on free-fall tolerance.

10,845

Heath, G.G. LUMINOSITY CURVES OF NORMAL AND DICHROMATIC OBSERVERS. *Science*, Oct. 1958, **128**(3327), 775-776. (Indiana University).

10,845

To afford a basis for comparison of observers in terms of photopic luminosities as the basis for determining relative heights of luminosity curves of normal and color blind persons the present study employed equality of the critical frequency of flicker-fusion (not to be confused with flicker photometry) as criterion of equality of brightness. Nine normals, six deuteranopes, and five protanopes made critical flicker frequency judgments at each of 14 narrow spectral regions, for four frequencies each. Curves are shown for each and are shown as they compare with the Council of the Illuminating Engineering Society luminosity curve. Some implications of results for theory of color vision are presented.

G. R. 3

10,846

Stern, J. A SYSTEM OF NAMES FOR BINARY NUMBERS. *Science*, Sept. 1958, **128**(3324), 594-596. (National Bureau of Standards, Washington, D.C.).

10,846

The purpose of this report is to present a system of names that will permit expression of binary numbers in words, enabling even the newcomer to the field to "think binary" - that is, to facilitate visualization of the magnitudes expressed in binary notation without depending on decimal translation. To this end names are assigned each position value. For example, "ten" is "ap", "one-hundred" is "bru", and so forth. Examples of names, number names, and magnitudes are given.

T. I.

10,847

Gulledge, Irene S., Koomen, M.J., Packer, D.M., & Tousey, R. VISUAL THRESHOLDS FOR DETECTING AN EARTH SATELLITE. *Science*, May 1958, **127**(3308), 1242-1243. (USN Research Laboratory, Washington, D.C.).

10,847

Visual thresholds were obtained for a simulated earth satellite moving horizontally at angular rates characteristic of altitudes from 200 to 1500 miles against a stars and sky background. Thresholds were also obtained for the satellite when stationary and compared to those calculated from point sources. These thresholds (stellar magnitude) were plotted as a function of sky brightness with solar depression angle and apparent angular velocity also indicated on the abscissa and ordinate respectively. Examples of information that can be obtained from these curves are given.

G. R. 5

10,848

Garvey, W.D., Gulledge, Irene S. & Henson, Jean B. EFFECT OF LENGTH OF OBSERVING TIME ON THE VISUAL THRESHOLD FOR DETECTING A FAINT SATELLITE. *Science*, May 1958, **127**(3308), 1243-1244. (USN Research Laboratory, Washington, D.C.).

10,848

To investigate the reduction of an observer's ability to detect a faint satellite after protracted observation periods, visual thresholds were taken at the beginning and end of seven observation periods (five to 120 minutes long) on eight men trained on the satellite simulator apparatus. Differences in pre-watch and watch thresholds were plotted as a function of duration of the observation period. These threshold changes were discussed briefly as they relate to vigilance.

G. R. 1

10,849

Graham, C.H. & Heis, Y. COLOR DEFECT AND COLOR THEORY. *Science*, March 1958, 127(3300), 675-682. (Columbia University).

10,849

To investigate the questions (1) how is brightness sensitivity distributed in the spectrum for protanopes and deuteranopes, and (2) what colors do such persons see, actual energy thresholds in different parts of the spectrum to determine the light energy required at fovea threshold for a given portion of the spectrum were measured for seven normals, five protanopes, and six deuteranopes. Results are presented in terms of luminosity curves, and are discussed as they relate to theories of color vision. To investigate the question what colors do deuteranopes see, luminosity curves and color discriminations are plotted for a unilaterally color blind subject. Significance of these data for theory of color vision are discussed.

G. R 24

10,850

Rosenzweig, M.R. & Postman, L. FREQUENCY OF USAGE AND THE PERCEPTION OF WORDS. *Science*, Feb. 1958, 127(3293), 263-266. (University of California at Berkeley).

10,850

To answer the questions "What makes some words more intelligible than others?" and "How should groups of words be chosen for maximum intelligibility?" results from French and English studies all using the same technique to measure intelligibility (words presented one by one in the presence of a masking noise) are discussed. Results include intelligibility measured as a function of frequency of use, as related to length of list of text words, and as a function of length of word. These are discussed and interrelationships are presented graphically. A suggestion is made for a way in which more highly intelligible alphabet equivalents might be selected and 22 changes in the United States-British list were recommended.

G. I. R 9

10,851

Dye, E.R. & Smith, M.D. IMPACT PROTECTION WITH FOAM PLASTICS. *Mech. Engrg.*, Dec. 1958, 80(12), 65-67. (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).

10,851

To select a low-density cellular plastic to protect the head in impact, tests were conducted with the body attitude and angle of impact surface to flight path of the head varied to five positions in simulated automobile accidents. Mechanical properties of low energy foam as energy absorbers were compared with those of one and three-quarter pound per cubic foot polystyrene rigid forms. General conclusions are presented in two graphs.

G. I. R 6

10,853

Olmstead, P.S. RUNS DETERMINED IN A SAMPLE BY AN ARBITRARY CUT. *Bell Sys. Tech. J.*, Jan. 1958, XXXVII (1), 55-82.

10,853

Certain nonparametric measures for use in detecting the presence of assignable causes in experimental data are discussed, and the literature here is reviewed critically. Charts, tables, and formulas relating to sample arrangement distributions for runs above and below any selected and all possible cuts or demarcation values are presented. A simple application is discussed.

T. G. R 7

10,854

Sobel, M. & Huyett, Marilyn J. NONPARAMETRIC DEFINITION OF THE REPRESENTATIVENESS OF A SAMPLE—WITH TABLES. *Bell Sys. Tech. J.*, Jan. 1958, XXXVII(1), 135-161.

10,854

The problem of determining how large a random sample is needed to attain a preassigned probability that the sample will possess a certain degree of representativeness of the true, unknown distribution under study is dealt with by a nonparametric (distribution-free) solution. Definitions of representativeness and degree of representativeness are given and tables presented which give the sample size required to guarantee this preassigned probability. The formulas used in computing the tables are derived.

T. G. R 8

10,856

Gilmore, A.C., Gray, P.R. & Irving, W.S. NEW DEVELOPMENTS IN MILITARY SWITCHING. *Bell Sys. Tech. J.*, March 1958, XXXVII(2), 375-400.

10,856

A manual switchboard of advanced design which mechanizes many of the manual procedures is described in detail. Its features include: minimized call delays, considerable flexibility in size of switching center and rapid installation or dismantling of equipment.

10,857

Sheppard, D. READING FROM A DIAL WITH A MOVING POINTER. *Occup. Psychol.*, Jan. 1958, 32(1), 34-49. (University of Reading, England).

10,857

To show what differences occur between observers reading from the same dial where instrumental measurements have to be taken from scales with a moving pointer, three observers took readings from the same dial. Variations in technique for taking the observation were made over a series of seven experiments. Tables showing extent of observer agreement, bias between observers when taking the readings, interpretation errors by different observers with different methods, and errors in relation to position of the pointer are included. Scores are for the most part based on the mean variations between readings given by the three observers. Analysis of variance was used on these raw scores for comparison purposes.

T. G. I. R 10

10,858

McKinnell, A.C. WOOL QUALITY ASSESSMENT: ITS SENSORY AND PSYCHOPHYSICAL BASIS. *Occup. Psychol.*, Jan. 1958, 32(1), 50-60. (University of Glasgow, Glasgow, Scotland).

10,858

Two series of experiments are reported in this paper. To assess the relative importance of vision and touch, three groups of six subjects each were required to test a wool top against a series of samples for quality under each of three conditions of judgments: 'tactilevisual', 'vision-only', and 'touch-only'. In a further experiment visual discrimination between single fibers was tested. To examine the tenability of the Weber-Fechner law and the concept of subjective scale in the wool sorting context, a paired comparison experiment was carried out using nine subjects. Results from both series of experiments are discussed as they relate to previous work in the field.

T. G. I. R 13

10,859

de la Mare, G.C. & Shepherd, R.D. AGEING: CHANGES IN SPEED AND QUALITY OF WORK AMONG LEATHER CUTTERS. *Occup. Psychol.*, July 1958, 32(3), 204-209. (University College, London, England).

10,859

To test the hypothesis that slowing with increasing age is due more to increasing difficulty in perceiving and appraising the situation and making decisions than to declining manual dexterity and speed of movement, time study was applied to the cutter's task in three departments in a firm making a wide range and style of shoe. Records for three twelve week periods in each of the years 1954, 1955, and 1956, were taken for men between 25-65 years of age and graphs showing speed of working, leather savings and hourly earnings of men in different age groups are presented.

T. G. R 3

10,860

Glanzer, M. DIAGNOSTIC (TROUBLE SHOOTING) SKILLS AND THEIR EVALUATION. *Occup. Psychol.*, Oct. 1958, 32(4), 236-244. (USA: Walter Reed Institute of Research, Washington, D.C.).

10,860

Types of trouble-shooting proficiency tests, some advantages and disadvantages of these and a few brief illustrative descriptions are presented. New problems in this area due to increased complexity of systems and new techniques (for example mathematical analyses) developed to solve these problems are indicated. In particular, problems of using actual equipment are enumerated and special techniques here are described.

I. R 11

10,862
Forrest, D.W. INFLUENCE OF LENGTH OF TASK ON RATE OF WORK AND LEVEL OF MUSCULAR TENSION. *Occum. Psychol.*, Oct. 1958, 32(4), 253-257. (University of London, London, England).

10,862
Ten subjects performed three lengths of mental addition under each of three sets of instructions: fast as possible, easy speed for ten minute periods, and easy speed plus pressing a spring balance. Performance was measured in terms of mean time and forearm muscle tension per addendum. Variance analyses were performed on these data. The results are compared to earlier work and discussed briefly.
T. R. 11

10,863
Fraser, D.C. RECENT EXPERIMENTAL WORK IN THE STUDY OF FATIGUE. *Occum. Psychol.*, Oct. 1958, 32(4), 258-263. (Waterloo College, Waterloo, Ontario, Canada).

10,863
Based on the author's experimental work on fatigue, definition, techniques for measurement, and criteria thereof are presented. Results from some aircraft fatigue studies (for example, jet compared to piston-engine planes) are mentioned briefly. Application of these techniques to other areas (industry) is suggested.

10,864
Smith, W.G. TESTING TOMORROW'S SPACE PIONEERS. *Science Digest*, March 1958, 43(3), 10-16.

10,864
A popularized account of the numerous and often grueling tests men now are undergoing in order to prepare for human flight into space: research in space medicine increasingly long periods of time spent in simulated space flight conditions, studies in the effect of weightlessness on the human body, and so forth, is presented here. Partially solved and as yet unsolved problems are discussed.

10,865
Winchester, J.H. AMAZING "EYES" OF THE AIR FORCE. *Science Digest*, June 1958, 43(6), 25-29.

10,865
This article describes, in simple terms some of the equipment used by present day jet reconnaissance planes; for example, "Strip Cameras" which make horizon-to-horizon photographs, and "cartographic cameras". The method by which a technician analyzes a picture for detail in order to interpret it is described, and the function of photo reconnaissance in an hypothetical wartime mission is presented in some detail. Electronic and radar reconnaissance are mentioned.

10,866
Wassersug, J.D. HOW MUCH COLD CAN YOU STAND? *Science Digest*, Dec. 1958, 44(6), 13-17.

10,866
This is a popular presentation of recently acquired knowledge of and experience with the temperature regulating mechanism in the human body. After presenting dramatic instances of survival after extreme reduction of body temperature, the author traces the history and describes modern medical use of freezing in surgery. Suggestions are made for how to combat cold in case of exposure, and for care of persons so exposed.

11,000
Reich, L.M.W., Sperry, C.J., Jr., & Ray, J.T. EFFECT OF FLICKERING LIGHT ON HUMAN SUBJECTS. Contract DA-44-000 NSG-8448, Proj. 8-18-06-008, First Tech. Rep., March 1955, 41pp. Tulane University Station, New Orleans 18, La.

11,000
To investigate the role of flickering light upon the production of various sensations in human subjects, a total of ten subjects were exposed to a flickering light of varied frequency for a series of five minute trials. Subjective responses were recorded and analyzed with regard to type of sensation (e.g., hypnosis, nausea, etc.), as a function of intensity of flicker. The results are discussed in terms of the effects of flickering light upon mechanisms of consciousness and in the production of such sensations as twitchings, blinkings, etc.
T.

11,001
Richards, D.L., & Archbold, R. J. THE DESIGN AND ANALYSIS OF LOUDNESS EFFICACY MEASUREMENTS. Res. Rep. 14035, Nov. 1955, 9pp. Pratt Office Research Station, Dollis Hill, London, England.

11,001
This study compares the "quantal response" and the "hidden length" methods of making subjective judgments as applied to the assessment of loudness efficacy of telephone channels. Various experimental designs suitable for accurate assessment of loudness efficacy are presented and discussed. The relative efficacy of "quantal response" vs. "hidden length" method is discussed with regard to the convenience, ease of application, and precision of each of these methods.
T. R. 8

11,002
Muller, E.A., & Reich, J.J. DIE FORTLAUFENDE REGISTRIERUNG DER PULSFREQUENZ BEI BERUFLICHER ARBEIT. (THE CONTINUOUS RECORDING OF PULSE-FREQUENCY DURING OCCUPATIONAL WORK). *Arbeitsphysiologie*, 1955, 14(2), 137-146. (UDC 613.72:612.14:53.087.6, Library Translation 509, Dec. 1955, 8pp. Royal Aircraft Establishment, Ministry of Supply, Farnborough, Hants, England).

11,002
Equipment and methods for the continuous recording of pulse rates over many hours of physical work are described. The development of a lightweight assembly, a clamp with a photo-cell and lamp that may be supported by the earlobe, is detailed. The construction details are briefly described.
G. I. R. 7

11,004
George Washington University. THE EFFECT OF ENVIRONMENT ON MILITARY OPERATIONS. Contract DA 22 079 ENG 141, Proj. 8 97 10 001, 8 97 10 002, June 1955, 14pp. George Washington University, Washington, D.C.

11,004
This is a brief report of progress on a research project, the objective of which is to evaluate the effects of environment on military operations in various theaters of action in World War II. Army records such as journals, operations reports, histories, after-action reports, and the like, are the source materials for information which is coded according to a 19-component system and fed into a "mechanical-memory" system and stored for future evaluation. A pilot study, using a limited amount of information, is described to illustrate the way in which analyses will proceed when all the data are stored.
T. G.

11,005

Isbell, J.R., & Wagner, F.J. MILITARY EVALUATION AND STATISTICAL DECISION. 2A Proj. 32886013, Ordnance Proj. 125-0102, Mono. Rep. 1014, June 1956, 37pp. Ballistic Research Laboratories, Aberdeen Proving Ground, Md.

11,006

In this discussion of military evaluation and statistical decision, the authors propose the development of a military decision theory analogous to the hypotheses rather than statistical methods. State variables would play an essential role in such a theory. Accordingly, two state variables are discussed along with the basic problem of decision, confidence (one of the state variables), conviction, propaganda problems, etc.

R 3

11,006

Neely, K.K., & Reek, B.J. ACOUSTIC PROPERTIES OF HEADGears: IV. EAR PROTECTION DEVICES. DND Proj. 100, Rep. 100-5, FCC D77-02-30-04, June 1956, 17pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

11,006

To assess the acoustic characteristics of various ear-protection devices, bilateral hearing threshold test procedures were employed over the frequency range of 100 to 8000 cycles per second. Open-ear thresholds were first determined followed by measurements obtained with the subjects wearing each type of ear-protection device in turn: Sound Shield Helmet, Selective Ear Muffs, General Turtleneck Headband Type SA-4 Ear Protector, General Turtleneck Headband Type SA-2 Ear Protector, and the NBC Ear Defender Cushion. The results were analyzed in terms of efficiency of sound attenuation for each device.

G. I. R 5

11,007

Thackray, R., & Cloonan, T. A PRELIMINARY INVESTIGATION OF THE PRACTICAL SIGNIFICANCE OF INTELLIGIBILITY DIFFERENCES BETWEEN RESPIRATORS FIELD ARTILLERY OPERATIONS. Contract DA-18-108-CHL-4037, Rep. 14, Aug. 1955, 12pp. Purdue University.

11,007

To determine relative intelligibility characteristics of three military respirators (Field Protective Masks M-9, E-13, and M-9 with E-20 Voice-mitter) under field conditions, a simulated combat exercise involving two field artillery gun crews and their executive officer was conducted. The executive officer read the specially devised artillery practice problems for each of three mask conditions to the two crew chiefs who, in turn, relayed them to the gunners. All commands were without benefit of electronic amplification and with a noise background. Total elapsed time for each problem and number of errors made in communicating the problems were compared for each mask. The results are related to laboratory findings.

T. I.

11,008

Verplanck, W.S. (Dir.). RESPONSE MECHANISMS AT THE VISUAL THRESHOLD: A METHODOLOGICAL STUDY. FINAL REPORT. JUNE 1955. Contract NSGRI 07639, Proj. NR 140-015, 31, June 1955, 6pp. Psychological Labs., Harvard University, Cambridge, Mass.

11,008

This is a final report on a methodological study of response mechanisms at the visual threshold. A brief summary of activities since the last report (1955) is given and current status of experiments outlined in that report are described. A list of publications, articles in press or submitted for publication, articles in preparation and research completed or terminated with no report anticipated is given.

R 19

11,009

Crane, J., Mason, F.B., Hunsdell, W., III, & Silber, J. AIRLINE AIRCRAFT REQUIREMENTS AS DETERMINED BY MALFUNCTIONS AND FOREIGN MAINTENANCE CHARACTERISTICS. Operations Analysis Rep. 25-1, AFMTC-25-05-0, Oct. 1955, 35pp. Operations Analysis Office, Air Force Missile Test Center, Patrick AFB, Fla.

11,009

To determine the number of aircraft necessary to operate a specific airline needed by the Air Force Missile Test Center, the problem was analyzed mathematically as a stochastic "birth and death" process. Assumptions for the mathematical model and detailed solution of the problem are presented. The parameters (rates of malfunction and periodic inspection, duration of repair intervals and inspections, and flying hour rate) are discussed in relation to the specific situation at Air Force Missile Test Center. General curves are given that enable calculation of number of aircraft needed for other conditions than the sample shown.

T. G. I. R 4

11,010

Klauer, R.W. SOME ACCLIMATIZING RESPONSES OF MAN TO PROLONGED COLD EXPOSURE. Proj. 8-7951, Rep. 1, Nov. 1955, 30pp. Arctic Aeromedical Laboratory, Alaskan Air Command, Ladd AFB, Alaska.

11,010

This study of the acclimatizing effects of prolonged cold exposure employed four subjects who spent three and one half weeks in a test laboratory at Fort Belvoir, Alaska. A number of variables including skin and rectal temperature, oxygen consumption, plasma volume, etc., were measured before, at the midpoint, and following the field exposure to cold. The relative acclimatizing effects reflected by these measures are discussed in terms of the probable physiological mechanisms and endocrine-muscular factors involved in the adjustment of acclimatization.

T. G. R 2000

11,011

Hewes, D. ON THE RELATION BETWEEN THE INTELLIGIBILITY AND FREQUENCY OF OCCURRENCE OF ENGLISH WORDS. J. Acoust. Soc. Amer., Feb. 1957, 29(2), 296-305. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

11,011

To investigate the effect of word frequency and word length on the intelligibility of spoken words, 279 words for experimental use were selected from the Long Magazine Count: frequencies (number of occurrences) in approximately equal ratios (decimal multiples of 1, 2, and 5) and lengths (number of letters) for odd numbers from 1 to 21. One speaker recorded the words (four lists) with speech-to-noise ratios from -9 to +20 decibels. A panel of five listeners responded by writing the word they heard. Critical speech-to-noise ratios (ratios at which a proportion P of the pooled words were correctly reported) were analyzed. Implications for intelligibility testing procedures are discussed.

T. G. R 26

11,012

Westheimer, G. RETINAL LIGHT DISTRIBUTION FOR CIRCULAR APERTURES SEEN IN MAXWELLIAN VIEW. Contract MONR 495 (09), Proj. NR-143-105, RF Proj. 654, Tech. Rep. 2, May 1957, 9pp. Ohio State University Research Foundation, Columbus, Ohio.

11,012

This paper presents a theoretical analysis of the effect of the size of the pupil of the eye on the intensity distribution in retinal images of circular apertures seen in Maxwellian view. Diffraction patterns in the plane of the pupil are described in terms of aperture size. Amplitude and intensity distributions are evaluated for a given aperture diameter for various pupil sizes and for various aperture diameters for a given pupil size. The effect of these on resolution is discussed and some applications of the results are indicated.

G. I. R 5

11,013

Tye, M. PHILOSOPHY OF AWARENESS. Rep. 59, Aug. 1956, 14pp. Advisory Group for Aeronautical Research & Development. NATO, Paris, France.

11,013

The concept of awareness is defined in terms of the contribution which the aircraft makes to flight safety. The role of various safety factors as they relate to awareness are discussed and a distinction is drawn between accident rate and accident probability. Reference is also made to the problem of aircraft design.

T. G.

11,014

Glanzer, M. & Glaser, R. PERFORMANCE CHARACTERISTICS OF THREE TYPES OF NAVY TEAM. Contract N70NR 37008, NR 154 079, AIR 26 57 FR 152, May 1957, 47pp. American Institute for Research, Pittsburgh, Penn.

11,014

To obtain information concerning specific difficulties of Navy teams during their course in training, observations were made on over 500 Combat Information Center (CIC), Ship Control, and Gunnery teams. Kinds of errors; corrective procedures used; and overall ratings of morale and efficiency were analyzed for: 1) types of activity in each team contributing most heavily to occurrence of errors; 2) relation between position making the errors and position correcting error and the correspondence with standards; 3) team efficiency in corrective procedures; and 4) relation of morale to efficiency. Recommendations concerning the training of teams are presented.

T. R 14

11,015

Glanzer, M. & Glaser, R. TECHNIQUES FOR THE STUDY OF TEAM STRUCTURE AND BEHAVIOR. PART I: ANALYSIS OF STRUCTURE. Contract N70NR 37009, NR 154 079, AIR 26 57, FR 153, June 1957, 47pp. American Institute for Research, Pittsburgh, Penn.

11,015

This paper examines work in the area of sociometry that is considered to be relevant to the study of the structure of task-oriented groups or teams. The emphasis is on communication structure referring to a relationship or set of relationships in a group and meaningful indices or measures. Sociometric techniques considered here are primarily mathematical and are treated under these headings: indices (group, subgroup, individual); enumeration of structures; comparison of groups; analysis of subgroups; assignment of individuals in subgroups; graph theory; and logic of relations.

T. I. R 46

11,016

Glanzer, M. & Glaser, R. TECHNIQUES FOR THE STUDY OF TEAM STRUCTURE AND BEHAVIOR. PART II: EMPIRICAL STUDIES OF THE EFFECTS OF STRUCTURE. Contract N70NR 37008, NR 154 079, AIR 26 57 FR 154, June 1957, 35pp. American Institute for Research, Pittsburgh, Penn.

11,016

This paper presents a critical discussion of laboratory studies of the behavior of groups and group structures of communication networks (a group of individuals with a set of specified communication channels). The period covered is from 1948 through 1957. Implications of these studies for investigation of structures in task-oriented groups are discussed.

T. I. R 20

11,017

Jerison, H.J., Cransell, C.W., & Pownall, Dorothy. ACOUSTIC NOISE AND REPEATED TIME JUDGMENTS IN A VISUAL MOVEMENT PROJECTION TASK. Proj. 7193-71816, WADC TR-57-54, March 1957, 24pp. Aero Medical Lab., WADC, AFSC, Wright-Patterson AFB, Ohio. (Miami University).

11,017

To investigate the effect of noise on time judgments, four groups (50 subjects) worked on a visual projection task in which a moving target disappeared and a guess had to be made as to when the target was under a crosshair. Noise was at a high level (110 decibels) either during the visible or invisible periods for two groups and either high throughout or at a masking level (70) for two groups. Each subject worked individually, repeating his task for ten successive trials. Measured judgment times were analyzed as functions of noise and successive trials. The results are discussed in relation to other findings on the effect of noise on performance.

T. G. R 12

11,018

McQuire, J.C., & Kraft, C.L. REACTION OF SIX RADAR AIR TRAFFIC CONTROLLERS TO CONFERENCE CONTROL OF TARGETS SIMULATED ON A 19-INCH HORIZONTAL DISPLAY. Contract AF 33(616)-3612, Proj. 7192, Tech. Rep. 56-542, Dec. 1956, 7pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Ohio State University and OSU Research Foundation).

11,018

This study was designed to assess the qualitative reactions of air traffic controllers experienced in vertical displays to a horizontal control system. Six experienced controllers operated a 19-inch horizontal display (with simulated targets) for a minimum of two hours and then completed a questionnaire. The results are presented in the form of a summary of the opinions expressed concerning such aspects of the display as size, ease of vectoring, operator fatigue, conference control, etc. The overall reaction, its implications for the assumption of preferences concerning vertical versus horizontal displays, and specific problems in the horizontal display are discussed.

11,019

Schipper, L.M. & Versace, J. PREDICTIONS OF ARRIVAL SEQUENCES OF SIMULATED RADAR TARGETS AS A FUNCTION OF DISPLAY SIZE, TARGET SIZE, AND TARGET SHARPNESS. Contract AF 33(616) 3612, Proj. 7192, WADC TR 56 72, Nov. 1956, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University).

11,019

This experiment investigated the ability of observers to judge which of two aircraft, displayed on a simulated cathode ray tube, would arrive at a fixed reference line first. Aircraft trails were represented by equally bright blips. The experimental variables were simulated display size, blip size, and blip sharpness. A range of traffic situations was provided. Several thousand measurements on each of four observers were taken in counter-balanced order over 16 sessions using the method of constant stimulus differences.

T. G. I. R 7

11,020

Meyers, H.C., Daniels, G.S., Churchill, E., & Roelke, Norma S. BODY DIMENSION CHANGES DURING BASIC TRAINING. Contract AF 33(616)-3841, Tech. Rep. 56-456, Dec. 1956, 29pp. Aero Medical Laboratory, WADC, Wright-Patterson AFB, Ohio. (Aero Medical Laboratory & Antioch College).

11,020

To determine the effects of Air Force basic training upon the bodily dimensions of the trainees, an anthropometric survey blank was utilized with approximately four hundred male and female airmen. Ten bodily dimensions were measured weekly for a period of twelve weeks. A correlational analysis of the resultant data was conducted to determine whether changes would be sufficiently consistent to permit prediction of change in clothing size. The degree of variation and types of relationships among the changes in bodily dimensions are discussed with regard to their negative implications for obtaining a predictive measure of change in clothing size.

T. G. R 5

11,021

Bartle, R.M., Shoro, V., & Gerlough, D.L. STARTING DELAY AND TIME SPACING OF VEHICLES ENTERING SIGNALIZED INTERSECTIONS. Highway Res. Board Bull. 112, Reprint 42, 1956, 33-41. (Institute of Transportation and Traffic Engineering, University of California at Los Angeles).

11,021

To study some specific quantities involved in a proposed formula for optimum timing of traffic signals, starting delays (time in seconds required for first vehicle to enter intersection after green signal appears) and time spacings (average time headway in seconds between successive vehicles in an entering platoon) were measured at thirteen heavily traveled intersections. Observations were made on five consecutive weekdays by five observers. Analysis of the data was in terms of variability of the parameters from intersection to intersection and from day to day at the same intersection. These values were related, where possible, to physical and traffic conditions. The use of these parameters in determining signal timing is discussed.
T. G. R. 6

11,022

Bartle, R.M. EFFECT OF PARKED VEHICLE ON TRAFFIC CAPACITY OF SIGNALIZED INTERSECTION. Highway Res. Bd. Bull. 112, 1956, 42-52. (Stone and Youngberg, San Francisco, Calif.).

11,022

To evaluate the effect of parked vehicle on traffic capacity of signalized intersection, a single car was parked at the curb at distances of 55 and 100 feet from intersection stop line. Numbers and time of entrance of cars into the intersection without a parked car and with the parked car were recorded by a single observer on four different days during periods of overloaded traffic conditions. Data were gathered for 81 signal light cycles for each condition and analyzed for differential effects of parked car versus no parking, distances of parked car, and first half versus last half of light cycle. Practical implications of the findings are discussed.
T. G. I. R. 2

11,023

Gerlough, D.L. OPERATION OF THE "VOLUME-DENSITY" VEHICLE-ACTUATED TRAFFIC SIGNAL CONTROLLER. Traffic Engng. Mag., July 1953, 6pp. (Institute of Transportation and Traffic Engineering, University of California at Los Angeles).

11,023

This report describes the operation of the "Volume-Density" vehicle actuated traffic signal controller. The instrument is a form of analog computer which establishes the signal cycle on the basis of traffic demands of the intersection at the time. It takes into account the number of cars waiting against the red signal, length of time waited by first vehicle, and instantaneous volume of traffic on the green signal phase (or volume density). In addition to an explanation of the general operation of the controller, circuit details with diagrams are given.
T. G. I. R. 1

11,024

Pipes, L.A. AN OPERATIONAL ANALYSIS OF TRAFFIC DYNAMICS. J. appl. Physics, March 1953, 24(3), 274-281. (Dept. of Engineering, University of California at Los Angeles).

11,024

This is a mathematical study of the dynamics of a line of traffic composed of n vehicles. The assumption is made that the movements of the vehicles are controlled by an idealized "law of separation" (each vehicle maintains a certain prescribed "following distance" from the preceding vehicle and that this distance is the sum of a distance proportional to the velocity of the following vehicle and a certain given minimum distance of separation when the vehicles are at rest). Differential equations governing the dynamic state of the system are obtained by application of the law to the motion of a line of vehicles. Solutions of the dynamical equations for several types of movement of the lead vehicle are obtained by the operational or Laplace transform method.
T. G. I. R. 19

11,025

Marbarger, J.P. (Ed.). SPACE MEDICINE. THE HUMAN FACTOR IN FLIGHTS BEYOND THE EARTH. 1951, 83pp. University of Illinois Press, Urbana, Ill. (College of Medicine, University of Illinois).

11,025

This symposium includes papers on multi-stage rockets and artificial satellites (description, problems encountered in construction, potential applications and so forth); physiological considerations on the possibility of life under extraterrestrial conditions (chiefly as related to temperature and oxygen); astronomy and space medicine (astronomical and astrophysical problems); orientation in space (expected usefulness of vestibular, kinesthetic and visual components of the "space orienting mechanisms") and the bioclimatology of manned rocket flight.
G. I. R. 24

11,026

Haber, H., Brenner, R., & Hulbert, S. PSYCHOLOGY OF TRIP GEOGRAPHY. Highway Res. Board Bull. 91, Reprint 35, no date, 20pp. (Institute of Transportation and Traffic Engineering, University of California at Los Angeles).

11,026

To explore possible causes of highway accident focal points in terms of driver behavior, a deductive analysis is made of a specific section of a Federal highway. A concept is developed called "psychology of trip geography" which demonstrates that known psychological behavior patterns can combine with the geography of the area over which a particular trip is planned to produce driver conditions conducive to accidents. Some of the psychological behavior patterns considered are: level of aspiration, rigid adherence to previously made plans, and general performance let-down incident to nearing a goal. Reduced tactile sensitivity, highway hypnosis and hypoxia are demonstrated to fit into the concept as causative factors. Plans for a statistical analysis of accidents are appended.
T. G. R. 31

11,027

Mathewson, J.H. AUTOMOBILE IMPACT RESEARCH. National Safety Council, 1954, 28, 93-101. (University of California).

11,027

The application of human engineering knowledge to automobile design for the purpose of minimizing its injury producing potential forms the basis for this paper. Specific crash safety problems of automobile design together with suggested solutions are discussed: Design for force moderation, engine location and mounts, steering wheel, instrument panel, seats and anchorage, and trunk compartment. The interaction of the motorist with his vehicle and environment during a collision is discussed. Safety belts and driver attitude toward them are evaluated. The need for automobile crash injury research is emphasized.
R. 15.

11,028

Tolhurst, G.C. THE RELATIONSHIP OF SPEAKER INTELLIGIBILITY TO THE SOUND PRESSURE LEVEL OF CONTINUOUS NOISE ENVIRONMENTS OF VARIOUS SPECTRA AND OCTAVE-BAND WIDTHS. Prepared under Contract N6onr-22525, Proj. NR 145-993, Rep. 69, March 1957, 12pp. USN School of Aviation Medicine, Pensacola, Fla.

11,028

To determine the effects of ambient noise spectra (six tilted and six octave-band noises) upon the speech efficiency of talkers, each spectrum was presented at six sound pressure levels (42 through 125 decibels). Constant level recordings were made of 48 speakers (lists from Multiple-Choice intelligibility tests) in the noises and these were subsequently played back to panels of listeners. Mean speaker intelligibility data were studied by analysis of variance testing speech score differences attributable to spectra and sound pressure level.
T. G. R. 9

11,029

Miller, J.W., & Ledwith, E. AN ANALYSIS OF CERTAIN FACTORS INVOLVED IN THE LEARNING PROCESS OF DYNAMIC VISUAL ACUITY FOR 1000 NAVAL AVIATION CADETS. Prepared under Contract Nonr-566(00), Proj. NM 17 01 99, Rep. 13, April 1957, 8pp. USN School of Aviation Medicine, Pensacola, Fla.

11,029

To examine certain aspects of the learning process of dynamic visual acuity, 1000 naval aviation cadets were tested. Five successive thresholds were established at 20 degrees per second and ten at 110 degrees per second angular velocity of test object. Observed means (minutes of arc) were analyzed as a function of number of trials. Comparisons were made of the data for the 100 best, the 100 poorest, and the entire group of 1000. The results were put into a semi-empirical equation descriptive of the data. The value of the findings for selection and training of naval aviators is discussed.
T. G. R 8

11,030

Buskirk, E.R., Dee, T.E., Welch, B.E., Levy, L.W., & Consoazio, C.F. CALORIC INTAKE ASSOCIATED WITH PROLONGED HAND WORK IN THE COLD. Proj. 7-83-01-004C, Tech. Rep. RP-58, May 1957, 24pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,030

To obtain information concerning "maximal" caloric requirements for men existing on a self-sufficient basis in the Arctic and performing hard work for extended periods, caloric intake, fluid balance, and body composition were studied in a group of 26 men during a 28-day stay at Fort Churchill, Manitoba, Canada. Seven days were spent preparing for bivouac and the remaining time was spent in a moving bivouac. Camp was broken and established each day and equipment hauled on sleds for nine to twelve mile per day. Data were collected and analyzed for changes in body weight, body density, food consumption, nitrogen balance, water balance, sweat loss on trail, physical performance, and energy expenditure.
T. G. R 23

11,031

Blake, D.O., & Howat, M.R. UNIVERSAL RADAR SIMULATOR. Rep. 219-1, Nov. 1956, 8pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

11,031

This report describes a piece of equipment, similar to a Plan Position Indicator (PPI) radar repeater, that is used to display synthetic information on various display tubes ranging in size from 5 to 24 inches. The capabilities, operating procedure, and circuit theory are described along with corresponding diagrams and schematics.
T.

11,032

Sanders, Virginia L., Cohen, J., & Arginteanu, Mary. THE EFFECTS OF ABSOLUTE AND CONDITIONAL PROBABILITY DISTRIBUTIONS ON INSTRUMENT READING: II. A COMPARISON OF A LINEAR AND A LOG-ARITHMIC SCALE. Contract AF 18(600)-50, Proj. 7186, WADC TR-54-253, Part 2, July 1955, 33pp. Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio. (Antioch College).

11,032

To compare the readability of a logarithmic and a linear scale, sixteen subjects were given preliminary training and then tested. Variables, in addition to scales, were: distribution of pointer settings (one skewed and one approximately rectangular), and order of presentation of settings (regular ascending or descending progressions and random). The stimuli were presented tachistoscopically for exposures of 0.8 second and each subject was tested under every condition. The results expressed in terms of total error in scale units and total angular error in response were studied by analysis of variance for differences due to scales, distributions and orders of settings. Recommendations for appropriate use of the logarithmic scale are made.
T. G. I. R 9

11,033

Burns, W. & Littler, T.S. CONSERVATION OF HEARING IN OCCUPATIONAL NOISE. OPERATIONAL EFFICIENCY SUB-COMMITTEE HEARING PANEL. RNP 57/081, CES 292, HP 7, Oct. 1956, 7pp. Operational Efficiency Sub-Committee, RNFEC, London, England.

11,033

This report presents a suggested specification of maximum sound pressure levels in seven frequency bands for avoidance of occupational deafness. Permissible ambient noise with ear protection is also specified. Other alternatives such as shorter equivalent periods of exposure are discussed. The tentative nature of the suggestions is pointed out.
T. R 4

11,034

Du Mas, P., & Worthel, P. THE INFLUENCE OF THE SPATIAL CONTEXT ON THE RELEARNING OF A ROTATED PERCEPTUAL MOTOR TASK. J. gen. Psychol., 1956, 54, 65-80. (University of Texas).

11,034

To investigate the effect of alteration in spatial context on relearning a rotated stylus-maze problem, 40 subjects were assigned randomly to two groups. All subjects learned two stylus mazes (a multiple T-maze and an irregular maze) to a criterion of two errorless trials. Group I learned the T-maze first; the maze was rotated 180 degrees and was relearned. They then learned the irregular maze, took a rest on the opposite side of the maze and relearned it in the new position. The procedure for Group II was reversed. Error scores were analyzed for differences between groups on initial learning, between maze-rotated and subject-rotated relearning and between relearning on the two types of maze.
T. G. R 19

11,035

Blake, R.R., Rhead, C.C., Wedge, B., & Mouton, Jane S. HOUSING ARCHITECTURE AND SOCIAL INTERACTION. Sociometry, 1956, 19(2), 133-139. (University of Texas).

11,035

To investigate relations between internal differences in the architecture of military barracks and social interactions among occupants, recruits undergoing the same standard training program, half of whom lived in open and half in closed cubicle barracks, were studied. An interaction questionnaire (number of acquaintances, knowledge of bunk location, degree of interaction with acquaintances during free periods, and buddy preferences) was administered to occupants of three open and three closed barracks (approximately 350) upon completion of the sixth, eleventh, or fourteenth day of training. The data were analyzed for effects of type of barracks and length of training on social structure.
T. R 4

11,036

Holtzman, W.H., & Bitterman, M.E. A FACTORIAL STUDY OF ADJUSTMENT TO STRESS. J. abnormal soc. Psychol., 1956, 52(2), 179-185. (University of Texas).

11,036

To search for common factors in a variety of measures believed on the basis of previous research to be of value in the prediction of adjustment to stress, 135 subjects (Air ROTC cadets) were given a series of individual and group tests. The variables selected for analysis were derived from ratings of personality and officer aptitude, objective and projective personality tests, measures of performance in stressful situations, the conditioning of galvanic skin response, perceptual tests, and analysis of urinary components. Test intercorrelations were computed and analyzed by Thurstone's centroid method of factor analysis. Factors thus derived were defined and discussed in relation to predictive values.
T. R 21

11,037
Harbold, G.J. PITCH RATINGS OF VOICED AND UNVOICED VOWELS. Prepared under Contract N6onr-22525, Proj. Designation NR 145-993, Balled & Surg Proj. NM 18 02 99, Subtask 1, Rep. 67, Feb. 1957, 6pp. USN School of Aviation Medicine, Pensacola, Fla.

11,037
To investigate the relative pitch of voiced and unvoiced speech, four trained speakers recorded 132 pairs of vowels (12 vowels paired to effect all combinations with each vowel represented in both initial and final position) in both types of speech. Listeners (69) responded to the paired signals by indicating which of each pair sounded higher in pitch. Data were tested by a paired comparisons method and rank order correlation. The results are discussed in terms of factors that determine pitch judgments.
T. G. R 4

11,038
Peters, R.W. A RATING SCALE TECHNIQUE FOR THE MEASUREMENT OF SPEAKER INTELLIGIBILITY. Prepared under Contract N6onr-22525, Proj. Designation NR 145-993, Joint Proj. NM 18 02 99, Rep. 66, Subtask 1, Feb. 1957, 6pp. USN School of Aviation Medicine, Pensacola, Fla.

11,038
To evaluate the technique of measuring speaker intelligibility through listener ratings of voice samples on an equal-appearing intervals scale, recordings were made (24 speakers) of multiple-choice intelligibility word lists and selected prose materials. Ten second voice samples were prepared from the prose reading. The word lists were played for seven listener panels (20 persons each) and a percent intelligibility score obtained. The voice samples were played under various signal-to-noise ratios (+5, 0, -5 decibels) to the panels and a scale value intelligibility score obtained. The scores were correlated to provide an estimate of validity and analysis of variance was used to test significance of differences for noise conditions.
T. R 5

11,039
Tolhurst, G.C. THE EFFECTS OF DISRUPTING THE SIMULTANEITY OF VISUAL-AURAL COMMUNICATION CHANNELS TO A SPEAKER. Prepared under Contract N6onr-22525, Proj. Designation NR 145-993, Joint Proj. NM 18 02 99, Subtask 1, Rep. 66, Dec. 1956, 9pp. USN School of Aviation Medicine, Pensacola, Fla.

11,039
To investigate the effects of a lack of synchrony between the visual and aural communication channels to a speaker, 48 subjects individually received messages in a face-to-face situation with the reader. For half the subjects the aural channel was delayed 0.23 seconds from that of the visual. The speakers repeated each message as soon as it was heard to a panel of listeners who heard only the speaker, not the reader. Mean percent intelligibility scores, mean sound pressure level in decibels of speakers voice, and mean duration in seconds of the messages were studied by analysis of variance for effect of delayed aural signal on the speech signal.
T. R 12

11,040
Churchill, E., Kuby, A. & Daniels, G.S. NOMOGRAPH OF THE HAND AND ITS RELATED DIMENSIONS. Contract AF 33(616) 3841, WADC TR 57-198, April 1957, 49pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

11,040
This report brings together actual dimensions of the hand and interrelationships among these dimensions. Dimensional data for the hands of both male and female USAF personnel are summarized in tabular and graphic form. Intensities of the interrelationships within each of the two groups of dimensions are given in the form of tables of correlation coefficients. A series of tables supplies estimates of the other dimensions for the appropriate ranges of values of hand length, hand breadth at metacarpale, hand breadth at thumb, and fist circumference. Nomographic charts are presented for estimating the related dimensions of likely combinations of hand lengths and breadths.
T. G. I. R 9

11,041
Harber, G.S. THE INTERRELATION OF VERNIER AND STEREOSCOPIC ACUTIES IN THE MAKING OF AN EQUIDISTANCE JUDGMENT. Proj. 6-95-20-001, Rep. 278, May 1957, 25pp. USA Medical Research Lab., Fort Knox, Ky.

11,041
To study the interrelation of vernier and stereoscopic acuities in depth discrimination, retinal stimulation combining variable ratios of vertical displacement of horizontal edges to lateral displacement of vertical edges in the relative depth adjustment of two panels was generated through varying the display slope surface (from 25 to 200 mills). The binocular depth acuity for equidistance adjustment of the panels with angle of slope was derived by trigonometric and probability considerations from vernier acuities obtained for monocular viewing and an estimate of stereoscopic acuity obtained under a no-slope condition (26 subjects). These findings are considered in relation to similar acuities obtained for binocular viewing under field conditions.
T. G. I. R 24

11,042
Miller, K.S., & Worchel, P. THE EFFECTS OF NEED-ACHIEVEMENT AND SELF-IDEAL DISCREPANCY ON PERFORMANCE UNDER STRESS. J. Pers., 1956, 25 (2), 176-190. (University of Texas).

11,042
To investigate the effect of interaction between need-achievement and the individual's evaluation of the adequacy of past responses to threat on performance under stress, 98 subjects were assigned to nine groups. High, medium, and low groups were formed on the basis of a need for achievement test (McClelland); these were further subdivided into high, medium, and low self-ideal discrepancy groups on the basis of the Self Activity Inventory (Worchel). The McKinney Reporting Test served as a measure of performance under stress (threat of failure induced by telling subject he is failing to meet standards). Performance scores for pre-stress, stress, and post-stress periods were analyzed for differences among the various groups.
T. R 13

11,043
Senders, J.W., & Bradley, J.V. EFFECT OF BACKLASH ON MANUAL CONTROL OF PITCH OF A SIMULATED AIRCRAFT. Proj. 7182-71555, WADC TR-56-107, March 1956, 4pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,043
To investigate the effects upon flight of "nonkinesthetic" backlash in which no accelerative forces were operating, five subjects operated a simulated aircraft in pitch with various amounts of simulated backlash in the control system. Each subject performed for five sessions with five one-minute trials for each of five backlash conditions (from zero to 1.83 degrees of stick movement). Their integrated error, generated in attempting to compensate for an external disturbance, was analyzed as a function of backlash. Implications of the findings in the fields of control and trainer design are discussed.
T. G.

11,044
Jenkins, W.L., & Karr, A.C. THE INFLUENCE OF VIEWING DISTANCE IN MAKING SETTINGS ON A LINEAR SCALE. Contract AF 18(600)-24, Proj. 7182, Task 71512, Tech. Note 55-204, Nov. 1955, 9pp. Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio. (Lehigh University).

11,044
To determine the influence of viewing distance on optimal ratios when making settings on linear scales, a series of experiments were performed. Distance between the operator and a ten-inch scale were varied (14, 36, 72, and 144 inches) by changing length of control shaft. A control knob (2-3/4 inches) was used to move pointer to a designated setting within a tolerance of .050 inch; travel distances were one or 4-1/2 inches. Twelve subjects performed under these conditions. For another experiment all conditions were perceptually proportional at viewing distances of 14 and 144 inches. Fifteen subjects were tested. Adjusting time and travel time are analyzed for effect of the various conditions.
T. G. R 1

11,045

Metzger, R.L. & West, E.D. A FEEDBACK SYSTEM FOR HUMAN ERROR INFORMATION. Contract AF 29(601) 124, Proj. 7800, AFSCMTR-55 12, Aug. 1955, 16pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

11,045

This report is based on the assumptions that reliability of special weapons systems can be increased through reduction of human errors and that reduction can be accomplished through a continuous flow of error data from operational sites to a central agency for evaluation and correction. A study of present practices in reporting was made to establish the frequency and consistency of human error reports within the Air Force. A field tryout of a special human error report form was conducted at an operating site for a three-week period. An analysis of the results led to a recommendation for a reporting system.

I.

11,046

Eckhardt, R.T., Hedberg, R.D., & Meade, R.D. HUMAN ENGINEERING ASPECTS OF RECOILLESS RIFLE DESIGN I: M18 AND T66 SERIES. Proj. T34-4018, Rep. R-1295, Human Engng. Rep. 8, Nov. 1955, 24pp. Pittman-Dunn Labs., Frankford Arsenal, Philadelphia, Penn.

11,046

This investigation was concerned with an examination of 57 millimeter shoulder-fired recoilless rifles (M18A1 and T66E2) from the standpoint of design for optimal use by human operators. Design features were considered in terms of operation by both the gunner and assistant gunner (loader), drawing upon pertinent literature and actual manipulative tests. Evaluation included portability and operational effectiveness, with particular attention given to anthropometric measurements, comfort, naturalness of motions involved, and general efficiency of perceptual-motor relationships of weapon operation. The findings, suggestions, and recommendations were formulated with the intention of minimizing other engineering problems concerned with the design of these rifles.

T. I. R 13

11,047

Gough, M.N. (Mod.). REPORT OF PRESENTATIONS AND GENERAL DISCUSSIONS AT THE MID-AIR COLLISION SYMPOSIUM. Held at Indianapolis, Indiana, November 8 and 9, 1955, 128pp. US Technical Development & Evaluation Center, CAA, Indianapolis, Ind.

11,047

This report presents transcriptions of presentations and discussions of a symposium on mid-air collision problems. General topics covered are (1) operational experiences - collision data, near-miss data, intercept problems, aircraft traffic control; (2) technical review of the problem - visual parameters, atmospheric visibility and conspicuity, aircraft exterior lighting, psychological problems of pilots; and (3) remedial measures - air traffic control, conspicuity, super airways, optical scanning device, doppler radar. The fall session of the Illuminating Engineering Society is also reported.

R 36

11,048

Perry, D.R., & Dyer, L.C. INCIDENCE, NATURE, AND EXTENT OF INJURY IN CRASH LANDINGS AND BAILOUTS. Proj. 8-7956, Rep. 1, Nov. 1956, 101pp. Arctic Aeromedical Lab., Ladd AFB, Alaska.

11,048

To determine the incidence, nature, and extent of injury in crash landings and bailouts, a survey was conducted using accident reports of the United States Air Forces. Areas covered were the Arctic region (1950-1954) and all areas in the world where Air Force aircraft operate (1952-1954). After screening, 667 reports remained that could be classified as major accidents. The number and extent of injuries for both situations were analyzed to show the effects of (1) type of aircraft, (2) type of terrain, and (3) altitude at which emergency warning came. A limited treatment of survival data was made. Recommendations are included.

T.

11,049

Smith, O.W. JUDGED DISTANCE AND SIZE CONSTANCY. Prepared under Contract Nmr-401(14), Sept. 1956, 24pp. Cornell University.

11,049

To study the relation between judged distance and size constancy, test objects (stakes of different heights arranged in an arc) were presented in photographs. The photographs were viewed monocularly and the subject required to make size matches (separate photographs of single stakes), judgments of distance in yards to same test objects for which size matches were made, and judgments of height in feet. The portrayed distance was either 75 or 250 percent of the original distance (two groups, 26 subjects each). Two abstract (no detail except horizon and shadows) photographs were also judged in the same manner. Judgment data were analyzed and compared for all conditions.

T. R 42

11,050

Harnqvist, K. ON THE EFFICIENCY OF MATCHED-GROUPS DESIGN. No. 40, Oct. 1956, 5pp. Psychological Lab., University of Stockholm.

11,050

This paper discusses the efficiency of matched-groups design for controlling interindividual differences in experiments. It is pointed out that matching must result in minimum correlation within pairs of the dependent variable for the matched groups design to be as efficient as a simple randomized design for a given number of degrees of freedom and on a given level of significance. This minimum is calculated, and the relation between the correlation within pairs of the dependent variable and between matching and dependent variable derived.

T. G. R 4

11,051

Moore, O.K., & Berkowitz, M.I. PROBLEM SOLVING AND SOCIAL INTERACTION. Prepared under Contract SAR/Monr-609(16), Tech. Rep. 1, Nov. 1956, 34pp. Interaction Lab., Yale University.

11,051

To construct and test a rigorous theory of both individual and group problem solving, a program of research has been initiated. This report discusses briefly two formal investigations: (1) deontic logic (the formal theory of normative concepts) and its application to the analysis of normative systems, and (2) the development of logically identical but notationally different language systems. An empirical study is also reported that is concerned with the relationships between the theory of games of strategy and certain sociological analyses of interactional forms and processes. It represents an exploration of a method of experimentation that permits observers to follow in detail the behavior of subjects playing games.

T. I. R 26

11,052

Moody, J.A., Jerome, E.A., Flynn, J.P., & Connor, T.J. AN AUTOMATIZED TECHNIQUE OF INVESTIGATING DIFFERENTIAL SENSITIVITY TO AUDITORY INTENSITIES. I. THE INFLUENCE OF STEP SIZE AND INTERVAL BETWEEN STIMULI. Proj. NM 000 019.02.02, July 1956, 7pp. Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md.

11,052

To supply a measure of sensitivity obtained by automation of the "staircase" method (modified form of method of limits of threshold determination) to be compared with data obtained by more usual methods, measurements of differential sensitivity to auditory intensities were made on four subjects. A completely automatic control system that permitted presentation of stimuli at any rate within the subject's capacity to respond was used. A tone of standard intensity (1000 cycles per second) was used with varied steps in decibels (1.0, 1.5, 2.0 and 3.0 decibels) and intervals between decrements (1.0, 1.5, 2.0 and 3.0 seconds). The data were analyzed to find effects of decremental steps and time intervals. The advantages and shortcomings of the method are discussed.

T. G. I. R 10

11,053

USAF Operational Test Center. JOINT (U.S. NAVY AND U.S. AIR FORCE) COMPARATIVE OPERATIONAL SUITABILITY TEST TO DETERMINE A STANDARD AIRFIELD APPROACH LIGHTING CONFIGURATION. FINAL REPORT. Proj. APC/CSC/800 A, Dec. 1955. 18pp. USAF Operational Test Center, Eglin AFB, Fla.

11,053

To determine, by operational suitability testing, an adequate standard military airfield approach lighting system configuration, sixteen patterns were compared. Except for one centerline system all patterns included features agreed upon by the Joint United States Navy-United States Air Force Ad Hoc Committee on Airfield Approach Lighting. Operational test conditions were used with a wide variety of aircraft under both instrument and visual flight conditions. Pilot preferences were determined by analysis of tape recordings of communications between aircraft and controller and from questionnaires. Three preferred configurations were further evaluated on economic considerations of installation, maintenance, and personnel requirements.
T. I.

11,055

Worsten, J.V. ANTI-G-EN SURVIVAL PAKKEN VOOR GROTE HOOGTEN. Nov. 1955. 19pp. WO:5796, 'a-Gravenhage, Germany.

11,055

This report gives a summary on the use and applications of anti-G and survival suits for high altitudes. A bibliography of titles and abstracts of articles and manuals on the subject is given.
R 25

11,056

Ruon, P.J., Griggs, T., Sampson, P.B. & Tiedman, D.V. A STUDY OF ASSISTANCE FOR LOW FREQUENCY INSTRUMENT APPROACHES. FINAL REPORT. Contract CCA 29186, ERC Proj. 30, Nov. 1951, 99pp. Educational Research Corporation, Cambridge, Mass.

11,056

A comparative study was made of standard low-frequency range approaches flown by pilots of minimum recent experience unassisted, with the help of an ADF (visual indicator), and in pairs, as pilot and copilot. Each of 36 pilots, all of whom had instrument ratings from the Civil Aeronautics Administration, flew three scored approaches, one for each condition. Flight proficiency was checked by a ground observer and a safety pilot on items classified under three headings: control of aircraft, radio procedures, flight procedures and planning. The value of the two types of assistance was evaluated by comparing unassisted with assisted performance.
T. I. R-2

11,057

Green, R.P., Goodenough, D.R., Andreas, B.G., Gerall, A.A., & Spragg, S.D.S. THE EFFECTS OF PLANES OF ROTATION OF CONTROL CRANKS ON PERFORMANCE LEVELS AND TRANSFER EFFECTS IN COMPENSATORY AND FOLLOWING TRACKING. Prepared under Contract N6onr-241, T.O. 6, Proj. 20-M-1d, Tech. Rep. 241-6-22 Aug. 1955, 8pp. Special Devices Center, Fort Washington, N.Y. (University of Rochester).

11,057

To determine the transfer effects between two control-display tasks having partial and complete continuity for accomplishing compensatory and following tracking, 82 right-handed subjects were divided at random into four groups. Two groups were tested on compensatory and two on following tracking. The two hand controls were arranged to give (1) complete continuity of position and movement relationship between display and control, and (2) partial continuity. One of the two groups assigned to the same tracking task was given eight trials on position one, followed by eight trials on position two. The procedure was reversed for the other group. Performance data (time on target) were analyzed for original learning and transfer effects among the various groups.

11,058

Towle, J.H. A PROTOTYPE VISUAL AIRSPEED-ACCELERATION INDICATOR. Rep. ASL NAW AD 250.7, Jan. 1955, 9pp. Aeronautical Structures Lab., NAWC, Philadelphia, Penn.

11,058

This report describes the prototype model of a visual airspeed-acceleration indicator developed by the Aeronautical Structures Laboratory of the Naval Air Experimental Station for use in experimental flight testing of Navy planes. The results of laboratory tests made to verify the accuracy and reliability of the instrument are presented. An alternative data display suitable for operational flying is included. Flight tests are recommended.
T. I.

11,059

Severy, D.M., Mathewson, J.H., & Bechtol, C.O. CONTROLLED AUTOMOBILE REAR-END COLLISIONS, AN INVESTIGATION OF RELATED ENGINEERING AND MEDICAL PHENOMENA. Canad. serv. med. J., 1955, 11, 727-759. (University of California & Yale University).

11,059

To determine the nature and extent of the force system on both the human occupants and vehicle structures of two automobiles involved in rear-end collisions, five experimental collisions were made (using a 1941 Plymouth to strike the rear of a 1947 Plymouth) at speeds ranging from 7 to 20 miles per hour. Human subjects were used in both cars for all speeds below 20 miles per hour; an anthropometric dummy was placed in the front car to provide control data for high-speed impacts. The subjects were instrumented by electrical accelerometers and high-speed photography was used for motion analysis. The analyses included effect of body posture, state of preparedness, and safety devices.
T. G. I. R-3

11,060

Buettner, K.J., & Haber, H. THE AEROPAUSE. Science, June 1952, 115 (2998), 1p. (Dept. of Engineering, University of California at Los Angeles).

11,060

This note proposes a new term "aeropause" for designating the region of the atmosphere where its various functions for man and craft begin to cease and space-equivalent conditions are gradually approached. Justification for the new term is based upon anticipated semantic difficulties due to the many disciplines that must be involved in the solutions to problems arising in the operation of manned vehicles at very high altitudes and eventually in free space.

11,061

Mathewson, J.H., & Brenner, R. ANALYSIS OF ACCIDENT STATISTICS. J. Amer. Soc. Safety Engineers, National Safety News, Aug. 1956, 6pp. (Institute of Transportation and Traffic Engineering, University of California at Los Angeles).

11,061

This paper presents statistical theory underlying various techniques of accident control charts (an analytical tool for making meaningful interpretations of accident rates). Five basic elements are discussed: (1) selecting the quality index, (2) estimating the range of variation of the index, (3) initial setting up of charts, (4) judging as to assignable causes, and (5) revising charts to reflect changing conditions. These techniques are extended to situations where there are wide variations both in severity and amount of exposure. An example is given to demonstrate the techniques.
T. G. I. R 14

11,062
Cation, W.L., Mount, G.E., & Brenner, R.
VARIABILITY OF REACTION TIME AND SUSCEPTIBILITY TO AUTOMOBILE ACCIDENTS. J. 822.
Psychol., 1951, 35(2), 101-107. (University of California).

11,062
To test the hypothesis that variability of reaction time is positively correlated with susceptibility to automobile accidents, simple reaction-time measurements (time required to move foot from accelerator pedal to brake in response to red stimulus light) were made on a sample of 104 Radio Patrol Officers. Means and standard deviations were computed for each subject's distribution of ten reaction times. Criterion data (official reports of accidents while on duty) were subjectively classified into three categories: (1) officer at fault, (2) responsibility doubtful, and (3) officer not at fault. An analysis of these data (age factor also included) was made by correlational techniques. The results are discussed in relation to the hypothesis tested.
T. R. 5

11,063
Haber, H. MANEED FLIGHT AT THE BORDERS OF SPACE. THE HUMAN FACTOR OF MANEED ROCKET FLIGHT. J. Amer. Rocket Soc., Reprint 15, Sept.-Oct. 1952, 269-283. (Institute of Transportation and Traffic Engineering, University of California at Los Angeles).

11,063
This paper discusses the human factor of manned rocket flight with special emphasis upon problems of aero-medical and space-medical nature for the various functions of the atmosphere. These are: contributing to respiration; preventing boiling of body fluids; sustaining combustion of fuel; absorbing heavy primaries of cosmic radiation and solar ultraviolet radiation; supplying aerodynamic lift and diffused daylight; absorbing meteors; interacting thermally with the craft; and interfering by air drag over long periods of time. Functional borders, in terms of miles of altitudes, are listed and use of the term "aeropause" for these border regions proposed.
T. G. I. R. 33

11,064
Haber, H. SAFETY HAZARD OF TINTED AUTOMOBILE WINDSHIELDS AT NIGHT. J. Opt. Soc. Amer., June 1955, 45(6), 413-419. (Institute of Transportation and Traffic Engineering, University of California at Los Angeles).

11,064
This paper presents a theoretical analysis of the effects of tinted optical media, particularly heat absorbing automobile windshields, upon visibility distances on the highway at night. The loss percentages in visibility distances caused by replacing clear windshields with tinted ones are calculated as functions of the variables involved: (1) transmittance of the tinted optical medium; (2) isocandela profile of the headlamp; (3) angular size and reflectance of the target. The results are compared with data obtained experimentally. Discussion is in terms of the safety hazard involved in night driving. A recommendation is made for reconsideration of minimum transmittance requirements for windshields in the American Safety Code.
T. G. I. R. 15

11,065
Kryter, K.D. A CRITERION FOR NOISE CONTROL. J. Acoust. Soc. Amer., Feb. 1957, 29 (2), 311. (Operational Applications Lab., AFMRC, Bolling AFB, Washington, D.C.).

11,065
This note attempts to rationalize a possible single criterion that will define acceptable levels of noise in office buildings, satisfactory both with respect to interference with speech communication and to annoyance. Basic interrelations among loudness, masking, and the perception of speech are examined and a tentative conclusion reached that a single criterion for noise control would be feasible.
R. 3

11,066
Miller, G.A. THE HUMAN LINK IN COMMUNICATION SYSTEMS. Pres. Nat. Elec. Conf., 1956, 12, 1-6. (Contract AF 33(033)-14343, AFMRC-15-56-63. Harvard University).

11,066
This article argues that man is an inseparable link in every communication system and, therefore, since he cannot be abolished, he must be carefully studied and measured. The mathematical theory of communication is advocated as providing a means of measurement and a theory so general that any device - human, electrical, or mechanical - must conform to the theory if it is to perform the function of communication. In illustration, a few tentative generalizations about man's capacity to handle information are given. These generalizations were derived from psychological experimentation which has applied the concepts of communication theory to the human link in the system.

11,067
Martin, V.E. CHILDREN'S BODY MEASUREMENTS FOR PLANNING AND EQUIPPING SCHOOLS. A HANDBOOK FOR SCHOOL OFFICIALS AND ARCHITECTS. Office of Education Special Publication No. 4, 1955, 113pp. Office of Education, US Dept. of Health, Education and Welfare, Washington, D.C.

11,067
To secure reliable and current information on the body measurements of children in working positions that are characteristic of the varied learning experiences engaged in by pupils in school, a total of 52 different measurements were made (70 additional were computed from these) on a sample of 3,318 children ranging in age from five to 21 years in all grades from kindergarten through high school. Tables are presented giving the mean, standard deviation, and range for 130 measurements by age groups and by school grades. Other tables give percentage distributions for some standard furniture measurements, correlations of selected measurements, and handedness distribution. A glossary of terms is appended.
T. G. I. R. 39

11,068
USA Board NR 1. SERVICE TEST OF TARGET LIGHT, POLE, RANGING. DA Proj. 8 35 10 117, Proj. FA 456, Dec. 1956, 15pp. USA Board NR 1, Fort Sill, Okla.

11,068
To determine the suitability of Target Light, Pole, Ranging for field artillery use in night surveying operations, various tests were carried out: (1) physical characteristics of the test target light carrying cases were determined, (2) characteristics of light source were determined by viewing the light under various conditions and from various angles and distances, (3) operational characteristics were studied during use on traverse and triangulation courses and in flash ranging, weapon location radar and weapon orientation during clear and instrument radar, and (4) ruggedness and resistance to forces of nature were checked by various tests. Deficiencies and suggested modifications were discussed.
I.

11,069
Brown, W.C., & Douglass, L.N. TEST OF A COMMUNICATION CONSOLE FOR RAPCON CENTERS. WADC TN-56-407, Dec. 1956, 17pp. Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio.

11,069
This report describes a repackaged version of the AN/PMA-4 Communication Console for use in Radar Approach Control Centers and fabricated to provide a smaller more compact unit that could be placed close to controller at his operating position. The redesigned console was evaluated for use with a 12-inch vertical radar indicator and a 22-inch horizontal radar indicator. Advantages and disadvantages were listed and discussed. Comparisons with the standard design were made. Recommendations are included.
I.

11,070
Boynton, R.M., & Kandel, G. ON RESPONSES IN THE HUMAN VISUAL SYSTEM AS A FUNCTION OF ADAPTATION LEVEL. J. Opt. Soc. Amer., 1957, 47(4), 275-286. (Prepared under Contract Nonr-556(06), University of Rochester).

11,070
To investigate visual responses as a function of adaptation level, thresholds were determined (three subjects) at various intervals before and after (-0.02 to +0.03 seconds) the onset of a 30-millisecond conditioning stimulus in the dark-adapted eye, and following six levels of pre-adaptation (from 0.0005 to 3000 millilamberts). Within each session there were two conditions used: (1) conditioning stimulus "on" as described above, and (2) conditioning stimulus "off" or not present. Threshold data were analyzed as functions of pre-adapting luminance and conditioning interval for both "on" and "off" conditions. The relation between "masking" and those effects attributable to photochemical bleaching is assessed and discussed.
T. G. I. R 20

11,071
Harberger, J.P., Kemp, W.R., Kadetz, W., et. al. STUDIES IN AEROEMBOLISM. Rep. 57-44; Feb. 1957, 11pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Aeromedical and Physical Environment Lab., University of Illinois).

11,071
To study the incidence of decompression sickness under conditions of limited desaturation, 15 male subjects were observed during a total of 75 flights in a low-pressure chamber to simulated altitude of 38,000 feet. At high altitude each subject participated in a standard exercise while breathing 100 percent oxygen for 30 minutes or until aviator's bends pains were reported. Desaturation conditions were: (1) four hours, 12,000 feet, breathing ambient air; (2) four hours, 18,000 feet, breathing mixture of oxygen and nitrogen; (3) two hours, 18,000 feet, breathing 100 percent oxygen; and (4) control run without desaturation. Quantitative estimates of gaseous nitrogen and total volume of expired air and incidence of pains were compared for the various conditions.
T. G. I. R 13

11,073
Bowler, J.W. Jr. ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL. A MUSCULAR ACTION POTENTIAL STUDY OF "CONFLICT". Rep. 55-125, Dec. 1956, 24pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University).

11,073
To compare muscular activity involved before and during final reactions in a series of discrimination situations in which the response requirements varied, muscle action potential records were obtained on three groups of subjects (20 each). Each group discriminated between two tones (standard tone of 1500 cycles per sec; variable tones, 1500, 1525, 1550, 1575, and 1600 cycles per sec). The response varied from group to group: (1) press right hand key (six-ounce pressure) if two tones were same; (2) press right hand key for same and left hand key for difference tones; and (3) same as preceding except that key required a six-pound pressure. The distribution and temporal course of tension levels were analyzed for differences in both arms attributable to the type of response made.
T. G. I. R 22

11,074
Miller, J.D. ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL. DIFFERENTIAL MUSCLE TENSION DURING A DELAYED RESPONSE. Rep. 55-129, Jan. 1957, 8pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University).

11,074
To study the distribution and temporal course of muscular activity during a two-choice spatial delayed response, muscle action potential records were obtained from the muscle groups closely involved in right and left hand key pressing. The stimulus consisted of a sequence of two tones, the first indicated which hand was to respond and the second was the reaction signal. 19 subjects participated in 18 trials, with records taken from both arms. Action potentials (mean highest peak in 100 x log microvolts) were analyzed graphically to show response patterns from a state of rest through the key-pressing for both right and left response trials. The results are discussed in relation to previous studies of muscle activity with general consideration of the physiologic mechanisms involved.
T. G. I. R 25

11,076
Brebba, D.R., Goldman, R.F., & Buskirk, E.R. WATER VAPOR LOSS FROM THE RESPIRATORY TRACT DURING OUTDOOR EXERCISE IN THE COLD. Proj. 7-64-12-004C, Tech. Rep. EP-57, May 1957, 10pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,076
To determine the quantities of water vapor contained in expired air when men work in the subarctic, measurements were made on three men in 26 experimental periods. Activity ranged from resting engine in a sleeping bag to running at rates up to 370 feet/minute over packed snow. Exercise periods varied in duration from 15 to 90 minutes. Expired air was collected from which water (grams) was measured. Heat loss attributable to vaporization of water from respiratory tract was calculated as a percentage of total energy expenditure. The importance of the results for proper design of Arctic clothing and face masks is indicated.
T. G. I. R 7

11,077
Abramovitz, M., Schmidt, S.F., & Van Dyke, R.D., Jr. INVESTIGATION OF THE USE OF A STICK FORCE PROPORTIONAL TO PITCHING ACCELERATION FOR NORMAL-ACCELERATION WARNING. NACA RM A53E21, Aug. 1953, 23pp. Ames Aeronautical Lab., NACA, Moffett Field, Calif.

11,077
To investigate the feasibility of providing an additional stick force that leads to normal acceleration in flight, in order to serve as a prior warning of excessive normal acceleration in rapid maneuvers, a test airplane was equipped with a torque servo to provide the required force. An evaluation was made both analytically and experimentally in flight. Performance results and subjective evaluation by the pilots are presented.
T. G. I. R 2

11,078
Seith, K.U. & Mehrkamp, R. A UNIVERSAL MOTION ANALYZER APPLIED TO PSYCHOMOTOR PERFORMANCE. Science, March 1951, 113(2931), 242-244. (University of Wisconsin).

11,078
An apparatus, the "Universal Motion Analyzer," is described which provides the following: 1) automatic registration of elapsed time in the performance of any simple or complex motor task, 2) separate automatic registration of the different components of travel time and manipulation, and 3) flexibility and universality of application of the analytic method to different types of task situations. An example of its application is presented.
I.

11,079
Brown, B.P. GROUND SIMULATOR STUDIES OF THE EFFECTS OF VALVE FRICTION, STICK FRICTION, FLEXIBILITY, AND BACKLASH ON POWER CONTROL SYSTEM QUALITY. NACA TN 3998, April 1957, 45pp. Langley Aeronautical Lab., NACA, Langley Field, Va.

11,079
Ground simulator tests were made to study the effects of various ratios of valve friction to stick friction on power control system quality. Boundaries were determined for good, tolerable, and unsatisfactory ranges of valve and stick friction for a rigid control system and a system with flexibility between the source of stick friction and the valve. The effect of various friction ratios with flexibility between the pilot and the source of stick friction is presented. The effect of backlash with various friction ratios is also presented.
G. I. R 2

11,080
Pfaffmann, C. TASTE MECHANISMS IN PREFERENCE BEHAVIOR. Amer. J. Clin. Nutri., 1957, 5(2), 142-147. (Brown University).

11,080
This paper presents, in summary form, certain electrophysiologic observations on taste sensitivity and the correlation with behavioral responses to the same stimuli. The relation between the concentration ranges for the two responses was analyzed for points of agreement. Receptor function was studied under conditions that modify the physiologic state of the organism. Changes in preference behavior were discussed in terms of possible neural causes.
G. I. R 20

11,081
Martens, B.O. THE EFFECT OF JOYSTICK LENGTH ON PURSUIT TRACKING. Proj. 6-95-20-001, Rep. 279, Nov. 1956, 11pp. Dept. of Psychology, USA Medical Research Lab., Fort Knox, Ky.

11,081
To determine the effect of joystick length on the manual tracing of a continuous simple pursuit task, eight subjects tracked a one-dimensional simple sine wave using eight lengths of joystick shaft (6, 9, 12, 15, 18, 21, 24, and 27 inches). Performance measures (cumulative time-on-target and graphic records) were taken on the last of eight sessions of 15 three-minute trials. Only on the first and last sessions were the subjects required to operate at each stick length; intervening sessions consisted of training at one length. Mean time-on-target scores, mean number of hits, and on-target durations were analyzed as functions of stick length. Design recommendations are given.
T. G. R. 4

11,082
Peacock, L.J., & Marks, R.A. BEHAVIORAL CONCOMITANTS OF COLD ADAPTATION: I. RATE OF RESPONDING AT 2.5° C. Proj. 6-95-20-001, Rep. 283, Dec. 1956, 7pp. Dept. of Psychology, USA Medical Research Lab., Fort Knox, Ky.

11,082
To investigate the feasibility of developing a behavioral index of acclimatization to cold, normal and acclimatized rats responded to an operant conditioning apparatus that delivered radiant heat as a reward for tests conducted at 2.5 degrees Centigrade. Normal or control rats lived at a temperature of 22 degrees Centigrade before testing; experimental rats were exposed nine days at test temperature. Operant level was measured (days 10 and 11); two daily sessions of regular reinforcement were followed by four sessions of three to one ratio reinforcement. Response rates of the two groups were analyzed for differences due to acclimatization. Possible reasons for behavioral differences are discussed.
T. G. I. R. 11

11,083
Peacock, L.J., & Marks, R.A. BEHAVIORAL CONCOMITANTS OF COLD ADAPTATION: II. RATE OF RESPONDING AT -5° C. Proj. 6-95-20-001, Rep. 284, Dec. 1956, 4pp. Dept. of Psychology, USA Medical Research Lab., Fort Knox, Ky.

11,083
To determine whether orderly changes in behavior accompany the process of cold acclimatization (see 11,082), normal and acclimatized rats responded to an operant conditioning apparatus that delivered radiant heat as a reward for tests conducted at temperatures of -5 degrees C. Normal (control) rats lived at a temperature of 22 degrees C; experimental rats were exposed for 12 days to temperatures of -5 degrees C. Operant level was measured (days 13, 14) followed by two daily sessions of regular and four of three to one ratio reinforcement. Response rates of the two groups were analyzed for differences due to acclimatization.
G. R. 2

11,084
Bonjer, F.H. (Chm.). FITTING THE JOB TO THE WORKER. Proj. 335, Rep. Phase I, Nov. 1956, 123pp. European Productivity Agency, Organization for European Economic Co-operation, Paris, France.

11,084
This report presents the results of a Mission (a group sponsored by the European Productivity Agency) to the United States to investigate what had been done, both in research and practical work, on "fitting the job to the worker" (human engineering or ergonomics). The following factors were studied: equipment design, anthropometry, fatigue, stress, climate, noise, vibration, and lighting. Chapter headings are as follows: disciplines or techniques in the United States which contribute to fitting the job to the worker, observations on American laborer's attitude, some brief accounts of the Mission's visits, communications, and summary. A note on proposed exchange of bibliographic information between Europe and the United States is appended.
I. R. 133

11,085
USN Bureau of Aeronautics. WEATHER DISPLAY AND PRESENTATION. Proj. ARMA (TED UNL MA 501), Task 23, Tech. Rep. 1, Aug. 1956, 24pp. USN Bureau of Aeronautics, Norfolk Air Station, Va.

11,085
To determine current deficiencies of United States Naval Air Station Aerology Office facilities and functions, a survey was conducted by questionnaire and by visitation. The questionnaire was sent to all users of Aerological services requesting information on display and layout, briefing techniques, and inflight reporting. An informal on-the-spot survey was made by a group of officer investigators of ten offices selected at random. The data were analyzed in terms of operational aviation as well as Aerological requirements. The best physical location for Aerology, new equipment available or under evaluation, and detailed recommendations for improving and standardizing displays and briefings are discussed.
I.

11,086
Alexander, M., & Hertzberg, H.T.E. A COMFORT EVALUATION OF A FORM-FITTING HIGH ALTITUDE HELMET. Proj. 7214, WADC TR-56-404, Feb. 1957, 15pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,086
This report describes comfort tests on an experimental pressure helmet assembly, consisting of an outer rigid shell and an inner compressible, form-fitting liner of polyurethane foam. Seventy-two subjects (21 rated military pilots) with head and face measurements representing 98 per cent of the Air Force flying population were fitted with a helmet of such a size that it fitted snugly without pressure or discomfort. After three to seven minutes wearing time, the subjects were questioned about specific comfort points. Four subjects wore the helmets from two to four hours to ascertain longer-range effects. Fabricational requirements for comfort and acceptability are discussed and their applicability to most forms of headgear indicated. Recommendations are included.
T. I.

11,087
Hambacher, W.O. HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: PART 5 EXPERIMENTAL EVALUATION OF A PROPOSED THEORY OF WHITENESS CONSTANCY. TED NAM EL-52004, Rep. NAMC-ACEL-297, Aug. 1956, 11pp. Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,087
To evaluate a proposed theory of whiteness constancy for application to aircraft work-space lighting (emphasis on cockpit), two experiments were performed under the condition of homogeneous backgrounds of a standard and of a variable disc. In one experiment, the stimuli were Munsell discs on a color wheel, the other were rings and discs of light. Eight subjects were required to match the whiteness of the variable disc to that of the standard by method of average error (ten trials per day on three consecutive days, for each experiment). Illumination for standard disc was 100 foot candles; for the variable disc, 50 foot candles. Mean brightness settings were analyzed in terms of whiteness ratios of disc to background for both variable and standard under the experimental conditions. T. R. 5

11,088
Gallup, H.F. & Hambacher, W.O. HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL LIGHT INDICATOR SYSTEMS. AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF VARIATION IN TEMPORAL CHARACTERISTICS OF LIGHTS ON THEIR ATTENTION-GETTING VALUE, WITH REFERENCE TO MASTER WARNING AND CAUTION SYSTEMS. TED NAM EL 52004, Rep. NAMC ACEL 298, Aug. 1956, 8pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,088
To evaluate their possible usefulness for light indicator warning and caution systems in aircraft, the effectiveness of three types of lights (steady, flashing, and alternating) as attention gainers was studied. Nine subjects, engaged in the counting of randomly spaced dots of light appearing directly in front of them, were required to respond as quickly as possible to the stimulus lights, presented peripherally and against a homogeneously dark background. Presentations were random. Reaction times to the onset of the lights were recorded and studied by analysis of variance for differences due to type of light used. Recommendations are presented with suggestions for both a master warning and a Master Caution System.
T. I. R. 2

11,090
Olow, M.F., & Douthett, S. EFFECT OF AMBIENT NOISE ON TRAINING IN DOPPLER DISCRIMINATION. NEL Rep. 677, April 1956, 12pp. USC Electronics Lab., SDC, San Diego, Calif.

11,090
To determine the effects of different noise conditions during training on the accuracy of making doppler discrimination (psychophysical judgments) under conditions of high ambient noise such as exist in helicopters (110 to 115 decibels), 50 enlisted men were given a pre-test, ten training drills, and a post-test. Noise conditions varied as follows: (1) low ambient noise (60-70 decibels), (2) low ambient noise for first seven drills; high (110 decibels) for last three, (3) progressive increments of ambient noise throughout training from 70 to 110 decibels, and (4) high ambient noise (110 decibels) for all training. Both tests were given at high ambient noise except for one subsection of the control group (1). Data were analyzed for differences due to training conditions. Recommendations are included. T. G. R 10

11,091
Stiles, G.J. PREDICTION OF THE APPARENT MAGNITUDE OF DISTANT MISSILES IN SUNLIGHT. Proj. 580306011, TB3-0538, Rep. 1008, June 1956, 30pp. USA Ballistic Research Labs. Aberdeen Proving Ground, Md.

11,091
A method of predicting the amount of light received from a missile observed at long range at low angle of elevation is presented. Results are expressed in astronomical magnitude units. The uncorrected magnitude is determined from a chart as a function of distance and missile size. Corrections are made for geometric aspect, atmospheric transmission, and missile reflectance and combined with the uncorrected magnitude to give the apparent magnitude photographic, photoelectric, and visual observations may be predicted. T. G. R 6

11,092
Lanzetta, J.T., & Roby, T.B. EFFECTS OF WORK-GROUP STRUCTURE AND CERTAIN TASK-VARIABLES ON GROUP PERFORMANCE. J. abnorm. Soc. Psychol., 1956, 53(3), 307-314. (Proj. 7713, APPTTC-TM-57-45, April 1957, APPTTC, ARDC, Lackland AFB, Tex. University of Delaware).

11,092
To investigate effects of work-group structure and certain task variables on group performance, three-man group were presented with a simple information-processing control-adjustment task. Detection and communication of changes in display readings were made and control switches adjusted accordingly. By varying the display-control relationships and the location of displays and controls at operator station, two work structures were produced differing both in volume of information to be transmitted and in extent of dispersion of information over group members. Two input parameters were varied: rate of change of instrument readings, and predictability of the changes. The performance data (number of errors made by group in control adjustments) were studied by analysis of variance and information theory techniques. T. G. R 9

11,093
Debons, A., & Crannell, C.W. FACILITATING IDENTIFICATION OF AIRCRAFT BY USE OF REFLEX-REFLECTIVE ("SCOTCHLITE") MATERIAL. Contract AF 33(616)-2844, Proj. 71e6, WADC TR-57-130, April 1957, 24pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Miami University).

11,093
To assess the value of reflex-reflective (Scotchlite) material as a means for enhancing the readability of digits of the size and type utilized in aircraft identifications (Standard Army-Navy Design, 8 by 10 inches), a study was conducted under night-time conditions utilizing a spotlight. Subjects (13) were required to read the digits presented for four seconds in groups of five. Variables were: horizontal lines of sight (from 18 to 90 degrees to surface viewed), viewing distance (144 to 500 feet), and targets (black digits on white, aluminum, or Scotchlite and Scotchlite digits on black background). Percent correct responses were analyzed for differential legibility of the digits under each condition. T. G. R 11

11,094
Green, R.F. THE EFFECTS ON PERFORMANCE OF A COMPENSATORY TRACKING TASK OF INTER-CHANGING THE CONTROL OF THE AXES OF MOVEMENT BETWEEN THE HANDS. Prepared under Contract N6onr-241, T.O. 6, Proj. 20-M-1d, Tech. Rep. 241-6-23, Aug. 1955, 6pp. Special Devices Center, Fort Washington, N.Y. (University of Rochester).

11,094
To investigate the effects of transferring control of each dimension of a two-dimensional compensatory tracking task to the opposite hand from the one previously controlling that dimension, 112 subjects were randomly divided into four groups. Crank arrangements were used which yielded (1) complete continuity between control and target movements, (2) partial continuity, and (3) complete discontinuity. Each subject was given 12 one-minute trials with 15 seconds rest between trials followed by five trials with the same crank arrangement but with each crank now controlling the dimension previously assigned to the other crank. The average time on target and variability of the scores were analyzed for the interference effects. Design recommendations are given. T. G. R 1

11,095
Weiss, B., Coleman, P.D., & Green, R.F. TIME-ORDERED EFFECTS IN LONG SERIES OF KNOB CONTROL ADJUSTMENTS. Prepared under Contract N6onr-241, T.O. 6, Proj. 20-M-1d, Tech. Rep. 241-6-19, Aug. 1955, 5pp. Special Devices Center, Fort Washington, N.Y. (University of Rochester).

11,095
To investigate time-ordered effects in long series of knob control adjustments, twenty subjects were required to make 120 consecutive bisections of a 40 degree angle on each of two successive days. The subjects were blindfolded and were given no information about performance accuracy (bonuses of money were given at end of experiment as motivating device). The data were studied by autocorrelation and power spectrum analysis. A mark-off process formulation was used to describe the underlying process of the time series data. The implications of such a model for evaluations of equipment and operators is pointed out. G.

11,096
Hill, J.E. EFFECTS OF ENVIRONMENT IN REDUCING DOSE RATES PRODUCED BY RADIOACTIVE FALLOUT FROM NUCLEAR EXPLOSIONS. RM-1285-1, Sept. 1954, 10pp. USAF Proj. RAND, Rand Corp., Santa Monica, Calif.

11,096
This paper summarizes the factors by which the infinite plane dose rate of fission product gammas would be reduced in these situations: open fields, parks, and so forth, streets of built-up urban areas, and various types of buildings and shelters. The reduction of the intensity of gamma radiation by various materials as a function of thickness is shown graphically. The reduction factors for dose rates in various sizes and types of buildings are tabulated. Locations offering maximum protection from gamma radiation are indicated. Discussion is in terms of the use of these facts for civilian defense. T. G. R 6

11,097 Hamacher, W.O. & Gallup, H.F. HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL WARNING AND CAUTION SYSTEMS. THE EFFECTS OF VARIATION IN TEMPORAL CHARACTERISTICS OF WARNING LIGHTS PRESENTED AGAINST A HETEROGENEOUS BACKGROUND, WITH THE LIGHT "HONEY" OCCURRING BOTH WITHIN AND OUTSIDE OF THE VISUAL FIELD. NANC ACCL 300, TED NAH EL 52004, Part 8, Aug. 1956. 11pp. USN ALC Crew Equipment Lab., NAMC, Philadelphia, Penn.

To investigate the attention-getting value of three kinds of stimulus lights (steady, flashing, and alternating), a mock-up of the F7U Cockpit was illuminated for night conditions according to military specifications and for day conditions with two daylight flood lamps. Ten Ss, while engaged in a tracking task, were required to respond as quickly as possible to the stimulus lights under two conditions: 1) onset of light occurring within the visual field at angle of 75° from line of sight; and 2) onset of light occurring outside visual field and brought in after five-second delay. All Ss performed under both day and night conditions. Reaction times were analyzed for differences due to type of stimulus under the various experimental conditions.
T. H. R. 3

11,098 Siegfried, Margaret. BIBLIOGRAPHY OF RESEARCH REPORTS ISSUED BY THE BIOPHYSICS BRANCH. Jan. 1957, 14pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,099 This bibliography lists those publications - technical reports, technical notes, memorandum reports, and papers - that are considered to be of lasting interest in the fields of research conducted by the Biophysics Branch of the Aero Medical Laboratory, Directorate of Research, Wright Air Development Center. The time period covered is from 1946 through 1956 and only articles now published are included. The areas covered are: acceleration, anthropology, bioelectronics, escape, and stress and fatigue.
R 116

11,099 USA Board NR 1. SERVICE TEST OF CAMOUFLAGE NET DRAPE SET FOR 240-MM HOWITZER. DA Proj. 8 31-02 100, Proj. FA 955, Oct. 1955, 14pp. USA Board NR 1, Fort Sill, Okla.

11,099 To determine the suitability of Camouflage Net Drape Set for 240 millimeter Howitzer for field artillery use, tests were conducted as follows: (1) physical characteristics, components were weighted, measured, and examined; (2) stowage, set was stowed and carried to and from test sites with time and effort recorded; (3) ease of handling, time and effort recorded for erection and dismantling in daylight and darkness; (4) concealment, aerial photographs taken and analyzed of gun positions covered by nets; (5) service of the piece, time to open and close embrasures with weapons in place was recorded, freedom of movement noted and effects on service of the piece observed; and (6) durability, stability and maintenance were observed throughout testing. Deficiencies and suggested modifications are listed with recommendations.

11,100 Rinehart, W.E., & Jacobson, E.H. THE ODOR DETECTION OF PHOSPHORUS TRICHLORIDE, PHOSPHORUS OXYCHLORIDE AND HYDROGEN CHLORIDE BY MAN. Rep. 374, ML5-374-(53), CNLRE-ML-82, NLRAR 374, July 1956, 11pp. Army Chemical Center, Md.

11,100 To determine the concentrations of phosphorus trichloride (PCl₃), phosphorus oxychloride (POCl₃), and hydrogen chloride (HCl) detectable by odor, sniff tests were used in establishing median detectable concentrations. Each S (19, 19, and 23 in age) sniffed increasing concentrations of a given compound in a geometric series of two starting from zero until he indicated that an odor or sensation had been detected. Concentration levels from Ss were treated by a time-response method to determine median thresholds for each compound. Descriptions of each odor were given. The findings were discussed in relation to concentrations considered safe for chronic exposure. Detectability and smoking habits were also discussed.
T. R 15

11,101 Price, A. SHIPBOARD EVALUATION OF EXPERIMENTAL COLD WEATHER CLOTHING. (AIRCRAFT CARRIER PHASE). Proj. NT001-002 & NT001-008, Rep. 3, May 1955, 19pp. Bureau of Supplies and Accounts, Dept. of the Navy, Washington, D.C.

11,101 To determine the functionality and general utility characteristics of Navy experimental cold weather clothing items (utilizing the double moisture barrier principle of insulation), an evaluation was performed aboard a carrier operating in the North Atlantic area for a four-week period. The clothing was issued to a group of 25 subjects selected to represent a cross section of flight deck personnel. Combinations of standard and experimental issue could be worn. Analysis was made of observations of clothing use and wear throughout the period and questionnaires completed by all subjects on ability to perform tasks, insulation and warmth, comfort and fit, and preferences for experimental or standard issue.
T. I.

11,102 D'Amico, S. DEVELOPMENT OF AN AIR CIRCULATING UNIT FOR VENTILATION OF IMPERMEABLE SUITS. Proj. NT001-053, Rep. 5, July 1955, 6pp. Bureau of Supplies and Accounts, Dept. of the Navy, Washington, D.C.

11,102 The problem of providing ventilation and other means of cooling for the wearer of impermeable protective suits is reviewed. The shortcomings of supplying air and relying on present evaporative cooling techniques are discussed. An experimental air circulating unit that is small and battery powered is described. Some results of a preliminary investigation of this unit as used with a suit having modified ventilating openings are presented. Recommendations are included.
G. I.

11,103 Brucato, J. DEVELOPMENT OF A NEW OXFORD FOR NAVY WOMEN. Proj. NT-001-018, June 1955, 15pp. Bureau of Supplies and Accounts, Dept. of the Navy, Washington, D.C.

11,103 To develop an oxford that would provide the comfort, durability, and style required by Navy women, a preliminary survey of commercially available shoes was conducted and nine models were selected and tested locally for six months. On the basis of subjective evaluations, one model was selected for development. Two service trials were conducted at the United States Naval Training Center Bainbridge, Maryland. Subjects were primarily recruits in basic training with some permanent personnel included. In the first test (eight-week period) the shoes were evaluated primarily for acceptability with durability factors noted. In the second test, the same design with more durable components was evaluated. Recommendations are included.

11,104

Farber, J.P., Jr., & Hestman, R.C. THE PREDICTION OF A CRITERION OF FLIGHT SAFETY IN NAVAL AVIATION. Proj. NM 001 056-08-01, Aug. 1955, 45pp. Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md.

11,105

To evaluate the use of four rating procedures as a means of establishing criteria of differential accident liability among naval flight personnel, 30 pilots assigned to a United States Navy aircraft carrier rated the other members of their squadron both as to "influence and skill." A criterion of accident reliability was derived from the ratings and tested for reliability. The following variables were measured and studied for their relationships to the criterion: (1) attitudes towards various aspects of naval flying (questionnaire), (2) subjective evaluations of flight safety procedures (six-point scale), and (3) galvanic skin response of pilots recorded as they viewed statements concerning these same items of flight safety procedures.
T. G. R 29

11,105

Chang, S.H., Stabbs, H.L., Dolansky, L.O., et al. VISUAL MESSAGE PRESENTATION. Contract AF 19(604)-1009, AFPC TX 55-580, Rep. 3, March-Aug. 1955, 33pp. Electronics Research Lab., AFPC, Cambridge, Mass. (Northeastern University).

11,105

This report describes work done on a research program directed toward designing an analyzer for a speech compression system. Two plans for the programming of the analyzer are described: a combined discrete-continuous-parameter system and a discrete-identification system. For the first plan, a "V" filter for measuring dispersion of turbulent-sound spectra has been developed and listed. Under the second plan, several steps in the automatic classification of nonstationary sounds by fractional power have been completed, using commercial computing equipment. Measurements of duration and total zero-crossing have been made to investigate whether either parameter could be used to separate stops from fricatives.
T. G. I-R 9

11,106

Moser, H.M. POSITION AND WEATHER TELLING METHODS. Contract AF 18(600)-316, AFPC TX 55-62, Tech. Rep. 27, July 1955, 9pp. Air Force Cambridge Research Center, Cambridge, Mass. (Ohio State University).

11,106

To compare the relative accuracy of three methods in telling digit encoded messages, 12 messages of 14 items each in standard sequence were spoken by one trained speaker. The methods of telling were: tag-word (separation by tag-word and minimum pause), plain telling (separation by distinct pause), and fast telling (separation by minimum pause). Three groups of listeners (one for each style of telling) transcribed the messages read half again as fast as the fast-telling method. The number of correct messages was compared for each method and the effect of practice in the three methods on reception of an impossibly rapid message was analyzed.
G. R 2

11,107

Schwartz, R. EVALUATION OF THE EFFECTIVENESS OF THE ACOUSTIC TREATMENT INSTALLED IN HANGAR BAYS OF USS SARATOGA. Lab. Proj. 5522-3, Final Rep., Sept. 1956, 12pp. Material Lab., New York Naval Shipyard, Brooklyn 1, N.Y.

11,107

To determine the effectiveness of acoustic treatment installed in the hangar bays of the USS Saratoga (CVA-60), objective and subjective measurements were made and compared with similar measurements obtained on the USS Forrestal (CVA-59) which did not have acoustic treatment. Measurements included ambient noise analysis, reverberation time, sound level distribution, frequency response, and speech intelligibility. The data from each measurement were summarized and compared for the two ships. The limitations of the method of assessment are discussed. Recommendations are included.
T. G.

11,108

Sleasin, H.B., Gillespie, D.G., & Harold, W.E. PEAK OXYGEN UPTAKE OF TRAINED HEALTHY YOUNG MEN AS DETERMINED BY A TREADMILL METHOD. Proj. NM 001 105 104, Rep. 1, Oct. 1956, 11pp. USN School of Aviation Medicine, Pensacola, Fla.

11,108

To determine the peak oxygen uptake of healthy young men, 50 naval aviation cadets (18 to 25 years of age) were tested by the treadmill method. Speed was held constant at 3.5 miles per hour and the tests at each grade (20, 24, 28, 28 1/2 until failure to complete a test) were of six minutes duration. Peak oxygen uptake was defined arbitrarily as the highest value obtained for rate of oxygen uptake as determined by measurement and analysis of expired gas collected during the sixth minute of exercise (liters per minute) and was correlated with other variables, such as body surface area, expiratory minute volume, respiratory rate, tidal volume and heart rate. Results are discussed in relation to data from previous studies.
T. R 13

11,109

Diacraft, Inc. VOICEMITTER FOR F-13 GAS MASK. Contract DA-18-108-CHK-5952, P.O. CF5-7518, Dec. 1956, 30pp. Diacraft, Inc., Army Chemical Center, Md.

11,109

This is a final report on the design, development and manufacture of a Voicemitter assembly (for gas masks) and the design and manufacture of tooling for the production of 500 assemblies. The requirements and certain additional desired characteristics for the Voicemitter are stated, followed by a description of the steps taken to fulfill them. Drawings for the approved assembly are included.
I.

11,110

Armstrong, J.V. VECTOR ANALYSIS OF INTERCEPTOR POSITIONING ERRORS. Tech. Memo. 15, Nov. 1955, 24pp. USAF Office of Operations Analysis, Eglin AFB, Fla.

11,110

One objective of the ground environment is to vector an interceptor aircraft out to an effect point where the interceptor performs a standard turn until a specific attack heading is reached (the rollout point). This paper determines the error in the position of the rollout point by analyzing the vector connecting the correct to the actual rollout point and by comparing the correct heading of the interceptor at rollout. Vectors are used to define the interception process and vector error expressions are developed which show the effect of any error in any of the various inputs used to solve the interception problem.
I.

11,111

Anderson, A.R. THE FORMAL ANALYSIS OF NORMATIVE SYSTEMS. Contract SAR/Monr 609(16), Tech. Rep. 2, Nov. 1955, 99pp. Interaction Lab., Yale University, New Haven, Conn.

11,111

This monograph presents a number of new systems of symbolic logic, which are intended, (as one of their principal applications) to shed light on the logical structure of normative systems, as currently studied by social scientists. The systems are proposed as "explications" of a variety of normative concepts (including obligation, permission, prohibition, and commitment); and, more specifically to the normative structures developed by small groups in the process of solving problems. The fundamental ideas of the logistic method are treated; all the formal "theorems" are translated into English, and examples given showing how formal proofs may be constructed.
R 80

11,112

Newell, A. & Kruskal, J.B., Jr. FORMULATING PRECISE CONCEPTS IN ORGANIZATION THEORY. Res. Memo. RM-619, June 1951, 14pp. USAF Project RAND, Rand Corp., Santa Monica, Calif.

11,112

This report presents a partial step in the formulation of precise concepts in organization theory. A rather general model of "reality" is constructed. The symbols that appear in it form the basic terms of the language. Organizational concepts are to be defined in terms of these symbols by use of the algebra of sets and the calculus of relations, and the usual concepts of mathematics.

11,115
Abrams, J.W. MILITARY APPLICATION OF OPERATIONAL RESEARCH. Nat. Convention Transactions, 1954, 107-113. (Royal Canadian Air Force, Ottawa, Ontario, Canada).

11,113
This paper endeavors to show how operational research, defined as a method by which management (or command) is provided with a quantitative aid in formulating decisions, has found its place in the military organization. The complementary in background of the scientist and the executive is stressed as an important factor. A brief account of the development of operational research is related, with specific examples from warfare. Recent developments in the use of "game theory" are discussed.

11,114
Bellows, P. TECHNICAL STUDIES IN CARGO HANDLING. I. FORMULATION OF RECURRENCE EQUATIONS FOR SHUTTLE PROCESS AND ASSEMBLY LINE. Contract No. 223(87), Rep. 56 53, Nov. 1956, 21pp. Engineering Dept., University of California.

11,114
This is the first in a series of reports devoted to the study of the flow of men and materials in space and time. Two specific processes, one arising in cargo-handling (a "shuttle" process) and the other arising in industrial production (assembly line), are discussed. Two types of mathematical processes are identified in both: deterministic and stochastic. The method of recurrence relations, a mathematical technique, is applied to two mathematical models, the link-node model of cargo-handling and an assembly line model to study the processes. Basic recurrence relations are derived which may be used to describe the process.
R 6

11,117
Hayne, J.V. & Armstrong, J.C. SOME CANADIAN ARMY PARATROOP IN-FLIGHT FEEDING TRIALS. Activities Rep., no date, 8(1), 27pp. (Defence Research Board, Ottawa, Canada).

11,117
To determine whether paratroopers would care to eat enroute to a dropping zone, and, if so, the nature and amount of food items that would be acceptable, in-flight feeding trials were conducted. Two types of food items were used: box lunch meals and candy type food. Thru winter training paratroop exercises were used each of which varied in length of time in flight, time of day, and reaction to regular meal times. After the in-flight meal was served, the paratroopers completed a questionnaire on preferences and amounts eaten. The troopers were allowed to carry to the ground any items not eaten. Analysis of data was in terms of acceptability of food items, food consumption patterns, need for flight feeding time for feeding and food for use after the drop. Recommendations are given. T. I. R 6

11,119
Peters, G.A., & Drums, L.R. VISUAL DETECTION OF TRIPMINES FOR ANTI-PERSONNEL MINES. Proj. TBI-1000, DA Proj. 595-20-COL, Tech. Rep. 2415, June 1957, 21pp. Samuel Peltzman Ammunition Labs., Picatinny Arsenal, Dover, N.J.

11,119
To study the visual detectability of anti-personnel mine tripwires, a simulated mine field was constructed. Sixteen tripwires (10, 25, 50, or 100 feet long) were placed at two levels (3-6 and 7-13 feet) above ground at intervals along a 600-foot path. Each subject (35) searched visually for the wires as he traversed the path. The number of tripwires detected, not detected but inadvertently avoided, and of mines actuated (wire contacted with sufficient force to set off an attached mousetrap) were analyzed for effect of length and height of tripwires. The findings are discussed in relation to practice and familiarization procedures.
T. I. R 14

11,120
Houston, J.M., & Peacock, L.J. THE EFFECTS OF AUXILIARY TOPICAL HEAT ON MANUAL DEXTERITY IN THE COLD. Proj. 6-95-20-001, Rep. 285, June 1957, 33pp. USA Medical Research Lab., Fort Knox, Ky.

11,120
To assess the effects of auxiliary topical heat on manual dexterity under conditions of low ambient temperature, 23 subjects were given a pegboard test of finger dexterity. They performed the task at room temperature (about 24 degrees Centigrade) with no auxiliary heat and at low ambient temperature (-15.5 degrees Centigrade) with no auxiliary heat, with low auxiliary heat, and with high auxiliary heat. Heat was applied through a heating pad strapped to the forearm. Skin temperatures were measured by copper-constantan thermocouples attached to the back of the hand. Pegboard scores and skin temperatures were analyzed for differential effects of the conditions. Practical significance of the findings are discussed.
T. G. R 13

11,121
Allen, E.G. RESPONSE REVERSAL AND FATIGUE. Proj. 6-95-20-001, Rep. 289, June 1957, 13pp. USA Medical Research Lab., Fort Knox, Ky.

11,121
To study the influence of a fatigue-inducing performance situation on the acquisition of a simple psychomotor skill and upon subsequent interference created by changing the response requirements of the task, 36 subjects (four groups) practiced a self-paced multiple-reaction time task in which four keys controlled a progression of colors in the signal light. Interference was produced by changing the order of progression. The variables were assessed (500 correct responses) or distributed (eight trials of 100 correct responses, ten-second rest between trials) practice. Latency of correct responses, errors, and blocks (latency equal to or exceeding median latency) were analyzed. Psychological blocking was discussed as an indicator of fatigue.
T. G. R 17

11,122
Weiss, F. MAGNIFIERS ENLARGE THE PFI. c1952, 2pp. Strategic Air Command.

11,122
This paper describes the development and use of a simple optical aid to enlarge the PFI (Plan Position Indicator) of a five-inch cathode ray tube (APC-12 and -23). The background optical theory is presented along with details of construction and installation of the device.
I.

11,123
MacLeod, S., Berah, F.J., Freeman, H.I., et al. THE ACQUISITION AND RETENTION OF ODOR IDENTIFICATIONS. RADC TR-57-7, Jan. 1957, 25pp. Human Factors and Intelligence Labs., RADC, Griffiss AFB, N.Y.

11,123
To investigate the relationships between human performance in learning and subsequent retention of olfactory identifications, 15 odorants were metered into a chamber where they were sniffed by groups of four or five Ss at one time. The four groups differed with respect to the number of signal odors they were required to distinguish from background odor as follows: 10-5, 8-7, 6-7, and 4-11. Identification was by alphabetic label aided by written associations of the Ss. All groups were given the same training schedule and retention tests followed at intervals of three minutes, two hours, twenty hours, one week, and five weeks. The percent correct identifications for learning and retention were analyzed in terms of effect of number of signal odors and kind of odorant. T. G. R 6

11,124
Boynton, R.M., & Bush, W.R. LABORATORY STUDIES PERTAINING TO VISUAL AIR RECONNAISSANCE. Contract AF 33(616)-2565, Proj. 7157, WADC TR-55-304, Part 2, April 1957, 48pp. Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio. (University of Rochester).

11,124
This is the second part of a three-stage program investigating relevant variables of visual air reconnaissance. The subject's task was to search for and identify a target (any one of six rectilinear forms) appearing in a background of curvilinear forms. Variables investigated were: (1) brightness contrast (five steps ranging from 100 to 18 per cent), (2) distance (4 to 40 meters), (3) response tendencies of subjects (as governed by reward probabilities), (4) numbers of figures in an array (8, 16, 32, 64, 128, 256), (5) exposure time (3, 6, 12, 24 seconds), and (6) experience with an array. The results were presented primarily as per cent correct recognition. Practical implications of the results are indicated.
T. G. R 4

11,125
Ritchie, M.L., & Bamford, H.E. THE EFFECT UPON THE OUTPUT OF A COMPLEX MAN-MACHINE SYSTEM OF QUICKENING AND DAMPING A DERIVATIVE FEEDBACK DISPLAY. Contract AF 33(616)-3000, Proj. 6190-71573, WADC TR-57-103, April 1957, 25pp. Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio. (University of Illinois).

11,125
To investigate the effect of quickening and damping an aircraft turn indicator display upon performance (maintenance of straight and level flight), a series of experiments were performed in an electronic flight simulator. Qualified jet pilots served as subjects. Quickening was produced by tilting the after end of the gyro assembly down. Various angles of tilt (zero to ten per cent), damping levels for indicator needle (100 to 700 per cent of normal) and combinations of these factors were used and performance compared with that which would have occurred in straight and level flight. The findings are discussed in relation to a simplified model of the experimental man-machine system.
T. G. I. R 2

11,126
Smith, R.G. Jr., & Cox, J.A. Jr. METHODS OF REDUCTION OF PSYCHOLOGICAL STRESS DUE TO RADIATION. Proj. 7734, Task 17103, AFPTRC TN-57-19, Feb. 1957, 10pp. Personnel Lab., AFPTRC, ARDC, Lackland AFB, Tex.

11,126
To study the extent to which the presence of radiation, even though within medically permitted dose rates, creates stressful conditions for individuals working in a radiation field, recent extensive reviews of the scientific literature on stress were examined. A survey of the personnel practices in nuclear firms and laboratories was conducted with personal visits to 22 such organizations. Practices which would appear to have most effect in reducing the deleterious effect of stress on performance are discussed and related to anticipated Air Force nuclear establishments.
R 12

11,127
Attneave, F., & Arnoult, M.D. THE QUANTITATIVE STUDY OF SHAPE AND PATTERN PERCEPTION. Psychol. Bull., 1956, 53(6), 452-471. (Proj. 7706, Res. Rep. AFPTRC TN-57-42, April 1957. Skill Components Research Lab., AFPTRC, ARDC, Lackland AFB, Tex.).

11,127
This article deals with method and theory relating to a general psychophysics of forms and the kinds of physical analysis and measurement appropriate to such a psychophysics. Two problems are considered: (1) how stimulus objects may be constructed for experiments in shape and pattern perception to allow maximum generalization of research results; (2) how the forms of natural objects may be measured in psychologically relevant terms. Various methods for coping with these problems are discussed and illustrated.
I. R 27

11,128
Seubert, E.D. BASIC RESEARCH IN PSYCHO-Acoustics. Contract DA 36-039-sc-63144 with SCNA, Proj. 3-99-12-022, Quart. Rep. 2, 1955, 9pp. State University of Iowa.

11,128
This is a progress report of a research project whose objective is to augment existing knowledge of the psychacoustics of speech. Work done during the period January through March is outlined and abstracts given. Task 1, Natural Sidelone, is aimed at exploring the vibration of various parts of the body during speech and at measuring the spectrum of the signal that gets to the ear from the vocal mechanism through bone and tissue. Task 2, Amplified Sidelone, is aimed at investigating the possible role of inter-aural phase relationships in amplified sidetones. Task 3, Other Projects, includes evaluation of previously constructed audio-spectrometer and a study intelligibility and binaural time differences.

11,129
Kendler, H.H., & Mayzner, M.S. Jr. NONREVERSAL SHIFTS IN CARD-SORTING TWO OR FOUR SORTING CATEGORIES. J. exp. Psychol., April 1956, 51(4), 244-248. (New York University).

11,129
To test a mediational stimulus-response (S-R) formulation of concept-formation behavior; (that superiority of a reversal shift over a nonreversal shift decreases as the number of categories increases) a concept-formulation test of the card-sorting variety was developed which could be used for two or four sorting categories. Experimental procedures were such that half of the subjects learned the concepts and then were required to learn the reverse by sorting cards in a manner opposite to that required for direct learning, the other half learned new concepts on each trial. Each of these groups were divided into two and four sorting categories. The number of trials to learn the concept (criterion: 15 consecutive correct) were compared for the various conditions.
T. I. R 2

11,130
Cafarelli, M.J. Jr. INVESTIGATION OF TECHNIQUES APPLICABLE TO AIR TRAFFIC CONTROL SIMULATION EQUIPMENT. AFPTRC TR-56-160, March 1956, 37pp. Air Force Cambridge Research Center, Cambridge, Mass. (Stavid Engineering, Inc., Plainfield, N.J.).

11,130
This report describes an investigation of equipments and techniques that are applicable to Air Traffic Control simulation. It is concerned particularly with target generators and associated equipments that have potential use in connection with the Air Traffic Control Central AN/GSN-3. Field trips were made to government agencies and commercial organizations to survey the equipments. Evaluations of the surveyed equipment, relevant conclusions and recommendations are given.
T. G. I.

11,131
USAF Air Research & Development Command Headquarters. TECHNICAL PROGRAM PLANNING DOCUMENT FOR HUMAN ENGINEERING. Aug. 1956, 61pp. USAF Air Research & Development Command Headquarters, Andrews AFB, Washington, D.C.

11,131
This document is concerned with the human engineering program in the Air Force. Present capabilities and limitations of human engineering in providing information about human behavior for the design of military equipment are discussed. Equipment or operations in which the basic tasks of the operator are similar are dealt with. Technical possibilities for gaining new knowledge are discussed and the technical requirements for a research and development program given.

11,132
Jones, J.C. CRANE CABS FOR THE STEEL INDUSTRY. Design, April, 1957, 100, 54-55. (The British Iron & Steel Research Association, London, England).

11,132
This is a brief popular article summarizing the outcome of ergonomic research on the controls in crane cabs used in the British steel industry.
I.

11,133
Helson, R.F. HUMAN TEMPERATURE REGULATION AND THE STEEL INDUSTRY. *J. Iron and Steel Inst.*, Oct. 1949, 193, 197-200. (Department of Human Anatomy, Oxford University, Oxford, England).

11,133
The adverse effects of heat on the performance of work in industry are discussed in this paper. The principles of body temperature regulation are described and related as far as possible to workers in the steel industry. Methods for protecting workers from excess heat are discussed in relation to specific situations existing in the industry.
R 16

11,134
Institute for Perception EVO-TNO. CUMULATIVE BIELIOGRAPHY. May 1957, 20pp. *Institute for Perception EVO-TNO*, Scastenberg, The Netherlands.

11,134
The topics covered in this cumulative bibliography (1947-1957) are primarily in the area of vision, with some few in audition. Journal articles, technical reports and memoranda from the Institute are included in the 110 titles listed. Brief annotations accompany each item.
R 110

11,135
Licklider, J.C.R., & Guttman, M. MASKING OF SPEECH BY LINE-SPECTRUM INTERFERENCE. *J. Acoust. Soc. Amer.*, 1957, 29(2), 287-296. (Massachusetts Institute of Technology).

11,135
To investigate the extent to which the theory of intelligibility that stems from the critical-band hypothesis and importance-function hypothesis accounts for the masking of speech by interference consisting of discrete time components of known frequencies and amplitudes, two series of intelligibility tests were conducted. Speech was presented against a background of (1) continuous-spectrum random noise, and (2) line-spectrum noise of from four to 256 sinusoids superposed in a linear adder, three different spacings of the components in frequency, and several distributions of power among components were studied. The findings are discussed in relation to intelligibility theory and prediction from physical parameters.
T. G. I. R 12

11,136
Jonger, J.F., & Carhart, R.T. CONTINUOUS VERSUS INTERRUPTED STIMULI IN AUTOMATIC AUDIOMETRY. Rep. 56-58, March 1957, 4pp. *USAF School of Aviation Medicine*, Randolph AFB, Tex. (Northwestern University).

11,136
To provide some information on the temporal nature of the stimulus most suitable for automatic audiometry, Bekesy-type threshold tracings were obtained for 30 young adults at frequencies of 250, 1000, and 4000 cycles per second. Both continuous and discontinuous (short-train tone of 100 milliseconds at intervals of 1200 milliseconds) stimulus tones were used. Threshold values and amplitude of oscillation around the threshold were analyzed and compared for the two stimulus patterns. The results are interpreted in terms of their significance for the general problem of automatic audiometry.
T. R 3

11,137
Buskirk, E.R., Iampietro, P.P., & Welch, B.E. VARIATIONS IN RESTING METABOLISM WITH CHANGES IN FOOD, EXERCISE AND CLIMATE. Proj. 7-B3-01-C04C, Tech. Rep. EP-59, May 1957, 19pp. *USA Quartermaster Research and Development Center*, Natick, Mass.

11,137
To investigate changes in resting metabolic rate during the daytime and factors that are associated with these changes, basal oxygen consumption (basal Vo_2) and resting Vo_2 were measured at four-hour intervals in four groups of eight men. Each group lived in one of four climates for at least one month. Exercise was a nine to ten mile walk and the diet was Army five-in-one rations. The experiment consisted of three phases: (1) effect of exercise and food; (2) the specific dynamic action of food; and (3) the impact of environment. The data are analyzed and discussed in terms of methods in use for computing daily energy expenditure.
T. G. R 42

11,138
Randall, A.W., & McIntire, O.E. CHARACTERISTICS OF MAGNESIUM FLUORIDE AND P7 PHOSPHOR FOR RADAR PPI APPLICATIONS. Tech. Dev. Rep. 211, June 1957, 4pp. *Technical Development and Evaluation Center, CAA, Indianapolis, Indiana*.

11,138
To compare magnesium fluoride and P7 phosphor for radar plan position indicator applications, tests were made on three cathode-ray tubes (two had magnesium fluoride screen phosphors and one, the standard P7, a zinc sulphide and cadmium screen phosphor). One group of tests included static characteristics, phosphor decay, and brightness. A second group included visual observations of relative brightness, target signal trials, resolution, and eye fatigue. The performance of each of the two magnesium fluoride phosphors is compared to that of the standard and evaluated in terms of operational requirements. Life expectancy and needed protective circuits for the new tubes are discussed.

11,139
Riblett, V.T. & Brown, A.H. EVALUATION OF PRODUCTION MODEL NO. 1 HAND, CHILD'S SIZE VOLUNTARY OPENING. Tech. Rep. 5808, April 1958, 6pp. *USA Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D.C.*

11,139
A production model of a child-size voluntary opening hand was evaluated by testing on an automatic-reciprocating machine and cycled at rate of 24 cycles per minute. At increments of 25,000 cycles, the hand was inspected for wear at the several pivot points, and measurements of the input and output forces and excursions were made. After the hand mal-functioned, it was disassembled and the mechanism examined. Recommendations for improvements are made.
T. I.

11,140
Seli, R.G. THE ERGONOMIC ASPECTS OF THE DESIGN OF CRANES. *J. Iron & Steel Inst.*, Oct. 1958, 199, 171-177. FE/SE/81/58. (British Iron & Steel Research Association, London, England).

11,140
This report describes how cranes and crane cabs can be designed to suit the characteristics of the men who operate them. Methods are described by which the cab can be designed and sited on the crane structure to insure good visibility. Recommendations are made for the protection of operators from the poor physical conditions prevailing in many steelworks. Details are given of the anthropometric seat developed by the British Iron and Steel Research Association in conjunction with the Medical Research Council. Research studies of the order, amount of use, and positioning of crane controls are described. Application of this information in the design of control points is made.
T. R 6

11,141
Peters, G.A., Jr. & Goldsmith, C.T. METHODOLOGICAL APPLICATIONS OF HUMAN FACTORS IN OPERATIONS RESEARCH. Tech. Memo. 16, May 1957, 11pp. *Samuel Fellman Annotation Lab., Dover, N.J.*

11,141
This case study includes (1) a description of some of the human factors involved in a weapons systems analysis of the effectiveness of anti-personnel mines, (2) an a priori (theoretical) solution for a component of the system, (3) the actual empirical results obtained from a field test of this component, and (4) how this relates to the methodological applications of human factors in operations research. Discussion emphasizes the importance of human components of man-machine systems in operational analysis, acceptable levels of component validity for decision-making, and the sometimes erroneous nature of common-sense and logic when applied to the human variable.
G. R 10

11,142.
Goldard, F.A. ADVENTURES IN TACTILE LITERACY. Ann. Psychol., March 1957, 12(3), 115-124. (University of Virginia, Charlottesville, Va.).

11,142

This paper discusses the human integument as a receiving source for several forms of energy and the possibility of using some of the sensory channels as a communication network. Chemical, electrical, and mechanical stimuli are analyzed from the above viewpoint and a series of experiments on vibratory communications are described. The development of a vibratory language and its practical application are discussed and illustrated.

G. I. R 10

11,143

Barter, J.T. ESTIMATION OF THE MASS OF BODY SEGMENTS. WADC Tech. Rep. 57-262, April 1957, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

11,143

The present study is concerned with the reanalysis of the data on the mass of body segments from two previously published reports: SPACE REQUIREMENTS OF THE SEATED OPERATOR, Dempster, 1955 and THE CENTER OF GRAVITY OF THE HUMAN BODY AS RELATED TO THE EQUIPMENT OF THE GERMAN INFANTRY, Braune and Fischer, 1889. Regression equations for computing the mass of body segments for any known weight are presented along with data on estimated weights of body segments of Air Force flying personnel.

T. I. R 5

11,144

Emanuel, I., & Barter, J.T. LINEAR DISTANCE CHANGES OVER BODY JOINTS. Contract AF 18(600)-30, Proj. 7214, WADC TR-56-364, Feb. 1957, 38pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,144

To provide data on linear distance changes over joints resulting from specifically defined changes in limb positions, measurements were made on 30 young males. The sample was compared statistically to the Air Force flying personnel. Joints and joint complexes included: head and neck, shoulder, elbow, wrist, fingers, trunk, hip, knee, and ankle. Summary statistics and design values are presented for 48 linear distance changes measured over these joints. The uses of these data for the design of close fitting altitude clothing and for determining easement factors in all types of clothing are discussed.

T. I.

11,145

Deutsch, S. SOME STATISTICS CONCERNING TYPE-WRITTEN OR PRINTED MATERIAL. Contract AF-30(602)-1471, Proj. 4519, Rep. R-526, PIB-456, Task 45350, RADC-TN-57-22, Oct. 1956, 13pp. Microwave Research Institute, Polytechnic Institute of Brooklyn.

11,145

This report discusses some statistics associated with a sample of typewritten or printed material for facsimile transmission. Based on the assumption of discrete quantized square (.01 inch) elements, curves are presented giving the probability of occurrence of combinations of black and white elements versus the length of each combination; the entropy of various blocks of symbols is calculated for vertical and horizontal scan; and the saving in time-bandwidth product is calculated for vertical and horizontal scan. Assuming that the sample is binary quantized and continuously scanned in a vertical direction along lines .01 inch apart, smoothed curves are presented that give the relative probability of binary messages versus length of each message.

11,146

Williams, A.C., Adelson, M., & Ritchie, M.L. A PROGRAM OF HUMAN ENGINEERING RESEARCH ON THE DESIGN OF AIRCRAFT INSTRUMENT DISPLAYS AND CONTROLS. Contract AF 33(616)-3000, Proj. 6190, Dec. 1956, 34pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,146

This report outlines a program of research on the human factors in the design of aircraft instrument displays and controls. The effort is intended as a source for the Air Force Integrated Display-Integrated Control Program. Three major approaches are listed and discussed: (1) longitudinal studies of particular weapon systems to produce actual designs of displays and controls and to initiate research on general problems uncovered in the process; (2) cross-sectional studies of general problems of design that apply to many types of systems; and (3) formal conceptual systems studies that may have some promise of general applicability such as tracking and servo theory, information and communication theory, game theory, decision theory, and probability theory.

11,147

Fry, E.I., & Churchill, E. BODILY DIMENSIONS OF THE OLDER PILOT. Contract AF 18(600)-30, Proj. 7214, Task 71728, June 1956, 39pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,147

To investigate age differences in body dimensions, a comparison of 132 such dimensions on selected groups of older (over 30) and younger (under 30) multi-engine aircraft pilots was made. Data were obtained from the 1950 Anthropometric Survey of Flying Personnel (Air Force). Comparisons were made of mean values and five percentile distributions between the groups. Differences were tested for statistical significance. All comparisons are presented in tabular form. The implications for the design of Air Force clothing and personal equipment are discussed.

T. R 3

11,148

Fullinwider, E.G. (Dir.). LONGSHORE SAFETY SURVEY. A SURVEY OF OCCUPATIONAL HAZARDS IN THE STEVEDORE INDUSTRY. Contract N7CNR 29151, Publ. 459, Sept. 1956, 79pp. Maritime Cargo Transportation Conference, National Academy of Sciences-National Research Council, Washington, D.C.

11,148

This report is a study of occupational hazards in the stevedore industry. An analysis of longshore safety data obtained from industrial and governmental sources was made of the degree of hazard involved, nature and extent of injuries to the worker, types of accident, causes of accidents, and estimated cost of accidents. The activities by management, labor, and the government to reduce the accident rates were reviewed. On the basis of the study, definite recommendations are made for methods of improving longshore safety practices to protect the work force and to improve the industries' service to the general public. Actions to be taken by labor, industry and government are specified.

T. I. R 8

11,149

Gyory, E. DEVELOPMENT OF AN ARCTIC PERSONNEL HEATING DEVICE. Contract DA19-129-QM-355, Proj. D053, Final Rep., Sept. 1956, 69pp. Armour Research Foundation, Illinois Institute of Technology.

11,149

This is the final report on the design and development of an Arctic personnel heating device. The device is self-powered and delivers a controlled amount of heat to an inactive person dressed in Arctic ensemble under Arctic weather conditions. Three phases of the research are discussed: (1) an evaluation of various proposed systems in terms of feasibility and practicality, (2) development of the design for the selected system, and (3) testing the performance of the experimental model. Basic design parameters were established for the future construction of a prototype.

G. I.

11,150
American Power Jet Co. ADVANCED METHODS OF
CARGO HANDLING: FUTURE DEVELOPMENTS. Con-
tract DA 44-177-TC-242, APJ Rep. 128-4, Sept.
1955, 176pp. American Power Jet Co., Ridge-
field, N.J.

11,150
This study recommends in detail a series of improve-
ments in the cargo handling process (covering loose
cargo, unitized pallets, containers, vehicles, and heavy
lifts) for future implementation to aid in increasing
the efficiency of military cargo handling, primarily
within the areas of port and beach operations. Each
recommendation is evaluated and justified on its own
merits, and each item of equipment or change is thor-
oughly described in terms of problem area, impacts on opera-
tions, required development efforts, costs, and effect
on Transportation Corps operations.
T. I. R 26

11,151
Bess, B.H. INTERRELATIONS AMONG MEASUREMENTS OF LEADER-
SHIP AND ASSOCIATED BEHAVIOR. Contract W70nr-35609, Tech.
Rep. 5, Dec. 1955, 21pp. Louisiana State University,
Baton Rouge, La.

11,151
To explore relationships of various factors of leader-
ship and behavior in groups, data were taken from a pre-
vious experiment wherein 19 groups of five members each
participated in leaderless group discussions. The method
of metagame-alometry-measurement of relations between and
within individuals' rank order judgments before and after
discussion of the items to be ranked had been used to ob-
tain the data on successful public and successful private
leadership. The extent to which each of these components
contributed to the composite scores was analyzed by cor-
relational methods. The reliability and validity of the
measures used are discussed.
T. R 11

11,152
USN Personnel Analysis Division. ANNOTATED BIBLIOGRAPHY
OF BILLET AND QUALIFICATIONS RESEARCH BRANCH STUDIES,
JANUARY 1944-JUNE 1955. NAVPERS 18421, Sept. 1955, 49pp
USN Personnel Analysis Div., Bureau of Naval Personnel,
Washington, D.C.

11,152
This annotated bibliography lists occupational and
organizational research studies developed by the Billet
and Qualifications Research Branch during the period
January 1944 through June 1955. The bibliography is
arranged according to the four major functions of the
Branch as follows: occupational research, organizational
research, occupational classification and qualifications
analysis. An index is included. A supplement covering
the period July 1955 through July 1956 is inserted.
R 193

11,153
Jackson, J.R. MACHINE SHOP SIMULATION USING
SMAG: PART I OF A PROPOSAL. March 1956, 10pp.
University of California at Los Angeles.

11,153
This paper proposes simulation research on machine
shop scheduling problems, using the National Bureau of
Standards Western Automatic Computer. The type of indus-
trial situation to be studied is described in general
terms and then as a paper-and-pencil model which provides
a condensed flow chart for a computer program. Related
simulation and mathematical research is summarized
briefly. Objectives of a fairly long-range program are
outlined and a specific proposal is presented.
R 11

11,154
Booth, C.R. THE FACTORS INVOLVED IN THE DE-
VELOPMENT OF A PANORAMIC SEXTANT. Proj. 55-10,
June 1955, 17pp. Senior Observer Section,
Mather AFB, Calif.

11,154
This paper presents a staff study (Senior Observer
Technical Specialist School) of the factors involved in
the development of a panoramic sextant for Air Force
use. The need for such an instrument is present and
future aircraft is stated; the compatibility of such a
sextant with design trends in equipment, and the time
cost factor of development are pointed out. These fac-
tors are evaluated and discussed. Recommendations are
included. Appendix are Air Force Regulation, Numbers
57-2, 60-6, and 60-13 concerning qualitative operational
requirements, classification of Air Force equipment, re-
search and development testing, and operational suitabil-
ity testing.

11,155
Miller, B.T., Lohr, D.J., & Donley, H.L.
AIRCREW EVALUATION OF MD-1 INTEGRATED FLYING
CLOTHING ASSEMBLY. July 1955, 7pp. Human
Factors Operational Engineering Section,
Strategic Air Command, MacDill AFB, Tampa,
Fla.

11,155
To provide aircrew evaluation of the modified MD-1
Integrated Flying Clothing Assembly (constant wear, anti-
exposure suit), flight tests were conducted on crews in
B-47 and F-84 aircraft. Duration of flights ranged
from two to seventeen hours. Test personnel supervised
the donning of the assembly and checked the blower system
(one part of assembly is a ventilation suit) and upon
landing inspected for dryness of clothing and fatigue.
Each crew was questioned about findings relative to equip-
ment during flight. One crew (three) was immersed in the
ocean to test the impermeability and flotation qualities.
The data were analyzed in terms of adequacy of (1) blower
system, (2) suit liner, (3) anti-exposure suit, (4)
gloves, and (5) knife. Fatigue factors are discussed.
Recommendations are included.

11,156
Haythorn, W.W. A REVIEW OF RESEARCH ON GROUP
ASSEMBLY. Proj. 7713, Res. Rep. APFTRC TN-57-
62, May 1957, 14pp. Crew Research Lab., APFTRC,
ARDC, Randolph AFB, Tex.

11,156
This paper reviews research pertaining to relations
between group composition and group effectiveness, espe-
cially emphasizing the assembly of individuals into
crews. This problem occurs in the Air Force whenever a
manpower pool must be formed into teams (3-29 crews,
two-man fighter-bomber crews, Air Defense Direction Cen-
ter crews). The research was categorized as pertaining
to (1) nomination techniques, (2) homogeneity of group
members, (3) distribution of technical and social skills,
(4) interaction of personalities, and (5) mathematical
problems in assembly. On the basis of available evidence
three general principles are stated regarding crew assem-
bly procedures. Some directions for further research
are indicated.
R 39

11,157
West, L.J. RECOMMENDATIONS FOR TYPEWRITING
TRAINING. Proj. 7714, Devel. Rep. APFTRC TN-
57-68, June 1957, 16pp. Maintenance Lab.,
APFTRC, ARDC, Lowry AFB, Colo.

11,157
This report presents recommendations for typewriting
training -- instructional procedures, materials, and
equipment -- that are based on research evidence
(abstracted from a more comprehensive review) and are
considered in the light of psychological knowledge about
learning. In order to provide a convenient reference
document for the instructor, the recommendations are
given in brief, numbered paragraphs under eleven major
headings. Concepts for learning and for assessment are
related to these procedures.
R 1

11,158
Howell, W.D., & Edwards, T.M. DETERMINATION OF SOME GEOMETRIC RELATIONSHIPS PERTAINING TO COLLISION FLIGHT PATHS. Tech. Develop. Rep. 259, June 1955, 138pp. Technical Development and Evaluation Center, CAA, Indianapolis, Ind.

11,158
To develop a basic means for permitting a better understanding of cockpit visual and aircraft conspicuity problems as they relate to mid-air collisions, formulas are derived and visual-angle distance charts are presented for certain combinations of straight-and-level, climbing, descending, and turning flight conditions. Visual angles and distances between aircraft may be determined using only aircraft headings and speeds; critical collision courses may also be determined. Tables are presented showing actual airplane altitudes during flight. Actual flight paths recorded in the vicinity of airports are presented. Some performance parameters used in the design of the charts were established from these flight-path data.
T. G. I. R 7

11,159
Peak, Helen. ANNUAL REPORT OF ATTITUDE CHANGE PROJECT. Contract Monr. 1224 (10), Task NR 171 039, Nov. 1956, 11p. University of Michigan, Ann Arbor, Mich.

11,159
This annual report (1956) describes the activities on a project devoted to determining the conditions of attitude change, or the conditions under which people come to accept or reject some person or group, or some issue or policy. Research efforts thus far have been concerned primarily with using knowledge about cognitive structure as a means for changing attitude, along with the allied problem of generalization. The development and adaptation of methods of measurement have also been of concern. Specific studies have explored the areas of attitude change, information and personality variables.

11,160
Perkin-Elmer Corp. REDESIGN AND MODIFICATION OF MACHINE GUN PERISCOPE SYSTEM. Contract DAI-19-059-507-ORD(P)-2245, Proj. TT2-689, Nov. 1955, 7pp. Perkin-Elmer Corp., Frankford Arsenal, Philadelphia, Penn.

11,160
This is a final narrative summary report of the steps taken in the redesign and modification of the Perkin-Elmer Corporation's Model 100,48 degree Machine Gun Periscope. A final step, a redesign of the modification to provide for ease of manufacture and maintenance was made. The modifications requested by the Army are listed and performance data compiled during tests are presented.

11,161
Brown, A. TESTING AMERICAN CHAIN AND CABLE FORCE TRANSMISSION SYSTEM. Tech. Rep. 5673, Dec. 1956, 3pp. Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D.C.

11,161
To evaluate the frictional and wear characteristics of a modified American Chain and Cable's force transmission system of prosthetic arms, a mock-up arm was constructed and tested by a reciprocating tester under simulated service conditions. The wear life of the new cable system was determined and compared to systems previously tested. Frictional characteristics of the system were measured and compared. The life and wearability of a new type of nylon-coated housing (used in the new model) was further determined. Recommendations concerning further developments are made.
T. I.

11,162
Cook, E.B. THE EPIDEMIOLOGY OF FROSTBITE. Lecture and Review Series 54-5, Sept. 1956, 411-426. Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md.

11,162
To examine the multiple causation of the trauma of cold injury, all (716) cases of frostbite among the American forces in Korea (1951-1952) were studied using the techniques of epidemiology. Factors included: (1) agent factor (cold, loss of body heat, and others), (2) environmental factors (weather, duration of exposure, condition of ground, combat action, shelter, clothing, and others); and (3) host factors (age, rank, previous injury or illness, nutrition, fatigue, tobacco, cold weather training and others). Control subjects were also interviewed. The data were analyzed for the contribution of the various factors and for interactions among them. Recommendations for minimizing the incidence of frostbite are included.
R 17

11,163
Ragsdill, R.A. (Proj. Officer). SUITABILITY TEST OF THE 35,000 FPM VERTICAL VELOCITY INDICATOR. FINAL REPORT. Proj. MOODY 56 20, Nov. 1956, 6pp. USAF Training Analysis & Development Div., Moody AFB, Ga.

11,163
To determine the operational suitability of the 35,000 FPM Vertical Velocity Indicator, the Indicator was installed in a T-33 type aircraft and flown 47 hours and 35 minutes (seven hours of night flight). A total of 13 instructor pilots participated in the evaluation flights, all of which were flown either in weather or under hooded VFR conditions. A questionnaire concerning specific performance aspects of the Indicator was answered by the pilots. The data (answers to questions) were analyzed as a basis for recommendations concerning acceptance of the instrument by the Air Force.
T.

11,165
Baker, L.E., Mansfield, H.W. & Edwards, S.P. (Chm.). ARMY HUMAN ENGINEERING CONFERENCE REPORT. THE PENTAGON, 14-15 DECEMBER 1955. 97pp. USA Office of the Chief of Staff, Washington, D.C.

11,165
This report is the record of the Army Human Engineering Conference called to provide improved interchange of information on this subject among the various agencies concerned. Addresses "On Human Engineering" and "Army Policy Affecting Human Engineering Research" are given in full, abstracts of technical service presentations to the conference and summaries of conference and summaries of conference discussions and conclusions are included. Appendices contain Army policy documents and texts of conference presentations which include: Army participation in the "Human Engineering Guide"; exchange of human factors information between equipment testing and human engineering research agencies; and improvement of communications among various agencies.

11,166
White, C.S., Whitby, R.D., & MacGregor, J.B. INVESTIGATION OF COCKPIT SEATING. Proj. TED No. PTA 25124, Feb. 1946, 11pp. Tactical Test Div., Naval Air Test Center, Patuxent River, Md.

11,166
To evaluate pilot comfort during long flights with various cockpit seating arrangements, 12 different test flights (from 1.5 to 5.8 hours duration) were made. Seating arrangements included: (1) rubber foam or hair filled seat cushion, (2) seat and back pad, and (3) vibratory seat cushion, on top of life raft and seat pack and seat type parachute. The pilot and one observer acted as experimental subjects with the observer keeping a log of his own and the pilot's impressions. After each trip the subjects were examined for reactive hyperemia (redness) particularly in skin of buttocks, lumbosacral regions, perineal region, and thigh. Analysis and discussion is in terms of seat design, operation of controls, and distracting discomfort. Recommendations are included. T. I.

11,167

Andrea, R.E. PRINT QUALITY FOR AIR PHOTO INTERPRETATION. Thesis, Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts, 1955, 213pp. Boston University.

11,167

To investigate various characteristics of photographic reproductions for air photo interpretation, 18 military photo interpreters were asked to choose between paired photographs on the basis of information content. Sixteen stereographs were printed from one pair of negatives (scale 1:8,400), each printed differently to emphasize one or more of 13 targets in the scene - transparency versus print, collimated versus diffuse light printing, glossy versus unglazed surface, light versus dark appearance, steep versus shallow curve gradient, and type of paper. Paired comparisons were made with and without a stereoscope. The data were analyzed as percent preferences shown for the various reproductive factors. Four subsidiary studies on various aspects of photography are appended. T. G. I.

11,168

Slawitz, A. REPORT OF AIRBORNE NOISE SURVEY IN USS TIMBERMAN (EAG 152). Lab. Proj. 528C-6, Final Rep., Sept. 1956, 15pp. Material Lab., N.Y., Naval Shipyard, Brooklyn, N.Y.

11,168

An airborne noise survey was conducted in the USS Timberman (an experimental ship of advanced design that incorporates the use of high pressure and high temperature steam conditions, high rotative speeds, and so forth) during November 1955, en route from Boston Shipyard to Key West Naval Base. Microphones were placed at ear height for all measurements in the selected stations: operating stations within machinery spaces, Captains Cabin, Combat Information Center, working stations by propulsion units, engine rooms, and others. Noise levels for each station were tabulated for speeds of 0, 10, 20, and 25 knots. Specification criteria were included for comparison. Comfort levels, speech interference levels, and deafness risk hazards are discussed and recommendations made. T. I.

11,169

Usawa, R. ON THE LOGICAL RELATION BETWEEN PREFERENCE AND REVEALED PREFERENCE. Prepared under Contract N6onr-25133, Proj. NR 047-004, Tech. Rep. 38, Nov. 1956, 20pp. Stanford University.

11,169

This note clarifies the logical relation between preference and revealed preference as it relates to the theory of consumer's choice. Mathematical proof is offered to support the stated theorems. R 8

11,170

Welch, B.E., Marcinek, J.G., Mann, J.B., Grotheer, M.P., et al. CALORIC INTAKE AND ENERGY EXPENDITURE OF ELEVEN MEN IN A DESERT ENVIRONMENT. Proj. 6-60-11-080, Rep. 190, Aug. 1956, 22pp. Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

11,170

This study is one of a series of experiments designed to quantitate caloric intake and expenditures in several environments with a well-defined regimen of physical activity. The test site for this study was the hot-dry environment of Arizona (Yuma Test Station); mean ambient temperature, 33 degrees Centigrade; mean relative humidity, 35 per cent. Caloric intake and expenditure were studied in 11 men. All foods were weighed, time-motion studies performed, and energy expenditures for all activities in the field determined. Measurements of body stores of fat and weight changes were made and used in assessment of caloric intake and expenditure. These results are compared with those from a subarctic environment. T. R 17

11,171

Lawrence, W., Stead, L.G., Jones, E.T., McLean, D.J., & Clark, J.A. METHODS AND PURPOSES OF SPEECH SYNTHESIS; REPORT OF THE COLLOQUIUM HELD AT S.R.D.E. ON THE 8th & 9th of SEPTEMBER 1955. U.D.C. 534.79, Rep. 1100, March 1956, 61pp. Ministry of Supply, London, England.

11,171

This report is an account of the proceedings of a colloquium held at the Signals Research and Development Establishment, Christchurch, Hants, England. Each of five speakers discussed the methods and purposes of speech synthesis and analysis from the point of view of their particular program, unsolved problems, and future plans. Abbreviated transcripts of these talks and subsequent discussions are included. A bibliography, with abstracts, is appended. T. I. R 87

11,173

Arnold, W.O., Bower, M.M., Crane, R.L., Erickson, J.R., et al. SYSTEMS ENGINEERING STUDY OF SEMIAUTOMATIC AIR TRAFFIC CONTROL AND DATA COMMUNICATIONS. Contract DA 36-039-ec-64567, Final Rep., Task A, Part 3, Vol. 1, Nov. 1954-Dec. 1955, 159pp. Bell Telephone Labs., New York, N.Y.

11,173

This report represents one phase of a study of air traffic control aimed at crystallizing planning for an improved Common System. The scope of work summarized in this report was limited to systems study effort designed to analyze the need for automation of communications and display in air traffic control, to explore promising means for its accomplishment, and to consider its potential use in an operational system. Technical and operational factors that influence selection of major system elements and help determine their characteristics were analyzed. An air-ground data link was studied in detail. Promising approaches to development and design of a semi-automatic system are included. T. G. I.

11,174

USA Arctic Test Branch. CHECK TEST OF MODIFIED ARCTIC AND MOUNTAIN SLEEPING BAGS, WITH LINERS. DA Proj. 7, 82 01.002, Proj. 2608KA, ATBC Rep. 427, July 1956, 40pp. USA Arctic Test Branch, Big Delta, Alaska.

11,174

To evaluate the modified Arctic and Mountain sleeping bags (with liner) for Army use under arctic winter conditions, field tests were conducted under arctic conditions at ambient temperatures ranging from 50 to -56 degrees Fahrenheit. Tests included determination of performance of rapid exit features, insulating qualities, portability, effects of laundering and dry cleaning, serial delivery, durability, ease of maintenance and field repair, and extent to which military characteristics were met. Observed deficiencies were listed together with suggested modifications. Recommendations are included for further research and development. T. I. R 5

11,175

Gray, R.P. RELATIONSHIPS BETWEEN OCULOGYRAL ILLUSIONS AND NYSTAGMUS. NADC MA 5609, Proj. NM 001 111 302, Rep. 1, Aug. 1956, 14pp. Aviation Medical Acceleration Lab., NADC, Johnsville, Penn.

11,175

To investigate relations among the several responses of humans to rotation which are used as indices of response to vestibular stimulation, four subjects were exposed to rotation during 228 runs on a human centrifuge. Various angular accelerations were utilized as stimuli while nystagmus and reports of oculogyral illusions (OGI) and feelings of rotation were continuously recorded from the time the centrifuge started until one and one-half minutes after it stopped. The time relationships among OGIs, nystagmus, and feelings of rotation were analyzed. The results are discussed in terms of causal factors of the oculogyral illusion. T. G. I. R 8

11,176

Kirsch, H.A. AN AIDED-TRACKING SYSTEM SIMULATOR. NITS TM 1778, June 1954, 39pp. USN Ordnance Test Station, China Lake, Calif.

11,176

To obtain an aided-tracking system suitable for high speed tracking, controllable by one operator, and reliable for use on missile test ranges under adverse weather conditions, this study was initiated. Derivations of the transform functions representing four aided-tracking systems were shown: 1) displacement-plus-velocity; 2) lead-displacement; displacement-plus-velocity; 3) displacement; velocity-plus-acceleration; and 4) lead-displacement; displacement; velocity-plus-acceleration. A description was included of the design and development of an aided-tracking-system simulator, a servomechanism capable of converting a linear input displacement into four basic output-motion components which form the required systems when combined suitably.

G. I. R 8

11,177

San Diego State College. TENTATIVE BIBLIOGRAPHY ON WORK AND FATIGUE. Contract NMR 126801, March 1954, 54pp. San Diego State College, San Diego, Calif.

11,177

This bibliography on work and fatigue lists 768 titles from journals published in the United States and foreign countries. Accompanying each reference is the year and abstract number in the Psychological Abstracts. The time period covered is from approximately 1937 through 1953.

R 788

11,178

Fleishman, E.A. PSYCHOMOTOR SELECTION TESTS: RESEARCH AND APPLICATION IN THE UNITED STATES AIR FORCE. Personnel Psychol., 1956, 9(4), 449-467. (AFPTRC, ARDC, Lackland AFB, Tex.).

11,178

This paper presents an overview of several lines of research carried out in the United States Air Force in the area of psychomotor testing. Psychomotor tests which have been most successful as predictors of pilot success are described (Complex Coordination, Rudder Control, Rotary Pursuit, Two Hand Coordination) and several new tests are discussed. The current status of the pilot selection program is indicated. A brief summary of fundamental research includes discussion of attempts to isolate and define important dimensions of human abilities in the area of psychomotor skills, and studies relating these aptitudes to efficiency in learning complex tasks.

G. I. R 20

11,179

Gaydos, H.F. & Dusek, E.R. EFFECTS OF LOCALIZED COOLING OF THE HANDS VS. TOTAL BODY COOLING ON PERFORMANCE OF A COMPLEX MANUAL TASK. Proj. 7 83 01 005, Tech. Rep. EP 65, Aug. 1957, 7pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

11,179

To investigate the nature of environmental factors that produce detrimental effects on manual performance in the cold, 16 subjects were tested on complex manual performance tasks (knot tying and block stringing without visual cues) under two different environmental conditions after a period of training to control learning effects. Under one condition, only the subject's hands were cooled while the rest of his body was exposed to comfortable ambient temperatures; in the other the subject worked in total in a low ambient temperature. Tests were given in both cases when skin temperatures reached certain predetermined levels. The performance data were studied by analysis of variance techniques.

T. G. R 3

11,180

General Electric Co. FOURTH INVITATIONAL CONFERENCE FOR VISUAL RESEARCH SPECIALISTS. PAPERS IN BRIEF. April 1956, 73pp. General Electric Co., Nela Park, Cleveland, Ohio.

11,180

This report presents summaries of twenty reports on research in light, vision, and seeing. The reports were given at an Invitational Conference for Visual Research Specialists held for the purpose of exchange of ideas, experiences, techniques, and results of research being done in various laboratories.

T. G. R 20

11,161

Gregg, L.W. CHANGES IN MUSCULAR TENSION DURING PSYCHOMOTOR PERFORMANCE. Contract DA 19-129-QM-250, Proj. 7-83-01-003A, Tech. Rep. EP-54, May 1957, 27pp. USA Quartermaster Research and Development Center, Natick, Mass. (Carnegie Institute of Technology).

11,181

To determine whether a feasible measure of generalized muscular tension could be derived from separate muscle action potentials obtained from various muscle groups, changes in the magnitude of such potentials were observed in two separate experiments. A total of 72 subjects performed fatiguing tasks (arm-hand steadiness, tapping, carrying 67 pound packboards, squeezing hand dynamometer and weight-lifting) while the muscle action potentials were being obtained. The action potential measures were analyzed for the effects of load, fatigue, rest, and their relation to performance changes.

T. G. R 12

11,182

Groth, Hilde, & Lyman, J. PREHENSION FORCE AS AN EFFORT INDEX FOR EVALUATING LIGHT MANIPULATORY PERFORMANCE. Contract DA 19-129-qm-525, Rep. EP-57-39, June 1957, 57pp. USA Quartermaster Research and Development Center, Natick, Mass. (Dept. of Engineering, University of California at Los Angeles).

11,182

To examine prehension force (grasp force exerted by the finger pads upon the manipulated object - a pressure sensitive cylinder) as a practical index of effort, 20 subjects performed a manipulation task requiring discrete movements. One group used right hand only, another the left hand. Conditions varied were: (1) pace: self-paced, rhythmical (two-second intervals), arrhythmical (one-to-five-second intervals); (2) pattern: regular or random; (3) noise: 70 and 90 decibels sound pressure level; and (4) a speed trial. Measurements were made of mean prehension force, pulse rate increase, effort rating scale scores, time per transport, and errors. Relationships between prehension force and the other measures were analyzed; effects of experimental conditions were studied and stability of measure was established.

T. G. I. R 25

11,183

Guetzkow, H., & Dill, W.R. FACTORS IN THE ORGANIZATIONAL DEVELOPMENT OF TASK-ORIENTED GROUPS. No date, 52pp. Graduate School of Industrial Administration, Carnegie Institute of Technology.

11,183

To study the mechanisms by which task-oriented groups develop interaction structures for task performance, various degrees of communication restriction were imposed upon the group (all channel, circle, and hub communication nets) for periods of task performance and periods of organizational planning activity. The processes involved in the organizational development were analyzed and two theories proposed - local learning and insightful planning. A second experiment was carried out to test these conclusions and the results analyzed the manner in which the various communication structures affected these processes and, hence, the degree of organization achieved.

T. G. I. R 15

11,184

Hale, H.B., Sayers, G., Sydnor, Katherine L., Sweet, M.L., & Van Fossan, D.D. BLOOD AGTH AND PLASMA CORTICOSTEROIDS IN MAN DURING EXPOSURE TO SIMULATED ALTITUDE AND HIGH AMBIENT TEMPERATURE. Rep. 57-55, Feb. 1957, 16pp. Department of Physiology and Biophysics, USAF School of Aviation Medicine, Randolph AFB, Tex. (Western Reserve University).

11,184

To evaluate the effect of exposure of healthy human subjects to adverse environmental influences (simulated altitude and high ambient temperature) on blood AGTH and on blood corticosteroids, a series of tests were conducted: (1) short exposures of 2, 15, or 45 minutes with hypoxia induced by gas mixture, heated metal chamber of 52 degrees Centigrade, exposures to altitude and temperature separately and combined, one control condition; (2) three-hour exposure to hypoxia induced by decompression (14,000 feet) in heated chamber; and (3) two hour exposure with same conditions but different subjects. Blood samples and other physiologic measures (circulation, respiration, temperature, and so forth) were analyzed for changes from normal.

T. G. R 27

11,185

Hoffman, H.S. THE DETECTION OF SIGNALS AND THEIR ATTRIBUTES. Proj. NM 003 041.55.02, Rep. 277, Sept. 1956, 6pp. USK Medical Research Lab., Naval Submarine Base, New London, Conn.

11,185

To study the relation between detection of a signal and detection of separate attributes of that signal, a series of signal-like noises was presented against a background of noise. Listeners were required to detect these signals and specify their separate attributes. Attributes were: chopping or periodic interruption of signal, and modulation or periodic change in signal bandwidth. A given signal was either chopped, modulated, chopped and modulated, or steady. Comparisons were made of the percentage of times the four types of signals were detected. The findings are discussed in terms of cues involved in signal detection behavior.

11,187

Kobrick, J.L. QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: III. DIMENSIONS OF THE LOWER LIMIT OF GLOVED HAND SIZE. Proj. 7-83-01-004, Tech. Rep. EP-43, Feb. 1957, 185pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,187

This report presents human engineering information on the hand dimensions of the soldier wearing various ensembles of Quartermaster protective handwear. The data are compiled for use by engineers and designers as a handbook for establishing size and space allowances in the design and sizing of hand operated equipment. The criterion used is the point below which the smallest five percent of hand sizes fall - the lower limit of hand size. The information is presented in pictorial form with index scales, so that dimensions can be measured on the pictures and referred to the index scale to establish actual size.

I. R 4

11,188

Kobrick, J.L. QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: IV. DIMENSIONS OF THE LOWER LIMIT OF BODY SIZE OF THE ARCTIC SOLDIER. Proj. 7-83-01-004, Tech. Rep. EP-51, April 1957, 83pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,188

This report presents human engineering information on the body size of the soldier clothed in full Arctic uniform. It was designed for use as a handbook for engineers and designers for establishing space allowances in the design and sizing of man-operated equipment. The criterion used is the point below which the smallest five percent of body sizes fall - the lower limit of body size. The information is presented in pictorial form with index scales, so that dimensions can be measured on the pictures and referred to the index scale to establish actual size.

I. R 4

11,189

Pohlmann, H.F., & Katchmar, L.T. AN EVALUATION OF SELECTED RIFLE SIGHTS UNDER TWO LEVELS OF ILLUMINATION. Proj. TBI-1300, Tech. Memo. 7-57, July 1957, 8pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Aberdeen, Md.

11,189

To determine the accuracy permitted by a series of rifle sights under live firing conditions for high (50 footcandle) and low (one footcandle) illumination, a repeated measurements design employing ten subjects was used. The sights were a standard M1 and two experimental sights that had been reported to permit a high degree of sighting accuracy for both high and low illumination under laboratory conditions. Each subject was given six trials of four ten-shot groups; one trial for each sight-illumination condition. All shot groups were scored and measured in inches; mean scores were analyzed for differences due to sights and illumination.

T. I. R 5

11,190

Kurke, M.L., & McCain, C.W. Jr. LOW POWER OPTICAL SYSTEMS AND AERIAL TARGET DETECTION. Proj. TBI-1000, Tech. Memo. 5-57, June 1957, 14pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Aberdeen, Md.

11,190

To determine minimum visible thresholds in detecting airborne targets, several monocular optical systems were investigated. The first experiment used an F-56 aircraft target with one, three, five, six and seven power optics; subjects (30) signalled for detection and again for confirmation when details of the target became visible. A second experiment used fixed targets of varying sizes against an empty field background and a terrain background with one, two and one-half, and three power optics in addition to an open tube and the bare eyes. The data (mean detection distance in yards of mean size of target detected at 100 yards) were analyzed for differences due to optical system and type of background.

T. I. R 13

11,191

Lang, D.A. SOME ADVANTAGES AND DISADVANTAGES OF VARIABLE AND NON-LINEAR GEARING BETWEEN THE PILOT'S CONTROL AND THE CONTROL SURFACE. Current Paper 253, Rep. 283, 1956, 15pp. Aeronautical Research Council, Ministry of Supply, London, England.

11,191

The advantages and disadvantages arising from the use of variable and non-linear gearing between the pilot's control and the corresponding control surface are considered. Possible methods of incorporating such gearing into control systems are outlined together with an analysis of resulting stick forces and movements. Reasons for desiring variable or non-linear gearing are discussed and methods for obtaining the required characteristics reviewed. Various possible applications are discussed.

T. G. R 2

11,192

Lieberman, A.M., Delattre, P.C., Cooper, F.S., & Gerstman, L.J. THE ROLE OF CONSONANT-VOWEL TRANSITIONS IN THE PERCEPTION OF THE STOP AND NASAL CONSONANTS. Psychological Monographs, 1954, 68(8), 13pp. (Haskins Labs., New York, N.Y.).

11,192

To study the role of consonant-vowel transitions (frequency shifts observed on spectrograms of such syllables) in the perception of the stop and nasal consonants, two series for each (stop and nasal) of simplified, handpainted spectrograms of transition-plus-vowel and vowel-plus-transition were prepared and converted into sound by a special purpose playback. The transitions were varied in steps of 120 cycles per second above and below the second formant (from 720 to 480 cycles per second). Groups (33 each) of listeners were asked to judge, variously, whether the sounds were (1) b, d, or g; (2) p, t, k; (3) m, n, or ng. Analysis was made of the distributions of judgments for the various stimuli.

C. I. R 7

11,193

Mathews, C.W. ANALOG STUDY OF THE EFFECTS OF VARIOUS TYPES OF CONTROL FEEL ON THE DYNAMIC CHARACTERISTICS OF A PILOT-AIRPLANE COMBINATION. NACA Res. Abstr. 116, June 1957, 13pp. National Advisory Committee for Aeronautics, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).

11,193

To investigate the intrinsic features of various types of control feel (forces on the pilot's stick that provide him with cues to the airplane response), a closed-loop type of analysis was made utilizing an analog of the human pilot. Types of feel forces considered were those obtained from the pilot's control inputs (stick centering springs) and those obtained from the airplane's response (bobweight feel). The usefulness and limitations of these sources for the longitudinal control system of an airplane are discussed.

G. I. R 6

11,194
Wiscloff, Christine. EFFECTS OF CLOTHING ON RANGE OF MOTION IN THE ARM AND SHOULDER GIRDLES. Proj. 7-83-0044, Tech. Rep. EP-49, June 1957, 31pp. USA Quartermaster Research and Engineering Center, Natick, Mass. (State University of Iowa).

11,194

To determine the effects of clothing on range of motion in the arm and shoulder girdles, measurements were taken of the range of movement combining shoulder flexion, abduction, and adduction and of elbow flexion on 359 male subjects, with and without an arm and shoulder harness simulating clothing restriction. A retest was given 87 subjects as a check on reliability of measurements. Ranges, means, and standard deviations were computed and compared for movements with and without restriction. Relations between the various motions were computed.
T. R. 19

11,195

Noro, L., & Heikel, A. Part I. PUBLICATIONS IN YEARS 1940-1950. Part II. PUBLICATIONS OF THE INSTITUTE OF OCCUPATIONAL HEALTH IN YEARS 1951-1957. 67pp. Institute of Occupational Health, Helsinki, Finland.

11,195

This bibliography lists publication - original investigations, review articles, popular articles, travel reports and congresses, annual reports of various related organizations - on occupational health covering the period 1940 to 1957 in Finland. Topics covered are: general aspects, industrial toxicology, pneumoconiosis, organic dust, occupational dermatitis, noise and vibration, industrial ophthalmology, occupational physiology, occupational psychology and accidents. A brief bibliography of periodicals on occupational health and safety in Finland is included.
R 1017

11,196

Hart, K.G. AUTOMATIC FLIGHT CONTROL SYSTEMS FOR PILOTED AIRCRAFT. Contract NDAS 51-514(C), BUAER Rep. AE 61 4.VI, April 1956, 340pp. USN Bureau of Aeronautics, Washington, D.C. (Northrop Aircraft Inc., Hawthorne, Calif.).

11,196

This volume is devoted primarily to methods for designing automatic flight control systems for piloted aircraft. It is written for the college graduate who has had some training in systems engineering. The history of the development of automatic aircraft control and a discussion of general functions performed by present day control systems are presented in Chapter I. Succeeding chapters include (1) a description of automatic flight control systems and, where possible, derivations of their transfer functions, (2) a recommended design procedure accompanied by an illustrative example, and (3) a discussion of the concept of systems engineering along with some other useful design considerations.
T. G. I. R 29

11,197

USN Physiological Psychology Branch. BIBLIOGRAPHY ON MOTION SICKNESS. Rep. 2, ONR Rep. ACR 3, Jan. 1956, 29pp. USN Physiological Psychology Branch, ONR, Washington, D.C.

11,197

This bibliography on motion sickness represents the literature up to and through the year 1954. Compilation was made preliminary to organizing a comprehensive study of the evaluation of drug protection against motion sickness in its many forms. References were selected that were felt to be of value to those concerned with the broad organization of the study as well as those undertaking various aspects of the program.
R 525

11,198

USN Personnel & Training Branch. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. SUPPLEMENT NUMBER 1: JUNE 1956-JUNE 1957. 12pp. USN Personnel & Training Branch, Washington, D.C.

11,198

This bibliography lists unclassified research reports produced by the Personnel and Training Branch of the Psychological Sciences Division, Office of Naval Research, for the period June 1956 to June 1957. Major topics are: isolation and measurement of basic psychological traits, selection and classification problems, performance criteria, and training and education research.
R 102

11,199

Schipper, L.M., Kraft, C.L., Smode, A.P., & Pitts, P.M. THE USE OF DISPLAYS SHOWING IDENTITY VS. NO-IDENTITY. A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33(616)-3612, Proj. 7192, WADC TR-57-21, Feb. 1957, 22pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation).

11,199

This experiment is the sixth in a series of systems studies of air traffic control. The purpose was to evaluate the efficiency of a one-controller system with (1) an omnipresent clock-type identity code versus (2) the absence of identity on the radar blips. A series of simulated return-to-base missions (32 for each condition) were used; each mission was composed of ten fighter-type and ten bomber-type planes and accepted for entry to the final 50 miles to GCA gate at separations of 60, 75, 90, or 105 seconds. Four experienced United States Air Force controllers served as subjects. Measures of fuel consumption, control time, conflicts (failures to achieve specified separations) and missed approaches were analyzed as functions of rate of entry for both conditions of identification. T. G. I. R 6

11,200

Sidorsky, R.C. PRECISE CONTROL MANIPULATION AS A FUNCTION OF CONTROL LOCATION. Proj. 6-95-20-001, Rep. 288, Jan. 1957, 9pp. Dept. of Psych., USA Medical Research Lab., Fort Knox, Ky.

11,200

To determine the relative efficiency of rotary control manipulation as a function of the location of the control with respect to the operator's body, ten subjects performed a compensatory tracking task using a rotary knob control. The location of the control was varied randomly over eleven positions distributed over an area that could be reached comfortably with the right arm (0, 45, and 90 degrees to the right at shoulder level, 45 degrees above and below shoulder level, and one position at 90 degrees above and one 80 degrees below shoulder level). Three trials of 33 seconds were given at each location daily for eight days. Mean error scores (millimeters) were analyzed for effect of control location. Recommendations are included.
T. I. R 7

11,201

Versace, J. THE EFFECT OF EMERGENCIES AND COMMUNICATIONS AVAILABILITY WITH DIFFERING ENTRY RATES. A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33(616)-3612, Proj. 7192, WADC TR-56-70, Dec. 1956, 72pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation).

11,201

This experiment is fifth in a series of systems studies of air traffic control. Two controllers were required to move a group of 32 jet bombers and fighters through the terminal zone extending for a radius of 50 miles from the Ground Control Approach (GCA) gate. Variables were: (1) presence or absence of direct, face-to-face communication between controllers, (2) presence or absence of emergencies, and (3) traffic load. Average separation of 45, 60 and 90 seconds per aircraft. An electronic air traffic control simulator was used with partially optimized displays - blips bright and clear and carrying identification coding. Control performance, as measured by fuel consumption, control time, and safe separations at the GCA gate, was analyzed for the effect of the experimental variables. T. G. I. R 26

11,202

Allen, W.H., & Megbitt, F.H. ANALYSIS OF SURVIVAL EQUIPMENT (AU 387-54-RSI, REVISED). ADIC-0-106, May 1958, 78pp. Aretia, Desert, Tropics Information Center, Research Studies Institute, Maxwell AFB, Ala.

11,202

This report analyzes the effectiveness of individual items of sea and land survival equipment used in survival kits of the United States Air Forces. The material for the study was obtained primarily from official reports of more than 2000 survival incidents. Some data were obtained from interviews with Air Rescue personnel, survival training instructors, personal equipment technicians, and others who use survival equipment. The material represents a sampling of survival experience for the period June 1950 to June 1954. Each article is listed alphabetically with accompanying case histories. Capabilities of the equipment are emphasized.

11,203

van den Brink, G. RETINAL SUMMATION AND THE VISIBILITY OF MOVING OBJECTS. No date, 104pp. Institute for Perception RNO-TNO, National Defence Research Council TNO, National Council for Applied Scientific Research in the Netherlands.

11,203

In this report both theory and experiments are described on: summative properties of the retina, thresholds for moving point sources for a dark-adapted eye, and visual acuity for moving objects. (1) The chance on summation of two subliminal effects (light flashes) was determined as a function of distance and time between the effects. A number of brightness and color combinations of flashes and adapting field were used at various retinal locations. (2) Thresholds for moving point sources were measured for a number of color and brightness combinations over a wide interval of velocities and exposure times. (3) Detail vision for moving objects was determined for a number of velocities as a function of exposure time. G. I. R 58

11,204

Wilbanks, W.A. THE MEASUREMENT OF COLOR BLINDNESS. Rep. 2, Aug. 1956, 44pp. USN School of Aviation Medicine, Pensacola, Fla.

11,204

This monograph provides a reasonably nontechnical introduction to the theoretical basis of tests of color blindness for persons who have had no formal training in color theory. The system of color specification accepted by the Optical Society of America, the CIE system, is described and color vision defects are then described and classified in terms of this system. A number of tests of color blindness involving the use of printed colored plates are discussed and the limits of these polychromatic tests examined. T. G. I. R 16

11,205

Ward, J.R. A NOTE ON THE INTERMITTENCY OF A HUMAN OPERATOR IN A CONTROL SYSTEM. ARL/HE Note 2, June 1957, 12pp. Aeronautical Research Labs., Research & Development Branch, Dept. of Supply, Sydney, Australia. (University of Sydney, Australia).

11,205

This report summarizes the early stages of an investigation into the characteristics of a human operator in a control system. Two approaches for a mathematical formulation of these characteristics--linear theory and the intermittency hypothesis--were examined critically. A model of the human operator was synthesized based upon the sampling hypothesis and tested by recording tracking errors of three human subjects and of the synthetic subject, using an analogue computer and arbitrary function generator. The records were analyzed for agreement between the human and the model. G. I. R 6

11,206

Aukes, L.E., & Simon, G.B. THE RELATIVE EFFECTIVENESS OF AN AIR FORCE TRAINING DEVICE USED INTACT VS. WITH ISOLATED PARTS. Proj. 7709, Rea. Rep. 57-77, June 1957, 15pp. Maintenance Lab., APPINC, ARDC, Lowry AFB, Colo.

11,206

To determine whether a training device used with isolated parts is superior to the device used intact in certain learning situations, three equivalent groups of elementary technical-course Air Force students (144 total) were given instruction by a tape-recorded lecture on the B-47 rudder power control system. A visual portrayal of the system was utilized in two forms: (1) intact--all parts involved in the various subsystems, and (2) isolated parts--relevant parts presented in each case. One group was taught by lecture alone; a second with the intact device, and a third with the isolated parts. Criterion paper-and-pencil tests of achievement were given and the scores for the three groups compared for differences attributable to method of training. T. I. R 3

11,207

Baker, P.T. SPATIAL DYNAMICS OF THE NECK-SHOULDER REGION. Proj. 7-83-01-004A, Tech. Rep. EP-56, May 1957, 17pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,207

To study the dimensional changes in the shoulder-neck area caused by movement, 21 men were photographed (each in seven poses) and measurements were made on enlarged photographs. The poses were selected on the basis of those arm, head, and shoulder movements required for an infantry soldier to perform his duty. Measurements of total shoulder length, effective shoulder length, total shoulder area, and effective shoulder area were summarized in tables, and their utility in clothing and equipment design pointed out. T. G. I. R 1

11,208

Baker, C.A., & Carter, G.H. DESIGN OF AN AIRCRAFT CLOCK DIAL. Task 71549, WADC TN-54-22, Dec. 1954, 8pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,208

To design a display providing the time information required by operators of military aircraft, studies were first undertaken of the various time measures used in operating an aircraft and the methods of clock dial presentation. Design recommendations are made for a display presenting time of day, total elapsed time, and working elapsed time. Specific recommendations are included on scales, numerals, letters, pointers, and setting controls. I. R 4

11,209

Benjamin, F.B. THE EFFECT OF SKIN TEXTURE ON THE HEATING OF THE HUMAN SKIN BY THERMAL RADIATION. Proj. NM 001-103-301, Rep. WADC MA-5515, Dec. 1955, 13pp. Aviation Medical Acceleration Lab., WADC, Johnsville, Penn.

11,209

To determine the effect of skin texture on the heating of the human skin by thermal radiation, the rates of heating and cooling of skin surface were measured for normal "white skin" and for skin painted with India ink when exposed for a short period to intense thermal radiation. Areas of exposure were volar surface of forearm and palm of hand. One series of measurements was made with surfaces covered with olive oil. Subjects were eight laboratory workers with age range from 19 to 42 and four of 80 years or over. The data were analyzed for effects produced by cutaneous site, sex, age, and oiliness or dryness of skin. T. G. I. R 17

11,210

Borch, P.J., Patterson, J.M., & Sheinfeld, W.M. THE EFFICIENCY OF PERFORMANCE DURING EMERGENCY-INDUCED ANXIETY. Rep. 57-20, April 1957, 6pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Columbia University).

11,210

To study problems of psychological stress upon performance, a trace conditioning procedure that involved pairing a one-second tone with a six-second shock after a lapse of six seconds was used. Twenty tone-alone (pre-stress), eleven tone-shock (conditioning), and eleven tone-alone (extinction) trials were administered to ten subjects. A pursuit-rotor task was superimposed on the regular Pavlovian procedure. Heart rate changes (recorded simultaneously with conditioning) and performance measures (percent of total trace time on target) were analyzed for differences during the various phases - pre-stress, conditioning, and extinction.

T. G. R 10

11,211

Bolt Beranek and Newman Inc. A STUDY OF THE JET NOISE PROBLEM IN RELATION TO AIRCRAFT CARRIER CONSTRUCTION. Contract NMs 61502, July 1955, 134pp. Bureau of Naval Affairs, Navy Dept., Washington, D.C. (Bolt Beranek and Newman Inc., Cambridge, Mass.).

11,211

To study the problem of jet noise aboard aircraft carriers and its effect on communications in important ship's spaces, the steps described below have been taken and are presented in this preliminary report: (1) Information on the noise source characteristics of carrier-based jet aircraft was obtained during an acoustical survey with free-field noise measurements of four different types of aircraft; (2) a detailed acoustical survey under normal operating conditions was made on the USS Franklin D. Roosevelt. Noise measurements were made in and around spaces, standard operating procedures were observed, and discussions were held with ship's personnel; (3) general methods of noise control applicable to carrier construction are presented and discussed.

T. G. I

11,212

Clarke, F.R. CONSTANT-RATIO RULE FOR CONFUSION MATRICES IN SPEECH COMMUNICATION. J. Acoust. Soc. Amer., 1957, 29(5), 715-720. (Contract AF 19(506) 1957, Rep. AFRC TR 56 72. USAF Operational Applications Lab., AFRC, Cambridge, Mass.) (Indiana University, Bloomington, Ind.).

11,212

To devise a simple means for predicting entries in a closed confusion matrix for any subset of items drawn from a master set of items with a known confusion matrix, three experiments are reported. Stimulus materials for the first experiment were three sets of six consonant-vowel syllables, one of which was subdivided into two groups of three items. Four listeners, limiting their responses to items on the list, responded to every item as delivered through earphones with speech-to-noise ratio selected to give 50 percent articulation. Analysis of the matrices led to formulation of a constant-ratio rule for predicting entries. Two experiments using monosyllables and digits were conducted to test the applicability of the rule to analysis of speech communication errors.

11,213

Davis, R.C. ELECTROGALVANIC FACTORS IN AIRCRAFT CONTROL: EXPERIMENTAL INVESTIGATION OF THE EFFECT OF A MUSCLE TENSION REFLEX UPON SIMPLE INSTRUCTED MOVEMENTS. Rep. 55-123, Dec. 1956, 21pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University).

11,213

To investigate the relation between a particular muscle tension reaction and particular forms of external reaction, three types of responses were evoked: a muscle tension reflex, an instructed right wrist extension, and an instructed left wrist extension. The corresponding stimuli were: brief (0.2 sec.) intense (90 db) tone, weak (50 db of either 500 or 1500 cps) tone, the significance of which alternated from subject to subject; administration was in all possible combinations evoking each response singly and in combinations in which the reflex began a few tenths of a second before instructed movement. Analysis was in terms of tension levels, muscular activity, and reaction times for each condition.

T. G. R 16

11,214

Davis, R.C. ELECTROGALVANIC FACTORS IN AIRCRAFT CONTROL: MUSCULAR ACTIVITY DURING SPOONY HOUSE AND ITS RELATION TO INSTRUCTED RESPONSES INDUCED BY VISUAL SIGNALS. Rep. 55 126, Jan 1957, 2pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University, Bloomington, Ind.).

11,214

To study muscular tension effects of noise and their relation to instructed flexion and extension movements, measurements of action potentials were made for anterior and flexor regions of both arms for 32 subjects under both noise (90 db) and quiet conditions. Subjects were instructed to move a lever with wrist action to one side or the other in response to specified visual signals, then immediately return it to center position. Action potentials and response times were analyzed for effects of noise, serial position, direction, and instructions. Results are compared to previous findings for auditory signal. Implications for operation of controls are discussed.

T. G. R 2

11,215

Davis, R.C. ELECTROGALVANIC FACTORS IN AIRCRAFT CONTROL: MUSCULAR TENSIONS DURING SIMULTANEOUS PERFORMANCE OF TWO TASKS AND THEIR EFFECT ON PERFORMANCE. Rep. 55 128, Dec. 1956, 12pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University, Bloomington, Ind.).

11,215

To study the effects of simultaneous performance of two tasks, measurements of muscular action potentials were made from six different regions (both arms, legs, and trapezius) for 26 subjects while performing two tasks (separately and simultaneously). The tasks were: supporting a 500 gram weight and the SMI Discrimination Reaction Test. The records were analyzed in terms of: muscle tension patterns for each response and combination of responses, temporal sequence effects, and the relation of both to response time. The findings are discussed in relation to non-laboratory situations.

T. G. R 12

11,215

Davis, R.C. ELECTROGALVANIC FACTORS IN AIRCRAFT CONTROL: MUSCULAR TENSION WHEN TASK REQUIREMENTS ARE CHANGED. Rep. 55 131, Jan. 1957, 12pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University, Bloomington, Ind.).

11,215

To investigate the relation of muscular tension and transfer of training effects, two tasks were used: SMI Discrimination Test (run in the usual fashion and the same test run with the significance of half the signals reversed). Two series of 40 trials were given to four groups (50 subjects), two of which practiced only one task while the other two changed tasks between trial series. Muscle action potentials were recorded from various muscle groups and studied by analysis of variance techniques for differences in inter-stimulus tension among the groups. Reaction time data were analyzed in the same way. Implications for aircraft controls are indicated.

T. G. R 17

11,217

Dease, J. CHANGES IN VISUAL PERFORMANCE AFTER VISUAL WORK. Contract AF 33(938) 22542, WADC TR 57 285, April 1957, 24pp. USAF Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (The Johns Hopkins University, Baltimore, Md.).

11,217

This report presents a critical review of representative experimental and field studies on the effects of prolonged visual work. Two basic kinds of work are differentiated, one primarily involving search for infrequently occurring signals (vigilance tasks) and the other involving continuous use of the oculo-motor system accompanied by more or less continuous mental operation (active task). Contrasts between these two types of tasks and the kinds of impairment resulting from work on each are discussed. Recommendations for further field study and eventual application to work situations are made.

R 77

11,218
Betsch, W.R., & Stalder, L.H. PROBABILITY AND WORK AS DETERMINERS OF EFFICIENCY IN NAVIGATION. J. exp. Psychol., 1957, 53(2), 73-81. (Contract AF 33(600)-25726, Rep. 57-83. Training Aids Research Lab., AFTRC, AFSC, Lackland AFB, Tex. University of Illinois).

11,219
To investigate the effects which two features of problem-solving tasks - probability and work - have upon behavior, two similar, but not identical, tasks were used. Each task required 12 subjects to locate the component that was defective out of three that could be on each of 12 test trials. Each component was different in the probability with which it was defective (1, 2, and 3) and the amount of work required to check it (task 1: 3, 2, and 1; task 2: 7, 4, and 1). First and second choice preferences for all trials were tabulated and the resulting proportions, per block of trials, were compared for the two tasks. In addition, verbalized preferences obtained at the end of the trials were analyzed and compared. Implications for training methods are discussed. T. G. R 2

11,220
Piek, J.L., Hardlow, W.R., & Hippell, Helen E. SAFE LEVELS OF CONTAMINATION FROM FISSION PRODUCTS. Proj. 7801, Task 78001, Rep. 56-2, April 1956, 26pp. Research Directorate, Air Force Special Weapons Center, AFSC, Kirtland AFB, N.M.

11,221
To study the radiation hazard resulting from fission product contamination of aircraft, aircraft parts, and aircraft facilities, an analysis of data available in current literature was made. Hazards are classified as inhalation, ingestion, and external. Suitable monitoring techniques for determining these hazards are suggested. Limits of external and internal radiation levels are recommended for those items of material released for general usage and for items kept in a controlled area; also, dosage limits for personnel working in such areas, and limits applicable to emergency situations are given. T. G. R 15

11,222
Deroy, L.B. BIBLIOGRAPHY ON USES OF HIGH-SPEED COMPUTERS IN PSYCHOLOGY. Aug. 1957, 4pp. IBM Associateship Program, Massachusetts Computation Center, Cambridge, Mass. (Institute for Applied Psychology, Tufts University).

11,223
This bibliography on the uses of high-speed computers in psychology covers a period from 1949 through May 1957. Journal reports and books are included. R 45

11,224
Domaszki, T.J. HUMAN STRESS RESPONSE IN JET AIRCRAFT OPERATIONS. Rep. 57-16, Dec. 1956, 4pp. Dept. of Pathology, USAF School of Aviation Medicine, Randolph AFB, Tex.

11,225
To study human stress response in jet aircraft operations, the blood eosinophil count was used as an objective index of such stress. Preceding and following one-hour flights, blood counts were made on jet pilots differing with respect to their prior flying experience in the aircraft concerned (F-80D and F-94): 1. two groups engaged in different stages of transition training, 2. experienced pilots engaged in new in-flight learning, and 3. experienced pilots and radar observers flying routine missions. Student pilots operating the F-80D simulator were also studied. The data were analyzed for differences that could be associated with the various experience levels. T. R 7

11,226
Egan, J.P. MONITORING TASK IN SPACE COMMUNICATION. J. Space Res., 1957, 22(6), 482-489. (Contract AF 12(600)-571, Rep. 56-45, Operational Applications Lab., AFTRC, Balling AFB, Washington, D.C. Indiana University).

11,227
This paper defines the monitoring task in space communication involving several relay channels where only certain ones carry relevant information to a given operator or monitor. A quantitative description of the monitor's behavior in receiving and identifying a restricted number of messages and ignoring others is given in terms of the operating characteristic (relation between probabilities of acceptance of correct and of incorrect messages) and the articulation-error function. The role of the criterion was investigated in two experiments in which 1. the criterion of acceptance was varied and 2. the degree of conflict among the messages was varied. T. G. R 6

11,228
Cookley, J.D. DETECTION OF AIRCRAFT BY RADAR SUBJECTS TO RADAR INTERFERENCE. Contract AF 36-630-SC-64667, Proj. 3-78-01-022, Final Rep., May 1957, 17pp. Signal Corps Engineering Lab., Fort Monmouth, N.J. (Dunlap and Associates, Inc., Stamford, Conn.).

11,229
This monograph examines some of the consequences of radio interference for the operator. Primary consideration is given to a typical FV scope used as a display for radar signals. Reasons for the neglect or underestimation of the results of interference are discussed under three related topics: 1. signal versus visual displays, 2. visibility versus detectability, and 3. interference versus spatial limitations, defects, and weaknesses affecting from operational use of the screen in detecting targets are brought out. The final section deals with suggestions for improvement in design and in operation that will be of advantage to the operator in detecting targets. C.

11,230
A symposium on human engineering, personnel and training research. The 34 reports in this text include studies on: recognition of shapes; dark adaptation and the preadaptation (field target size and control of behavior); USAF recruiting salesman selection method for determining a cell proportion; increasing reinforced practice; training needs; tests; system research laboratory studies; effects of sleep deprivation; perception of direction; model for paired-associate learning data; estimating multivariate probabilities; optimum group assembly; statistical decision functions; tracking behavior; psychomotor skills; predicting pilot training performance; K-system trouble shooting behavior; reliability and criteria for item selection; electronic trouble shooting; time sharing between auditory and visual channels, etc.; predicting speech communication in noise; discrimination of auditory display components; a framework for problem solving; reception errors in early international Morse Code training; shape discrimination; tracking with intermittent illumination; studies in task engineering; evaluation of maintenance training devices; variables related to problem solving; adaptation in emergencies and extreme conditions; construction of factor-pure aptitude tests; the effect of positive acceleration on the relation between illumination and dial reading. (MILAS)

11,231
Fitch, G., & Cameron, F. SYMPOSIUM ON AIR FORCE HUMAN ENGINEERING, PERSONNEL, AND TRAINING RESEARCH. Contract AF 18(600) 1457, Tech. Rep. 56 8, Nov. 1955, 13pp. Anthropology & Psychology Div., National Academy of Sciences, National Research Council, Washington, D.C.

11,225
Fletcher, J.L. LOCALIZATION OF SOUNDS IN
HEMISPHERES. Proj. 6-95-20-001, Rep. 304, Aug.
1957, 14pp. Experimental Psychology Dept.,
USM Medical Research Lab., Fort Mon, Ky.

11,225
To investigate the ability of human subjects to localize the distance of sounds, 20 subjects with normal hearing adjusted a variable tone until they judged it to be at the same distance from them as a standard reference tone. Variables were: Distance of standard tone from subject (10 or 20 ft.), frequency of signal (400 and 1000 cps), and auditory angle between the tones (5° and 30°). Sound pressure level was 78 db for 1000 cps and 94 db for 400 cps signal; one signal was always attenuated 15 db relative to the other. The standard tone was on the right for half the trials and on the left for the other half. Mean settings and error scores were analyzed for effects of the main variables.
T. I. R 6

11,226
Fox, Katherine. THE EFFECT OF CLOTHING ON
CERTAIN MEASURES OF STRENGTH OF UPPER EXTRE-
MITIES. Proj. 7-85-0044, Tech. Rep. EP-47,
June 1957, 33pp. USA Quartermaster Research
and Engineering Center, Natick, Mass.

11,226
To investigate the effect of clothing on measures of strength, 35 MCC students were tested. The following measurements were made: (1) maximum strength and endurance for pushing, with and without an arm and shoulder harness simulating clothing restriction, and (2) maximum strength and endurance of five types of grips chosen to represent the effect of harness upon grip formation (normal, thumbless, thumb and finger, wide, and padded grips). Strength scores (in pounds) were analyzed for differences due to simulated clothing restriction and simulated harness. The relation of strength differences and age was studied. Replications for clothing design are indicated.
T. I. R 6

11,227
Graham, W.J., & Iven, R.L. PROPELLER FOR T-6
AIRCRAFT, NOISE LEVEL SURVEY. Note 52-56,
EDC 695-33, Sept. 1952, 19pp. Aero Medical
Lab., WADC, AFCC, Wright-Patterson AFB, Ohio.

11,227
To investigate noise spectra generated by two different models of propellers (12 JAC/612A-12 and 6931A-19) for T-6 aircraft, propellers were mounted on aircraft and subjected to static and flight tests. Measurements of noise were made under "free field" conditions as arches located 25, 50 and 100 feet from propeller hub for engine settings of 1500, 2000, and 2250 rotation per minute. Flight tests were conducted over the microphones at altitude of 100 feet at various engine settings. These data were analyzed and compared for the two propellers. In addition a comparison was made with human tolerance criteria. Recommendations are made concerning necessary protection of service personnel.
T. C.

11,228
Gerathwohl, S.J., & Cibus, P.A. SURFACE
TEXTURE AND DEPTH PERCEPTION. Rep. 57-24,
April 1957, 13pp. Dept. of Ophthalmology,
USAF School of Aviation Medicine, Randolph
AFB, Tex. (Cibus; Washington University).

11,228
To study the role of irregular surface texture in depth perception, a plate-stereometer was used to measure true and apparent differences. Five test panels (surfaces varying in grain size and density) were viewed binocularly by 20 subjects in such a manner that the upper half of the contourless panel was seen by the naked eye and the lower half through glass plates. The task was to adjust the glass plates so that the upper and lower half appeared equidistant, or so that the lower half appeared to be just behind the upper half under two conditions of luminance (bright and dim). Errors (deviations of glass plates from zero) were analyzed for effects of separate texture elements--grain size, density, and distribution of light points--upon depth perception.
T. I. R 8

11,229
Geodry, F.E. Jr., & Heberman, Y. APPARENT
ADAPTATION EFFECTS IN VESTIBULAR REACTIONS.
Proj. 6-95-20-001, Rep. 293, Jan. 1957, 14pp.
Dept. of Psychology, USA Medical Research Lab.,
Fort Mon, Ky.

11,229
To determine whether adaptation effects in vestibular reactions are manifest during the course of prolonged reactions, 20 subjects were subjected to three series of six angular decelerations of different magnitude (from 1.90 to 10.02 degrees per second squared). The duration of each deceleration was calculated to produce a theoretical cupula deviation which would be the same for all decelerations. Measurements of (1) time from termination of deceleration to cessation of primary apparent rotation effect, (2) time from onset of deceleration to subject's signal of onset of apparent rotation, and (3) total time from onset of apparent rotation until effect subsided. These data were analyzed for adaptation effects and for rate of development of this process.
T. C. R 16

11,230
Hales, A.C., Bechall, Y.R., & Callis, A.D.S.
A SUMMARY OF RESEARCH WORK ON THE PERIOD
1947-1955. Res. Rep. 13061, Oct. 1956, 9pp.
Post Office Engineering Dept., Post Office
Research Station, Dollis Hill, London, England.

11,230
This report summarizes work done on vocoders over the period 1947 to 1955. A list of reports completed during this period is given. Major parts of the report are devoted to description and discussion of pitch circuit improvements, frequency allocation of spectrum channels, constant volume amplifiers, construction of an analyzer/synthesizer for the pitch circuit, and tests of performance. Suggestions are made for additional development.
T. I. R 11

11,231
Hardy, J.D. THE NATURE OF PAIN. WADC DA-5607,
June 1956, 49pp. Aviation Medical Accel-
eration Lab., WADC, Johnsville, Penn. (Uni-
versity of Pennsylvania).

11,231
This paper summarizes present knowledge about the pain sense and evaluates its role in human life. An historical review of the concepts of pain and its importance as a moral force is presented. "Physical" and "mental" pain are described in terms of reactions to noxious stimulation and reactions to pain which together constitute the pain experience. Methods used for the study of pain are described - thermal radiation and pressure - and evidence presented for the uniformity of pain thresholds. Further topics treated are pain intensity and tissue injury, reactions to noxious stimulation, reactions to pain, and the effect of analgesic agents upon pain.
G. I. R 38

11,232
Hood, P.D., Halpin, A.W., Hanitchak, J.J. et al. CREW MEMBER AGREEMENT ON RE-47 CREW OPER-
ATING PROCEDURE. Contract AF 18(600)-1051,
Proj. 7713, Res. Rep. 57-64, May 1957, 49pp.
Operator Lab., AFFTRC, ARDC, Randolph AFB, Tex.
(Ohio State University).

11,232
To measure the extent to which crew members agree with each other on RE-47 crew operating procedures (those not included in standard operating procedures) and to determine relationship of this measure to independent criteria of crew effectiveness, photo-reconnaissance crews were used. A questionnaire concerning crew operating procedures in four task areas was developed and administered to crew members. Responses indicated who did what, when. Indexes of agreement were computed. The criteria measures included ratings by supervisors and objective data of crew performance. The data were analyzed by correlational methods. Possible uses for use of this measure for prediction are discussed.
T. I. R 10

11,233.
Pearson, H.G., & Byars, G.E. Jr. THE DEVELOPMENT AND VALIDATION OF A CHECKLIST FOR MEASURING SUBJECTIVE FATIGUE. Rep. 56-115, Dec. 1956, 16pp. Dept. of Psychology, USAF School of Aviation Medicine, Randolph AFB, Tex.

11,233.
To construct a subjective measure of fatigue the scale discrimination method was adopted. Selected items (15) for the scale were selected in a developmental study. The 15-item experimental forms were constructed and administered to both an experimental group (150 subjects) and a control group (150 subjects - no task). The scale was studied for reliability (equivalent form correlation) and validity (change in scores within group and discrimination between groups). A related study used the checklist to investigate differences among subjects taking multiple, dependent, and placebo drug treatments.
T. G. R. 35

11,234.
Pearson, H.G. TASK PROFICIENCY AND FEELINGS OF FATIGUE. Rep. 57-77, April 1957, 5pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,234.
To study the relation between task proficiency and feelings of fatigue, 150 subjects received 50 minutes of training on a complex fatiguing perceptual-motor task (United States Air Force SAM Multidimensional Percept Test). Following a ten-minute rest period, the subjects continued at the task for a three-hour period, during which measures of proficiency were continuously recorded. A 12-item checklist, previously developed and validated to measure feelings of fatigue, was administered before the learning period, during the rest period, and upon completion of task. Correlations between proficiency measures and checklist data (subjective fatigue) were computed and discussed. The influence of motivation was indicated.
T. G. R. 13

11,235.
Flatzer, H.L. THE PHASE-PLANE AS A TOOL FOR THE STUDY OF HUMAN BEHAVIOR IN TRACKING PROBLEMS. Contract AF 33(035)-10420, Proj. 7182, WADC TR-55-444, Nov. 1955, 10pp. Aero Medical Lab., WADC, AFSC, Wright-Patterson AFB, Ohio. (Franklin Institute, Philadelphia, Penn.).

11,235.
This report presents the background and the results of experiments performed to determine the applicability of phase-plane techniques to the study of human response in tracking problems. A mathematical description of phase-plane technique is given and its advantage as a tool for determining non-linearities in human response pointed out. In the experiments described the display presented to the operator was the error signal which was controlled by a spring-centered stick yielding the possibility of continuous control. Experimental results are then analyzed by the phase-plane technique. Indications of the usefulness of this technique are discussed.
I. R. 2

11,236.
USA Quartermaster Food & Container Institute for the Armed Forces. THIRST AND WATER BALANCE IN SURVIVAL CONDITIONS. BIELIOGRAPHY. 1949. 16pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

11,236.
This bibliography includes English and foreign language publications on thirst and water balance in survival conditions. The period covered is from 1900 (approximately) to 1948.
R 287

11,237.
Ruger, S.N., & Voots, R.J. EXPERIMENTAL DETERMINATION OF THRESHOLD RELIABILITIES FOR FOUR METHODS OF AUTOMATIC SELF-TESTING, PULSE-TONE ADDUCTION. Rep. 57-63, March 1957, 10pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (State University of Iowa).

11,237.
To investigate suitable psychophysical procedures for obtaining threshold measures on an automatic, self-testing, pulse-tone adductor, apparatus was designed and constructed to test four of the most promising methods. In all methods, a first approach to threshold was made by 5, 10, 15, and 20 decibel steps from above and below threshold. Subjects (132), randomly assigned, were tested at three frequencies (500, 2000, and 6000 cycles per second) on each of two consecutive days. The data were analyzed to provide an estimate of precision and reliability of the four methods.
T. I. R. 6

11,238.
Ruger, S.N., & Voots, R.J. DESIGN AND CONSTRUCTION OF AN AUTOMATIC, SELF-TESTING, RECORDING, PULSE-TONE ADDUCTION. Rep. 57-64, April 1957, 20pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (State University of Iowa).

11,238.
An automatic, pulse-tone (coded-stimulus) adductor is discussed and design criteria evaluated. The stimulus response system, the control system (operation, construction features and calibration), and method of data-recording (International Business Machine card-punch) are described. Present test-time (about 20 minutes) varies since the system is self-paced. Further development is considered. The appendix furnishes technical details.
I. R. 6

11,239.
Richards, D.L., & Archbold, R.B. CALCULATION OF THE ARTICULATION OF A TELEPHONE CHANNEL. APPLICATION TO COMMERCIAL TELEPHONE CIRCUITS. Res. Rep. 13723, March 1956, 24pp. Post Office Engineering Dept., Post Office Research Station, Dollis Hill, London, England.

11,239.
This report discusses the application of a method for calculating articulation scores for telephone circuits to commercial telephone channels. Problems encountered in obtaining appropriate sensitivity-frequency characteristics of commercial sets are discussed. Various measuring methods were tested to find those yielding a useful extent of agreement with the calculated scores. A number of examples are included to show specific use of the method and a convenient plan for making the computations is included in the appendix.
T. G. R. 14

11,240.
Pollock, Y. INTENSITY DISCRIMINATION THRESHOLDS UNDER SEVERAL PSYCHOPHYSICAL PROCEDURES. J. Acoust. Soc. Amer., 1954, 26(6), 1056-1059. (Operational Applications Lab., AFSC, Bolling AFB, Washington, D.C.).

11,240.
To examine the range among discrimination thresholds for the detection of change in the sound level of a tone obtained by different experimental procedures, a series of experiments were carried out. The primary variable was temporal duration between successive bursts of a tone (from 0.31 to 20 seconds). Five procedures differing in terms of presence or absence of an objective comparison tone and in stability of test conditions were used: floating standard, single standard, roving standard, single comparison standard, and roving comparison standard. Detection thresholds for criteria of 60, 75, and 90 percent correct detection were analyzed and graphic comparisons among methods were made. Discussion is in terms of molar concepts pertinent to the listener.
G. I. R. some

11,241
Pollack, I. SOUND LEVEL DISCRIMINATION AND VARIATION OF REFERENCE TESTING CONDITIONS. *J. acoust. Soc. Amer.*, 1955, 27(3), 474-480. (Operational Applications Lab., AFRC, Bolling AFB, Washington, D.C.).

11,241
To establish the accuracy of sound level discrimination as a function of the magnitude, temporal and dimensional aspects among reference testing conditions, a series of tests were conducted. All tests paired two successive tone bursts for discrimination between sound level of the second as compared to the first. The first, or reference signal, was varied systematically in regard to: (1) intensity difference, (2) temporal patterning, (3) temporal interval, (4) dimensional variability, (5) interaction of frequency and intensity variability, (6) varying frequency of occurrence, and (7) predetermined vs. random external testing conditions. The results are considered in terms of psychological dimensions in auditory discrimination.
G. I. R 5

11,242
Pollack, I. METHOD OF REPRODUCTION AND THE IDENTIFICATION OF ELEMENTARY AUDITORY DISPLAYS. *J. acoust. Soc. Amer.*, 1954, 26(6), 1060-1063. (Operational Applications Lab., AFRC, Bolling AFB, Washington, D.C.).

11,242
To develop a psychophysical procedure that might improve identification of aspects of elementary auditory displays, the salient features of the classical discrimination and identification experiments were combined. The method consisted of presentation of a step on the stimulus scale, listener's response, presentation of the step represented by the listener's response, and another listener response (method of reproduction). The original sequence was repeated (recycle) and a control procedure consisting of repeated identification without correction was used. Two auditory stimulus aspects were examined: sound level and frequency of a tone. The data were analyzed in terms of average information transmitted (bits) as a function of the number of successive responses.
G. I. R 5

11,243
Pollack, I. MASKING BY A PERIODICALLY INTERRUPTED NOISE. *J. acoust. Soc. Amer.*, 1955, 27(2), 353-355. (Operational Applications Lab., AFRC, Bolling AFB, Washington, D.C.).

11,243
To examine the effect of a wide range of intermittent noise conditions upon the masked threshold of a 1000-cycle tone and the intelligibility of monosyllabic words, two experiments were conducted. Three variables were manipulated: burst repetition rate, inter-burst ratio (difference between burst level and interval between bursts, in decibels), and burst-time fraction (portion of each cycle occupied by noise bursts) of an interrupted white noise. With noise burst level constant (91 decibels), masked thresholds for a 100-cycle tone were determined by eight listeners as each variable was manipulated. PB (phonetically balanced) lists were substituted for the tone in the intelligibility tests. The data were analyzed as functions of interrupted noise as compared with continuous noise. G. I. R 4

11,244
Delattre, P.C., Liberman, A.M., & Cooper, P.S. ACOUSTIC LOCI AND TRANSITIONAL CUES FOR CONSONANTS. *J. acoust. Soc. Amer.*, 1955, 27(4), 769-773. (Haskins Labs., New York, N.Y.).

11,244
To investigate the acoustic loci (a fixed frequency position) and transitional cues (frequency shifts) for consonants, acoustic stimuli were produced by converting hand painted spectrograms into sound for evaluation by the ear. Stimulus patterns having a straight transition of the second formant and varied degrees of rising transition of the first formant and producing 65 vowels of differing color were identified and evaluated to find the positions of the second formant loci of stop consonants b, d, and g and to test their independence of vowel color. The patterns of the first and second formants were then reversed to identify first formant locus. A third series of stimuli were designed to determine whether transitions start from the locus and move to steady-state level of the vowel or merely point to the locus. I. R 6

11,245
Pickett, J.M. PERCEPTION OF VOWELS HEARD IN NOISES OF VARIOUS SPECTRA. *J. acoust. Soc. Amer.*, 1957, 29(5), 613-620. (USAF Operational Applications Lab., AFRC, Bolling AFB, Washington, D.C.).

11,245
To study the perception of vowels spoken in syllables and heard in noises of various spectra, two sets of test syllables were used: one artificial set in which vowels occurred with equal probability and one Harvard PB (phonetically balanced) set in which the vowels matched the frequency of speech sounds in English. Four noise signals were used: high frequency, flat, low frequency, and very low frequency. Practiced listeners wrote the words or the syllables under each noise condition. The response data were analyzed by means of confusion matrices for shifts due to changes in the noise spectrum. The shifts in vowel confusions were further analyzed in terms of a current theory of vowel perception, and as a basis for selecting vowels for use in noise.
T. G. R 11

11,246
Secker, L.R. & Pickett, J.M. VISUAL INDICATION OF SPEECH AS AN AID TO HEARING IT IN NOISE AND DAPPLE. *J. acoust. Soc. Amer.*, Jan. 1957, 29(1), 150-151. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

11,246
To determine whether visual indication of speech would improve its intelligibility under conditions of low signal-to-noise ratios, six trained listeners were presented with 300 phonetically balanced (PB) words. Each listener heard half of the words while watching a meter indication of the noise-free speech signal and half without watching the signal. Noises tested were multi-voiced babble (4, 8, 15, and 32 voices) with four signal-to-noise ratios (+3, 0, -3, and -5 decibels) and random noises with four signal-to-noise ratios (0, -5, -9, and -12 decibels). Percentage of words heard correctly were analyzed for differences due to listening with meter indication.
T. R 2

11,247
Fallon, D. ENGINEERING PSYCHOLOGY BRANCH BIBLIOGRAPHY. July 1957, 17pp. Applications Research Div., Naval Research Lab., Washington, D.C.

11,247
This bibliography lists in chronological order all unclassified reports issued by the Engineering Psychology Branch between its founding on October 1, 1945 and July 1957. Brief annotations are included for those reports of general scientific interest.
E 93

11,248
Fairbanks, G., Guttman, N., & Miron, M.S. THE EFFECTS OF TIME COMPRESSION UPON THE AUDITORY COMPREHENSION OF SPOKEN MESSAGES. *J. Speech Dis.*, 1957, 22(1), 10-19, 20-22. (University of Illinois).

11,248
To explore methods of increasing the efficiency of communication of information through spoken messages, a series of three experiments were conducted. Message comprehension was measured under the following conditions: (1) rate of presentation varied from 141 to 270 words per minute, yielding time compressions of 0, 30, 50, 60, and 70 percent; (2) double presentation of same material at a time compression of 50 percent and single presentation at zero percent; (3) message length increased 43 percent by non-repetitive restatements of selected portions with presentation time same as for uncompressed. The data (test scores) were analyzed for effects of rate of presentation and varied repetition upon auditory comprehension.
T. G. R 11 III - 1050

11,249

Pink, J.B. ELECTROKYMOTGRAPHIC FACTORS IN AIRCRAFT CONTROL: THE DEVELOPMENT AND LOSS OF A MUSCLE TENSION SET TO AN INCIDENTAL STIMULUS. Rep. 56-130, Dec. 1956, 15pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University).

11,249

To investigate acquisition and extinction of a muscle tension set to an incidental stimulus, a Pavlovian conditioning paradigm was used. Subjects were instructed to press a right-hand key to a high-pitched signal tone, preceded by a special warning tone, and a left-hand key to a low-pitched signal tone (no special warning tone). A second group was given the same instructions, however, a low-level tone was given preceding the left-hand response contrary to instructions (30 training trials, 10 extinction trials). Measurements were obtained of left arm extensor digitorum muscle action potentials and studied by analysis of variance techniques to evaluate time and trial effects. Replications of incidental motor sets for control movements in practical situations are indicated. T. G. R 31

11,250

Kobrick, J.L. A DEVICE TO CONTROL MUSCULAR TENSION AND FOREWARNED LEADTIME FOR REACTION TIME STUDIES. Proj. 7-93-01-0034, Tech. Rep. EP-50, June 1957, 6pp. USA Quartermaster Research and Engineering Center, Natick, Mass.

11,250

A device is described for simultaneously inducing specific amounts of muscular tension and controlling length of forewarned in reaction time studies. Data on the reliability of measurements obtained with the device are presented. T. I. R 3

11,251

McGuire, J.C., & Kraft, C.L. REACTION OF TEN RADAR AIR TRAFFIC CONTROLLERS TO OPERATIONAL USE OF THE TWIN-MICROPHONE, BOOM-TYPE, SPLIT HEADSET. Contract AF 33(616)-3612, Proj. 7192, WADC TN-56-541, Dec. 1956, 10pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University).

11,251

To investigate the acceptability of a lightweight, twin microphone, boom-type, split headset (Telex Company) for air traffic controllers, ten operators used the headset during a four-hour period of radar air traffic control. Each operator then completed a questionnaire designed to obtain his reactions to the headset as compared with the standard "earmuff" headset. The responses were summarized. Some deficiencies were noted and recommendations made for the necessary corrections. I.

11,252

McKee, Mary Ellen. THE EFFECT OF CLOTHING ON THE SPEED OF MOVEMENT IN THE UPPER EXTREMITY. Contract DA-44-109-QM-1760, Proj. 7-83-01-004A, Tech. Rep. EP-48, June 1957, 38pp. USA Quartermaster Research and Engineering Center, Natick, Mass. (State University of Iowa).

11,252

As part of a larger study of the effect of clothing restriction upon movement, 339 ROTC students were given speed tests of overhead and forward cranking and horizontal striking, with and without an arm and shoulder harness simulating clothing restriction. The tests were repeated for 60 of the subjects. Speed was measured as the total movement time (cranking) and number of hits in one minute (horizontal striking). The data were analyzed for test-retest reliabilities, for relations among the three types of speed test, for differences in speed due to clothing restriction and for differences due to age. Warm-up phenomena and fatigue effects were noted. T. R 24

11,253

Neville, A.R. Jr. INSTRUMENT PANEL PHOTOGRAPHY IN THE T-33 AIRCRAFT USING A MODIFIED MAP CAMERA. Proj. 508-016-0003, June 1956, 12pp. Headquarters, Human Resources Research Center, Air Training Command, Lockland AFB, Tex.

11,253

To meet the requirements for instrument panel photography in the T-33 jet aircraft, a camera installation was designed and constructed. This report gives details of the modifications made on a camera available through Air Force supply channels and of the mounting assembly. Directions for installation and operation are given. I. R 2

11,254

Neumann, Ego, & Ammons, R.B. ACQUISITION AND LONG-TERM RETENTION OF A SIMPLE SERIAL PERCEPTUAL-MOTOR SKILL. J. exp. Psychol., 1957, 52(5), 159-161. (University of Louisville).

11,254

To determine some characteristics of the acquisition and retention of a simple serial perceptual-motor task, 100 subjects learned a circular sequence of eight randomly paired toggle switches to a criterion of two consecutive perfect trials. Groups of 20 subjects each were tested for retention (relearning to the same criterion) after one minute, 20 minutes, two days, seven weeks, or one year. Performance curves for acquisition and retention were constructed and analyzed. Serial position curves were also studied. Reports of subjects on the methods they used to learn the task had been gathered during acquisition trials and these were analyzed for effects of verbalization in task performance. G. R 2

11,255

Patton, R.M. ELECTROKYMOTGRAPHIC FACTORS IN AIRCRAFT CONTROL: THE EFFECT OF INDUCED TENSION UPON MUSCULAR ACTIVITY DURING SIMPLE VOLUNTARY MOVEMENT. Rep. 55-133, Jan. 1957, 20pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University).

11,255

To investigate the relation between amount of muscular tension present at specific locations and the quality (reaction times) of responses in which the muscles at these locations are involved, action potential recordings were made over the extensor and flexor digitorum muscles of the right arm. Tensions were varied requiring the subject to make a flexion movement with his left wrist and subsequently presenting a signal for movement of right wrist at varying intervals of time (seven intervals from 0.4 to 4.0 seconds). The right arm task was a discrimination between two tones, one for flexion and one for extension. Muscle tension and reaction time data were analyzed in terms of temporal relations, facilitation effects, and type of movement. T. G. R 20

11,256

Roby, T.B., & Lanzetta, J.T. A REPLICATION STUDY OF WORK GROUP STRUCTURE AND TASK PERFORMANCE. AFTRC-TN-57-85, Proj. 7713, Task 27101, June 1957, 12pp. Operator Lab., AFTRC, ARDC, Randolph AFB, Tex.

11,256

To investigate effects on performance in three-man groups of varying communication structures, 12 such groups (men in Air Force basic training) were studied. Subjects were seated in three booths, arranged to prevent direct visual and auditory communication, containing two simulated aircraft instruments and two simple switches. The group task was to detect changes in instrument readings, relay the necessary information to the proper individual (telephone circuit) and execute switch adjustments based on relayed or directly available information. Communication structure was varied by the units of information directly available to the control agent (0, 1, 2, and 3 units). Group performance (error scores, number and duration of calls over each channel) was examined in relation to the experimental conditions. T. I. R 1

11,257
Cagel, W.C., & Schnaps, J.A. PERCEIVED FRONTAL SIZE AS A DETERMINER OF PERCEIVED STEREOSCOPIC DEPTH. Proj. 6-95-20-001, Rep. 296, Feb. 1957, 81pp. Experimental Psychology Dept., USA Medical Research Lab., Port Knox, Ky.

11,257
To investigate some factors involved in the process by which a stereoscopic extent is perceived as a depth extent, different frontal sizes of the same familiar objects (playing cards) were presented with a ring of light between and behind. Distances between objects were always constant. The subject's task was to throw darts (in separate throwing alley) to the distance of the cards and then the ring. Verbal estimates were also given. Two groups of 12 subjects were used, one with cards of normal size and one with double-size cards. The data (means and standard deviations of perceived distance scores) were analyzed for differences in the two conditions.
G. I. R 5

11,258
Spilth, W. DOWNWARD SPREAD OF MASKING. J. Acoust. Soc. Amer., 1957, 29(4), 502-505. (Proj. 7591, AFPC TX-56-11. Operational Applications Lab., AFPC, Bolling AFB, Washington, D.C.).

11,258
To investigate the low-frequency masking function of noise bands, pulsed pure-tone audiograms were obtained in quiet and in the presence of narrow bands of noise centered at 500, 1000, 2000, and 4000 cycles per second at several sound pressure levels. Threshold data were compared graphically and the amount of masking shown. The results are discussed in relation to masking produced by a single pure tone and related to an hypothesis that ear-produced distortion products is the mechanism producing the effects noted.
T. G. R 3

11,259
Sell, R.G. & Box, A. THE POSITIONING OF THE CONTROLLERS ON THE 48 IN. MILL AT STEWARTS AND LLOYDS, CORBY. FE/SE/73/57, March 1958, 12pp. Plant Engineering and Energy Division, The British Iron & Steel Research Association, London, England.

11,259
This report describes a test carried out in the steelworks of Stewarts and Lloyds, Corby, to determine the optimum positions of the controllers for their new 48 inch mill. (The type of controllers and their general positioning had been decided before this ergonomics test was made.) The trial was carried out by means of a mock-up of the mill controls. This consisted of full size models of the controllers which could be adjusted and fixed in position to suit the convenience of each operator. Recommendations are made on the basis of this trial for the positioning of controllers in the actual mill situation.
T. I. R 2

11,260
Whitt, C.B., Johnson, P.J., & Hertzberg, H.T.E. REVIEW OF ESCAPE HATCH SIZES FOR BAILOUT AND DITCHING. RDO 695-75, TN WCRD 52-81, Sept. 1952, 4pp. Library, Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,260
To review vertine specifications of escape hatches in terms of current (1952) and experimental flying equipment, a mock-up consisting of a plywood panel having a large opening which could be varied in size by means of movable slats was constructed. Seven subjects, representing a range in size from the 5th to 95th percentile of Air Force personnel, wearing the full flying equipment in present use, or experimental Arctic clothing (both with survival kits) made simulated bail-out and ditching tests from the side, bottom and top hatches. Exits were timed and opening increased until greatest possible speed was attained. Recommendations are included.
R 2

11,261
USAF School of Aviation Medicine. SUBJECT INDEX OF SCHOOL OF AVIATION MEDICINE RESEARCH REPORTS. Jan. 1942 - Dec. 1956, 72pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,261
This index contains titles of research reports published by the School of Aviation Medicine from 1942 through 1956. The subject headings are arranged by major field of interest with subheadings under each field. These major fields are: accidents, air evacuation, aviation medicine, dentistry, internal medicine, microbiology, neuropsychiatry, ophthalmology, otolaryngology, pathology, personnel, pharmacology and biochemistry, physiology, psychology (clinical and experimental), radiobiology, space medicine, statistics (medical), preventive medicine, surgery and anesthesiology, veterinary sciences, and miscellaneous.
R 1200

11,262
Miller, E.T. (Proj. Officer). AIR CREW EVALUATION OF INTEGRATED FLYING CLOTHING ASSEMBLY. NCES 220 7(15), Sep. 6, Oct. 1954, 9pp. USAF Human Factors Operational Engineering Section, MacDill AFB, Fla.

11,262
To provide air crew evaluation of the integrated flying clothing assembly for Strategic Air Command use in the B-47 aircraft, 15 assemblies were worn by crew members (five crews) for flights of five, ten, and fifteen hours duration. Test subjects were familiarized with use of equipment prior to the test flights. Each flight was met upon landing and the crew inspected for dryness of clothing and fatigue. The crews were then questioned as to their findings relative to the equipment. Immersion tests were also made to test for leakage and the suitability of flotation gear. Test data were analyzed in terms of functioning of each assembly item: blower system, ventilation suit, suit liner, anti-exposure suit, life preserver, gloves, and knife. Recommendations are included.

11,263
Ohio State University. PUBLICATIONS. Jan. 1951 to July 1957, 6pp. Aviation Psychology Lab., Ohio State University.

11,263
This bibliography lists publications from the Laboratory of Aviation Psychology, The Ohio State University for the period January, 1951 to July, 1957.
R 67

11,264
Zeitlin, L.R. THE RELATIVE LOUDNESS OF PURE AND COMPLEX TONES. Proj. 6-95-20-001, Rep. 285, Sept. 1957, 20pp. Experimental Psychology Dept., USA Medical Research Lab., Port Knox, Ky.

11,264
To investigate the relative loudness of pure and complex tones, 15 subjects equated (by method of adjustment) the loudness of a variable intensity pure tone (sine wave) with a reference standard complex tone (square wave). Loudness matches were obtained at 100, 150, 200, 300, 400, 700, 1000, 2000, and 4000 cycles per second. A harmonic analysis of the complex wave form was obtained by a photographic method that is fully described. The results are shown in curves based on the differences between the pure and complex tones - tone voltage, power ratios, and acoustic differences. Methods of obtaining a rough approximation of complex tone loudness by summing the loudness of its harmonics are discussed.
T. G. I. R 6

11,265
Ward, J.E. REQUIREMENTS FOR PRESENT-DAY EXPERIMENTAL ZERO GRAVITY PARABOLAS. Rep. 57-121, July 1957, 6pp. Dept. of Space Medicine, USAF School of Aviation Medicine, Randolph AFB, Tex.

11,265
In simplified form, graphs are presented that allow rapid determination, without calculation, of parabolic entry velocity, angle of climb at entry, and vertical altitude travelled during the trajectory as a function of the total duration of zero gravity and minimum speed attained during the parabola (determined by stalling speed) by the experimental aircraft.
G. R 5

11,266

MacKintosh, H.H. (Dir.). HUMAN PERFORMANCE REPORTS, LIST 3. ILLUSTRATIONS FROM RECENT CONFERENCE ON THE DESIGN OF EQUIPMENT FOR HUMAN USE. Summer 1957, 17pp. Applied Psychology Research Unit, U.C., Cambridge, England.

11,266

Brief summaries of human performance reports from this research unit are reported. They are grouped under the following general headings: general (design of equipment), seeing, hearing, deciding, thinking and learning, remembering, and moving.

R 20

11,267

USN Physiological Psychology Branch. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS, SUPPLEMENT NO. 31. JULY 1956-JULY 1957. 12pp. USN Physiological Psychology Branch, CGO, Washington, D.C.

11,267

This bibliography of physiological and psychological reports covers the period July, 1956 to July, 1957. Five areas (31 research contracts) are covered: (1) psychophysiology of sensory mechanisms - vision, audition, chemoreception, modulation of vibratory forces; (2) problems of perception and orientation in space - visual acuity for moving objects, visual perception of space and motion, factors in human orientation and disorientation, voice communication; (3) neurophysiological aspects of performance - studies of the brain and human behavior, autonomic and central nervous system, muscle system, hearing losses; (4) psychophysiological factors in human tasks - display, control and transmission of information, both visual and auditory, tracking performance; and (5) effects of high intensity noise. R 137

11,268

Miller, J.W. A REVIEW OF THE METHODS PREVIOUSLY EMPLOYED TO PRODUCE A HOMOGENEOUS VISUAL FIELD AND THE DESCRIPTION OF A NEWLY DEVISED TECHNIQUE. Contract Wonn-568 (00). Joint Proj. XM 17.01.99, Subtask 2, Rep. 14, Aug. 1957, 10pp. USAF School of Aviation Medicine, Naval Air Station, Pensacola, Fla. (Kresge Eye Institute, Detroit, Mich. & USN School of Aviation Medicine).

11,268

This report reviews various methods that have been used to produce homogeneous visual fields. A new method is then described that permits the manipulation of the hue, saturation, brightness, and density of the whole visual field. Details of the apparatus are given. A number of problems are mentioned which have not been investigated previously due to instrumentation difficulties but which may be examined utilizing this apparatus. Autokinesis in an illuminated field, detection of moving and stationary targets in a homogeneous field, empty field myopia, and the determination of the minimum perceptible velocity in a uniform field.

I. R 11

11,269

McBride, Patricia Y., Johannsen, Dorothea E., & Wulfeck, J.W. THE EFFECT OF PRE-EXPOSURE ON DARK ADAPTATION: AN ANNOTATED BIBLIOGRAPHY June 1955, 69pp. Executive Secretariat, Armed Forces - NRC Vision Committee, University of Michigan. (Tufts University).

11,269

This bibliography summarizes research concerned with the effects of different pre-exposure variables upon subsequent dark adaptation. Only those parts of a study are included in which such pre-exposure effects are described. Coverage is comprehensive through the spring of 1954. For ease and accuracy in comparing studies, the format is partially tabular with results given in summary form.

R 69

11,270

Jerison, H.J., & Wallis, R.A. EXPERIMENTS ON VIGILANCE: PERFORMANCE ON A SIMPLE VIGILANCE TASK IN NOISE AND IN QUIET. THIRD IN A SERIES. Contract AF 33(616)-3404, Proj. 7193, WADC TR-57-318, June 1957, 12pp. Aero Medical Lab., WADC, ANDC, Wright-Patterson AFB, Ohio. (Antioch College).

11,270

To study the effect of noise on performance of a simple vigilance task, each subject (2) monitored a clock for double jumps which occurred at irregular intervals interspersed with single jumps. Work time was 13 1/4 hours in both noise and quiet (112.5 and 79 decibels sound pressure level). Percent correct responses in successive time periods were studied by analysis of variance techniques for differences due to the experimental variables. A further analysis of number of subjects responding to each double jump stimulus was made to study performance decrements. The findings are related to previous studies in terms of the components of the vigilance task used.

T. G. R 7

11,271

Gerathwohl, S.J. BRIGHTNESS AND BRIGHTNESS CONTRAST ON THE INTENSITY MODULATED RADAR SCOPE. A CALIBRATION STUDY. Rep. 56-68, June 1957, 39pp. Dept. of Ophthalmology, USAF School of Aviation Medicine, Randolph AFB, Tex.

11,271

This paper reports the measurement of brightness and brightness contrast of sweep, various kinds of targets, and background on the 5 FT 7 and 5 FT 14 cathode ray tubes using a Radar Flight Simulator AN/APQ13-T1A as the research device. Target appearance and identification thresholds were also studied using various electrical parameters, filters and sweep characteristics. In spite of operator and display variation, some generalizations are made with regard to the design, improvement, and operation of intensity modulated radar display.

T. G. I. R 15

11,273

Weldon, R.J. ERROR REDUCTION IN COMPUTATIONS. Engng. Res. Rep. SC-4074(1R), Nov. 1956, 132pp. Sandia Corp., Albuquerque, N.M. (Dept. of Psychology, University of New Mexico).

11,273

To determine ways to reduce errors in computations done without the aid of a machine, a series of experiments were performed in which subjects, type, and amount of computations were controlled. A provisional unit of measure (dit) was developed as a control for amount of computation. Procedures studied included type of worksheet used, correcting procedures used and checking procedures. All computations were timed. Proficiency of performance (error and time data) were analyzed as a function of worksheet, checking and correcting procedures, and of computers. Appendices contain a review of related literature, forms and methods used in the investigation.

T. R 18

11,274

Hauty, G.T., Payne, R.B., & Bauer, R.O. EFFECTS OF OXYGEN AND DEXTRO-AMPHETAMINE UPON WORK DECREMENT. Rep. 56-127, Jan. 1957, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,274

To study the effects of oxygen and dextro-amphetamine upon skill fatigue, 72 young, male subjects were tested. Following 50 minutes of practice at a compensatory pursuit task, subjects were randomly assigned to the six combinations provided by three mixtures of air (60, 21, and 12 per cent oxygen) and two drug conditions (placebo and five milligrams dextro-amphetamine) and then required to perform the task for four consecutive hours. Proficiency scores were studied by comparing performance curves and by analysis of variance techniques for the single and joint effects of oxygen and dextro-amphetamine. Physiologic costs attributable to the analeptic are discussed.

T. G. R 6

11,275
Garvey, W.D. THE EFFECTS OF TASK-INDUCED STRESS ON MAN-MACHINE SYSTEM PERFORMANCE. Proj. NR 401-000 and NR 401-002, NRE Rep. 5015, Sept. 1957, 11pp. Naval Research Lab., Washington, D.C.

11,275
A series of experiments were conducted to determine the effect of stressing the human element in a man-machine tracking system on the performances of three systems: (1) acceleration control, (2) acceleration-aided control, and (3) position control system. First, equated groups of subjects (16) were trained on systems (1) and (2) followed by a series of task-induced stress conditions. Second, the same two systems were equated by selecting the best operators for the poorer system and vice versa. Both training and stress conditions were then imposed. Last, equated groups performed on (1) and (5) as in the preceding. Performance data were analyzed in terms of stress effects on balanced systems achieved by selection, training and human engineering.
T. G. I. R 7

11,275
Crowder, N.A. A PART-TASK TRAINER FOR TROUBLE SHOOTING. Proj. 7709, Task 37301, Rep. AFFRC TN-57-71, June 1957, 15pp. Maintenance Lab., AFFRC, AADC, Lowry AFB, Colo.

11,276
This article describes the development and use of a part-task trainer for trouble shooting (the Malfunction Information Trainer) on the Sperry K- and MA-6 and MA-7 Bomb-Ray systems. The device permits the student to obtain, for a specific malfunction, coded "test results" at any of 478 test points in the system under any of 26 different combinations of control settings and signal injection procedures. The feasibility of such a coding system, and of physical methods of manufacturing and displaying the coded information were investigated by trial procedures. The acceptability and comprehensibility of the trainer by students were observed in informal trials.
I. R 4

11,277
Frozier, R. & Horowitz, M.W. REPEATED INFORMATION DISPLAYS FOR OPERATIONAL FLIGHT TRAINER INSTRUCTOR STATIONS. Contract N 61339 74, Proj. 89(11)57, EEC Proj. 47-3, Letter Order 3, Jan. 1958, 83pp. Advisory Research Corporation, Cambridge, Mass.

11,277
To examine alternative modes of presenting cockpit information to the flight simulator instructor, a study was first made of all the relevant literature on instruments currently used in Navy Flight simulator stations. A second approach involved extended collaboration with informed personnel--engineers, pilots, and training device experts. On the basis of this information, 28 different instruments were evaluated and proposals for alternate modes of presentation were made.
T. I. R 57

11,278
Brown, J.L. & Burke, R.E. THE EFFECT OF POSITIVE ACCELERATION ON VISUAL REACTION TIME. Proj. NM 17 01 12.1, NADC MA 5712, Rep. 4, Aug. 1957, 21pp. USN Aviation Medical Acceleration Lab., NADC, Johnsville, Penn.

11,278
To investigate the effect of positive acceleration (g) on visual reaction time, two subjects responded to visual test signals during exposure on a human centrifuge. Visual signal was presented at random intervals throughout a run or until g-tolerance (failure to respond within 1.5 seconds after onset) was reached. Two test light luminances (4560 and 0.025 millilambert) and two regions of the retina (28' 22minutes and 7' 24 minutes along nasal meridian) were investigated. Reaction time data were analyzed in relation to acceleration level, test light luminance, test light position, and visual effect (g-tolerance). Subjective reports on early loss of form vision are discussed.
T. G. I. R 12

11,279
Lecomte, P. L'ACCROISSEMENT DE LA PRECISION A L'ATTERRISSAGE PAR L'EMPLOI D'INDICATEUR D'INCIDENCE. Rep. 30, Feb. 1956, 16pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France.

11,279
Landing on relatively short runways raises various technical problems. The present report gives details on the use of the angle of attack indicator for approach and on the advantages from the point of view of a decrease in approach speeds and an increase in the accuracy of touchdown.
T. I.

11,280
Armed Forces-NEC Vision Committee. REPORTS IN ARMY-NAVY-NEC VISION COMMITTEE FILES NOT LISTED IN A BIBLIOGRAPHY OF VISUAL LITERATURE, 1939-1944, SUPPLEMENT. May 1947, 30pp. Armed Forces-NEC Vision Committee, CDR, Washington, D.C.

11,280
This bibliography lists reports and textbooks in the general areas of the physiology and psychology of vision, visual examination and testing, correction of ocular defects in military personnel, training for military specialties, ocular trauma, goggles and ocular protection, illumination, visibility, and military use and design of optical instruments and aids to vision. These areas are those listed in A Bibliography of Visual Literature for which additional reports have been placed in Army-Navy-NEC Vision Committee files. The time period covered is primarily 1945-1946.
R 293

11,281
McKnight, F.S. A PRELIMINARY STUDY OF OPERATIONAL ADVANTAGES OF PICTORIAL NAVIGATION DISPLAYS. Proj. 6 2 5, Tech. Dev. Rep. 241, June 1954, 26pp. Technical Development & Evaluation Center, CAA, Indianapolis, Ind.

11,281
In the preparation of an evaluation program for three types of pictorial computers, a study of possible applications of these navigation displays to operational problems was made with particular emphasis on application to air traffic control problems. The three pictorial computers (or displays) had a common principle in that they display omnibearing-distance information in pictorial form with the position of an aircraft plotted directly on an aeronautical chart by a position indicator. The advantages of these displays when compared to conventional symbolic instrumentation are discussed. The effects of possible navigation errors when the displays are used with very-high-frequency omnirange/distance-measuring equipment (VCR/DME) are considered.
T. G. I. R 5

11,282
Phillips, C.B. & Morse, A.L. A REVIEW OF AIRCRAFT EXTERNAL LIGHTING ACTIVITIES. Rep. 215, Sept. 1953, 10pp. Technical Development & Evaluation Center, CAA, Indianapolis, Ind.

The initial advent of night flying required external aircraft lights. The marine practice was adopted in the form of steady-burning, red and green wing-tip lights and a white tail-light. However, in the early days, intensities and fixture designs were not uniform. These lights became less and less adequate as speeds and traffic densities increased. Until, in 1938, growing concern resulted in the expressed need for improvements. Since that time, the Technical Development and Evaluation Center of the Civil Aeronautics Administration and its predecessor organizations have collaborated in much of this work. This report reviews the major activities in this field and, in particular, outlines the trends over the past 14 years in thinking and in development. Mainly, this has been a highly co-operative activity with private concerns and individuals making major contributions at their own expense. Coordination of effort is indicated by an orderly process of evolution. The combined opinions and suggestions of all concerned have guided the TDEC in its development and evaluation work.

11,283
Blount, E., Dowling, C.E., Kay, H., McCormick, R.E., et al. TECHNICAL AND OPERATIONAL EVALUATION OF THE TYPE IV PICTORIAL-DISPLAY EQUIPMENT. Proj. 6 2.5, Tech. Dev. Rep. 242, June 1954, 32pp. Technical Development & Evaluation Center, CAA, Indianapolis, Ind.

11,283
This report describes the technical and operational evaluation of the Type-IV rotatable-panel pictorial display, a navigational aid for use in aircraft equipped with visual omnirange and distance measuring equipment and with a Gyro-syn compass. The display plots the track of the aircraft on a map and simultaneously indicates the heading; course-line-computer indications are also available. Laboratory tests were made of bearing, distance, and heading accuracy as well as physical aspects of the equipment. Accuracy of the display under actual flight conditions was determined and the ability of the pilot to comply with current navigation and traffic-control procedures was established. Recommendations are included.

T. G. I. R 5

11,284
George Washington University. WHAT HUMERO IS DOING, JULY 1957 - JUNE 1958. Res. Bull. 5, Dec. 1958, 53pp. Human Resources Research Office, George Washington University.

11,284
This bulletin reports the variety of research that is being done by the Human Resources Research Office (HumRRO). A body of research techniques and methods have been developed by HumRRO personnel which permit quick and direct solutions of Army training problems. Applications of these methods are reflected in a number of tasks reported here. Some basic and supporting research inquiry has been initiated and is also reported. Included in the bulletin are final reports published in 1957-1958 and a table of the organization of HumRRO.

T. G. I. R 16

11,285
Milton, A.W. PROBLEMS OF MEASURING THE PROFICIENCY OF E-4 FIRE CONTROL SYSTEM MAINTENANCE MECHANICS. PARTS I-IV. Contract AF 18(600) 144, Research Proj. 21.07.012, RAD Proj. 507 007 0001, EPC Proj. 38, March 1955, 15pp. Educational Research Corporation, Cambridge, Mass.

11,285
The equipment and organizational problems encountered in developing a trouble shooting performance test for the E-4 fire control system are discussed and compared to those of the E-24 system. Five general techniques for inserting malfunctions also are considered.

11,286
O'Rourke, G.G. VERTIGO ALLEY. The Atlantic Monthly, Aug. 1955, 196 (2), 54-57.

11,286
This is an account of a routine night flying mission during which pilot vertigo occurred given by a highly experienced Army pilot. The conditions giving rise to vertigo and the consequences in loss of mastery over the aircraft are portrayed in graphic language.

11,287
Tiedemann, A.T. LIGHTING PATTERN DISTORTION CAUSED BY RAIN ON AN AIRPLANE WINDSHIELD. Tech. Devel. Rep. 160, Jan. 1953, 8pp. Airport Division, Technical Development and Evaluation Center, CAA, Indianapolis, Ind.

11,287
To study the effectiveness of airport lights and light patterns when viewed through an airplane windshield during rainfall, a limited series of observations (direct and photographic) were made. Actual airport approach lights were observed and photographed from a ground station where possible distortion factors could be controlled: (1) rain in atmosphere between observer and lights, (2) rates of waterflow on windshield, (3) air stream on water on windshield, and (4) anti-wetting agent on windshield. Photographic records were analyzed in terms of factors contributing to distortion and maximum rainfall rates that can be tolerated without windshield wipers.

T. R 3

11,288
Gilbert, M.S., & Pearson, H.J. Coryn. A STUDY OF THE VISIBILITY AND GLARE RANGES OF SLOPE-LINE APPROACH LIGHTS. Tech. Devel. Rep. 150, Nov. 1951, 29pp. Airport Division, Technical Development and Evaluation Center, CAA, Indianapolis, Ind.

11,288
This report includes a mathematical and graphical analysis of the visibility distribution of the slope-line approach-light system (airport) using the standard civil aeronautics 250 PAR-56 lamp. Some consideration is given to the standard of the United States Air Forces. The analysis, based on Allard's Law, determines the distance from which a slope-line light can be seen by approaching pilots and the distance from which it will be excessively glaring under a variety of visibility conditions and lamp brightness settings. These data are used for a study of the angular settings of the lamps and possible modifications of lamp sizes. Recommendations are included.

T. G. I. R 11

11,289
Beck, L.H. EXPERIMENTAL EVALUATION ON THE ELGEET IMAGE-STABILIZED BINOCULARS FOR TANK USE. Memo 2144-785-M, May 1955, 6pp. Engineering Research Institute, University of Michigan.

11,289
To evaluate the Elgeet Image-Stabilized Binoculars for tank use, target visibility with these and with conventional binoculars was compared under various conditions of use. Three observers were used. Both binoculars were further compared in terms of general convenience of use. Other engineering interpretations of the concept of image-stabilization are discussed briefly.

11,290

Beck, L.H. AN EXPERIMENTAL STUDY OF GALILEAN TELESCOPIC SPECTACLES. Memo 2144-792-M, June 1955, 11pp. Engineering Research Institute, University of Michigan.

11,290

To explore possible uses of Galilean telescopic spectacles, two experiments were performed. Six observers wore two-power telescopic spectacles for one hour and reported subjective feelings of dizziness or eye-strain. One observer made quantitative tests of range gain by the method of matched visibility. The second experiment compared three sets of spectacles. Data on the range gain of each set over the unaided eye were obtained for two trained observers under controlled laboratory conditions by the method of matched visibility. Recommendations for further study are made.

T. I. R 5

11,291

Beck, L.H. APPROPRIATE UNITS FOR DESCRIBING VISIBILITY DATA. Memo 2144-823-M, July 1955, 11pp. Engineering Research Institute, University of Michigan.

11,291

Appropriate units for describing visibility data on charts for military use are discussed. Considerations involved in making quantitative specifications of the three major visual variables contributing to visibility contrast, background luminance, and size - are discussed. Size specification is seen as the variable involving the most problems; therefore considerations involved in making a choice are detailed: stadimetric use factors, range estimation factors, intelligence, and stress. Recommendations are included.

I.

11,292

Beck, L.H. AN EXPERIMENTAL STUDY OF A 13.3 x 125 x 2.4° MONOCULAR TELESCOPE. Memo 2144-793-M, July 1955, 23pp. Engineering Research Institute, University of Michigan.

11,292

To evaluate the overall optical-visual efficiency of a 13.3 x 125 monocular telescope, the telescopic gain (ratios of the distances at which the same target can be detected with the naked eye and the telescope) was determined for three trained observers by the method of matched visibility. Identical procedures were used with the conventional 7 x 50 binocular. The detection efficiency of the instruments was then figured as the ratio of the observed gains to the theoretical magnification. A theoretical analysis of visual-optical efficiency is presented.

T. I. R 5

11,293

Meeker, W.R., May, A.J., Carrell, R.M. & Simshauser, E.D. STUDY OF COMMUNICATION IN HIGH-LEVEL AMBIENT NOISE FIELDS. Contract DA 36 039 SC 64469, SIGEL Proj. 1320, CMS Proj. 843-D, Rep. 7, May 1956, 39pp. Radio Corporation of America, Camden, N.J.

11,293

This is a progress report on a research program designed to provide information leading to improvement in design of Signal Corps voice communication systems used in high-level noise environments of armored vehicles and helicopters. Articulation tests were conducted on communication systems comprised of a mixture of components from the present system (VHC-7) and equivalents from the recommended system. Studies and measurements on systems of electronic noise reduction were made. One ear phone system (H-101 headset) was investigated for stability of performance. Plans for further work are given.

G. I.

11,294

USA Board NR 6. EVALUATION OF BRITISH-DESIGNED CENTRAL COLLECTIVE PITCH CONTROL. FINAL REPORT ON PROJECT AVN 2756. Rep. ATDEV 6 452/98, Aug. 1956, 17pp. USA Board NR 6, Fort Rucker, Ala.

11,294

To determine the feasibility of a single central collective pitch control in Army helicopters and test the suitability of the British-designed Central Collective Pitch Control for such use, the British system was installed in an H-13C Helicopter and flown a total of 59 test hours. Fifteen experienced helicopter pilots and two student pilots were given training and orientation flights from both pilot and co-pilot seat. Proficiency in various maneuvers was analyzed in relation to the length of training and previous experience. Installation and maintenance problems were studied. Recommendations are included.

I.

11,295

Seligson, A.L. RESEARCH REPORT ON TRANSIENT DISTORTION IN LOUSPEAKERS. Lab. Proj. 5247-4, Final Rep., June 1956, 19pp. Materiel Lab., N.Y. Naval Shipyard, Brooklyn, N.Y.

11,295

To study the factor of transient distortion in loudspeakers as it affects subjective judgments of loudspeaker quality, frequency response harmonic distortion and transient distortion measurements were compared for six representative loudspeakers. These measures were correlated and studied for significant relationships. Listeners ranked the loudspeakers on basis of quality after hearing both speech and music. These results were compared with the physical measurements of transient distortion. Finally, a variable degree of transient distortion was introduced into a sound system and effect upon sound quality and amount perceived was observed. Recommendations are given.

G. I. R 6

11,296

Stewart, H.D., & Rail'snyder, M.H. ORIENTATION AND FAMILIARIZATION WITH RADAR AIR TRAFFIC CONTROL. Task 64541, April 1956, 89pp. Directorate of Flight and All Weather Testing, WADC, ARDC, Wright-Patterson AFB, Ohio.

11,296

This booklet was written as an orientation and familiarization aid to all personnel on supervised tours of the Wright-Patterson Radar Approach Control Center. Part I presents a history of the air traffic control program, explains the basic system objectives and the various sections of the organization developed to meet the objectives. Photographs and/or drawings of radar equipment, operational layouts and procedures are included. Part II gives a general description of Traffic Control, Approach, and Landing System in terms of equipment and procedures, both present and future. The function of ground and airborne equipment is explained.

T. I.

11,297

Emanuel, I., & Alexander, M. HEIGHT-WEIGHT SIZING AND FIT-TEST OF A CUTAWAY G-SUIT, TYPE CSU-3/P. - Proj. 7214, WADC TR-57-432, July 1957, 22pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,297

Body size data from the 1950 Air Force Anthropometric Survey have been reanalyzed to yield a statistical sizing program based on height and weight. This six-size program was incorporated into the Type CSU-3/P Cutaway Anti-G Garment, which was tested from the standpoint of fit and comfort on a representative sample (73) of subjects. Suit selection was accomplished simply by asking each subject his height and weight. Conclusions concerning the feasibility of using this sizing procedure are made based on fitting and procurement procedures.

T. I. R 5

11,299
Kopra, L.L., Bridges, C., & Siegelman, N.
HEARING ACUITY OF AIR FORCE FLIGHT-LINE PERSONNEL. Prelim. Rep. 57-73, July 1957, 13pp.
USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas).

11,299
As part of study of relationships between Air Force specialties or job assignments and hearing acuity of individuals involved in these jobs, pure-tone audiometric tests and job, acies, and medical history questionnaires were administered to 996 personnel from Air Force Base flight-line personnel. The audiometric data were analyzed and mean thresholds for all test frequencies calculated for 16 Air Force specialties. Hearing losses at 4000 cycles per second were examined in terms of specialties. Hearing loss was further analyzed in relation to age and exposure. The use of ear protection devices was examined.
T. G. I. R 19

11,300
Felton, Jean Spencer, & Spencer, Carol.
MORALE OF WORKERS EXPOSED TO HIGH LEVELS OF OCCUPATIONAL NOISE. No date, 59pp. Office of the Surgeon, Air Materiel Command, and the University of Oklahoma School of Medicine.
(University of Oklahoma School of Medicine).

11,300
To study the morale of workers exposed to high levels of noise, 100 jet engine testers were studied and compared with a control group of 100 welders and grinders, matched for age, race, sex, pay status and length of service. Both groups were drawn from workers at the Tinker Air Force Base, Oklahoma. Noise conditions for the two groups measured 119 versus 76 decibels sound pressure levels with 112 and 56 decibels speech interference levels respectively. Techniques included personal interviewing, psychological testing, sociometric investigations, review of illness absence, injury experience, and frequency of visits to medical dispensaries. Analyses of data were made in terms of factors determining morale and behavior on the job.
T. G. I. R 109

11,301
Griggs, T. & Rulon, P.J. INTERNATIONAL LANGUAGE FOR AVIATION INSTRUMENT FLIGHT. Summary Report. Contract CCA 29581, ERC Proj. 37, Jan. 1953, 174pp. Educational Research Corporation, Cambridge, Mass.

11,301
The objective of this research was to provide a language for radiotelephone communications connected with instrument flight which can be used universally in all language zones. The language should be clear and intelligible against background noise, easy to learn and pronounce, and structurally simple and consistent. Part I of this report discusses the research project-objectives, methods, findings, and recommendations. Part II presents first phrase-by-phrase and then analytically, the actual language for instrument flight. The language is based on English and has a vocabulary of less than 800 words.
T. I. R 20

11,302
Erlick, D.E., & Hunt, D.P. EVALUATING AUDIO WARNING DISPLAYS FOR WEAPON SYSTEMS. Proj. 7189-71570, WADC TR-57-222, April 1957, 23pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,302
This report outlines and discusses the major variables and problem areas that should be given consideration in the evaluation and use of audio warning displays in weapon systems. The problem areas relate to the determination of criticality of events, the human and equipment characteristics involved in the selection of audio warning displays and the task dimensions essential to evaluate them. Operational and research implications are discussed for a two step audio warning display: the first step designed to bring about detection, maintain attention, and identify a general category; the second to isolate the specific malfunction. A general program of research is discussed.
G. R 8

11,303
Bamford, H.E., & Ritchie, M.L. INTEGRATED INSTRUMENTS: A ROLL AND TURN INDICATOR. Contract AF 33(616)-3000, Proj. 6190-71573, WADC TR-57-205, May 1957, 18pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (University of Illinois).

11,303
This report is one of a series concerned with the development of effective standby instrumentation for the directional control of an aircraft in case of attitude indicator failure. To evaluate an integrated roll and turn indicator, simulated flight performance of nine Air Force pilots was studied in the YF102 electronic flight simulator under three conditions: (1) with full standard panel (reference condition); (2) attitude indicator covered (control condition); and (3) integrated roll and turn indicator substituted for standard turn indicator (experimental condition). Errors in the direction channels, bank and heading, were compared for each condition. Three principles of display design are offered and discussed.
T. I. R 3

11,304
Harris, J.D. A SEARCH TOWARD THE PRIMARY AUDITORY ABILITIES. DoMod Proj. RM 22 01 20, 2.2, Memo Rep. 57-4, April 1957, 15pp. USN Medical Research Lab., Naval Submarine Base, Groton, Conn.

11,304
In this paper the history of the search for primary auditory abilities is set forth as background for a current program of research in basic psycho-acoustics. Work accomplished in the areas of loudness discrimination and masking is described. The techniques used were those of factor analysis. Factors and their interrelationships are discussed. Future plans are indicated.
T. G. I. R 10

11,305
Taylor, F.V. PSYCHOLOGY AND THE DESIGN OF MACHINES. Amer. Psychol., 1957, 12(5), 249-258. (Naval Research Lab., Washington, D.C.).

11,305
This paper is concerned with the role of psychology in the design of machines. Engineering psychology is examined in terms of what it represents professionally and scientifically. Three functions presently performed by the psychologist are discussed: human engineering technology or the design of machines, man-machine evaluations, and studies of the engineering properties of man. The final topic deals with engineering psychology and its relation to science.
I. R 1

11,306
Hill, J.H. SYSTEM DESIGN AND HUMAN TASKS. Res. Rept., July 1957, 18-24. (Naval Research Lab., Washington, D.C.).

11,306
This paper discusses the development and problems of "procedural analysis", the technique whereby the human engineer and the design engineer collaborate in consideration of a proposed system so that the final design will have the best possible relationships with human operation. Problems that arise in solving these relationships are: the human operator's role in terms of system requirements; the need for a human operator, instrument design and the operator, industrial instrumentation, and automation.
I.

11,307
Rend, F.A., Birmingham, E.P., Tipton, C.L., & Garvey, W.B. THE UTILITY OF QUICKENING THE-
SINES IN IMPROVING TRACKING PERFORMANCE WITH
A BINARY DISPLAY. Proj. DA 368-610, MIL Rep.
3023, Sept. 1957, 6pp. Naval Research Lab.,
Washington, D.C.

11,308
To compare the relative effectiveness in improving
tracking performance of a binary (two lights) and a con-
tinuous (cathode-ray tube) visual error display under
conditions of partial, full, and super-saturation of
the display-control relationship, six subjects performed
under all conditions on two consecutive days. To allow
for tracking performance adaptations, only the last five
of ten trials for each condition was scored. The track-
ing task was compensatory and in one dimension and re-
quired keeping the target centered on scope face or keep-
ing the lights flickering back and forth as rapidly as
possible. Average performance (error scores) curves
were constructed and analyzed for differences due to
experimental conditions.
T. G. R 2

11,309
Kilg, J.A., & Kraft, C.L. RESEARCH ON HUMAN
ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL.
Contract AF 33(516)-3612, Proj. 7192, Rep. 5,
August 1957, 21pp. Wright Air Development
Center, AMSC, Wright-Patterson AFB, Ohio.
(Ohio State University Research Foundation).

11,310
This is the fifth quarterly progress report on a
research project concerned with human engineering as-
pects of air traffic control. Current experiments are
described briefly and are classified as to operational
studies of existing air traffic control systems, studies
on simulated operations, technical studies and support-
ing research, theoretical formulations, and design and
development of research equipment.
R 23

11,311
Clark, M.A. & Farley, D.C. GENERALIZATION OF PATTERN
RECOGNITION IN A SELF-ORGANIZING SYSTEM. Proc. Western
Joint Computer Conference, March 1955, 86-94. (Lincoln
Lab., Massachusetts Institute of Technology, Lexington,
Mass.).

11,312
A self-organizing system reported in a previous paper
is described briefly. The behavior of the system was
simulated by means of a digital computer--the Memory Test
Computer of the Lincoln Laboratory. Two further experi-
ments are described here: the first to demonstrate that
self-organization still takes place even if the input
patterns are subjected to considerable variation; the
second to show that after organization with the usual
fixed patterns, the system classifies other input patterns
statistically according to a simple preponderance pattern.
The significance of the results as a generalization in
pattern recognition is discussed and some remarks are
made on simulation of such systems and its relation to
computer design.
I. R 1

11,313
Cohen, E. GROUP SITUATIONAL PERFORMANCE TESTS:
THEIR USES AND CONSTRUCTION. Personnel
Psychol., Spring, 1957, 10 (1), 61-69.

11,314
This article defines a group situational performance
test and summarizes some of the research conducted on
this type of test in the military situation. Six func-
tions that can be served by such tests are discussed and
illustrated: to establish leadership criteria, as train-
ing devices, to determine training needs, to evaluate
training methods, work methods, and organizational struc-
tures. Problems of construction, administration, and
scoring are discussed; some of the possibilities for in-
dustrial use of the tests are suggested.
R-10

11,311
Murrell, H., Marsh, S.J., Sedfield, H.G.,
McCarthy, C., & Marley, W.J. THE DISPLAY
OF HEADING AND RANGE INFORMATION. Rep. 43,
July 1951, 6pp. Naval Station Study Unit,
Depts. of Operational Research and of the
Senior Psychologist, London, England.

11,312
To determine the various factors involved in the dis-
play of heading and range information, 25 subjects were
each given 30 stimuli on each of two problems with head-
ing information and one problem with range information.
The methods of display were used: pictorial and numeri-
cal. The problems called for comparison of headings and
of ranges. The facts (time to make the judgments and per-
cent correct judgments) were analyzed for speed and ac-
curacy differences between the two methods of display.
T. I. R 4

11,313
Kly, J.N., Schneider, R., Kelly, C.R., &
Chamell, R.C. TRACKING TRAINING I: AN AF-
FIRMAGE. Prepared under Contract Nanz-1900(00),
Proj. 20-7-12, May 1957, 6pp. SEE Training
Device Center, Fort Washington, N.Y. (Dunlap
and Assoc., Inc., Stamford, Conn.).

11,312
To study human tracking performance to elicit aspects
critical to operational success and that are amenable to
training, a survey of tasks containing tracking elements
was conducted through literature surveys and visits to
field operational and training activities. An analysis
of these tasks led to the development of a descriptive
model of tracking behavior designed to encompass all
tracking tasks. Based on the survey and model, a review
of literature, discussions with personnel in tracking
research and a synthesis of the authors' experience, a
group of hypotheses was developed concerned with transfer
of training in tracking tasks.
S. I. R 9

11,313
USAF Office of the Inspector General. VISIBILITY FROM
THE REAR COCKPIT OF F-33 AIRCRAFT. FIELD 1 JANUARY
1952 - 31 DECEMBER 1953. Publ. 24 54, June 1954, 20pp.
USAF Office of the Inspector General, Norton AFB, Calif.

11,313
To determine the extent of obstruction and distortion
affecting the visibility of a pilot seated in the rear
cockpit of a F-33 aircraft, three methods of measurement
and observation were used: 1) ground areas of vision ob-
struction were plotted for various attitudes and fuel
loads and corrected for perspectives that would exist at
prescribed distances and heights from runway touchdown
points; 2) photographs of visible forward areas were taken;
and 3) day and night flights conducted to verify computa-
tions and ascertain further areas of distortion and ob-
struction under a variety of weather conditions. These
data were analyzed and discussed in terms of needs of in-
structor pilot occupying the rear seat. Accident studies
are included.
G. I.

11,314
Churchill, E., & Bernhardt, Katherine. WAF
TRAINEE BODY DIMENSIONS: A CORRELATION MATRIX.
Contract AF 33(516)-3641, WADC TR-57-197,
April 1957, 75pp. Aero Medical Lab., WADC,
AMDC, Wright-Patterson AFB, Ohio. (Antioch
College).

11,314
To add to the stockpile of anthropometric data that
provides a basis for planning and executing design pro-
grams involving body dimensions, correlation coefficients
expressing the degree of relationship between the 1830
pairings of 61 Women Air Force basic trainee body dimen-
sions are presented. Multiple correlation coefficients
expressing the degree of relationship between each of
these dimensions and several pairs of them are given. Re-
gression equations for estimating all other dimensions
from specified values of stature, of weight, and of stature
and weight together are listed. Values are tabulated
for the most frequently occurring values of stature,
weight, and stature-weight.
T. R 7

11,315

USAF Directorate of Flight Safety Research. LIST OF PRESENTATIONS AVAILABLE THROUGH THE MEDICAL SAFETY DIVISION DIRECTORATE OF FLIGHT SAFETY RESEARCH. STUDIES, ANALYSES AND PRESENTATIONS COMPLETED DURING 1952, 1953, 1954, AND 1955. Rep. M I 2, Sept. 1955, 4pp. USAF Directorate of Flight Safety Research, Dayton AFB, Ohio.

11,315

This is a list of published studies, analyses, and presentations by the Directorate Flight Safety Research, United States Air Force, Dayton Air Force Base, California. The period covered is from 1952 through September, 1955. The general area of research is flight safety and includes reports and analyses of accidents, studies on the use of emergency escape systems (compressed, ejection seats, parachutes) and of oxygen equipment, and reports on survival after bailout.

R 26

11,316

USAF Human Factors Operations Research Lab. HUMAN ENGINEERING ANALYSIS OF THE USES OF B-47 AIRCRAFT REMOTE. Sept. 1955, 118pp. USAF Human Factors Operations Research Lab., Bolling AFB, Washington, D.C.

11,316

This report presents summary and detailed descriptions of the work performed by B-47 aircraft personnel. It also outlines in detail the characteristics (such as knowledge, initiative, mental alertness, and judgment) required of each crew member. These job analyses were developed by studying all printed documents pertaining to the program, through intensive interviewing of personnel connected with the program, and by direct observation. Preliminary drafts were submitted to experienced B-47 aircraft men for review. The uses to which such job analyses might be put are discussed.

11,317

Tufts University. REPORT ON THE EFFECT OF AMBER FILTERS ON VISUAL ACUITY. Rep. 22, May 1944, 13pp. Tufts University, Medford, Mass.

11,317

To study the effect of amber filters on visual acuity, a series of experiments were conducted under outdoor daylight conditions. In all tests observers judged the orientation of the open end of the test letter (E) with and without a filter as follows: 1) white test object at each of four distances (1.16, 1.66, 2.14, and 2.83 miles); 2) colored test object (white, red, yellow, light green, and blue) on medium green at two distances (765 and 1095 feet); and 3) small white test object against two large colored grounds (blue and red) at same distance as before. Performance (per cent correct judgments) with and without filters was analyzed for differential effects of distance and color.

T. I. R 4

11,318

Tufts University. THE EFFECT OF GREEN AND AMBER FILTERS ON DETAIL VISION DURING THE TRANSITION FROM DAYLIGHT TO DUSK. Rep. 15, March 1943, 7pp. Department of Psychology, Tufts University, Medford, Mass.

11,318

To study the effect of green and amber filters on detail vision during the transition from daylight to dusk (from about 8.5 to 6.4 log microfootlamberts), acuity determinations were made by four observers with a green filter (Lumalith 0-4403, ten gauges), with an amber filter (Polaroid X166AFA), and with the naked eye of test objects at 200 feet. Determinations were made at 15-minute intervals from about 5:30 to 7:15 p.m. Brightness was measured photometrically at the start and end of each test. Tests were repeated on two dark overcast days. Acuity data are compared for vision with and without filters and acuity losses calculated in terms of decreases in brightness producing them.

T. G.

11,319

Seashore, R.E., & Slavinske, A.J. A MESSAGE ANALYSIS OF STRATEGIC AIR COMMUNICATIONS. Contract W33-036-ec-21289, Tech. Rep. 5015, Oct. 1949, 33pp. Air Materiel Command, Wright-Patterson AFB, Ohio. (University of Virginia).

11,319

To ascertain the nature of information being exchanged on long-range strategic flight operations, a preliminary message content analysis was conducted at four operating bases of the Strategic Air Command. Samples of communications from three types of missions (simulated bombing, photo and weather reconnaissance) were included in the analysis. Chief sources of data were interviews with operating personnel and analyses of aircraft radio logs. The messages were classified as to type of report; tentative "message units" were derived, based on items of information, and were used for a more detailed analysis. The results are discussed in relation to a system of visual message presentation.

T. R 4

11,320

Cookley, J.D., Abbott, W.C., & Bishop, E.W. HUMAN ENGINEERING REVIEW OF REQUIREMENTS FOR THE RADIO SET AN/GRC-53 (1) ANTENNA AND MAST. PART I: THE ANTENNA ASSEMBLY. Contract DA-36-039-SC-64647, Proj. 3-99-01-022, Sept. 1957, 30pp. USA Signal Engineering Labs., Fort Monmouth, N.J. (Dunlap & Assoc., Inc., Stamford, Conn.).

11,320

To review the requirements for an antenna to be used with the Radio Set AN/GRC-53 from a human engineering viewpoint and make recommendations for design which will facilitate its use, specifically for reduction of time and manpower required for assembly in the field, several types of antenna were considered. The one that was most adaptable to the specified requirements was selected, and various design alternatives were evaluated in a detailed examination of the manual operation involved in setting up and operating the equipment. From this information the best design features and operating procedures were selected and are presented as recommendations.

I.

11,321

Cookley, J.D., Abbott, W.C., & Bishop, E.W. HUMAN ENGINEERING REVIEW OF THE RADAR SET AN/APN-100 TERRAIN CLEARANCE INDICATOR. Contract DA-36-039-SC-64647, Proj. 3-99-01-022, July 1957, 18pp. USA Signal Engineering Labs., Fort Monmouth, N.J. (Dunlap & Associates, Inc., Stamford, Conn.).

11,321

To provide human engineering guidance for the design and development of a terrain clearance and obstruction warning radar device, a description of the equipment and its operating characteristics was obtained from preliminary designs and from conferences with personnel of the United States Army Signal Engineering Laboratories. A critical review was made of its functions and recommendations for the design and utilization of the equipment were derived from this analysis and from the application of human engineering principles. The recommendations are presented in two groups, location of displays and controls and specifications for the characteristics of the individual controls and displays.

T. I.

11,322

Cookley, J.D., Abbott, W.C., & Bishop, E.W. ROUTE FINDING AND SWITCHING PROBLEMS IN A FIELD ARMY TELEPHONE COMMUNICATIONS SYSTEM. Contract DA-36-039-SC-64647, Proj. 3-99-01-022, Aug. 1957, 31pp. USA Signal Engineering Labs., Fort Monmouth, N.J. (Dunlap & Associates, Inc., Stamford, Conn.).

11,322

This report analyzes a proposed field Army telephone communications system in which the location of subscribers and equipment is continually changing. It is concerned primarily with the role of the operator in the route finding and switching required to operate the system. The basic operations are considered separately, and specific recommendations made for the design of a route finding plan and for methods of maintaining and using it under changing conditions. The use of automatic equipment is considered in the light of required system flexibility and the capability of the operating personnel.

I.

11,323

Bryan, G.L., Bond, H.A., Jr., & La Porte, H.R. AN ANALYSIS OF PROBLEMS RELATED TO SCHEDULING MAINTENANCE OF ELECTRONIC EQUIPMENT ABOARD NAVAL SHIPS. Prepared under Contract Nour-228(NE), Proj. NR 153-093, Tech. Rep. 22, June 1957, 40pp. Psych. Dept., University of Southern California.

11,325

This report presents a critical analysis of preventive maintenance of shipboard electronic equipment. A list of the main difficulties involved in carrying out current maintenance doctrine under shipboard conditions is given. Principles upon which a shipboard maintenance program might be based are discussed. Final sections of the report describe a hypothetical maintenance system based upon the proposed principles and utilizing computer facilities external to the ship for scheduling preventive maintenance abroad. Possible advantages and disadvantages of the system are discussed and comments on practical implementation and evaluation are offered.

T. 6

11,324

Nealy, I.L., Macpherson, P.A., & Thrasher, D.H. A STUDY OF THE SPEECH TRANSMISSION CHARACTERISTICS OF LOUDSPEAKER EQUIPMENT. DMR Proj. 216, Rep. 216-1, April 1957, 9pp. Defence Research Medical Lab., Toronto, Ontario, Canada.

11,324

To evaluate the speech transmission characteristics of a loudspeaker system proposed for use in the CL-25 aircraft to transmit emergency information to off-duty crewmen not wearing earphones, two systems (LS 104/AC 10 and HI-44) were studied. Multiple-choice intelligibility test forms were presented to 15 listeners under subject noise conditions comparable to those in flight during cruising conditions (105 and 110 decibels). Other conditions varied were position (0 or 60 degrees from loudspeaker), distance (3-12 feet from loudspeaker), and wearing headsets with and without speech signals. Mean per cent intelligibility scores were analyzed for the various conditions. Recommendations for the use of a loudspeaker system on aircraft are given.

T. G. R 6

11,325

Bryan, G.L. A STUDY OF RELATIONSHIPS BETWEEN TRUE AND RELATIVE MOTION AS PERCEPTUAL TASKS IN TWO DISPLAY CONTEXTS. Prepared under Contract Nour-228(NE), Proj. NR 153-093, Tech. Rep. 20, May 1957, 39pp. Psych. Dept., University of Southern California.

11,325

To explore some relationships between the perception of true and relative motions, two displays involving the motion of two ships, were constructed. Variables studied were: angular difference between true courses (0, 30-60, and 120-150 degrees), and true speeds difference (one to one and five to two ratios). In one display relative motion was presented (one ship stationary and the second moving) and 16 subjects estimated the direction of true motion; in the other, true motion of both ships was presented (both were moving) and a second group of 16 subjects estimated the direction of relative motion between the two ships. The data were analyzed for effects of type of motion, courses, speeds, and their interactions. Implications for training are discussed.

T. I. R 7

11,326

Stirner, F.W., Siegel, A.I., & Fox, B.H. CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT: III. AN EXPERIMENTAL INVESTIGATION INTO THE ADVANTAGES OF A "MASTER" CAUTION INDICATOR. Contract NAMX-ACEL-339, May 1957, 24pp. Air Crew Equilib. Lab., NANC, Philadelphia, Penn. (Applied Psychological Services, Villanova Penn.).

11,326

To investigate the advantages of a centralized master indicator to convey information that one or more peripherally located signals are illuminated, seven subjects were given a multiple compensatory tracking task (simulated flight task) to perform. A collateral task was responding to randomly presented "caution" signals on peripherally located panels. Reaction time to the peripheral indicators and the number of misses (lights not responded to within 4.75 seconds) were recorded. Two peripheral locations of cautionary light panels (on the right at different distances from subject) under simulated day and night flight conditions, with and without the master indicator, were tested. Reaction times and "misses" were analyzed for differences due to the presence of the master indicator. T. I. R 3

11,327

Jackson, J.P., & Kuratani, Y. PRODUCTION SCHEDULING RESEARCH: A MONTE CARLO APPROACH. Discussion Paper 61, presented to Seminar on Techniques of Industrial Operations Research, Illinois Institute of Technology, June 1957, 117p. University of California at Los Angeles.

11,327

This is a progress report on work aimed at a variety of problems arising in the operations of job-order machine shops. Exploratory studies are reported in which shop activities have been simulated computationally. Emphasis in these first studies is largely on comparisons of various decision rules in an effort to develop one "good enough" to be incorporated as part of a model in experiments on other aspects of the shop. Plans for future experimentation are discussed.

T. 3 24

11,328

Campbell, P.A. THE EFFECT OF WEARING EAR COTTON STOPS HEARING ACTIVITY. Proj. 10, Rep. 1, Feb. 1942, 6pp. AAF School of Aviation Medicine, Randolph Field, Tex.

11,328

To study the effect of wearing cotton in the ear upon hearing acuity, audiometric tests were made on both ears of 25 young male subjects without and with cotton placed in the external canal of the ear. The two audiograms were compared for differences due to the wearing of cotton. The degree of protection from noise afforded by this device is discussed.

T. G. I.

11,329

Hansley, A.C., & Tully, F.P. INFLUENCE OF COLORANT SYSTEMS ON THERMAL PROTECTION. PART I: STUDIES ON A SINGLE LAYER FABRIC SYSTEM. PART II: STUDIES ON A 3-LAYER FABRIC SYSTEM AT ONE EXPOSURE LEVEL. Proj. 7-12-01-0020, Rep. 97, May 1957, 55pp. Textile, Clothing & Footwear Division, USA Quartermaster Research and Development Center, Natick, Mass.

11,329

To study the effect of colorants on the power in which thermal energy is used in clothing systems, two experiments were conducted. In the first, single layers of cotton (undyed and vat-dyed in five different colors) were exposed to four levels of irradiance for 0.5 seconds. Temperature rise was analyzed in relation to spectral reflectance, transmittance and absorption. In the second, a three-layer system (resin backed vinyl applied to cotton poplin or a plain vat-dyed poplin, with inner layers of dyed cotton and standard (se-shirt fabric) was exposed to 8.6 calories per square centimeter for 0.5 seconds. Resultant time-temperature curves were analyzed as a function of spacing between layers.

T. G. I. R 19

11,330

Scobee, R.G. A COMPARISON OF TESTS FOR HETEROPHORIA. Proj. 375, Rep. 1, April 1945, 5pp. AAF School of Aviation Medicine, Randolph Field, Tex.

11,330

To study the Screen-Maddox Rod test in relation to other widely used tests for heterophoria, measurements were made on 50 subjects. Three tests (Screen-Maddox Rod, Diplopia E, and Screen and Parallax) were administered at both 20 feet and 13 inches. At the latter distance two additional tests (Maddox Wing and Thorington) were given. The test data were compared by correlational methods for degree of relationship. The Screen and Parallax test data were used as criteria for the analysis. A second study was made of the reliability of the Screen-Maddox test by comparing measurements made by two examiners on the same groups of subjects.

T. R 1

11,331

Scobee, R.C. THE EFFECT OF EXHAUSTION AND OF MODERATE ANOXIA ON OCULAR MUSCLE PALANCE. Proj. 252, Rep. 1, July 1944, 3pp. AAF School of Aviation Medicine, Randolph Field, Tex.

11,332

To study the effect of exhaustion and of moderate anoxia on ocular muscle balance, 14 healthy white males were selected on the basis of previous finding of a vertical phoria of one prism Diopter (Hobbs, et al). All subjects ran on a treadmill (seven miles per hour on a ten per cent grade) to exhaustion and phoria measurements were made at both 20 feet and 13 inches immediately. Six of the men were taken to simulated height of 15,000 feet in a low pressure chamber for 30 minutes without oxygen. Phoria determinations were made at 13 inches. The measurements were analyzed for changes due to exercise or anoxia.

T.

11,332

Weitz, J. EFFECT OF THE SHAPE OF HANDLES AND POSITION OF CONTROLS ON SPEED AND ACCURACY OF PERFORMANCE. Proj. 266, Rep. 1, June 1944, 6pp. AAF School of Aviation Medicine, Randolph Field, Tex.

11,332

To determine the relative effect on performance of changing the position and the shape of the handles on aircraft controls, a mockup control column was used with four interchangeable control handles (barrel, sphere, tube, and truncated cylinder). The controls were used to operate a discrimination reaction time test by five groups of subjects (45 each) for three control positions and control shapes. The groups were given two practice periods on two conditions with control groups practicing on only one. Comparisons of speed and accuracy scores were made for interference effects of position and shape changes in learning the new task.

T. C.

11,333

Fougnet, H.B. EVALUATION OF EAR PLUG EFFECTIVENESS. Proj. 257, Rep. 2, July 1944, 3pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,333

To determine the effect of various types of ear plugs on the middle and external ear when worn at high altitude, 490 subjects were tested in small groups. Four types of plugs were selected: molded impermeate, wax impregnated impermeate, molded perforate, and dry cotton dental roll. Experiments were conducted in the altitude chamber at ground level, 10,000, 24,000, and 38,000 feet with standard pressure rates of ascent and descent in the presence of 107 decibels noise. Immediately following the tests each subject completed a comfort questionnaire and was examined for evidence of middle or external ear pathology and graded according to the severity of the signs on a four-point scale. The data were analyzed for effects of type of ear plug and altitude.

T. R. 6

11,334

Loucks, R.B. LEGIBILITY OF AIRCRAFT INSTRUMENT DIALS: A FURTHER INVESTIGATION OF THE RELATIVE LEGIBILITY OF TACHOMETER DIALS. Proj. 265, Rep. 2, Oct. 1944, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,334

To investigate the influence of size and thickness of division numerals on the relative legibility of four types of aircraft tachometer dials, comparisons were made under conditions of reflected and ultraviolet light. Numeral sizes in inches were: 3/16 times 1/32, 9/32 times 3/64, 3/16 times 3/64, and 1/8 times 1/64; one dial with numerals at each 100 revolution per minute division mark and three at each 500 revolution per minute mark. Twenty subjects were required to read settings to the nearest ten revolutions per minute for 1.5 and 0.75 second exposures. Error data were analyzed to provide objective information about specifications and markings for such dials. Problems of maintaining dark adaptation while preserving legibility are discussed.

T.

11,335

Jorgar, J.F. AUDITORY ADAPTATION. Rep. 87-19, Jan. 1957, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Northwestern University).

11,335

To investigate adaptation for pure tones, ten young adults served as subjects. Each of 12 experimental conditions consisted of measurement of adaptation (by auditory plane localization) for a given frequency and intensity at one-minute intervals over a five-minute period. Seven frequencies (from 152 to 8000 cycles per second) and seven intensities (from 30 to 90 decibels) were explored. Amount of adaptation (decibels) was computed and mean adaptation curves derived. The influence of frequency, intensity and duration on adaptation were analyzed. Adaptation in relation to loudness was studied by converting the unit of measure to sones.

G. I. 29

11,336

Madson, E.M. EVALUATION OF AIRCRAFT INSTRUMENT DIAL MARKINGS FOR ACCIDENT INVESTIGATION. Proj. TED ADC/AE-7686, Rep. NADC-41-5675, March 1957, 12pp. USN Air Development Center, Johnsville, Penn.

11,336

To investigate the reliability of a thin coating of paint on the back of instrument pointers as an accident investigation aid, experimental tests were conducted to determine the bending characteristics of various types of pointers. The "g" forces necessary to make pointers strike the dial face were computed by mathematical methods and checked on a centrifuge. The range of "g" forces developed in various types of aircraft accidents were computed and compared with data based upon investigations of actual accidental and experimental crashes. All data were analyzed to determine whether the pointer would touch the dial under crash forces. Recommendations are included.

T. C. R 2

11,337

Criggs, T. & Bulon, P.J. INTERNATIONAL LIAISON FOR ILA. Summary Report. Contract CCA 29395, EBC Proj. 32, Dec. 1951, 26pp. Educational Research Corporation, Cambridge, Mass.

11,337

This report is one of a series issued during a study of an International Language for Aviation. Arrangements for international liaison and cooperation in collecting recordings of radiotelephone communications are described. Informal discussions with communication specialists from nine different countries representing eight different languages are reported.

11,338

Townsend, J.C. DEVELOPMENT AND EVALUATION OF TELEMETRY OF ALL-WEATHER INTERCEPTOR PILOTS IN THE PROFICIENCY MEASUREMENT. Proj. 7716, Devel. Rep. AFPTAC-TN 57 118, Task 57051, Sept. 1957, 74pp. USAF Operator Lab., AFPTAC, Randolph AFB, Tex.

11,338

To develop and evaluate a telemetry station as a research tool for securing in-flight E-4 radar fire-control system performance data for all-weather interceptor pilots of single-place aircraft, the basic Bendix TGRS-2 FM/FM station was supplemented by locally designed and constructed circuitry to permit the telemetering and ground reproduction of airborne radarscope display information. Fifteen flights were flown during which the feasibility of the concept and the actual operation of the telemetry station were evaluated in light of the requirements of a tool for proficiency measurement research and for training. Suggested uses of information gained by this method are offered.

T. G. I. R 1

11,339

Postman, J.M., & Savary, D.M. POTENTIAL INJURY FROM THE FORCES IN AUTOMOBILE COLLISIONS. Report from: "Paper presented at National Convention of Cloakets and Computer Section, 1956, Los Angeles." July 1956, 15pp. Institute of Transportation & Traffic Engineering, University of California, Los Angeles, Calif.

11,339

This paper discusses some aspects of the vehicle safety problem on streets and highways and reviews briefly some findings from the automobile crash injury research program at the University of California. Various studies on the forces of deceleration that prevail during a crash and the relative protection provided to the occupant of the vehicle by several restraining devices (belts and harnesses) are reported.

T. C. I. R 10

11,340

Troutman, D.L., Davis, N., Bollfron, J., et al. ANALYSIS AND SIMULATION OF VEHICULAR TRAFFIC FLOW. Res. Rep. 20, Dec. 1954, 74pp. Institute of Transportation and Traffic Engineering, University of California at Los Angeles.

11,340

This report delineates the phenomena of vehicular traffic flow with particular attention given to relating vehicle delay at intersections to traffic control (such as signalization). The concept of vehicle rate is studied by analysis and simulation: (1) a model involving both the structure and dynamics of intersecting streams of vehicles in terms of flow paths and the operations of queuing, waiting, and proceeding (or turning) subject to cross-traffic and pedestrian interference is constructed; (2) the statistical behavior of congested merging traffic is investigated; (3) simulation with general-purpose computers is considered; and (4) logical designs for a digital and analog computer for simulation purposes are discussed. Recommendations for further study are made. G. I. R 87

11,341

Reiner, G.M. DECISION-MAKING: OBJECTIVE MEASURES OF RISK AND CRITERIA. Paper presented to the American Psychological Assoc., Sept. 1957, 7pp. (N.Y., N.Y.) Electric Boat Div., General Dynamics Corp., San Diego, Calif.

11,341

To make a preliminary study of the risks people take when they make decisions, eight subjects were tested over a period of eight weeks. The subject drew a sample of items and decided from which of two or more populations it originated. Descriptions of the possible parent populations were presented on a card. The sample could be as large as subjects needed to make his decision. The data were analyzed by comparing performance with predicted performance following a sequential ratio test. Effects of ambiguity and complexity (2-, 3-, 4-, and 5-choice problems) were further studied in terms of hit and risk probabilities. Differences between subjects were analyzed.

G. I. R 1

11,342

Iampietro, P.F., Bass, D.E., & Buskirk, E.R. CALORIC INTAKE DURING PROLONGED COLD EXPOSURE. Proj. 7-83-01-005B, Tech. Rep. EP-66, Sept. 1957, 8pp. Physiology Branch, USA Quartermaster Research and Development Center, Natick, Mass.

11,342

The effects of cold stress on caloric intake and energy expenditure of five men were studied. Cold stress consisted in living in a chamber at 60 degrees Fahrenheit for 14 days. The men wore only shorts and were allowed minimal physical activity (playing cards, reading, writing, watching television or movies). The cold period was preceded and followed by two weeks at 80 degrees Fahrenheit. Activity and dietary composition were the same for both periods. Accurate records were kept of each item of food eaten and caloric intakes calculated. Resting oxygen consumption was measured at intervals and nude body weight taken each morning. Comparisons were made between data from the cold stress period and from the control and recovery periods.

G. R 7

11,343

Iampietro, P.F., Bass, D.E., & Buskirk, E.R. DYSRHYTHMIC CONSUMPTION AND METABOLIC TEMPERATURE OF MAN DURING CONTINUOUS COLD EXPOSURE. Proj. 7-83-01-005B, Tech. Rep. EP-67, Oct. 1957, 6pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,343

Effects of continuous cold stress on daily patterns of oxygen consumption and rectal temperature were studied in five men. Cold stress consisted of living continuously in a chamber at 60 degrees Fahrenheit for 14 days wearing only shorts and taking minimal physical activity. Resting oxygen consumption and rectal temperature were measured at 8 a.m., 12 noon, 4 p.m., and 8 p.m. The cold period was preceded and followed by two weeks at 80 degrees Fahrenheit. Activity and dietary composition were the same for all periods. The data were studied for diurnal patterns that might be attributed to continuous cold exposure.

G. R 5

11,344

Horowitz, M.M., & Wells, C.F. A TWO WEEK SAMPLE OF MAINTENANCE PROBLEMS ON A REPRESENTATIVE TRAINING DEVICE (1956). Contract N 61339 74, EKC Proj. 47.6, Letter Order 6, Sept. 1957, 37pp. Educational Research Corporation, Cambridge, Mass.

11,344

This report presents the results of a two-week investigation to ascertain maintenance problems associated with a representative training device (1956). Information was obtained on such factors as: down-time relative to utilization-time; areas of breakdown; causes of breakdown; problems experienced by maintenance personnel; detection; among part failure, design failure, and human failure; and opinions of personnel on minimizing maintenance problems.

T.

11,345

Russell, R.W. EFFECTS OF VARIATIONS IN AMBIENT TEMPERATURE ON CERTAIN MEASURES OF TRACKING SKILL AND SENSORY SENSITIVITY. Proj. 6-95-20-001, Rep. 300, Nov. 1957, 69pp. USA Medical Research Lab., Fort Knox, Ky.

11,345

To obtain information regarding the effects of ambient temperatures ranging from -10 to +40 degrees Centigrade on five different measures of human performance (skill in using movement and pressure tracking controls, tactile and kinesthetic sensitivity, and strength of hand grip), 12 groups of six subjects each were tested. The groups were divided into two sets, one set using movement and the other pressure controls for tracking. Both sets were required to perform four cycles of all the tasks at one of the six temperatures. A control and a recovery session were given preceding and following each experimental session. Performance data were analyzed as functions of degree and exposure time of temperature. Discussion relates to the use of these data in equipment design.

T. G. I. R 2

11,346

Guedry, F.E., & Richmond, G. DIFFERENCES IN RESPONSE LATENCY WITH DIFFERENT MAGNITUDE ANGULAR ACCELERATION. Proj. 6-95-20-001, Rep. 301, Nov. 1957, 8pp. USA Medical Research Lab., Psychology Dept., Fort Knox, Ky.

11,346

To determine the latency of detection of rotation when cues to motion other than vestibular stimuli are weak or absent, 15 subjects (seated at the center of a large turntable) received eight angular accelerations (from 0.8 to 10.6 degrees per square second) during each of five sessions. The subjects signalled the onset of apparent rotation as quickly as possible. Only a small target light, secured to the turntable, was visible. The response latencies (time between onset of acceleration and subject's signal of apparent rotation) were analyzed as a function of the magnitude of angular acceleration. Discrepancies between the obtained results and predictions, derived from theoretical mechanics of the semicircular canals, are discussed.

111-1062T. G. R 7

11,347
Mackinson, C.M. AUTOMOBILE DRIVING SIMULATOR FEASIBILITY STUDY. FINAL REPORT. Contract DAM 59672, Rep. YR 1344 T 6, Nov. 1958, 177pp. Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

11,347
A study of the feasibility of developing an automobile driving simulator suitable for research is reported. General types of simulators were examined for applicability. The broad engineering requirements were then established and methods of simulating each of the major portions of the total driving environment were examined. It was concluded that development is feasible but that visual display would not be totally adequate until certain new developments in the television industry are reached to practice. Initiation of a research, design, and development program is recommended.
T. G. I.

11,348
Kennedy, J.L. THE CONTEXTUAL MAP. Res. Memo 1575, Oct. 1955, 9pp. USAF Project RAND, Rand Corp., Santa Monica, Calif.

11,348
This memorandum describes a tool for assisting decision-makers in dealing with large, complex, interacting problems. The contextual map is a display of information prepared in such a way that the viewer may comprehend the totality of a complex problem before breaking it up into components. The use of the map is described for a specific problem and a variety of uses are discussed: (1) as a large, living memory for a decision-making group; (2) as a device for obtaining a tangible, intelligible product from planning activity; and (3) as a communication device for coordinating the plans and actions of a number of widely-separated planning groups.

11,349
Westinghouse Electric Corp. PILOT ASSIST DEVICE FOR ARMY FIXED-WING LIAISON AIRCRAFT. Contract DA 36-039-sc-63202. EA-40Q-TR109. Quarterly Engng. Rep. 1, Nov. 1954, 46pp. USA Signal Corps, Fort Monmouth, N.J. (Westinghouse Electric Corp., Air Arm Division, Friendship International Airport, Baltimore, Md.)

11,349
This is a report of progress on an analytical study of pilot assist devices undertaken to establish a basic philosophy of aircraft control in relation to pilot requirements. During the reporting period, a sampling of pilot viewpoint was secured by interview with 17 pilots familiar with the general categories of pilot assist systems. Five of the six known manufacturers of autopilots were consulted and a study made of their assist systems. Sufficient data to conduct a dynamic analysis of the L-19 airplane was obtained and a control stick-instrument makeup was partially completed. Plans for further work are given.
G. I.

11,350
Brisack, E.J., & Schulz, A.E. EXPERIMENTATION WITH FORCE-STICK CONTROL OF AN AUTOPILOT-STABILIZED MEDIUM CARGO AIRPLANE. Proj. 1364, WADC TN-55-91, Task 64560, June 1955, 6pp. Directorate of Flight and All-Weather Testing, WADC, ARDC, Wright-Patterson AFB, Ohio.

11,350
To investigate the applicability of force stick control of an autopilot-stabilized medium cargo airplane, two force control systems (force wheel and force disconnect) were compared with the standard control configuration on a Sperry E-4 autopilot (knob and wheel on pedestal controller). The flight testing (70 hours) was devoted to improving operating characteristics; demonstrating the feasibility of the systems. Advantages and disadvantages of the three systems were listed with recommendations for future investigations.
I. R 3

11,351
Institute of Industrial Relations and School of Business Administration. MOTIVATIONAL FACTORS IN PRODUCTIVITY. Prepared under Contract Nonr-225(09), Annual Tech. Rep., Feb. 1955, 27pp. Human Relations Research Group, Institute of Industrial Relations and School of Business Administration, University of California at Los Angeles.

11,351
This annual technical report describes work completed and work in progress on a program of research designed to identify and measure those human variables that have an impact upon group functioning. Seven studies in four major areas have been completed: organizational objectives, personality characteristics of leaders and followers as related to productivity in formal organizations, the social situation as it relates to productivity of leaders and followers, and impact of change in organizational objectives or in social structure upon behavior of leaders and followers. Future work is discussed.
R 7

11,352
USA Board MR 5. TEST OF L-19 AIRPLANE SEATS MODIFIED TO ACCOMMODATE SURVIVAL KITS. REPORT OF PROJECT MR AA 1753. RSB Tech. Cbj. LC 144, April 1955, 21pp. USA Board MR 5, Fort Bragg, N.C.

11,352
To determine suitability of the L-19 Airplane modified seat kit for use in conjunction with present or contemplated survival kits for Army aircraft, the physical characteristics of the seats were determined. Ease of installation and time required to install seats were measured and necessary modifications noted. Flight tests were made and simulated abandonment conducted by subjects wearing both temperate and winter flying components with standard MA-1 and A-1 Suits. Deficiencies and suggested modifications were listed. Recommendations are included.
T. I. R 8

11,353
Karlin, S., & McGregor, J. MANY SERVER QUEUEING PROCESSES WITH POISSON INPUT AND EXPONENTIAL SERVICE TIMES. Prepared under Contract Nonr-225(28), Proj. MR 047-019, Tech. Rep. 1, May 1957, 51pp. Dept. of Statistics, Stanford University.

11,353
This paper presents analyses of non-stationary problems associated with the many server queueing process, subject to the special assumptions of exponential service time and Poisson input. The analyses rely primarily upon the theory of recurrence and absorption for a birth and death process. The problem is defined, related problems are described, factors in the infinite server queueing process are determined and specialized to the one and two server process. Various probability distributions associated with queueing problems of one and two servers are studied, and corresponding results for the many server queue are written out. Proofs are given in the appendix. The distribution of the maximum length of line during a busy period is derived.
T. R 12

11,354
Yiller, P.R., & Greider, H.R. EFFECTS OF ACTIVITY ON METABOLIC RATES OF SUBJECTS WEARING THE FULL PRESSURE SUIT. Proj. TED NAM AE 5109, Rep. NAMC ACEL-345, July 1957, 6pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,354
To determine the effects of activity on metabolic rates of subjects wearing the full pressure suit, three subjects performed a simple pilot's task (pushing the stick and two throttles forward and backwards every ten seconds for six minutes) while seated in a F7U mock-up. Metabolic rates and oxygen consumption were obtained while subjects were wearing three suit types (summer flying, unpressurized pressure suit, and pressure suit pressurized at 2.0 pounds per square inch) and either sitting at rest or performing the pilot's task. The data were analyzed for differences due to suit type and to activity. The findings are discussed in relation to need for knowledge of effect of prolonged wear of pressurized suit on energy expenditure.
G. I. R 7

11,355

Allen, R.C., & Armstrong, R.C. MEASURES OF PILOT TOLERANCE TO A HIGH THERMAL-NOISE ENVIRONMENT. Rep. 12-001, Rev. 1957, 11pp. Convair, General Dynamics Corp., San Diego, Calif.

11,355

To test the effects of high heat and noise levels on pilot efficiency, eight subjects performed a task which simulated some of the functions of actual flight, under four conditions: (1) 90 decibels noise, cockpit and wall temperature 80 degrees Fahrenheit; (2) 115 decibels noise, 80 degrees temperature; (3) 90 decibels noise, air temperature 100 degrees and wall temperature 300 degrees; and (4) 115 decibels noise, air temperature 100 degrees and wall temperature 300 degrees. Physiological measures (skin, rectal and oral temperatures, systolic and diastolic pressures, pulse and respiratory rates) and performance measures (task time, errors) were analyzed for effects of test environments. Findings are discussed in relation to design standards for cockpit thermal conditions. T. G. R 3

11,356

Solomon, P., Leiderman, P.H., Mandelson, J., & Wexler, D. SENSORY DEPRIVATION. Amer. J. Psychiat., Oct. 1957, 114(4), 357-363. (Harvard Medical School).

11,356

This article is a critical review of sensory deprivation as presented in pertinent anthropological reports of environmental stress, "brain-washing" reports of prisoners-of-war, and experimental data on reducing the absolute intensity of stimuli, reducing the patterning of stimuli and imposing a structuring of stimuli. Common features in these types of observation are discussed and the need for further studies of the psychological and behavioral patterns of man under conditions of stress is indicated.

R 28

11,357

Garner, W.R. SYMMETRIC UNCERTAINTY ANALYSIS AND ITS IMPLICATIONS FOR PSYCHOLOGY. Psychol. Rev., July 1958, 65(4), 183-196. (Johns Hopkins University).

11,357

This paper presents some equations, originating in information theory, which show some valuable properties of uncertainty analysis. These equations are presented in a form which emphasizes the fact that an uncertainty analysis can be carried out so that all variables involved can be dealt with in a completely symmetric manner. Implications for several areas of psychology are pointed out through a series of illustrative examples. T. G. R 8

11,358

Schwab, R.S. & Pritchard, J.S. NEUROLOGIC ASPECTS OF FATIGUE. Neurology, March-April, 1951, 1(2), 133-135. (Massachusetts General Hospital, Boston, Mass. & Harvard Medical School).

11,358

This brief paper discusses the four sites of the development of fatigue in humans as a function of various neurological abnormalities. The effect of Neostigmine on muscular performance of normals and neurological and psychological patients is summarized.

11,359

Newell, A. THE CAPACITY OF A RAILROAD FREIGHT YARD (A SURVEY OF THE PROBLEM -- NO A SOLUTION). Res. Memo 555, June 1950, 17pp. USAF Proj. RAND, Rand Corp., Santa Monica, Calif.

11,359

This paper surveys the problem of a railroad yard to receive, hold, and deliver freight cars upon order. Suitable parameters are sought to describe the performance of the yard. The statistical (sources of cars and orders) and the combinatoric (internal workings of the yard) aspects of the problem are defined by exposition and examples worked out to illustrate each type and to give some indications as to how more adequate models might be built. G. I.

11,360

Simpson, W.H. MODIFICATION OF SEATING ARRANGEMENT FOR M35 AND M35S CARGO TRUCKS. Proj. 9-97-40-000, Final Rep., House Task 5.6, June 1957, 16pp. Transportation Corps, USA Transportation Research and Engineering Command, Fort Eustis, Va.

11,360

This report covers the design, construction, and testing of a modified seating arrangement for M35 and M35S cargo trucks wherein troop seats are mounted back to back in the center of the cargo body instead of along the sides. Two methods of fastening center seats to cargo body were tested for structural adequacy and ease of installation. The advantages and disadvantages of the arrangement for troop carrying and for cargo hauling are discussed.

T. I.

11,361

McFann, C.S. RUNWAY DISTANCE MARKERS. WADC TR-57-142, Task 6061-60424, May 1957, 8pp. Directorate of Flight and All-Weather Testing, WADC, ARDC, Wright-Patterson AFB, Ohio.

11,361

To determine optimum runway distance marker design (an aid to pilots in determining their longitudinal position on runway during takeoffs and landings), tests were conducted on 11 runway markers of various sizes, colors, and light combinations. Pilots were required to make normal day and night takeoffs and landings and then complete a questionnaire on the effectiveness of the markers. A total of 65 questionnaires were analyzed from pilots of bomber type, fighter type, and cargo type aircraft. The data are presented and discussed under these headings: takeoff and landing phases, marker effectiveness, lighting, lateral spacing, size and color, reflective and non-reflective surfaces, and maintenance. Recommendations are included.

T. I.

11,362

Bebow, R.W. RADAR DATA STORAGE WITH DIRECT VIEW DISPLAY. Proj. 5159, WADC TR-57-122, Task 50545, Feb. 1957, 3pp. Weapons Guidance Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,362

To evaluate the Direct View Radar Data Storage and Display System, the following tests were conducted: (1) checked and calibrated on a radar mockup; (2) compared with a standard radar indicator when installed on an Ultrasonic Trainer; and (3) flight tested for bombing and navigation purposes in a B-29 aircraft. Weaknesses and advantages of the system are discussed.

11,363

Aeroplane and Armament Experimental Establishment. AN ASSESSMENT OF THE KELVIN AND HUGHES PERISCOPIC DRIFTMETER. Rep. AAEE/Inst/111, March 1957, 12pp. Aeroplane and Armament Experimental Establishment, Ministry of Supply, Roscombe Down, England.

11,363

To assess the Kelvin and Hughes Periscopic Driftmeter in general terms and determine its usefulness for Royal Air Force navigation, various aspects of design and operation were studied. The driftmeter was installed in a Service plane (Avio Ashton MK IWB 490) and qualitative assessments made of design of graticule, optical system, controls, and illumination. Drift and ground-speed accuracy were determined by taking a series of observations at heights between 10,000 and 35,000 feet and speeds between 180 and 328 knots. Serviceability was also checked. Recommendations are included. T. I.

11,364
Stroessler, J.H., Clarke, J.H., Martin, P.A., & Gries, P.T. HUMAN FACTORS IN THE DESIGN AND UTILIZATION OF ELECTRONICS MAINTENANCE INFORMATION. JEL Res. Rep. 782, May 1957, 35pp. USN Electronics Lab., San Diego, Calif.

11,365
To study human factors in the design and utilization of Navy electronics maintenance information, a two-man team interviewed Navy and civilian maintenance personnel at a representative selection of Navy ships, shore establishments, and commands. Data on strengths and weaknesses were presented under the following headings: competence of personnel as technical manual users; uses of technical manuals in maintenance situations; for non-maintenance functions; and by features (schematics, theory of operation, block diagrams, and so forth); effectiveness of current Navy technical manuals (size, inclusiveness, text schematics, systems data, organization, repair and installation data, accuracy); and use and effectiveness of supplements. Recommendations for improvement are included. T. R 11

11,365
USA Arctic Test Branch. ARCTIC TEST OF AA OPERATIONS CENTER AM/MQ-1. REPORT OF PROJECT NR TF 3053 (ARCTIC). Jan. 1955, 12pp. USA Arctic Test Branch, Big Delta, Alaska.

11,365
To determine the suitability and adequacy of Anti-aircraft Operations Center AM/MQ-1 (communication and plotting equipment installed in a 30-foot semi-trailer van) for use in extremely cold weather, arctic tests were conducted. At sub-zero temperatures, tests were made of the time required to raise the temperature of the van to 70 degrees Fahrenheit, of the ability of the heater to maintain this temperature, of heating distribution, of fuel consumption, and of acceptability to user personnel. Mobility tests were made by hauling the van over primary and secondary snow-covered roads; and van components inspected for damage due to extreme cold. Recommendations are included. R 1

11,366
Egan, J.P. MESSAGE REPETITION, OPERATING CHARACTERISTIC AND CONFUSION MATRICES IN SPEECH COMMUNICATION. Contract AF 19(604) 1962, AFRC TR 57 50, June 1957, 164pp. USAF Operational Applications Lab., AFRC, Bolling AFB, Washington, D.C. (Hearing & Communication Lab., Indiana University, Bloomington, Ind.).

11,366
This report describes various terms, concepts, and functional relations that have been found useful in the analysis of certain aspects of the behavior of communication operators when they are attempting to transmit and listen to the spoken word in the presence of noise. The material relates primarily to the operators' estimates of their own accuracy in communications. The results of a variety of experiments are presented and a substantial bibliography is appended. T. G. R 48

11,367
Fletcher, Dorothy E. THE EFFECTS OF MODERATE AND LOW LUMINANCES AND VARIOUS DURATIONS OF PRE-EXPOSURE ON DARK ADAPTATION. NADC TA 5708, BU Med Surg NM 001 110 300, Rep. 3, May 1957, 30pp. Aviation Medical Acceleration Lab., NADC, Johnsville, Penn.

11,367
To measure the effects of moderate and low luminances and various durations of pre-exposure on dark adaptation, monocular dark adaptation data for two observers were obtained with the Hecht adaptometer fitted with a two millimeter diameter pupil, as absolute thresholds taken by ascending series of the method of limits. After 30 minutes in the dark, the pre-exposure was presented at a luminance of from 0.000608 to 971 millilamberts and at a duration of from 0.01 to 20 minutes. The white pre-exposure field was 35 degrees in diameter, centered ten degrees nasally. The test field was green, one degree in diameter; ten degrees nasal and 0.02 seconds in duration. The resulting dark adaptation curves are discussed and the data are compared with those of related studies. T. G. R 10

11,368
Miller, G.A., & Friedman, Elizabeth A. THE RECONSTRUCTION OF MUTILATED ENGLISH TEXTS. Information and Control, Sept. 1957, 1(1), 38-55. (Harvard University).

11,368
To further understanding of message transmission problems (in such systems as teletype), a study was performed to determine how much mutilation an ordinary text can tolerate. The ability of 50 human operators to correct mutilations was tested for a variety of mutilations such as inadvertent abbreviation and substitution. The possibility of reducing the redundancy inherent in English orthography is discussed. T. G. R 9

11,369
McKern, T.W., & Stewart, T.D. SKELETAL AGE CHANGES IN YOUNG AMERICAN MALES. ANALYZED FROM THE STANDPOINT OF AGE IDENTIFICATION. Proj. AE7D, Tech. Rep. EF-45, May 1957, 188pp. USA Quartermaster Research and Development Center, Watck, Mass.

11,369
To provide new methods for determining age, this report presents an analysis of skeletal age changes compiled from the results of extensive identification research on a series of 450 skeletal remains of the United States war dead returned from Korea in 1954. The report is divided into eleven chapters; ten outline the progress of age changes in selected skeletal segments and one chapter portrays the total pattern of skeletal maturation. T. G. I. R 70

11,370
Klemmer, E.T. A FURTHER STUDY OF INFORMATION TRANSMISSION WITH MATRIX PATTERNS. AFRC TR 57-1, Sept. 1957, 6pp. Operational Applications Lab., AFRC, Bolling AFB, Washington 25, D.C.

11,370
To study information transmission with matrix patterns, eleven subjects were shown dot patterns on a four times five matrix for a tachistoscopic exposure of .03 seconds. The subjects reported the positions of lighted bulbs by placing pencil marks in cells of four times five matrices on paper forms. Information transmission scores for the various subjects are presented and there is some discussion of the problem of computing scores in a situation of this sort. T. R 1

11,371
Miller, G.A., & Beebe-Center, J.G. SOME PSYCHOLOGICAL METHODS FOR EVALUATING THE QUALITY OF TRANSLATIONS. Mech. Translation, Dec. 1956, 53-80. (Contract AF 33(038)-14343, AFRC TR 56-61, Harvard University).

11,371
This article attempts to survey some of the possible methods for evaluating the quality of translations. The methods discussed are: asking the opinion of competent judges, comparing translations with one of excellence by statistical means, and asking a person who has read only the translation to answer questions based on the original. The advantages and disadvantages of each method are illustrated by examples. T. R 2

11,372
Moser, H.M., Dreher, J.J., & Schwartzkopf, L.J. AN EAR-MOUTH VOICE TRANSDUCER. Contract AF 19(604) 1577, Proj. 7681, AFRC TR 57-54, RP Proj. 864, Tech. Rep. 43, July 1957, 14pp. Operational Applications Lab., AFRC, Bolling AFB, Washington 25, D.C. (OSU & Research Foundation).

11,372
This report describes an ear-mouth voice transducer which operates with sufficiently good signal-to-noise ratio to be used without circumaural protection in the noise field generated by propeller-driven aircraft. Spectral measurements and articulation results for trained listeners with this experimental microphone-receiver are presented as well as some suggestions for possible improvement of the device. T. G. I. R 6

11,373
Mozer, H.M., Droher, J.J., & G'Neill, J.J.
THE MASKING OF ENGLISH WORDS BY PROLONGED VOWEL
SOUNDS. Contract AF 19(604)-1577, Proj. 7661.
APCRC TR 56-74, Proj. RF 664, Tech. Rep. 40,
May 1957, 17pp. Operational Applications Lab.,
APCRC, Bolling AFB, Washington 25, D.C. (OSU
& Research Foundation).

11,373
To investigate the effectiveness of prolonged vowel
sounds for masking English words, 110 monosyllabic words
were selected from the Thorndike list to represent equally
each of the ten vowels and were presented to 300
American listeners in an articulation test. Also tested
were 70 Spondee words representing the same vowel sounds.
Masking was done by recordings of each of the prolonged
vowels by a male trio. The number of correct responses
for each word under each condition of masking was noted
and analyzed. The rank order of vowel masking effective-
ness is given.
T. G. R 12

11,374
Stevens, K.W., Pietrasanta, A.C., & The Staff
of Bolt Beranek and Newman, Inc. PROCEDURES
FOR ESTIMATING NOISE EXPOSURE AND RESULTING
COMMUNITY REACTION FROM AIR BASE OPERATIONS.
Contract AF 33(616)-2151, Proj. 7210, WADC
TR-57-10, April 1957, 74pp. Aero Medical Lab.,
WADC, ARDC, Wright-Patterson AFB, Ohio.
(Bolt Beranek and Newman, Inc., Cambridge,
Mass.).

11,374
This paper presents detailed engineering procedures
for computing noise exposure in communities near jet
air bases. Both ground run-up and take-off operations
of all types of jet aircraft are considered. Graphical
aids for computing noise exposure are provided with cor-
rections to be applied to account for normal background
noise in the community, the previous noise exposure of
the community, and so forth. Tentative means for esti-
mating the complaint behavior of a community are also
included.
T. G. I. R 6

11,376
Boes, Anita. BIBLIOGRAPHY OF RESEARCH REPORTS
AND PUBLICATIONS ISSUED BY THE BIO-ACOUSTICS
BRANCH (1947-1957). Sept. 1957, 22pp. Aero
Medical Lab., WADC, ARDC, Wright-Patterson AFB,
Ohio.

11,376
This bibliography of research reports and publications
issued by the Bio-Acoustics Branch of the Aero Medical
Laboratory at Wright Air Development Center contains re-
ports on the following major topics: sound sources and
noise fields, sound propagation, acoustic instrumentation,
noise control, hearing and physiology of the ear, speech,
effects of noise, ear protection, and response of the
human body to vibration.
R 16

11,377
Westheimer, G. RETINAL LIGHT DISTRIBUTIONS FOR DEFO-
CUSSED TARGETS IN MAXWELLIAN VIEW. Contract NMR 495
(09), Proj. NR 140-105, RF Proj. 654, Tech. Rep. 3,
Nov. 1957, 13pp. Ohio State University Research
Foundation.

11,377
The general theory of images of coherently-illumin-
ated objects is applied to various types of targets seen
by the eye in Maxwellian view. Circular, slit, and
grating targets are considered and special attention is
given to the retinal light distribution pattern when the
targets are defocused. Equations for these are given
but the actual evaluation of the patterns requires the
use of computational devices. Experimental verification
of some of the conclusions was accomplished with Ronchi
line gratings as targets.
R 6

11,378
Massey, Iris H. & Creager, J.A. VALIDATION OF THE AIR
MAN CLASSIFICATION BATTERY: 1949-1953. Proj. 770,
Task 77006, AFPC TR 56-129, Nov. 1957, 17pp. USAF
Personnel Research Lab., Jackson, Miss.

11,378
This report summarizes the available data on the
validation of the Airman Classification Battery from
1949 to 1953. It includes citations of published refer-
ences on the characteristics of individual tests and
batteries, and it presents data not previously reported
in published form.
T. G. R 42

11,379
Barron, F. THE DISPOSITION TOWARD ORIGINALITY. J. ab-
norm. psychol., Nov. 1955, 51(3), 478-485. AFPC
TR 56-122 (Institute of Personality Assessment & Res-
earch, University of California, Berkeley, Calif.).

11,379
To explore relationships between originality and
personality organization, a study of two groups of 100
Air Force captains was made. A consistently original
group and a consistently unoriginal group were selected
on the basis of responses to eight tests which could be
scored objectively or rated reliably. An original re-
sponse was defined as one that is both uncommon to the
sample under study and, at the same time, adequate for
the realistic demands of the problem. Five major hy-
potheses and the 15 derived predictions concerning orig-
inality, which had been suggested by previous related
findings, were tested by comparing the two groups in
terms of relevant personality data gathered during a
three-day, living-in assessment study.
T. R 11

11,380
Foley, P.J. & Scott, D.M. LEGIBILITY OF LEROY DIGITS
AS A FUNCTION OF SIZE, DISTANCE, ANGLE OF VIEW, AND
ILLUMINATION LEVEL. DRML Proj. 76, Rep. 76 3, PCC
Proj. D 77 94 20 21, HR 143, June 1957, 7pp. Defence
Research Medical Labs., Toronto, Ontario, Canada.

11,380
A study was made of the legibility of 12 sizes of
digits drawn with the Leroy standard Gothic Lettering
guide. Digit sizes ranged from 0.06 to 0.50 inches in
height; five viewing distances (2, 4, 8, 16, and 32
feet); three viewing angles at each distance (normal and
45 degrees right and left); and three conditions of il-
lumination (one, ten, and fifty foot-candles) were used.
Results are presented showing per cent of the popula-
tion (30 subjects) reading each digit size with 100 per
cent accuracy, for each of the experimental conditions.
T. G.

11,381
British Iron and Steel Research Association. THE
DESIGN OF CONTROL POINTS IN STEELWORKS. Summary 83,
Oct. 1955, 2pp. British Iron & Steel Research Associa-
tion, London, England.

11,381
A brief summary of the human engineering studies con-
ducted by the British Iron and Steel Research Association
is presented. Concentration has been primarily on the
design and layout of controls where an operator has sev-
eral controls to coordinate, particularly in overhead
travelling cranes and mill pulpits which require from
three to seven movements to control. Three main consid-
erations are discussed: 1) type and design of controller,
2) layout of controllers, and 3) identification of con-
trols.
I.

11,382
Halbrook, J.W. TEST AND EVALUATION OF THE DIRECT
VIEWING STEREO PLOTTER, WERNSTEDT-MAHAN TYPE. Sub-
Proj. 8 35 03 208, Tech. Rep. 1471 TR, Feb. 1957,
20pp. USA Engineer Research & Development Labs.,
Fort Belvoir, Va.

11,382
This report summarizes engineering and service
tests of the Portable Topographic Stereoplotter, de-
veloped as a replacement for the stereocomparagraph.
Recent trends toward the use of 20 degree convergent
photography to produce maps from high altitude are dis-
cussed with reference to the portable plotting equip-
ment that will accommodate only near vertical photo-
graphs. Recommendations concerning need for further
development are made.
I.

11,383
 USA Library. GLOSSARIES. A PRELIMINARY SURVEY OF
 SELECTED TITLES OF TECHNICAL AND SCIENTIFIC, DOMESTIC
 AND FOREIGN TERMS AND DEFINITIONS EMPLOYED BY THE DEPART-
 MENT OF DEFENSE. Spec. Biblio. 3, May 1956, 27pp. USA
 Library, Adjutant General's Office, Washington,
 D.C.

11,383
 A preliminary list of official reports and publica-
 tions of the Department of Defense and other Federal
 agencies is presented. These reports and publications
 are either glossaries in their entirety or do contain
 definitions or glossaries. The page numbers are includ-
 ed in the latter case. Although emphasis was placed on
 glossaries appearing since 1947, some older glossaries
 are included because of their additional contribution.
 In general, the glossaries are 1) pertinent to the field
 of supply and logistics, 2) used in administrative,
 technical, and scientific fields, and 3) used in connec-
 tion with research requiring the knowledge of foreign
 languages.
 R 280 (approx.)

11,384
 Seitz, L.F., Byrd, W.H., Jr. & Williams, R.R. FINAL
 REPORT OF PROJECT NR AVN-756 SERVICE TEST OF THE U-1A
 AIRPLANE. ATDEV 6 452 1/230, June 1957, 45pp. USA
 Aviation Board, Fort Rucker, Ala.

11,384
 To determine the suitability of the U-1A Airplane for
 Army use as a light, cargo, troop-carrying, and medical e-
 vacuation aircraft, service tests were conducted. The air-
 plane was flown for a total of 475 hours under various
 load, field, and weather conditions. Various maneuvers re-
 quired for the services the U-1A was to serve were execut-
 ed. Maintenance was accomplished by two enlisted mechan-
 ics. Tests were also conducted to determine the suitabil-
 ity of the U-1A for parachute delivery of personnel and
 cargo. Observations on general characteristics, transi-
 tion training required, tactical suitability, maintenance,
 and associated equipment are summarized with recommenda-
 tions.
 T. I. R 4

11,385
 Worchel, P. & Mauney, J. THE EFFECT OF PRACTICE ON
 THE PERCEPTION OF OBSTACLES BY THE BLIND. *J. exp. Psychol.*, March 1951, 41(3), 170-176. (University of
 Texas).

11,385
 In order to determine the effect of training in the
 perception of obstacles, seven totally blind subjects,
 who had failed previously in an obstacle test course,
 were given 210 training trials under conditions favorable
 for learning. Pre- and post-practice test series are
 compared for the subjects and certain recommendations for
 the training of the blind are made.
 T. R 8

11,386
 Turin, G. COMMUNICATION THROUGH NOISE. RANDOM-
 MULTIPATH CHANNELS. Contract AF 19(122)-458,
 Tech. Rep. 116, May 1956, 98pp. Lincoln Lab.,
 Massachusetts Institute of Technology.

11,386
 Statistical methods are applied in this report to the
 problem of communication through a multi-path channel
 which has random or unknown path characteristics and
 which has additive random noise present at the receiver
 end. In an introductory chapter the transmitter and re-
 ceiver for such a system are defined. The first problem
 dealt with is that of establishing an a priori statistical
 model of the channel, exploring its adequacy, and dis-
 cussing (a posteriori) information about the channel.
 The problems of determining the operational form of the
 receiver's probability computer and of generation of an
 optimal set of message wave forms are investigated. Pos-
 sible future extensions of the work are discussed.
 G. I. R 38

11,387
 McGinnis, J.M. EFFECTIVENESS OF PROTOTYPE
 COLD WEATHER FACE MASKS FOR MILITARY ACTIVI-
 TIES. Proj. 7-85-20-005, Tech. Rep. EP-80,
 June 1957, 51pp. USA Quartermaster Research
 and Engineering Center, Natick, Mass.

11,387
 To review the problem of cold weather face protective
 devices for Army use, Quartermaster research was surveyed
 and information secured concerning the need and military
 requirements for face and eye protection. Two new face
 masks (Coldwar and Wood-Hufferty) were studied to gain
 information concerning the advantages and disadvantages
 for use by men engaged in various activities. The masks
 were issued to equipment operators, gunners, armor per-
 sonnel, and others engaged in work that exposed them to
 low temperatures and severe windchill. From subsequent
 interviews information was secured concerning desirable
 and undesirable characteristics, effectiveness under
 various conditions, and improvements needed. Specific
 recommendations are made for further developmental work.
 T. R 58

11,388
 Zwillocki, J. IN SEARCH OF THE BONE-CONDUCTION
 THRESHOLD IN A FREE SOUND FIELD. *J. acoust. Soc. Amer.*,
 1957, 29(7), 795-804. (Prepared
 under Contract Nonr-1866(15), Psycho-Acoustic
 Laboratory, Harvard University).

11,388
 To establish a bone-condition (body conduction)
 threshold in a free sound field, thresholds of audibility
 were first established on six subjects. These data were
 compared with threshold curves of the American Standard
 in order to establish the adequacy of the general acous-
 tic conditions used. An automatic step attenuator was
 used for threshold measurements. Two methods of attenu-
 ating sound were compared: (1) semiplastic earplug plus
 ear muff, and (2) perforated semiplastic earplug con-
 nected to a resonator. Using both methods, thresholds of
 audibility were determined on the same six observers over
 the same frequency range (125 to 10,000 cycles per sec-
 ond). The bearing of the results on protection of the
 ear against noise is indicated.
 G. I. R 17

11,389
 Zwillocki, J. SOME MEASUREMENTS OF THE IMPED-
 ANCE AT THE EARDRUM. *J. acoust. Soc. Amer.*,
 1957, 29(3), 349-356. (Prepared under Con-
 tract Nonr-1866(15), Psycho-Acoustic Lab.,
 Harvard University).

11,389
 Three methods are described for measuring acoustic
 impedance at the eardrum. Two methods are psychophysical
 (attenuation and binaural balance) and the other is purely
 physical. Preliminary data taken by all three methods
 were compared. Further values for impedance at the ear-
 drum were made by the physical method and compared with
 results of other investigations. The practical impli-
 cations of the findings for coupler cavities for minia-
 ture earphones and in calculations on the sound attenua-
 tion afforded by ear protectors are indicated.
 G. I. R 12

11,390
 Zwicker, E., Glottorp, G., & Stevens, S.S.
 CRITICAL BAND WIDTH IN LOUDNESS SUMMATION.
J. acoust. Soc. Amer., 1957, 29(5), 548-557.
 (Prepared under contract Nonr-1866(15), Psycho-
 Acoustic Lab., Harvard University).

11,390
 To investigate the concept of critical band width in
 loudness summation, a series of experiments were conduc-
 ted in which the signals were presented binaurally
 through a pair of earphones to the subject seated in an
 anechoic chamber who adjusted the level of a comparison
 signal to match the loudness of a standard signal. The
 major problems explored were: (1) how the loudness of a
 group of tones (four equally intense) depends on the
 spacing (frequency difference between the highest and
 lowest) of tones in the complex; and (2) how the loudness
 of a band of constant sound pressure level depends on the
 width of the band. The data were compared with those
 from other methods. The relation of the critical band
 to other functions is noted.
 G. I. R 17

11,381
Stevens, S.S. CONCERNING THE FORM OF THE
LUMINOUS FUNCTION. J. optom. Soc. Amer.,
1957, 52(6), 688-690. (Prepared under con-
tract Navy-1000(15), Psycho-Acoustic Lab.,
Harvard University).

11,382
To examine certain possible irregularities in the
luminous function, the method of adjustment was used by
each of 22 subjects to judge and double the luminance of
a 1000 cycle sine at luminance levels of 34, 64, 94, and
120 decibels (on 0.0002 meter) presented in random
order. The data (double change required to judge or
double luminance) were analyzed graphically to show the
form of the distribution of both types of judgments.
These findings are compared with evidence from other
types of estimations. A rule for expressing the relation
of luminance to intensity in a first approximation is
offered.
T. G. R 5

11,383
van Boven, G. VIBRATIONS ON THE SKIN SIMILAR
TO DIRECTIONAL HEARING, BEATS, AND HARMONICS
OF THE EAR. J. optom. Soc. Amer., 1957, 52(4),
482-484. (Prepared under contract Navy-1000
(15), Psycho-Acoustic Lab., Harvard University).

11,384
To compare sensations on the skin to phenomena in
hearing, a mechanical model of the cochlea in which the
skin of the arm is used as a sense organ was used to ap-
plicate, insofar as possible, directional hearing, beats,
and harmonics of the ear. Interaction between two similar
stimuli with a time delay was investigated for vibra-
tions (skin) and clicks (ear). Frequency changes during
beats were investigated on the model and compared with
earlier observations of Becholtz. Concerning harmonics
the method of beat beats of sinusoidal oscillations was
studied (1) on the fingertip, (2) on the model of the
ear, and (3) in hearing.
G. I. R 20

11,385
Clark, W.E., Pietrasanta, A.C., Calloway, W.J.,
et al. NOISE PRODUCED BY AIRCRAFT DURING
GROUND RUN-UP OPERATIONS. Contracts AF 33(616)
2151, CALL 18 and AF 33(616)-3335, TASK 23,
Proj. 7210, WADC TR-56-60, June 1957, 142pp.
Aero Medical Lab., WADC, AFMPC, Wright-Patterson
AFB, Ohio. (Bolt Beranek and Newman, Inc.,
Cambridge, Mass.).

11,391
Measurements of the noise field around six turbojet
aircraft (F-4A, F-4B, F-4C, F-4D, F-4E, and F-4F)
and one propeller aircraft (C-124) during ground run-up
operations are reported. Sound pressure levels in octave
bands of frequency were obtained for different operating
conditions of the aircraft engines at distances ranging
from 100 to 1600 feet. These data were analyzed and the
results reported in terms of acoustic power level, direc-
tivity, and noise spectra. An empirical procedure is
described for making engineering estimates of the charac-
teristics of the noise field produced during ground run-
up operations of jet aircraft.
T. G. I. R 4

11,392
Smith, A.A. & Boyes, G.E. A NEUTRAL DENSITY FILTER
FOR SETTING OPTIMAL BIAS ON RADAR DISPLAYS EMPLOYING
MAGNESIUM FLUORIDE PHOSPHORS. DRL Proj. 163, Rep.
163 12, POC Proj. D77 94 20 22, HR 145, April 1957,
4pp. Defense Research Medical Labs., Toronto, Ontario,
Canada.

11,394
To determine the appropriate filter for setting opti-
mal bias when the CV 429 cathode-ray tube (magnesium
fluoride) is in use, five filter densities were tested:
0.5, 1.0, 2.0, 3.0 and 4.0. Five subjects made judg-
ments of the bias voltage at which the sweep-line could
just be seen through each filter density as the bright-
ness was increased in small (one volt) increments. Each
subject also made a determination of VRI--the bias volt-
age at which the sweep was just visible--with no filter
in place. Filter density was plotted against mean volt-
age averaged over all subjects for five replications and
the desired information taken off the curve.
T. G. R 4

11,385
Scott, A.L. VISIBILITY OF RADAR SCREENS:
CHANGES DURING OPERATIONAL OPERATION. DRL
Proj. 153, POC Proj. D77-94-20-22, DRL Rep.
153-7, April 1957, 6pp. Defense Research
Medical Labs., Defense Research Board, Toronto,
Ontario, Canada.

11,386
To determine the effect of off centering the Posi-
tion Indicator (PI) radar scopes on target visibility,
20 subjects were tested under three conditions of the
base length (defined as to radius as: constant, one
radius; offset one-half, 1.5 radius; fully offset, two
radius) and seven PIC (picture ray tube) sizes (24 to 30
inches). The task was to report a "seen", "not seen" each
time the sweepline passed through a designated square.
Brightness of target signals was controlled in steps of
one decibel. Performance was evaluated by analysis of
variance for differences attributable to subjects, the
base length and PIC size.
T. G. R 3

11,395
Baker, S. ROYAL CANADIAN MOUNT ELECTRICAL MAINTENANCE
CONTROL SYSTEM. DRL Proj. 156, POC D77-97-75-65,
DRL Rep. 156-1, October 1955, 36pp. Defense Research
Medical Labs., Defense Research Board, Toronto, Ontario,
Canada.

11,396
This report discusses three phases of a fourfold
electrical maintenance control system for the Royal Ca-
nadian Mount (RCM). The system is based on certain as-
pects of the new Royal Electrical Register, modified to
meet the needs of the RCM and to standardize the method
of keeping electrical records. The system is composed
of (1) history sheets of all electrical gear, (2) a rec-
ord of occurrence of defects, (3) a system of reporting
maintenance activity, and (4) a method of regulating
routine preventative maintenance. An introduction to the
system is given and a detailed description of the form
and method of operation of the first three phases. Spec-
imen copies of the forms are shown in appendix.
I.

11,397
Fletcher, Dorothy E. HUMAN ENGINEERING INVESTIGATIONS
OF AIRCRAFT COCKPIT VISUAL DISPLAYS. PART 8, SUGGES-
TIONS FOR THE FORM OF THE AIRCRAFT SILHOUETTE OF THE
YEARFOOT DIRECTIONAL HORIZON. DRL Proj. 156 AE 7047,
DRL Rep. 156 1 224, Rep. 1954, 16pp. USN Aero Medical
Development Lab., WADC, Philadelphia, Penn.

11,397
This report considers the design of the aircraft
silhouette which appears on the Yearfoot Directional
Horizon Instruments, 6L-1AX and 6L-1EM. These instru-
ments combine attitude and directional information in
one display; attitude appears as a relatively pictorial
display as compared to the more symbolic display of di-
rectional information. The aircraft silhouettes are
analyzed in terms of legibility improvements that might
be made. Suggested changes are discussed with photo-
graphs attached.
I. R 2

11,398
Regan, J.J. & Ely, J.H. "FLYING" THE SUBMARINE. Res.
Rep. Nov. 1957, 6-10. (USN Training Device Center,
N.Y.).

11,398
This is a popularly written article discussing a
research project concerned with the development of a
new control system for maneuvering a submarine through
water in three dimensions at high speed. A modifica-
tion of the system, for the experimental submarine USS
Albatross, in which one man (or three) operates airplane-
type control devices is described. Techniques used in
the research study are discussed and future needs in-
dicated.
I.

11,400

McK, A.B. EFFECTS OF AVIATION PSYCHOLOGY. Rep. No. 1, May 1957, 20-54. (U.S. School of Aviation Medicine, Naval Air Station, Pens.).

11,399

The work of aviation psychologists is discussed in relation to the need for and types of motivational testing, selection testing, predicting proficiency, accident, accident prevention, human engineering, and follow-up studies. Some of the general conclusions reached through this work are listed.

11,398

Cooper, C.G. STEREO ELEVATION METER: TEST REPORT OF MARINE CORPS EQUIPMENT BOARD. MCDC Proj. E-1227, 29 Feb 1957, 13pp. Marine Corps Development Center, Marine Corps Schools, Va.

11,402

The Stereo Elevation Meter was tested and evaluated to determine its suitability for replacing the Stereocomparograph as an aerial photographic interpretation instrument in Fleet Marine Force units. Tests included ease of operation, maintenance and repair, portability, accuracy in use, comparative performance with Stereocomparograph, durability, and suitability. Recommendations are included.

11,401

Seydick, R.P. CHAIR, FOLDING, METAL: TEST OF. Proj. E-1221, March 1954, 23pp. MCDC Development Center, Marine Corps Schools, Va.

11,401

A folding metal chair was tested and evaluated in comparison with the standard Marine Corps Chair, Folding (Canvas) for suitability for Marine Corps use. The following tests were conducted: 1) physical characteristics, 2) stowability, 3) durability and stability, 4) maintenance requirements, 5) user acceptability, and 6) suitability for Marine Corps use. Recommendations regarding acceptance of the new chair are made.

11,402

Ehrenfried, A.B. GENERAL OPERATING PRINCIPLES OF THE A-1 GUN-BOMB-ROCKET SIGHT. Rep. R 10, Feb 1951, 33pp. Instrumentation Lab., Massachusetts Institute of Technology, Cambridge, Mass.

11,402

This report presents the general operating principles of the A-1 Gun-Bomb-Rocket Sight as employed in fixed-gun fighter aircraft to control gunfire, rocketfire, and the dropping of bombs. The A-1 Sight is described and important elements are shown graphically. The various sections of the report then present general methods for generating lead, gravity-drop, velocity-jump, and cross-roll corrections for gunfire operation; overall gunfire calibration procedure; and the principles of rocketfire and bombing.

1. R 4

11,403

Davis, R.A. CAMOUFLAGE TESTS OF ARMY AND MARINE CORPS SHELTER HALF-TENTS. Proj. EE-1282, Proj. DA 8-31-01-001, June 1957, 9pp. Marine Corps Equipment Board, MCDC, Marine Corps Schools, Quantico, Va.

11,403

To study camouflage coloration to be used on an Army and Marine Corps standardized shelter half tent, six models (both Army and Marine Corps standard models and experimental patterns) were evaluated. The tents were set up in a straight line at six foot intervals in an open field. Aerial photographs and observations were made and ground visual observation was made up to 900 yards. Thresholds for detection were analyzed for best coloration pattern. Marine Corps uniforms and helmet covers were evaluated at the same time and special consideration was given to the problem of a cover to camouflage body configuration of the combat clad Marine. Recommendations are included.

1. R 1

11,404

National Education Association. WHAT CAN YOU DO? RESEARCH NEEDS IN TRAFFIC SAFETY EDUCATION. May 1954, 20pp. National Education Association, National Commission on Safety Education, Washington, D.C.

11,404

To determine the major problems in traffic safety education, a selected group of 2545 persons in the public schools, colleges, and universities, and other interested agencies were polled for their opinions on the relative values of listed studies. The questionnaire listed both experimental and survey type studies and called for a rating of very useful, useful, of little or no value, and no answer. Space was provided for the respondents to suggest topics for research. The data from 944 returns were analyzed to show per cent distribution among assigned values for survey and experimental studies. The priority given to proposed studies by colleges and university respondents was studied and other research topics summarized.

T.

11,405

Snodgrass, F.T., Teople, J.B., & Sleight, R.B. EFFECTS OF FATIGUE ON PERFORMANCE OF VISUAL-MOTOR TASKS: AN ANNOTATED BIBLIOGRAPHY. Contract DA 36-039-sc-67912, Aug. 1957, 27pp. Applied Psychology Corp., Washington, D.C.

11,405

This is an annotated bibliography on the subject of fatigue. The studies collected are primarily concerned with the relation of fatigue that may be experienced under normal operating conditions to the performance of complex visual-motor tasks. Some studies deal with fatigue resulting from task performance. The abstracts are presented in terms of purpose, materials and procedures, results and conclusions.

R 31

11,406

Nevek, J.W., Teople, J.B. & Sleight, R.B. SLEEP DEPRIVATION AND TASK PERFORMANCE: AN ANNOTATED BIBLIOGRAPHY. Contract DA 36-039 sc 67912, Aug. 1957, 18pp. Applied Psychology Corp., Washington, D. C.

11,406

This is an annotated bibliography of sleep deprivation. Emphasis is placed on those studies that assess the effects of sleep loss on task performance and which provide quantitative data. Several types of sleep loss are covered: acute sleep loss, chronic sleep loss, and interrupted sleep. The studies are outlined in terms of purpose, materials and procedures, and results and conclusions.

R 21

11,407

Davis, D.A., Ayer, J.E., & Mayfield, R.N. GLOVES FOR PROTECTIVE ENCLOSURES. Contract W-31-109-eng-38, Final Rep. ANL-5743, May 1957, 22pp. University of Chicago. (Argonne National Lab., Lemont, Ill.).

11,407

A study of the problem of protective gloves for use in enclosed systems where pyrophoric, radioactive, toxic, or poisonous materials are handled was made as a necessary prerequisite to any attempt at coordination or standardization. Materials, methods of manufacturing, and general properties of gloves were described. Glove design was analyzed and suggestions made in regard to an acceptable standard. Permeability characteristics of various glove compounds were reviewed and the effect of moisture contamination upon hypothetical systems tabulated. An electrical test is proposed for determination of glove soundness.

T.G. I, R 4

11,408
NRL Research Lab. REPORT OF NRL PROGRESS. Nov. 1957.
53pp. NRL Research Lab., Washington, D.C.

11,409
This monthly report of progress of the Naval Research Laboratory (NRL) contains three articles: "NRL contributions to an automatic approach and landing system", "Fracture strength", and "Radiation-induced formation of osmium". Problem notes relating to work in astronomy and physics, chemistry, mechanics, metallurgy and ceramics, nuclear and atomic physics, radio, and solid state physics are given. A list of published reports and papers is included.
G. I. R 52

11,409
Carver, W.J., & Nitsch, L.L. A COMPARISON BETWEEN THE PPI-SCOPE AND THE 360° B-SCOPE FOR THE PURPOSES OF TARGET EVALUATION. Proj. NO 284-112, NRL Problem Y02-10, NRL Rep. 4511, March 1955. 15pp. Naval Research Lab., Washington, D.C.

11,409
To compare the plan position indicator (PPI) display (polar coordinates) and a 360 degree B-scope (rectangular coordinates) in a target designation system (TDS), the latter display was designed so that an operator could quickly obtain information related to ships heading and target position relative to own ship's position. Under conditions that simulated a TDS aboard a destroyer-type vessel, eight naval enlisted men observed a tactical situation as it developed on the displays and assigned appropriate gun directors to the target which constituted the greatest threat. Performance on ten problems was scored as number of correct director assignments and director-target ratio, and analyzed for differences due to displays. Problems other than tactical evaluations are discussed. G. I. E 1

11,410
McGuire, J.C. EFFECT OF TRAFFIC CONFIGURATIONS ON THE ACCURACY OF RADAR AIR TRAFFIC CONTROLLER JUDGMENTS. Contract AF 33(616)-3612, Proj. 7192, WADC TR-56-73, May 1957, 18pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University).

11,410
To investigate the relationship between traffic configurations and radar air traffic controller judgments of "collision possibility", six skilled operators adjusted a movable target to a position judged to be one that would result in simultaneous arrival of the adjustable and standard targets at a reference. Each trial consisted of five blips. The two aircraft were simulated as flying at different speeds (180, 240, and 300 knots); three traffic configurations were used, and two types of trails (constant brightness or fading brightness of blips). The results were analyzed for both constant and variable errors and studied as functions of configuration and type of trail.
T. G. I. R 5

11,411
Harter, G.A., & Gain, P. AN ELECTRONIC TARGET SIMULATOR FOR USE WITH OPERATIONAL RADAR SURVEILLANCE SYSTEMS. Contract AF 33(616)-3612, Proj. 7192, WADC TR-57-277, May 1957, 33pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University).

11,411
This report describes an Operational Target Simulation (OTS) system for simulating targets and mixing them with "live" targets on operational plan position indicator (PPI) radar displays. Three designs are proposed; each is composed of an electronic target generator and the additional circuitry required to convert rectangular-coordinate output signals to polar-coordinate signals compatible with the video-type intelligence required for radar display. The method to be used for this transformation differs among the three designs and is fully reported here. A prototype unit of one design has been constructed and tested at the RAPCON Center, Wright-Patterson Air Force Base.
G. I. R 7

11,412
Mohl, J.C. AIRCRAFT FLEXIBLE GUNNERY CONTROL SYSTEMS: HUMAN ENGINEERING OF. PART III. DESIGN OF TARGET ACQUISITION UNIT FOR USE WITH PERISCOPE MK 48 AND AUTOMATIC TARGET TRACKING DEVICE. NRL Problem R13-13, BuOrd TR Re8e-52, NRL Memo. Rep. 76, Oct. 1952. 16pp. Radio Division III, Naval Research Lab., Washington, D.C.

11,412
This report is the last in a series of three dealing with interaction between the human operator (tracker) and various elements in an aircraft flexible gunnery control system. The tracker's task is analyzed on the basis of relevant human engineering considerations and recommendations made for improved effectiveness. This report concerns the part of the task called target acquisition and design of a unit for use with the Periscope MK48 and the Automatic Tracking Device. The present design is criticized on the basis of its inflexibility and incompatible spatial relationships. Requirements for an adequate design are listed, and two units which meet these requirements are described.

11,413
Mohl, J.C. HUMAN ENGINEERING OF AIRCRAFT FLEXIBLE GUNNERY CONTROL SYSTEMS. PART I. DISPLAY OF CONDITION INFORMATION IN PERISCOPE MK 48 MOD 0. NRL Problem R13-13, BuOrd TR Re8e-3-52, NRL Memo. Rep. 22, June 1952, 14pp. Radio Division III, Naval Research Lab., Washington, D.C.

11,413
This is the first in a series of three dealing with interaction between the human operator (tracker) and various elements of an aircraft flexible gunnery control system. A brief description of the Periscope MK48 Mod 0 and a detailed account of the tracker's task are presented. The primary concern here is with presentation of information on the condition of various components of the system to the tracker while he is tracking with the periscope. Possible methods of signalling the information are discussed. A list is presented of human engineering requirements which the signals must meet and specific design recommendations are made concerning characteristics and means of mechanization of a set of signals meeting these requirements.
I. I.

11,414
Stevens, S.S. (Dir.). PERIODIC STATUS REPORT XXIX. PERIOD COVERED: 16 NOVEMBER 1956 - 15 MAY 1957. Contract NONR 1866(15), Proj. NR 142 201, May 1957, 13pp. Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

11,414
This status report presents a list of personnel, an annotated bibliography of research completed, brief descriptions of work in progress, and a list of special activities of the personnel at the Psycho-Acoustic Laboratory, Harvard University for the Office of Naval Research. The period covered is from November 1956 to May 1957. A list of all scientific reports beginning with mid-1954 is appended.
R 47

11,415
Stevens, S.S. (Dir.). PERIODIC STATUS REPORT XXX. PERIOD COVERED: 16 MAY - 15 NOVEMBER 1957. Contract NONR 1866(15), Proj. NR 142 201, Rep. PNM 78, Nov. 1957, 14pp. Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

11,415
This status report presents a list of personnel, an annotated bibliography of research completed, brief descriptions of work in progress, and a list of special activities of the Psycho-Acoustic Laboratory, Harvard University for the Office of Naval Research. The period covered is from May to November, 1957. A list of scientific reports beginning with mid-1954 is appended.
R 59

11,416

Chang, S.H., Dolansky, L.O., Stubbs, H.L., Jiren, J., & Bach, R.E. VISUAL MESSAGE PRESENTATION. Contract AF 19(604)-1033, Item 1. AFPC-TR-57-150, March 1957, 93pp. Air Force Cambridge Research Center, Bolling AFB, Washington, D.C. (Electronics Research Lab., Northeastern University).

11,416

This report summarizes three years of research directed toward the specification of important parameters of speech for use in visual message presentation and in speech-compression systems. A working model of the Formoder (Formant-Mimic-Coder), a speech-compression system, is described with details of the circuits used in analysis and synthesis. Tracking curves and spectrograms are presented along with results of articulation tests as evidence of quality of performance. Improvements for the Formoder are discussed. An alternative approach to the speech-compression problem, based on automatic classification of phonemes into groups by successive binary selections, is discussed. The design for an acoustic room for articulation testing and recording is given. T. G. I. R 17

11,417

Eggert, W.W. PHASE V (ALL-WEATHER) FLIGHT TEST OF L-20A AIRCRAFT. TR WCT-53-20, March 1953, 30pp. Directorate of Flight and All-Weather Testing, WADC, ARDC, Wright-Patterson AFB, Ohio.

11,417

To determine the capabilities and limitations of the L-20A Aircraft during night and adverse weather operations and to determine optimum piloting techniques and procedures for instrument and night flight, 27 hours of flight tests were conducted on 18 flights. The tests encompassed flights at all altitudes up to the operational ceiling (12,000 feet) with all combinations of gross weights and center of gravity locations that could be located. Conditions included visual and instrument flight rules and hooded flight. The results were evaluated for each of the following: cockpit (general layout, visibility, lighting), instrumentation (arrangement, lighting, operation), auxiliary equipment, and handling characteristics. Specific recommendations are listed. I.

11,418

Hay, W.W. CLIMATIC CRITERIA DEFINING EFFICIENCY LIMITS FOR CERTAIN INDUSTRIAL ACTIVITIES. SECTION 2d. THE EFFECT OF WIND ON RAILROADS. Contract AF 19(604)-416, 15pp. Geophysics Research Div., Air Force Cambridge Research Center, Bolling AFB, Washington, D.C. (University of Illinois).

11,418

This report considers the effect of wind and wind combined with snow, rain and ice storms and with excessive dust and sand on railroad operations. The various sections of the report are devoted to the effects of these climatic conditions on efficiency of personnel, locomotives, cars, roadway and track, train and yard operations and maintenance. The appendix presents several reports of sample wind storms and their effects of efficiency of railroad operations.

11,419

Churchill, A.V. MANIPULABILITY OF BRAILLE CONTROL KNOBS. Canad. J. Psychol., 1955, 9(2), 117-120. (Defence Research Medical Labs., Toronto, Ontario, Canada).

11,419

To evaluate the comparative manipulability of eight differently shaped control knobs, 72 subjects were required to move a pointer to a given setting on a dial scale (300 degree unit marks one degree apart, numbered in tens) by manipulating the knobs (concealed from sight) with fingertip control. Eight settings were made with each knob using a control-knob-pointer ratio of approximately four to one. Data were recorded in terms of time and errors and studied by analysis of variance techniques. The results are discussed in terms of a control coding system for knob shapes which would consider manipulability as well as tactual discriminability. T. I. R 3

11,420

Siegel, A.I., & Stinson, F.W. CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT: IV. BACKGROUND VARIATION, LETTER SIZE, AND THE ADVANTAGE OF A MASTER INDICATOR WITH YELLOW CAUTIONARY SIGNALS IN A RED ILLUMINATED ENVIRONMENT. TED NAM EL 52004, NAMC-ACEL-347, Part 16, August 1957, 22pp. Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,420

To investigate some aspects of digits for presenting cautionary and warning information, ten subjects performed multiple complementary tracking and responded to randomly presented cautionary signals. Digits to convey information as to location of signal appeared on an indicator bank (lower right) in one of three heights (1/8, 1/4 or 3/8 inch) in positive (background-illuminated) or negative (digit illuminated) displays. In half the trials a centrally located "Master" indicator was air-illuminated whenever a signal appeared. All signal lights were presented through aviation yellow filters with surround illumination in aviation red. Response times and number of signals missed were analyzed for effect of digit size, positive or negative display, and for the usefulness of a "Master" indicator.

11,421

Slivinske, A.J., & Crumley, L.M. THE EFFECTS OF CONTRAST, COLOR AND VIEWING ILLUMINATION ON THE LEGIBILITY OF LETTERS AND NUMERALS. NAMC-ACEL-329, TED NAM AE-7047, Part 16a, Feb. 1957, 13pp. Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,421

To evaluate the effects of contrast, color, and viewing illumination on the legibility of letters and numerals, 50 subjects identified the stimuli by call-out procedures. The stimuli, five letters and five numerals were selected from speed of perception data (Tinker) to give a representative difficulty range. They were presented under three degrees of contrast (46.45, 15.30, and 5.16), two colors (white or red on black), and under conditions of day viewing (.09 foot-candles). The data (response times) were evaluated by analysis of variance for effects of the experimental variables. Hand orders for legibility were obtained. Practical implications of the results for cockpit installations are discussed. T. G. R 3

11,422

Galanter, E. INVESTIGATIONS OF THE CHARACTERISTICS OF ATTENTIONAL AND INFORMATIONAL TRANSMITTING VALUES OF AIRCRAFT SIGNAL INDICATORS: II. THE WARNING SIGNAL PROBLEM: CLARIFICATION AND EXPERIMENTAL DESIGN. Contract N156-33966, NAMC-ACEL-366, TED NAM EL52004, Part 16, Oct. 1957, 16pp. Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,422

This paper presents an analysis of the warning signal problem as it exists in high speed aircraft. Two quite general experimental problems are raised: (1) the relation between reaction latency and choice probability; and (2) distraction and attention as related to signal level and motivational payoff. Experimental procedures for investigating these problems are outlined and discussed. The employment of a new technique of functional simulation is advocated. G. I. R 1

11,423

Slivinske, A.J., Crumley, L.M., & Connon, Helen. THE EFFECTS OF CONTRAST, COLOR AND VIEWING ILLUMINATION ON SCALE READING. Contract N156s-32041, NAMC-ACEL-324, TED NAM AE-7047, Part 16, Feb. 1957, 34pp. Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,423

To study the effects of contrast and color of dial marks under different levels of illumination on scale reading performance, two experiments were conducted using a common group of four trained subjects. The dial scale was a 36-degree sector of a standard 2.75-inch multirotational dial with standard-size major, intermediate, and minor dial marks. Five light on black contrast ratios (46.45 to 1.90) were combined with two colors (white or red on black) and viewed under illumination conditions of simulated daylight (30 foot-candles) and night (.05 foot-candle). Each subject read 101 scale settings under each experimental condition. Errors and accumulated time scores were evaluated by analysis of variance and information measures. T. G. I. R 22

11,424
 Fletcher, Dorothy E. HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS. PART 7. EVALUATION OF THE DISPLAY OF THE HANFORD DIRECTIONAL HORIZON CH-128. TRD EAC AB-7067. Rep. NO-7-628. Sept. 1954. 8pp. Aero Medical Equipment Lab., NAE, Philadelphia, Penn.

11,425
 To evaluate the visual display of the Hanford Directional Horizon CH-128, the brightness, brightness contrast, attitude indication, and directional indication were studied under day and night illumination on the basis of visual inspection and brightness measurements. Specific recommendations for each of these features are made.
 I. R 3

11,425
 Harrell, K.F.M. TWO STUDIES OF DECREMENT OF PERFORMANCE WITH TIME: (i) IN PLOTTING TELEPHONED INFORMATION AND (ii) IN RADAR REPORTING. Rep. 42, Feb. 1951. 11pp. Naval Motion Study Unit. Dept. of Operational Research, London, England.

11,425
 To study the effect of time on performance of complex tasks, two experiments were conducted: (1) information was sent over five channels simultaneously to subjects who plotted range and bearing information (9.5 plots per minute) for one hour; three noise conditions (low, medium and high) were used; each of seven subjects performed at each channel under each condition; (2) performance (plots correct) was analyzed as a function of time and noise; and (2) subjects (24) reported range and bearing of targets from a plane position presentation of radar information for varying numbers of echoes (6 to 21) for six half-hour runs and one two-hour run; performance (number of correct reports per minute) was analyzed as a function of time and speed.
 T. G. R 7

11,426
 Godwin, A.C. THE DAMAGING EFFECTS OF NOISE AND NOTES ON PROTECTION AGAINST THEM. RNP 53/758. OES 239. Rep. 57. August 1953. 8pp. Naval Motion Study Unit; Depts. of Physical Research and of the Senior Psychologist, London, England.

11,426
 This report discusses various sources of high intensity noise levels in the Royal Navy, such as ship and aircraft propulsion units, ventilation systems, industrial equipment, gunfire, and other sources of shock waves. The damaging effect of noise on hearing, both temporary and permanent, is treated at some length. Other effects such as bodily effects harmful to health or safety, output and work efficiency, and subjective effects such as fear and annoyance are treated more briefly. Protective devices such as insert ear plugs, noise occluding pads, and helmets are considered together with the possibility of procedures for reducing noise at the source.
 R 26

11,427
 Fulkerson, S.C. ADAPTABILITY SCREENING OF FLYING PERSONNEL. RESEARCH ON THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY. TR 57-106. July 1957. 17pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,427
 To investigate the usefulness of the Minnesota Multiphasic Personality Inventory (MMPI) for prediction of adjustment to flying stress, two approaches were made: use of combinations of scales already developed and development of new scales. Samples of Air Force pilot trainees representing various levels of training from primary through aircraft commanders enrolled in Combat Crew Training were given the group form of the MMPI. The criterion of adjustment to flying training was based on a psychological examination and amount of flying experience. Eleven previously developed scales and two empirical keys were analyzed by correlational procedures for degree of relationship to the criterion. Further validation studies are discussed.
 T. R 22

11,428
 USAF Operational Test Center. OPERATIONAL SUITABILITY TEST OF TYPE O-11A CRASH FIRE TRUCK. Proj. APG/CSC/228 ABC. July 1954. 54pp. USAF Operational Test Center, Eglin AFB, Fla.

11,428
 To determine the operational suitability of the type O-11A crash fire truck, its fire-fighting capability and other operational aspects were tested in temperate and arctic winter conditions. Specific tests included simulated crash fire-fighting, mobility and maneuverability over various types of terrain, acceleration and braking, and (under controlled low temperatures) tests of draining, heating, pumping, and the like. Maintenance was performed by test personnel. The results are presented and discussed in terms of personnel requirements for operating and maintaining the equipment, capabilities, and limitations, and operational techniques. Detailed recommendations for design changes are included.
 I.

11,429
 Marcus, E.R. VISUAL RECOGNITION ALONG FOUR MERIDIANS OF THE VISUAL FIELD: PRELIMINARY EXPERIMENTS. Contract DA-36-039-SC-62654. Proj. NR-3-99-10-024. Rep. 2144-50-7. June 1957. 15pp. Vision Research Labs., Engineering Research Institute, University of Michigan.

11,429
 To investigate visual recognition capabilities for targets along four meridians (the array of visual receptors stimulated by a linear target with fixation at center) of the retina, nine observers were required to reproduce linear patterns of nine filled and unfilled ellipses presented at angular inclinations on the frontal plane of 0, 45, 90, and 135 degrees from vertical. Fixation was maintained on center ellipses. Targets were presented binocularly with background luminance approximately five foot lamberts, exposure time 0.20 and 0.25 seconds, and angular extent of total pattern 3.4 degrees. Reproduction errors were analyzed with respect to angle of inclination. The results are discussed in terms of neural sets established by reading habits.
 T. G. I. R 9

11,430
 Mason, H.M. A COMPARATIVE EVALUATION OF TWO APPROACHES TO JOB-KNOWLEDGE TEST CONSTRUCTION. J. appl. psychol. 1954. 38(6). 384-389. (Contract AF 33(038)-25) 6. University of Illinois).

11,430
 To evaluate two approaches to construction of job-knowledge tests, a series of tests for airplane and engine mechanics were classified as (1) job-requirement approach (mastery of formal statements from training courses and job handbooks), or (2) job-experience approach (mastery of distinctive learning opportunities on the job). The tests were administered to 204 working airplane and engine mechanics. Criteria were length of aircraft maintenance experience and peer ratings. Each subject ranked for competence the six men whose work habits he knew best. Results were evaluated to show degree to which tests assigned to each approach were consistent to criteria and differences between patterns of relationships to criteria.
 T. R 7

11,431
 Barter, J.T., Emanuel, I., & Truett, B. A STATISTICAL EVALUATION OF JOINT RANGE DATA. Contract AF 18(600)-30. Proj. 6333. WADC TR-57-311. Aug. 1957. 22pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,431
 This study re-analyzes previously published data concerning the range of motion of human body joints and presents the information in a form applicable to Air Force design problems. An analysis of variance of 43 joint movements for four subgroups originally selected on the basis of physique was made to determine what body movements were related to physique. The subgroup statistics were combined to yield summary statistics for the total sample of 39 young men. Design ranges were derived from these total group values. Descriptions and illustrations of joint movement are included.
 T. I. R 34

11,430

Trent, J.D., & Hume, J.W. EVALUATION OF ANGLE OF ATTACK SYSTEM OF THE MODEL P2U-1 AIRPLANE. Proj. TED PTR AE-7540.9, Rep. 1, Final Rep., May 1957, 6pp. Flight Test Div., Naval Air Test Center, Patuxent River, Md.

11,432

A Specialties Inc. angle of attack system (cockpit indicator, indicator lights, external lights and transmitter) was evaluated from an aircraft carrier suitability standpoint in a model P2U-1 airplane on 14046. A qualitative comparison of the angle of attack and airspeed systems for speed control was conducted during day and night mirror field landings, day mirror shipboard landings and catapult landings. Recommendations are included.

I.

11,433

Waybrew, R.B. AN EXPLORATORY STUDY DESIGNED TO SUGGEST CLUSTERS OF TRAITS AND ASSESSMENT TESTS RELATED TO SUBMARINE ADJUSTMENT. Proj. NM 003 041.54.03, Rep. 879, Jan. 1957, 14pp. USN Medical Research Lab., Submarine Base, New London, Conn.

11,433

To isolate some trait-groupings (factors) related to successful adjustment to submarine environment and to provide a catalog of assessment measures and factors correlated with them, 22 enlisted men were pre-tested with a battery of 29 assessment tests. They were then confined to an experimental submarine for 50 days and rated at intervals with respect to 20 trait-dimensions by eight members of a research staff. These ratings and an overall rating as a submariner were correlated and clusters of traits determined by factor analysis. The 29 assessment tests were similarly analyzed and studied for relationships to trait clusters. Application of these findings to assessment procedures is discussed.

T. R 17

11,434

Spiegel, C.J. THE INDUSTRIAL HYGIENE AND TOXICOLOGY OF MERCURY. Contract W-7401-eng-45, Rep. UN-469, Oct. 1957, 26pp. Atomic Energy Project, Dept. of Radiation Biology, University of Rochester.

11,434

This is a review of literature dealing with industrial hygiene and toxicology of mercury. Topics treated are: history of mercurialism in industry, physical and chemical properties (general, vapor pressure, adsorption, analysis, toxicology, routes of entry, systemic distribution, excretion), symptoms and diagnosis, treatment, and industrial hygiene control measures. A summary table of recommended safety standards and procedures is presented.

T. R 81

11,435

Pollock, M. TECHNICAL STUDIES IN CARGO HANDLING - IV. METHODS OF COMPUTING DELAYS IN A N-STAGE SHUTTLE PROCESS. Prepared under Contract Nonr 233(07), Rep. 57-37, May 1957, 21pp. Dept. of Engineering, University of California at Los Angeles.

11,435

As a part of a basic investigation of material handling operations in the loading and unloading of maritime cargo, methods of computing delays in a N-stage shuttle process with random working times are studied. Two approaches, simulation and recurrence equations, are each investigated for two variations to determine the best computational form to use on a high speed digital computer, with emphasis on the amount of storage (memory) space required.

T. I. R 3

11,436

Oliver, R.M. THE MATHEMATICAL DESIGN AND ERROR ANALYSIS OF A PRODUCTION AND INVENTORY CONTROL SYSTEM. Contract DA-19-C20-080-3684, Proj. 599-01-004, Interim Tech. Rep. 6, June 1957, 106pp. Massachusetts Institute of Technology.

11,436

The mathematical aspects of an inventory and production control system are analyzed. The mathematical expression for the cost-rate of storing, producing and changing the production rate is derived. The minimization of the cost-rate is accomplished by analytical methods of the discrete calculus of variations for different conditions. Quadratic cost curves are compared to previous studies in quadratic programming models and simple approximations of real and discontinuous cost curves are made. The production and control model is analyzed for the effect of errors in sales forecasts and unit costs of each time period, also for effect of replacing cost-rate problem by finite mathematical approximations which lend themselves to practical numerical computations. G. I. R 26

11,437

Olsonaki, J.J. TESTS OF CARRIER APPROACH ATTITUDE ALIGNMENT LIGHT SYSTEM FOR THE MODEL S2F-1, -2, AND TF-1 AIRPLANES. REPORT NO. 1, FINAL REPORT. Proj. TED PTR EL-5022, May 1957, 6pp. Naval Air Test Center, Patuxent River, Md.

11,437

To test a proposed carrier approach attitude alignment light system for model S2F-1, -2 and TF-1 airplanes, the system was installed in a TF-1 airplane. Several combinations of color and light intensity were evaluated during 26 simulated carrier approaches at the Naval Air Test Center airfield. Two experienced landing officers observed the approaches with test lights "on" and "off". The extent to which the system provides the landing officer with adequate information as to position, attitude, and direction is discussed. Recommendations as to color and candlepower appropriate for the system are made.

T. R 1

11,438

Clark, T.B. COMPARATIVE EVALUATION OF ALTIMETERS; COUNTER-POINTER VS. DRUM-POINTER. FINAL REPORT. Proj. TED PTR AE 7058.2, ST312 55, Rep. 1, March 1957, 8pp. USN Air Test Center, Patuxent River Air Station, Md.

11,438

To make a comparative evaluation of the counter-pointer altimeter (Kollsman production) and the drum-pointer altimeter (Kollsman with Air Force specifications), the instruments were installed in a TV-2 airplane and evaluated by 15 pilots during 116 flight hours. A cover was provided to blank off one instrument to permit individual evaluation of each. At the termination of each flight the pilots completed a questionnaire concerning presentation and performance of each altimeter. A summary of the findings is presented and discussed with recommendations for correcting deficiencies of drum-pointer altimeter.

T. R 3

11,439

Duerfeldt, C.H. EVALUATION OF LIGHTED AIRCRAFT INSTRUMENTS. INTERIM REPORT. Proj. TED PTR AE 7051, ST312 354, Rep. 1, Dec. 1956, 16pp. USN Air Test Center, Patuxent River Air Station, Md.

11,439

This interim report reports the evaluation of two types of integrally lighted aircraft instruments: flat glass and wedge-shaped glass. Instruments were mounted in a model TV-2 airplane and flown for a total of 30.5 hours during 22 flights by 13 pilots. Ambient lighting conditions normally encountered during fleet operations including instrument weather were sampled. Four hours of evaluation during ground operations were conducted. Pilot reaction was gained through questionnaires, qualitative reports and interviews. Results were analyzed for differences between experimental and standard instruments. Recommendations for further development are included.

I.

11,440

Keegan, E.J., Schloter, J.C., Neas, Gladys M., & Hall, W.A. SPECTROPHOTOMETRIC AND COLORIMETRIC STUDY OF COLOR TRANSPARENCIES OF SOME NATURAL OBJECTS. Contract AF 33(616)-82-21, WBS Proj. 0801-50-2385, Rep. WBS-4794, March 1957, 139pp. National Bureau of Standards, Dept. of Commerce, Washington, D.C.

11,440

This is a comparison of the effect that natural formations or objects have upon the various emulsion layers that comprise color positive and color negative photographic films. Spectral transmittance measurements and colorimetric computations were made of these effects. Visible and near infra-red spectral directional reflectance measurements were made for photographed sand, soils and bark of trees. Chromaticity coordinates, Munsell notations, daylight reflectances or transmittances, color designations (Inter-Society Color Council-National Bureau of Standards), Lovibond notations of these materials and color differences between wet and dry sand and their corresponding color transparencies are reported. T. G. I. R 27

11,441

Kidd, E.A. ARTIFICIAL STABILITY INSTALLATIONS IN B-26 AND F-94 AIRCRAFT. Contract AF 33-038-20639, Proj. 1364, TR-70501, WADC-TR-54-441, Sept. 1954, 66pp. Aeronautical Research Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Cornell Aeronautical Lab., Inc., Buffalo, N.Y.).

11,441

To establish acceptable and optimum boundaries of flexible longitudinal stability and control characteristics in aircraft, artificial stability installations were made in a B-26 and an F-94 airplane. These installations provide variable period and damping of the short period and phugoid modes of longitudinal motion with variable stick force and stick position gradients. The equipment used is described in this report. G.I.R 4

11,442

George Washington University. QUARTERLY RESEARCH REPORT, JULY-SEPTEMBER 1956. Oct. 1956, 16pp. Human Resources Research Office, George Washington University, Washington, D.C.

11,442

This is a quarterly report (July-September 1956) of research in the following areas: conservation of training time in infantry weapons instruction, map using proficiency of Army personnel, development of methods and techniques for improving tank driving and maintenance, improvement of tank crew team effectiveness, improvement of communications efficiency of armor personnel, development of methods and techniques for improving tank gunnery performance, improvement of skills required for tank crew in night operations, and a study of human factors influencing span of control within the armor battalion.

11,443

Birnbaum, A.B., Sharp, L.H., Armore, S.J., & Sprunger, J.A. PREDICTION OF SUCCESS IN ORDINANCE JOBS. PRB Proj. D-15-201-21, 22, 25, PRB Tech. Res. Note 58, Oct. 1956, 8pp. Personnel Research and Procedures Div., Adjutant General's Office, Washington, D.C.

11,443

To evaluate the effectiveness of composites of Army Classification Battery (ACB) tests for predicting success in jobs for which personnel were trained at Ordnance School, ACB scores were compared with ratings of job success of 671 men. The six jobs were: Ordnance Storage Specialist, Small Arms Repairman, Light or Heavy Artillery Repairman, Machinist, and Welder. The two-test composite with the highest validity coefficient in each sample of each job was identified and unbiased estimates of validity (validity-generalization correlation coefficients were obtained in remaining job samples). These data were used to select the most promising composites for predicting success in Ordnance jobs. T. R 3

11,444

Carpenter, V.J., & Miller, M.D. STUDY OF VISUAL STEREOSCOPIC ACTIVITY. Contract DA-44-000-ENG-2082, Proj. 8-36-03-118, Interim Tech. Rep. 3, March 1957, 30pp. The Engineering Research & Development Lab., The Engineer Center, Fort Belvoir, Va. (Institute of Optics, University of Rochester).

11,444

This study is concerned with determining the optimum conditions of viewing for stereophotogrammetric map compilation. This, the third interim report, describes the photography of artificial targets and the start of taking data on the training of observers. Forty-one subjects were screened through a stereoscope tester and thirty accepted for training. Complete training curves have been found for four observers and a basis of observer selection determined. T. G. I.

11,445

Bolt Beranek and Newman Inc. CAPABILITIES AND LIMITATIONS INVESTIGATION OF LONG-RANGE PUBLIC ADDRESS EQUIPMENT. FINAL REPORT. PHASE 4. FIELD TESTING. Contract DA-36-039-SC-64503, Proj. 3-29-12-022 and 3-27-01-015, Rep. 466, June 1957, 76pp. Bolt Beranek and Newman Inc., Cambridge, Mass.

11,445

This is the fourth report in a research project on the determination of the capabilities and limitations of long-range public address equipment for transmission of intelligible speech under varied meteorological and terrain conditions. The body of experimental data accumulated during several series of field measurements were considered. Test sites, measurement procedures, relevant micrometeorological information, and equipment were described. The acoustic data were analyzed in terms of sound propagation over open level terrain, through dense forest and in hilly terrain with accompanying analysis of micrometeorological data. Computational procedures developed were applied to several typical examples of calculated expected attenuation of sound and compared with the experiment. T. G. I. R 18

11,446

Bolt Beranek and Newman Inc. CAPABILITIES AND LIMITATIONS INVESTIGATION OF LONG-RANGE PUBLIC ADDRESS EQUIPMENT. FINAL REPORT. INSTRUCTION MANUSCRIPT ON FIELD CALCULATION SYSTEM. Contract DA 36-039 SC 64503, Projs. 3 99 12 022 & 3 27 01 015, Job 865, Rep. 493, July 1957, 25pp. Bolt Beranek and Newman Inc., Cambridge, Mass.

11,446

This is the fifth and concluding report from a research project concerning the capabilities and limitations of long-range public address equipment for the transmission of intelligible speech under varied meteorological and terrain conditions. A calculation procedure is presented that is basically designed to enable a loud-speaker team in the field to predict with a high degree of probability the success or failure of his assignment to cover a given target area with intelligible speech. Necessary validation procedures before being put to military use are outlined; recommendations for micrometeorological instruments necessary for the system and loud-speaker modifications are listed. Appendices give the necessary firing maps, alignment charts, and tables. T. G. I.

11,447

Churchill, E., & Truett, B. METRICAL RELATIONS AMONG DIMENSIONS OF THE HEAD AND FACE. Contract AF 18(600)-30 & AF 33(616)-3841, Proj. 7214, WADC TR-56-621, June 1957, 127pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Antioch College).

11,447

To contribute to the basic data that the engineer can use in designing masks, helmets, and other special devices for the head and face, correlational data for the head and face dimensions of two groups of United States Air Force personnel were computed. Forty-one dimensions of flying personnel (sample of 4000) and six dimensions of Women's Air Force trainees (sample of 852) are reported. Coefficients of correlation for 620 and 15 pairs of data from the first and second samples, respectively, are given. Multiple regression coefficients for each dimension and selected pairs of dimensions with over 70 bivariate frequency tables are given. The utility of correlational statistics in the design of personal equipment is discussed. T. I. R 11

11,446

Barker, R.A. SURVEY OF VARIOUS NAVIGATIONAL AIDS DEVELOPED IN GREAT BRITAIN AND FRANCE. Contract AF 19(604) 1508, AFRC TR 57 161, May 1957, 38pp. USAF Cambridge Research Center, Bedford, Mass. (Stavid Engineering, Inc., Plainfield, N.J.).

11,448

This report summarizes and discusses information gathered from a survey of various navigational aids developed in Great Britain and France. These navigation systems are Decca (and Dectra), Radio Mob, Vorac, and the crossbar approach-lighting system. Decca and Radio Mob are both essentially low frequency techniques. The former is older and has a reputation for accuracy; the latter is new and has potential application for both navigation and air traffic control. Vorac is similar to the hearing portion of the Federal Telecommunications Laboratories Tacan system. The crossbar approach lighting system is standard in most countries except the United States and has achieved success in reducing under-shoots and go-arounds. T. I. R 6

11,449

Barker, R.A., & Hertz, R.C. INVESTIGATION OF TECHNIQUES FOR DISPLAYING INFORMATION IN AN AIR TRAFFIC CONTROL CENTER. Contract AF 19(604)-1508, AFRC TR-57-160, May 1957 30pp. Air Force Cambridge Research Center, Bedford, Mass (Stavid Engineering, Inc., Plainfield, N.J.).

11,449

Several types of display equipment were studied in an effort to determine their suitability for use in an en route air traffic control center. These devices fall into four categories: (1) large screen projection displays, both photographic and optical-electronic; (2) character writing techniques; (3) three-dimension presentation; and (4) special or miscellaneous displays. The physical and operating characteristics of the various equipments are presented from the viewpoint of the operational requirements. This is a continuing investigation. T. I.

11,450

USAF Strategic Air Command Headquarters. RB 36 RECONNAISSANCE OBSERVERS MANUAL. SAC Manual 50 22, March 1954, 145pp. USAF Strategic Air Command Headquarters, Offutt AFB, Neb.

11,450

This manual provides training and educational assistance for experienced and inexperienced Reconnaissance Observers in RB-36 aircraft. The objective is to supply background information explaining the why behind the how. Various sections treat the mission of reconnaissance, the RB-36 aircraft, the primary navigator, the photorecognizer, the radar observer, and the weather navigator. Sample record sheets are included in the appendix. T. I.

11,451

Aeroplane & Armament Experimental Establishment. AN ASSESSMENT OF THE GYRO-STABILIZED B6 DRIFFMETER. Rep. AAE/Inst/110, June 1957, 8pp. Aeroplane & Armament Experimental Establishment, Boscombe Down, England.

11,451

To assess the suitability of the gyro-stabilized B6 Driftmeter for use in the Royal Air Force, the instrument was installed in Avro Ashton MK.1 WB. 490. Trials were carried out to determine the device's function in maritime operations and for high speed high altitude transport operations. The defects, as well as the good points, of the device are discussed. T. I. R 1

11,452

National Education Association. A CRITICAL ANALYSIS OF DRIVER EDUCATION RESEARCH. 1957, 60pp. National Education Association, National Commission on Safety Education, Washington, D.C.

11,452

This report is a critical analysis of previous and current studies of the effectiveness of driver education programs in secondary schools. Research on the problem of youth and accidents is summarized. Previous analyses of driver education research are presented. In later sections of the report, the problems of experimental design in this area of research are discussed and various studies are evaluated in terms of how well they meet criteria of good design. T. G. R. some

11,453

USA Headquarters. MOTION ECONOMY THROUGH USE OF OPERATION CHARTS AND MAN-MACHINE CHARTS. Pamphlet 20 302, Oct. 1957, 33pp. USA Headquarters, Washington, D.C.

11,453

This pamphlet describes and illustrates motion economy techniques. Man-machine charts and operation charts and their use are presented in full. Examples of the use of the charts for work simplification analysis are given. Finally, suggestions are given for teaching supervisors to use motion economy techniques. T. I.

11,453

Bausch & Lomb Optical Co. PHASE I (STUDY) OF PROCUREMENT OF A STEREOSCOPIC RANGE FINDER-SIGHT (MODIFICATION OF FINDER, RANGE M-12 OR FINDER, RANGE T-46). Contract DA1-30-115-567-ORD-(P)-693, Ord. Proj. TT2-689, Final Prog. Rep., Jan. 1957, 14pp. Bausch & Lomb Optical Co., Rochester, N.Y.

11,454

The object of this study was to determine the feasibility of producing a stereoscopic range finder sight, using ballistic reticles, by modification of the Finder, Range M-12 or Finder, Range T-46. Specifically, the following were considered: (1) the projection, from a single reticle, of a right and left reticle image; (2) provision for foresighting the range finder weapon combination; and (3) provision of four sets of ballistic reticles to be introduced into the system as required at the will of the operator. On the basis of the success of the study, initiation of detailed design engineering was recommended. T. G. I.

11,455

Wiener, J.B., Harvey, G.O., & Zimmermann, H.J. QUARTERLY PROGRESS REPORT. April 1957, 171pp. Research Lab. of Electronics, Massachusetts Institute of Technology.

11,455

This is a quarterly progress report, for early 1957, from the Research Laboratory of Electronics at the Massachusetts Institute of Technology. The research activities of interest to psychologists are reviewed under the following topics: statistical communication theory, process analysis and synthesis, processing and transmission of information, speech analysis, communications biophysics, and neurophysiology. T. G. I. R. some

11,456

Weiss, G.H. RELIABILITY IN COMMUNICATIONS SYSTEMS. NAVORD Rep. 5664, Proj. 401-664/46005/03040, June 1957, 16pp. USN Ordnance Lab., White Oak, Md.

11,456

This paper discusses the definition of reliability for communications systems. The first part of the analysis deals with the case in which the distribution of possible messages is known; the second, with the case in which the distribution is not known. In the first case, reliability is defined allowing for permutations between messages and the minimum possible reliability for a finite number of messages can be determined. When the distribution of messages is not known, the situation is more complex. A formal extension of these results is made to the case where the signal space can be a continuum. G. R 7

11,457

Stoddard, J.C. MEASUREMENT OF SECOND-ORDER PROBABILITY DISTRIBUTIONS OF PICTURES BY DIGITAL MEANS. Tech. Rep. 302, July 1955, 21pp. Research Lab. of Electronics, Massachusetts Institute of Technology.

11,457

This paper approaches the transmission of a picture from the point of view of statistics and information theory; transmission of a picture is reduced to the problem of sending a number which indicates which of the possible intensity levels occurred in the sample. Equipment that measures the second-order probability distribution of a video wave-form from a facsimile transmitter by digital means was built. System tests were made to permit evaluation of the potential accuracy of measurement. T. G. I. R 9

11,458

Schipper, L.M. PREDICTION OF CRITICAL EVENTS IN CONTEXTS OF DIFFERENT NUMBERS OF ALTERNATIVE EVENTS. Contract AF 33(616)-43. Proj. 7192, WADC TN-55-744, Dec. 1955, 7pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation).

11,458

In the present experiment, subjects predicted the occurrence of the critical event within contexts of three different numbers of alternative events. The critical event was a short flash of a particular light; alternative events were flashes of similar lights. The design was an orthogonal arrangement of the relative occurrences of the critical event, 1/2, 1/4, 1/6, and three levels of alternative events, 1, 3, 5. The hypothesis that as number of alternative events increased the subjects would perceive the occurrence of the critical event as more frequent is evaluated.

T. G. R. 5

11,459

Miller, M.H. PROGRESS REPORT OF LOGISTICAL OPERATIONS JUNEAU ICE FIELD RESEARCH PROJECT, ALASKA, 1949, 1950 and 1951. Contract N5onr-83001, NR 307-233, JIRP Rep. 5 Oct. 1951, 45pp. Dept. of Exploration and Field Research American Geographical Society, New York, N.Y.

11,459

This report provides information on equipment and logistics for operations on snow and ice in arctic and subarctic regions gained during the Juneau Ice Field Research Project. The usefulness of selected Quartermaster Corps, Signal Corps, Engineering Corps, Medical Corps, and Air Force items is evaluated. In addition, the problems involved in aerial delivery and field operations of Ordnance Equipment and other heavy units are considered.

T. I.

11,460

Miller, G.A. THE PERCEPTION OF SPEECH. For Roman Jakobson, 1956, 353-360. (Contract AF 33(636)-14343, AFRCR TN-56-50; Contract N5onr-76, Proj. NR 142-201, Rep. PNR-180. Psycho-Acoustic Lab., Harvard University).

11,460

The thesis of this theoretically-oriented paper is that one of the most fruitful approaches to the study of language or speech perception is the analysis of confusions. What we mean by similarity is demonstrated by behavioral confusions. Examples of situations leading to language confusions and analyses of these situations are scattered through the paper. It is suggested that the distributional techniques of linguistics and the analysis of confusions developed in psychophysics are complementary methods for the study of language.

T. G. R. 4

11,461

Marill, T. DETECTION THEORY AND PSYCHOPHYSICS. Tech. Rep. 319, Oct. 1956, 73pp. Research Lab. of Electronics, Massachusetts Institute of Technology.

11,461

This paper reports the mathematical derivation of the theoretical ("ideal detector") psychophysical function for the problem of auditory masking of pure tones with gaussian noise as measured by a forced-choice technique and, in addition, presents the results of experiments performed to determine the extent to which and the manner in which subjects differ from the "ideal detector" of detection theory. A model for signals consisting of two-component tones is also presented.

T. G. R. 25

11,462

Gulliksen, H. COMPARATAL DISPERSION, A MEASURE OF ACCURACY OF JUDGMENT. Prepared under Contract Monr 1858(15), National Science Foundation Grant G-642, Tech. Rep., June 1957, 24pp. Princeton University and Educational Testing Service, Princeton, N.J.

11,462

This paper defines a measure of accuracy of judgment. The quantity which represents the ambiguity of total comparative judgment is termed the comparatal dispersion. It is shown that the comparatal dispersion for paired comparison judgments may be used to measure accuracy of judgments made by paired comparisons. A simultaneous solution for scale values and ratios of comparatal dispersion is presented.

T. G. R. 14

11,463

Carlough, D.L. SIMULATION OF FREEWAY TRAFFIC BY AN ELECTRONIC COMPUTER. Highway Res. Board Proc., 1956, 35, 545-547. (Institute of Transportation and Traffic Engineering, University of California at Los Angeles.).

11,463

This paper discusses the use of the electronic computer for studying the flow of traffic on freeways. The engineer must quantize time and distance and, for input data, he must have a distribution of desired speeds and a distribution of input time-spacings. Vehicle length, following, passing and time within system could be handled by the computer also. Two different approaches to such problems are discussed. Exploratory studies are used to state the degree of agreement between results and expected behavior.

T. G. R. 2

11,464

Frank, W.E. A STUDY OF THE FEASIBILITY OF TONAL BRAILLE. J. Franklin Inst., Jan. 1957, 263(1), 12pp. (Franklin Institute Labs., Philadelphia, Penn.).

11,464

This paper explores the feasibility of a new auditory system of reading for the blind called "tonal Braille". To test the learnability and acceptability of this method of communication, Braille was converted into a tone system by representing each dot in a particular horizontal level by a note; and this system was taught to 16 adult blind subjects. Results are reported and the nature of future work suggested.

T. G.

11,465

Frank, W.E. INSTRUMENTATION FOR BIOENGINEERING. Science, May 1957, 125, 871-874. (Franklin Institute Labs., Philadelphia, Penn.).

11,465

This article describes bioengineering, the application of physical science techniques to problems in medicine and biology. One of the major divisions of the field, instrumentation, is illustrated by the following examples: devices for measuring intra-ocular pressure, endoscopes, reading devices for the blind, prosthetic and protective equipments, sensory substitutes, and methods for measuring effort expenditure.

I.

11,466

Deichert, R.W. DAYLIGHT VIEWING CATHODE RAY TUBE INDICATOR FOR AIRCRAFT INSTRUMENTATION PRESENTATION. Contract AF 33(600)-3115, Sci. Rep. 6, Feb. 1957 - April 1957, 13pp. Circuit Research Labs., Allen B. Duffont Labs. Inc., Clifton, N.J.

11,466

This is a report of progress in the development of a compact cathode ray tube package for use in aircraft under conditions of high ambient lighting. Mechanical and electrical features of the device are described, as well as certain problems met in the course of development.

11,467

Berkowitz, S.M. PLANNING AIR TRAFFIC CONTROL. Aviation Age, July 1952, 18(11), 3pp. (Franklin Institute Labs., Philadelphia, Penn.).

11,467

The steps in planning a new system of air traffic control are outlined in this article. The development and use of two graphical simulators (a slide-rule device for final approach problems and a distance versus time plotting technique for analyzing problems in the terminal area) are described. The next step in the evolution of traffic control measures is conceived to be the use of an electromechanical dynamic traffic control simulator to solve traffic problems. C. E.

11,466

Berkowitz, S.M., & Grubmeyer, R.S. REQUIREMENTS FOR A NEW UNIVERSAL AIR TRAFFIC CONTROL SIMULATOR. In: Transactions on Aeronautical and Navigational Electronics, June 1957, ANE-4 (2), 59-64. (Franklin Institute Labs., Philadelphia, Penn.).

11,466

This paper summarizes the role of dynamic simulation in helping solve air traffic control and navigation problems. A brief description is given of the Civil Aeronautics Administration Technical Development Center's electromechanical-optical simulator and some of its present limitations are outlined. The paper concludes with a discussion of areas which require further study if an adequate simulator is to be developed: target generation, communications, displays, and data reduction and analysis. I. R 3

11,469

Hoelt, L.O. THE DEVELOPMENT OF A MOBILE ACOUSTICS LABORATORY. Proj. 7210, WADC TR-56-656, Dec. 1956, 25pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,469

This report describes a mobile acoustics laboratory designed primarily to document the sound fields of aircraft but flexible enough to be used for other measurement problems. The laboratory consists of a six-axis semi-trailer equipped with a fifteen kilowatt motor generator, relay racks for equipment, storage space, work bench, UHF radio, airconditioning and heating, and an observation dome. G. I. R 4

11,470

Stevens, S.S. CALCULATING LOUDNESS. Noise Control, Sept. 1957, 3(5), 11-22. (Prepared under Contract Nonr-1866(15), Proj. NR 142-201, Rep. PNR-195. Psycho-Acoustic Lab., Harvard University).

11,470

This article describes current problems and methods for measuring loudness reactions. Psychological scaling techniques are discussed and a test of the adequacy of procedures for predicting loudness levels is presented. The use of charts and formulas is illustrated by example. The evidence presented suggests that the errors inherent in the procedures are no greater than the errors obtained in straight forward sound-level measurement. T. G. R 17

11,471

Hurley, H.C., Anderson, S.R., & Keary, H.F. THE CAA VHF OMNIRANGE. Tech. Devel. Rep. 113, June 1950, 65pp. Technical Development and Evaluation Center, CAA, Indianapolis, Ind.

11,471

This report describes the development of a VHF omnirange system for air traffic control. The range furnishes magnetic bearing information with respect to the range station and provides definite track guidance between the station and any point within its service area. The ground and airborne components of the system are described in full. This is followed by a description of the operational characteristics of the system, including statements concerning the accuracy of the system in operation. T. G. I. R 17

11,472

Bausch & Lomb Optical Co. PERFORMANCE TESTS FOR EIGHT 7X50 BINOCULARS. (Contract N00s 67987, Final Rep., Nov. 1956, 15pp. Bausch & Lomb Optical Co., Rochester, N.Y.).

11,472

Optical and Recognition Contrast Resolution Tests were performed on eight standard 7x50 binoculars of four different makes and models. Each barrel was tested a total of six times at representative field angles and target orientations. Each of the six tests resulted in a curve of image contrast versus angular subtense of the bars in a resolution test object. Pertinent data points were selected and analyzed. The data are discussed in terms of field performance and are analyzed diagnostically. C.G.

11,473

Gerathewohl, S.J., Ritter, O.L., & Stallings, H.D. PRODUCING THE WEIGHTLESS STATE IN JET AIRCRAFT. Tech. Rep. 57-143, Aug. 1957, 11pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,473

This paper reports the use of some simple arithmetic functions for computing duration, height, and angle of climb of flight parabolas for producing the weightless state in jet aircraft. The results, based on certain flying characteristics of the T-33, F-94, and F-104, are compared with the data obtained for the first two types of aircraft mentioned, during actual zero-gravity maneuvers. T. G. I. R 11

11,474

Wharton, W.E. EVALUATION OF UNUSUAL ATTITUDE RECOVERY PROCEDURES. Proj. TR & D 57-1, 1957, 6pp. Research and Development Section, USAF Instrument Pilot Instructor School, Moody AFB, Ga.

11,474

To evaluate Unusual Attitude Recovery Procedures for jet aircraft equipped with the J-8 or similar type of non-tumbling Attitude Indicator, 16 pilots tested three types of procedures under hooded conditions in T-33 aircraft. Later the pilots were asked to evaluate the relative effectiveness and ease with which recovery was accomplished with the various procedures. The findings are presented as well as conclusions and recommendations deduced from these. T. G. I. R 11

11,474

Yaglou, C.P. HABITABILITY IN CLIMATIC EXTREMES. WORK-REST SCHEDULES FOR DESERT HEAT. Contract DA-49-004-MD-203, Feb. 1957, 13pp. Research & Development Division, Office of the Surgeon General, Washington 25, D.C. (Harvard University School of Public Health).

11,475

As part of a project on habitability in climatic extremes, four associated subjects (1) made marches of 25 to 50 miles in the hot desert sun at three and one-half miles per hour, resting five to ten minutes in the shade between marches, for six hours a day, and (2) made marches of 75 to 150 minutes interspersed with rest pauses of 15 to 30 minutes. The daily mileage was the same for both conditions of the experiment. The incidence of heat exhaustion symptoms, heart rates, and rectal temperatures were compared for the two conditions in order to determine the optimum work-rest schedule for desert heat. T. G.

11,476

Stevens, S.S. THE CALCULATION OF THE LOUDNESS OF NOISE. Proc. of the Second ICA Congress, 1956, 26-30. (Prepared under Contract Nonr-1866(15), Psycho-Acoustic Lab., Harvard University).

11,476

This paper discussed the calculation of the apparent loudness (in sones) of a complex noise from measurements of sound pressure levels in separate frequency bands. From the results of numerous experiments, a practical rule is developed for deriving the total loudness of a noise from measurements based on octave bands. The procedure involves the use of charts and a formula for the addition of loudness. G. R 2

11,477
Shaw, M.E., Rothschild, G.H., & Strickland, J. P. DECISION PROCESSES IN COMMUNICATION NETS. J. abnorm. soc. Psychol., 1957, 54 (3), 323-330. (Prepared under Contract N5-0ri-166, Task Order 1, The Johns Hopkins University).

11,477
Three experiments dealing with the general problem of decision making in communication nets are reported in this paper: (1) four subjects solved two human relations problems in three different communication nets: the star, the slash, and the concon. Differences between the nets are evaluated; (2) twenty-four groups of four subjects were placed in a star net and required to estimate number of clicks in a series after discussion in order to determine whether a central subject changes a judgment more readily than a peripheral subject; and (3) the effects of the support-opposition variable upon judgmental change in different positions in the star were isolated. T. G. I. R 15

11,478
Newman, E.B., & Miller, G.A. FINAL TECHNICAL REPORT. Contract AF 33(038)-14343, Rep. FLR-51, Jan. 1957, 23pp. Operational Applications Lab., AFRCG, Bolling AFB, Washington, D.C. (Psychological Labs., Harvard University).

11,478
With the need for increasing the effectiveness of verbal communication systems in mind, this paper explores the factors which may have a part in determining how a receiver decides what message was actually sent to him. In addition to the obviously important physical properties of the received signal, certain characteristics of language itself are considered as basic to successful communication. The redundancy aspect of language is given special emphasis in this study, a new method of estimating redundancy being introduced. Data for statistical analysis were provided by using communication systems that distorted signals or mixed the signal with noise. R 8.

11,479
Ragsdill, R.A. EMPLOYMENT AND SUITABILITY TESTING OF COMBINED SENSITIVE AIRSPEED AND MACH INDICATOR. FINAL REPORT. Proj. TR 6 D 56 1, 1957, 3pp. USAF 3550th Combat Crew Training Group (Interceptor), Moody AFB, Ga.

11,479
This is a final report on the suitability testing of the Combined Sensitive Airspeed and Mach Indicator. Ten pilots flew the instrument for a total of 40 hours in T-33 aircraft. Questionnaires were completed by the pilots covering their flights on the instrument. The reactions of the pilots are analyzed and certain recommendations for improvement in the device are given.

11,480
Plutchik, R. A CRITICAL ANALYSIS OF THE LITERATURE DEALING WITH THE EFFECT OF INTERMITTENT SOUND STIMULI ON PERFORMANCE, FEELING, AND PHYSIOLOGY, WITH PRELIMINARY WORK TOWARD AN EXPERIMENTAL ANALYSIS OF THE PROBLEM. Prepared under Contract Nonr-2252(01), Oct. 1957, 48pp. Hofstra College.

11,480
This paper contains (1) a critical review of the literature since 1950 on the influence of loud and/or repetitive sounds on behavior, feeling, and physiology, and (2) a report on preliminary work toward an experimental analysis of the problem. The first phase of the research involved the determination of various subjective characteristics of repetitive sound. Four subjects were presented frequencies from 100 to 400 cycles per second in repetition rates from one to 15 pulses per second at increasing intensity. Equal unpleasantness and equal painful contours were obtained for the data. Each subject was later tested on a pursuit-rotor with and without a painful sound. T. G. I. R 80

11,481
Fagelley, C.D. MODEL TESTING TECHNIQUES FOR INVESTIGATING JETTISONING OF EVACUATION CAPSULES FROM SUPERSONIC AIRCRAFT. SYMPOSIUM ON THE PROBLEMS OF EMERGENCY ESCAPE IN HIGH SPEED FLIGHT. Sept. 1952, 14pp. Southwest Research Institute, San Antonio, Tex.

11,481
This is a study of model testing techniques that may be used to investigate the characteristics of jettisonable capsules for evacuation from high speed aircraft up to speeds of Mach 3.5. The difficulties involved in providing for complete similarity between model and full scale testing are discussed. Captive wind tunnel models, and also free flight models were studied, both ground launched from a track and air launched from an aircraft at high altitude. G. I.

11,482
Hortman, B.O. THE EFFECT OF THE EXTENT OF MOVEMENT (CONTROL SENSITIVITY) ON PURSUIT TRACKING PERFORMANCE. AMRL Proj. 6-95-20-001, Rep. 308, Dec. 1957, 12pp. USA Medical Research Lab., Fort Knox, Ky.

11,482
To determine the effect of changes in movement extent on manual tracking, five subjects tracked a 30 cycles per minute, simple one-dimensional sine signal using a joystick control. The task was to keep target and following cursors aligned by moving the stick from side to side. Extent of movement was varied by changing stick lengths; five steps from 4 to 11.4 inches were used. Each subject had 15 three-minute trials in one session. Performance was analyzed in terms of time-on-target, number of hits and frequency distributions of each movement extent; the latter was taken from graphic records. The concept of control/display ratio for evaluation of control sensitivity is discussed and implications of findings for design of controls indicated. T. G. R 11

11,483
Hartman, B.O., Jaynes, V.E., & Herbert, M.J. ANALYSIS OF ABDUCTIVE AND ADDUCTIVE PHASES OF MOVEMENT IN CONTINUOUS TRACKING. AMRL Proj. 6-95-20-001, Rep. 314, Dec. 1957, 18pp. USA Medical Research Lab., Fort Knox, Ky.

To determine the relative efficiency of abductive and adductive movements in continuous tracking, when the response movement is in the left-right plane, eight right-handed and eight left-handed subjects tracked a simple, one-dimensional sine signal with preferred and with nonpreferred hands using a springless, lightweight joystick. Analyses of performance were made in terms of time-on-target and error amplitude for differences due to type of movement. Efficiency of performance was further studied as a function of locus, direction and reversals. A summary of the four functions was constructed in terms of lead-lag error. Recommendations are included for further investigation of a directional factor in tracking performance. T. G. R 12

11,484

Kreider, M.B., & Baskirk, E.R. EFFECT OF SUPPLEMENTAL FEEDING ON BODY TEMPERATURE DURING SLEEP IN THE COLD. Proj. 7-83-01-004C, Tech. Rep. KP-73, Oct. 1957, 10pp. USA Quartermaster Research and Engineering Center, Mattick, Mass.

11,485

This is a report of an investigation of the effect of supplemental feeding on body temperature during sleep in the cold. Skin temperatures (T_{sk}) and rectal temperatures (T_{re}) were taken on six men sleeping 12 nights in Arctic sleeping bags at -34.5 degrees Centigrade. Oxygen consumption was measured for two of these men sleeping six nights. For the first eight days, half of the men received a supplement to the usual three meals of 600 calories (20 per cent protein and 40 per cent each of fat and carbohydrate). For the last four days, half of the men received no evening meal but a 1200 calorie supplement before retiring. The effects are noted.
T. G. R 6

11,486

Cornia, F.E., Dougherty, J.W., & Unrau, Shirley A. EVALUATION OF HISTAMINE-ITCH TECHNIQUE FOR MEASURING SKIN IRRITATION FROM CLOTHING. Proj. 7-83-01-005B, Tech. Rep. KP-72, Oct. 1957, 14pp. USA Quartermaster Research and Engineering Center, Mattick, Mass.

11,487

This paper reviews the literature on inflammation and itching and reports the results of studies made of the mechanisms underlying these processes. Various histamine solutions were injected into subjects and the responses are discussed. The paper also evaluated the use of the histamine itch technique for measuring skin irritation from clothing.
I. R 26

11,488

Green, D.H., Birdsall, T.G., & Tanner, W.P. SIGNAL DETECTION AS A FUNCTION OF SIGNAL INTENSITY AND DURATION. Contract DA-36-039-SC-63203, Proj. 3-99-04-042, Tech. Rep. 42, Feb. 1957, 42pp. Engineering Research Institute, University of Michigan.

11,489

The object of this study was to determine how signal amplitude and duration effect the detectability of a pure tone partially masked by random noise. Three experiments were performed, all employing the same observers. In the first, signal duration was held constant while amplitude was varied. In the second, signal energy was held constant while various pairs of values for duration and amplitude were tested. Finally, amplitude was held constant while duration was varied. A three parameter equation was determined and compared with data of previous research. The predictions generated by a single filter model are discussed.
G. R 10

11,487

Bellman, R., Fukuda, Y., & Poilack, M. TECHNICAL STUDIES IN CARGO HANDLING - II. COMPUTATION OF DELAYS IN THE MULTI-STAGE SHUTTLE PROCESS. Prepared under Contract Nonr 233(07), 33pp. Dept. of Engineering, University of California at Los Angeles.

11,487

As part of a program studying cargo handling processes, this paper describes a Monte-Carlo approach to the calculation of delays in the multi-stage shuttle process by means of SWAC, a high-speed digital computer. Several codes were developed for SWAC to generate the random time elements, and to calculate the delays in the second stage for 3-, 4-, 5-, and 6-stage shuttle processes. There is a detailed discussion of the computations and the results.
G. R 2

11,488

Lewis, S.T., & Stapp, J.P. A CRASH-RESTRAINT DEMONSTRATOR. HADG TN 57-9, June 1957, 14pp. Aeromedical Field Lab., HADG, ARDC, Holloman AFB, N.M.

11,488

A crash-restraint demonstration decelerator is described which is capable of applying deceleration forces to human subjects in either the forward or backward facing seated positions. Human volunteer subjects were subjected to a deceleration of five gravities (G) on this device. Time studies on 48 runs were made beginning at the instant of seat deceleration to successful escape from the seat. Results are discussed and an improved model of the decelerator is described.
T. I. R 5

11,489

Bryan, G.L., Bond, W.A., Jr., & Hoffman, L.S. TIME REQUIRED TO TROUBLE SHOOT A RADIO RECEIVER AS A FUNCTION OF TYPE OF INFORMATION PROVIDED. Prepared under Contract Nonr-228(02), Proj. NR 153-093, Tech. Rep. 21, April 1957, 34pp. Dept. of Psychology, University of Southern California.

11,489

To study the time required to trouble-shoot a radio receiver as a function of the type of information provided, two experiments were performed in which the check readings provided the trouble-shooters were systematically varied. For both experiments, 42 experienced Navy technicians served as subjects. Synthetic problem materials were employed. First, the extent to which difficulty level of a problem is dependent on the size of deviations presented was studied; the second experiment determined the effects of manipulating the type of interpretive information available at each test point. The results are the topic of a general discussion section at the end of the report.
T. I. R 14

11,490

Shapiro, B. HUMAN ENGINEERING DESIGN REQUIREMENTS FOR BOMARC OPERATIONAL TEST EQUIPMENT. Contract AF 36(038)-19589, No. D-80408, June 1956, 42pp. Boeing Airplane Co., Seattle, Wash.

11,490

This report furnishes human engineering information to assist the designer of BOMARC XIM-99A Operational Test Equipment. It presents a summary of the steps which must be taken to design test equipment which gives quick and accurate results in a comfortable and safe manner. Visual display, control, tone signal, illumination, layout, maintenance, and general environmental factors are among the topics considered in detail.
R 22

11,491

Fraser, D.C. A STUDY IN FATIGUE IN AIRCREW. IV. OVERVIEW OF THE PROBLEM. FPRC 504, Feb. 1957, 5pp. RAF Institute of Aviation Medicine, Flying Personnel Research Committee, Farnborough, Hants, England.

This study employs a test of variability of judgment under vigilance conditions to investigate the effects of fatigue in aircrew. Crews of piston-engined aircraft and jet-engined aircraft were tested before and after long flights. Comparisons were also made between the fatigue effects of night vs. daylight flights of similar duration. In addition cumulative fatigue effects were studied, not only by performance measures but by physiological measures as well. Some of the conclusions reached are as follows: a) A significant fatigue effect occurs after a flying continuously in a piston-engined aircraft for more than 10 hrs.; b) No significant fatigue effect occurs after 3-4 hr. continuous sorties in a jet bomber during the day; c) A significant fatigue effect occurs after 3-4 hr. sorties in a jet fighter during the day or after 2-3 hr. sorties at night; d) The fatigue effect involved in night flying is greater than in day flying of equivalent length; e) Subjective reports of fatigue in the individual scores of the Ss in this investigation are significantly correlated with objective deterioration of vigilance; f) Marked changes in performance and subjective states of Ss after prolonged, repeated flights can occur without extensive detectable physiological changes. (HEIAS)
R 11

11,488
Rosen, L.H. PHOSPHORESCENT AND FLUORESCENT MATERIALS. Proj. NR 381 030, NML Rep. 4854, Dec. 1956, 47pp. Naval Research Lab., Washington, D.C.

11,489
This report is a survey of the properties and uses of phosphorescent and fluorescent materials which are of value to aids to military activity. A brief discussion is given of vision at low values of illumination and of methods of photometry and colorimetry as applied to the measurement of luminosity and color of luminescent material. The characteristics of commercially obtainable materials are shown and applications of this type of material are described and some possible uses suggested.
T. C. I. R 13

11,490
Eccles, R.L. THE INTERRELATIONSHIP OF STRATEGY AND LOGISTICS. Pub. no. 157-89, Dec. 1956. Mem. Industrial College of the Armed Forces, Washington, D.C.

11,491
This is a report of a speech on the interrelationship of strategy and logistics. The spectrum of war (from controllable to uncontrollable features) was discussed, as well as the structure of war with emphasis on the military factors of strategy, logistics, tactics, intelligence, and communications. The importance of the strategic-logistic relation is illustrated by analyzing certain military failures and successes of the past.
T. C.

11,492
Debeau, D.E., Kahn, G., & Swager, E.L. FORMAL DEFINITIONS OF RELIABILITY. Contract AF 33(616)-2344, Spec. Rep., May 1957, 13pp. Wright Air Development Center, Wright-Patterson AFB, Ohio, Battelle Memorial Institute, Columbus, Ohio.

11,493
The purpose of this report is to define reliability and its related topics in terms applicable to propeller-control systems. Failure rate of a machine is taken as the basic concept and all the other concepts, such as hazard rate, are stated in terms of failure rate. Some specific failure patterns are described and the paper concludes with a discussion of the emergency reliability and maintenance reliability of propeller-control systems. The application of reliability theory to these systems is described.
C.

11,495
Dordick, I.L., & Thuronyi, G. AN ANNOTATED BIBLIOGRAPHY ON FOREST CLIMATES. Meteorological Abstr. & Biblio., April 1957, 8(4), 427-570. (American Meteorological Society, Boston, Mass.).

11,495
This is an annotated meteorological bibliography covering the year 1957 for such topics as general geophysics, applied meteorology, instruments, structure and physics of the atmosphere, radiation and temperature, pressure and wind, hydrometeorology, and climatology. A special feature of this volume of the series is a selective annotated bibliography on the climate of the forest. Titles of recent papers not yet abstracted are also included.
R 462

11,496
Larkin, L. & Connel, F.A. RESEARCH ON THE DESIGN OF TELEPHONE STATIONS FOR HIGH AMBIENT NOISE LEVELS. Lab. Proj. 567 4, Final Rep. NML 683 894, March 1957, 11pp. NML Material Lab., New York Naval Shipyard, Brooklyn, N.Y.

11,496
To study the performance characteristics of the Cal-Phone Dial Telephone Station and to determine those factors that contribute to this performance with a view to devising simpler means of achieving similar performance, pertinent information from previous evaluations of the Cal-Phone Station was abstracted. Two design possibilities were suggested: 1) a noise-cancelling transmitter and receiver amplifier fitted into conventional handset, and 2) a noise-cancelling carbon cartridge. Comparison of performance was made by determining the frequency response, sensitivity, random noise discrimination, and measured word articulation scores for the two designs. The results were related to Cal-Phone Station performance. Recommendations are included.
T. C. I. R 8

11,497
Foster, A.C. SOME OCCUPATIONAL INFORMATION; II, EXAMPLES OF TECHNICAL MAINTENANCE TASKS PERFORMED BY SHIPMEN. Rep. 55, Aug. 1955, 250pp. USN Personnel Research Findings Activity, Bureau of Naval Personnel Analysis Div., 55-1160, Calif.

11,497
This investigation describes in detail examples of the various types of minor technical maintenance tasks which seamen must perform aboard ship to keep equipment operational. Information on 69 tasks was obtained from 29 experienced seamen from 15 different destroyer-type ships. The task descriptions were used to abstract performance requirements for minor technical maintenance which appear in appendices and are suggested for use by selection and training personnel.
T. R 1

11,498
Mine Safety Appliances Company. DEVELOPMENT OF A "SOUND-PROOF" HELMET. FINAL REPORT. Contract NOSS 61106, Nov. 1954, 57pp. Mine Safety Appliances Company, Pittsburgh, Penn.

11,498
This is the final report of a project investigating the possibility of developing a sound-proof helmet. The report includes a review of literature and results of tests on two prototype helmets and on attenuating devices. A discussion of the problems met during the investigation is included, and the need for further research on various aspects of speech communication, materials, and means of evaluating sound-attenuating devices is stressed.
T. C. I. R 11

11,499
Gray, J.S. THE TIME-DISTRIBUTION OF SYMPTOMS AT 35,000 AND 38,000 FEET IN THE LOW PRESSURE CHAMBER. Proj. 71, Res. Rep. 1, Sept. 1952, 6pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,499
To determine the optimum duration of low pressure chamber flights for altitude classification, over 1000 pressure chamber flights were analyzed. Simulated flights at altitudes of 35,000 feet and 38,000 feet were checked for the times at which various symptoms (bends, chokes, and abdominal pain) appeared and declined over a period of three hours. From the results, certain recommended procedures are outlined.
T. G.

11,500
Rushin, A.D., Kneishi, F., Ince, W., Jr. & Norclink, J.
THE EVALUATION OF ENERGY EXPENDITURE BY INDIRECT CALORI-
METRY. I. A COMPARISON OF RESULTS BY MOUTH PIECE VS. FACE
MASK COUPLING. II. A COMPARISON OF FACTORIAL AND DIRECT
MEASUREMENT. Proj. 6 60 11 620, Rep. 100, Aug. 1954,
12pp. Medical Nutrition Lab., Fitzsimons Army Hospital,
Denver, Color.

11,500
To further develop techniques of indirect calorimetry
with the Miller-Peans portable respirometer, two methods
(face mask and mouth piece coupling) of collecting re-
quired air were used under two conditions: constant
temperature and humidity room with rigidly prescribed
activities, and a normal temperature-humidity room with
routine activities. Ventilation rate, per cent oxygen
in expired air and calculated caloric cost of work element
per unit of time were compared for the two methods (one
subject). A second part of the study compared total en-
ergy expended as determined by time-motion and work-
element energy cost techniques (factorial) and as deter-
mined by continuous measurement of oxygen consumption.
Recommendations for further development are made.
T. I. R 16

11,501
Webster, J.C. HEARING LOSSES OF AIRCRAFT RE-
PAIR SHOP PERSONNEL. J. acoust. soc. Amer.,
Sept. 1954; 26 (5), 782-787. (Rep. 549, USN
Electronics Lab., San Diego, Calif.)

11,502
To study hearing loss in aircraft repair shop per-
sonnel, the Navy Electronics Laboratory's variable-tone audi-
ometer test was administered from magnetic tape to 1133
subjects. They were tested in groups of 15. The results
were analyzed (1) by percentiles within each ten-year
age grouping, and (2) by classifying each audiogram into
one of four deafness categories. Results were compared
to those for a large non-noise-exposed population.
T. G. R 15

11,502
Smith, O.W., Hochberg, J.E. & Smith, P.C. PROBLEMS OF APPLICATION IN DISTANCE PERCEPTION.
Contract Nonr 401(14), Dec. 1957, 15pp. Cornell University, Ithaca, N.Y.
An analysis is made of certain relatively untouched problems of distance perception--the
extent to which various aspects of the stimulus determine depth perception, interaction of
cues and conditions, scalable distance judgments, and individual differences. Two specific
programs are suggested. The first involves establishing usable tables of stimulus-judgment
relationships. The second consists of specifying effective visual inputs as well as the
population for which they are expected to be effective. Some methodological requirements
for such programs are listed. Cf. 11,825
R 24

11,503
Webster, J.C. & Solomon, L.M. EFFECTS OF RESPONSE COM-
PLEXITY UPON LISTENING TO COMPETING MESSAGES. J. acoust.
soc. Amer., Nov. 1955, 27(6), 1199-1203. (Rep. 638,
USN Electronics Lab., San Diego, Calif.)

11,503
To determine the effects of response complexity on
listening to competing messages, three groups of 12 men
listened to sequences of 2, 3, or 4 messages under four
different conditions (filters in, filters out, channels
split, channels together). They responded, on different
occasions, to one or two messages of a set. The first
group wrote the content of the message(s) while the
second group spoke the contents to a partner who wrote
the message. The third group transposed (decoded) the
message content before writing it down. Performance
under the different conditions is evaluated.
G. I. R 6

11,504
Webster, J.C., & Sharpe, L. IMPROVEMENTS IN
MESSAGE RECEPTION RESULTING FROM "SEQUENCING"
COMPETING MESSAGES. J. acoust. soc. Amer.,
1955, 27(6), 1194-1196. (USN Electronics Lab.,
San Diego, Calif.)

11,504
This experiment was designed to find out how much
faster and more accurately competing messages (2, 3, or
4 occurring every 14 seconds with varying degrees of
overlap) can be handled if delayed (stored) temporarily
and listened to on the operator's own call. Ten Naval
personnel heard five-second messages in control tower
phonology over four channels during half-hour sessions.
Playback could be controlled by the operator. Listening
conditions ranged from having operator responding to one
station with nothing to answering three stations without
nothing and results are compared for the various condi-
tions.
T. G. I. R 12

11,505
Webster, J.C. A RECORDED MARBLE TONE AUDIO-
METER TEST SUITABLE FOR GROUP ADMINISTRATION
OVER LOUDSPEAKERS. J. Speech & Hearing Dis-
orders, 1952, 17, 215-223. (Rep. 546, USN
Electronics Lab., San Diego, Calif.)

11,505
This paper reports the development of a pulsed-tone
group hearing test which (1) uses variable tones (tones
that vary in frequency at a given rate - 5 cycles per
second - and over a given extent as from 885 to 1125
cycles per second), (2) uses within-group attenuation
(each pulse within a group of pulses is softer than the
pulse preceding it), and (3) is recorded on a disc or
tape. This test was tried out on 200 subjects using
loudspeakers and using headsets. The results are com-
pared to those for the more usual type of group test.
T.G.R 10

11,506
Lichtenstein, M. EFFECTS OF VIDEO NOISE DIS-
TRIBUTION AND OPERATOR RESPONSE CHARACTERIS-
TICS ON PPI SONAR TARGET DETECTABILITY. Rep.
562, Feb. 1955, 17pp. USN Electronics Lab.,
San Diego, Calif.

11,506
This report deals with the effects of (1) noise
distribution, apart from noise level per se, and (2)
operator response tendencies on Planned Position Indica-
tor sonar target detectability. Both of these factors
are evaluated and means for improving the situation and
recommendations for future research are discussed.
G. I.

11,507
Madun, J.M. THE CHARACTERISTICS OF AN EXPERIMENTAL CRT
GE TYPE 24-230 LONG PERSISTENCE PHOSPHOR. Prob. MEL N3
1a, Tech. Memo. 98, April 1955, 6pp. USN Electronics
Lab., San Diego, Calif.

11,507
This memorandum presents information on the decay
characteristics, the memory, the spectral energy distri-
bution, and a preliminary operational test of an experi-
mental CRT GE Type 24-230-long-persistence phosphor,
developed to ultimately replace the P-7 in standard
equipment.
G.

11,508

Hamilton, P.M. NOISE MASKED THRESHOLDS AS A FUNCTION OF TONAL DURATION AND MASKING NOISE BAND WIDTH. J. Acoust. Soc. Amer., 1957, 29 (4), 506-511. (Rep. 774, USN Electronics Lab., San Diego, Calif.).

11,508

To study some of the limitations and potentialities of the human operator as a detector of aural information, this report describes the measurement of noise-masked thresholds for 800 cycles per second (cps) tonal pulses 25 to 400 milliseconds long, in masking noise bands 19 to 110 cps wide. Eight subjects provided data showing noise masked thresholds as a function of noise band width and signal duration. The threshold varied according to a formula proposed on the basis of limited data in an earlier report.

G. R 15

11,509

Fischer, C.F. DEVELOPMENT OF A MATHEMATICAL ANALOG FOR THE HUMAN OPERATOR IN THE CONTROL OF FLIGHT VEHICLES. Interim Rep., Sept. 1953, 60pp. Prepared under ONR, Forrestal Research Center, Princeton University.

11,509

This paper attempts, in a preliminary way, to establish a mathematical analog for the maximum performance of a human operator handling airplane type controls to accomplish the task of stabilizing a mechanical system such as an aircraft. The problem is treated as an analysis of servo-mechanisms. Some experimental data are used to check the adequacy of the analog.

T. G. I. R 60

11,510

Herman, I.L. THE VALIDITY OF RADAR AIMING POINT IDENTIFICATION MOTION PICTURE GROUP TESTS. Proj. 7711, Task 77194, Lab. Note AORL-LX-55-3, August 1955, 23pp. Aircraft Observer Research Lab., AFPTRC, ARDC, Mather AFB, Calif.

11,510

The purpose of this study was to obtain information concerning the validity of radar aiming point identification motion picture group tests. Performance on the tests administered in pre-flight training was correlated with course grades in primary and basic observer courses. In addition to the predictability of the tests, the effect of training on accuracy of radar point aiming identification, as evaluated by the test, was determined.

T. R 3

11,511

Herman, I.L. TARGET STUDY WITH KNOWLEDGE OF ACCURACY OF AIMING POINT IDENTIFICATION. Proj. 7711, Task 77201, Tech. Memo. AORL-TM-55-4, May 1955, 19pp. Aircraft Observer Research Lab., AFPTRC, ARDC, Mather AFB, Calif.

11,511

To test the effect of target study with immediate knowledge of performance on radar aiming point identification, 76 subjects were used. A different group of subjects was trained on each one of five different motion picture bomb runs. During the first four trials on the run, half the subjects were informed of the correct aiming point location every 30 seconds, while the other subjects did not receive this information. Both groups were tested without knowledge of performance immediately after trial four and again after a lapse of 72 hours. Results are presented in some detail.

T. G. I. R 4

11,512

De Fries, L.J. ARCTIC TEST OF BALSCOPE SR OBSERVATION TELESCOPE (WINTERIZED) WITH TRIPOD M15. Proj. FA 2853, April 1955, 8pp. USA Arctic Test Branch, Big Delta, Alaska.

11,512

To determine the operational characteristics of the Balscope Sr Observation Telescope, the instrument was subjected to normal tactical usage throughout the winter test season by personnel wearing standard arctic clothing. Particular attention was given to the determination of damage, ease of operation, and jogging tendencies of the equipment.

I.

11,513

von Békésy, G. THE EAR. Scient. Amer., Aug. 1957, 197(2), 10pp. (Psycho-Acoustic Lab., Harvard University).

11,513

This is a general paper on the ear as an instrument. The structure of the ear is described and well illustrated. Other topics are the auditory control of speech, auditory localization, auditory message phenomena, pitch detection, and management of deafness.

G. I.

11,514

Boynton, R.M. SENSITIVITY CHANGES IN THE HUMAN EYE DURING ADAPTATION TO ILLUMINATION. FINAL REPORT. JANUARY 1 - DECEMBER 31, 1956. Prepared under Contract Nonr-1864(00), May 1957, 2pp. Physiological Psychology Branch, Office of Naval Research, Washington, D.C.

11,514

This is a final report summarizing the status of research problems on chronic adaptation, stray light, responses in the human visual system as a function of adaptation level, and monocular versus binocular effects.

R 4

11,515

Koponen, A., Waters, R.H., & Orlansky, J. THE ASSOCIATIONAL VALUE OF AERONAUTICAL CHART SYMBOLS. Prepared under Contract N8onr-641, Task Order 05, July 1952, 36pp. Dunlap and Associates, Inc., Stamford, Conn.

11,515

As part of a larger series of studies, this paper reports the development of procedures by which meaningful chart symbols, insuring rapid and accurate chart reading, can be devised and evaluated. The associational values of chart symbols were determined through five consecutive steps by the use of tests administered to Naval and civilian subjects. The symbols appearing on WAC charts were evaluated on the basis of the results obtained in the tests described above.

T. G. I. R 2

11,516

Waters, R.H., & Orlansky, J. THE USE OF MATHEMATICAL AND METEOROLOGICAL DATA IN AERONAUTICAL CHART CONSTRUCTION. Prepared under Contract N8onr-641, Task Order 05, Rep. 641-05-4, May 1951, 33pp. Dunlap and Associates, Inc., Stamford, Conn.

11,516

The purpose of this report is to describe as part of a larger investigation mathematical and meteorological criteria for the selection of features to be shown on aeronautical charts. The relevant literature on visibility of objects from high altitudes was searched, appropriate formulas and graphs on the effects of atmospheric attenuation gathered, mathematical tables and graphs developed from which the relation between an object's size and its angular subtense at the eye from different altitudes can be read, and nomographs for the prediction of object visibility described.

T. G. I. R 18

11,517

Kishler, J.P., Waters, R.H., & Orlansky, J. THE DEVELOPMENT OF GRAPHIC AIDS TO AIR NAVIGATION. Prepared under Contract N8onr-641, Rep. 641-05-1, May 1951, 27pp. Dunlap and Associates, Inc., Stamford, Conn.

11,517

This report describes the first phase of an investigation directed toward the improvement of aeronautical charts. The historical development of aeronautical charts is reviewed and the need for improved charts is stressed. The WAC chart for cross-country navigation is evaluated and there is a report on various studies having to do with (1) developing a prototype high-speed, high-altitude chart and a tabular navigation form, (2) the visibility of objects from high altitude, (3) chart symbols, and (4) methods of testing charts.

T. I. R 13

11,518

Cramer, R.J., Waters, R.H., & Orlansky, J. A NAVIGATIONAL FORM FOR CROSS-COUNTRY FLIGHTS. Prepared under Contract N8onr-641-05, Rep. 641-05-3, May 1951, 20pp. Dunlap and Assoc-ates, Inc., Stamford, Conn.

11,518

This paper reports the development of a tabular form to display the information necessary to meet the navigational requirements for routine cross-country flights by pilots in single-place aircraft. After conferences with pilots, a preliminary form was constructed and submitted to jet pilots for suggestions which were incorporated in a revised form. This report is part of a larger investigation designed to improve aeronautical charts.
T. R 1

11,519

Rigby, M. (Supervisor). METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY. Feb. 1957, 2(2), 215-277. American Meteorological Society, Washington, D.C.

11,519

Meteorological Abstracts and Bibliography is a monthly publication of current literature in meteorology and related fields. Part I contains abstracts arranged according to the Universal Decimal Classification. Part II of each issue comprises an annotated bibliography on a special subject. This issue contains such a treatment of "Night Airglow" (sometimes called the nonpolar or permanent aurora). The majority of papers selected for inclusion were written after 1945 although a few from the 1930-1945 period are included. Subject areas treated are: general theory, instruments and equipment, methods of measurement of intensity and height, variations in night sky radiation, physical properties, spectral analysis, and associated phenomena.
R 488

11,520

Krop, S., Joffe, M.H., Hoffman, R.A., & Boynton, H. TOXICITY AND HEALTH HAZARDS OF CW AND BW DECONTAMINANTS. Proj. 4-61-14-002, CWL Tech. Memo 24-4, 1956, 54pp. USA Chemical Warfare Labs., Army Chemical Center, MD.

11,520

This document is concerned with the toxicity of various chemical and biological warfare decontaminants. For each decontaminating agent, the following are listed: physical and chemical properties, decontaminating properties, toxic effects and other handling hazards, physiological effects, maximum allowable concentrations, and antidotes and first aid measures.
R 11

11,521

Bishop, E.W., Waters, R.H., & Orlansky, J. SPECIFICATIONS FOR A NAVIGATION CHART FOR USE IN HIGH-SPEED, HIGH-ALTITUDE AIRCRAFT (EXPERIMENTAL CHART XDA). Prepared under Contract N8onr-641, May 1951, 26pp. Dunlap and Assoc., Inc., Stamford, Conn.

11,521

The purpose of this study was to develop production specifications for an aeronautical chart to be used for cross-country flight in high altitude, single-pilot aircraft. A job analysis of navigation procedures was prepared from interview and questionnaire data, and additional information was obtained from an analysis of high altitude aircraft characteristics and a study of the objects visible at high altitude. Functional requirements for a prototype chart were derived from these data and production specifications for a chart developed.
T.

11,522

Noert, L.O. A SYSTEM FOR MEASURING THE HIGH SOUND PRESSURE LEVELS FROM ROCKETS. Proj. 7210, WADC TR-56-655, Dec. 1956, 38pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,522

This report describes a noise measurement system developed for measuring the high intensity noise produced by rockets. In order to obtain far and near field noise characteristics in the short firing time of rocket engines, a 21 channel recording system was developed. Selection of microphones and other components, testing of the equipment, and its calibration up to 195 decibels re .0002 microbar are discussed. The procedures advisable for field test use are described as well as the system to be used for analyzing the data.
T. G. I. R 10

11,523

Carlson, L.D. MAN IN COLD ENVIRONMENT. A STUDY IN PHYSIOLOGY. Contract AF-33(038)-422, Aug. 1954, 161pp. Arctic Aeromedical Lab., Alaskan Air Command, Ladd AFB, Fairbanks, Alaska.

11,523

This monograph attempts to summarize our knowledge concerning man in cold environments and to describe various physiological concepts and research techniques involved in studying man in the cold. Heat loss, heat input, circulation, metabolic adjustments, special aspects of aviation, and clothing and shelter are the major topic headings. Gaps in the discussion led the author to include an extensive bibliography.
T. G. I. R 600

11,524

Cornog, D.Y., & Hansen, R. PHYSICAL ANTHROPOLOGY IN HUMAN ENGINEERING. Contract AF 33 (616)-2353, 1957, c200pp. H.L. Yoh Co., Inc., Philadelphia, Penn.

11,524

This is a preliminary cumulative bibliography of approximately one thousand titles in the area of physical anthropology in human engineering. The headings under which the titles are listed include the following: body size, comfort, clothing and equipment problems, kinematic muscle strength, seating, and work space.
R 1000

11,525

Vavala, D.A. THE BIOPHYSICAL AND PATHOLOGICAL EFFECTS OF EXPLOSIVE DECOMPRESSION. Unno. Rep., June 1954, 28pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,525

To determine the present state of knowledge on the subject of explosive decompression, a review and study of experimental and clinical data was made. Some of the pertinent anatomical relationships of the thoracic region which might become involved in the mechanical trauma and effects following explosive decompression are discussed. The physical and physiological factors and the pathological effects and conditions which are involved with and follow explosive decompression are given. Graphs, tables, photographs, x-rays, and case histories are included.
T. G. I. R 64

11,526

Allais, E.A., & Martin, H.B. COMPARATIVE INFORMATION-HANDLING PERFORMANCE WITH SYMBOLIC AND CONVENTIONAL ARABIC NUMERALS: VERBAL AND MOTOR RESPONSES. Contract AF 33(616)-3612, Proj. 7192, WADC TR-57-196, April 1957, 12pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation).

11,526

To compare the information-handling performance of subjects in making verbal and motor responses to two sets of Arabic numerals - one a set of conventional figures (AND-10400), the other a set of symbolic (generated from an eight-element straight-line matrix) - two groups of 24 subjects were tested. One group responded to the stimuli by pressing its corresponding key, the other by naming the number represented. Each subject responded for one session of five trials (100 presentations of each type of stimuli) on each of two successive days. Five volunteers from each group continued for 12 days. From the data (time and errors) the amount of information transmitted (bits per stimulus) was computed and compared for the two sets of conditions. Effects of longer term practice were also studied. T. G. Z. R 15

11,527

Kobrick, J.L. QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: II. DIMENSIONS OF THE UPPER LIMIT OF GLOVED HAND SIZE. Proj. 7-83-01-004, Tech. Rep. EP-41, Dec. 1956, 185pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,527

This report presents information on the hand size of the soldier wearing various ensembles of Quartermaster protective handwear. It is intended for use as a handbook by engineers for establishing size and space allowances in the design and sizing of hand-operated equipment. The criterion employed is the bare hand size that is equal to or bigger than the hand size of 95% of the Army personnel (95th percentile of Army hand size distribution). The information is presented in pictorial form with index scales. Dimensions can be measured on the pictures and referred to the scales to establish actual size. I. R. 3

11,528

O'Connor, J.U., Gerstman, L.J., Liberman, A.M., Delattre, P.C., & Cooper, F.S. ACOUSTIC CUES FOR THE PERCEPTION OF INITIAL /w, j, r, l/ IN ENGLISH. Word, April 1957, 11 (1), 24-43. (Haskins Labs., New York, N.Y.)

11,528

To investigate the physical stimuli essential to the recognition of the phonemes /w, j, r, l/ in initial positions before vowels, hand-painted patterns containing the cues believed to be most important were prepared and converted to sound. In the first part of the experiment, a wide variety of acoustic variations (number of formants, duration of steady-state onsets, starting frequencies of transitions, transition duration) were explored by the experimenters. In the second part, a sampling of the various acoustic dimensions found to be important above were presented to a group of 44 naive listeners for identification. Per cent responses for each phoneme were analyzed for agreement with previous judgments. G. I. R 15

11,529

Lisker, L. CLOSURE DURATION AND THE INTERVOCALIC VOICED-VOICELESS DISTINCTION IN ENGLISH. Language, Jan.-March 1957, 33(1), 42-49. (University of Pennsylvania and Haskins Labs., New York, N.Y.)

11,529

To determine the extent to which a variation in closure duration might be a cue to the intervocalic voiced-voiceless distinction in English, the pair p-b was selected for study. A number of sentences including trochees in position of primary stress and also trochees spoken in isolation were recorded and made into spectrograms. Analysis of the spectrograms recorded consistent differences in closure patterns. A series of tape-splicing experiments on recordings of rupee-ruby were carried out in which the normal closure durations were reduced and lengthened, varied in steps over a range of time, and final portions of the two words reversed. The results of judgments were analyzed in terms of closure-durational differences in the voiced-voiceless stop distinction. G. R. 3

11,530

Liberman, A.M. SOME RESULTS OF RESEARCH ON SPEECH PERCEPTION. J. acoust. Soc. Amer., Jan. 1957, 29 (1), 117-123. (Haskins Labs., New York, N.Y., and University of Connecticut).

11,530

This paper describes and attempts to interpret some research with synthetic speech which has succeeded in isolating some of the acoustic cues which underlie speech perception. The methods or techniques of the research are given briefly followed by a discussion of three types of consonant cues - those related to constriction sounds, to transitions from the consonant to the next phone, and to the on-off action of a single fixed resonator. Some data relating to the effects of learning on the distinctiveness of speech sounds are presented and discussed. I. R. 18

11,531

Hardy, J.D., & Stroll, Alice M. MEASUREMENT OF THE RADIANT HEAT LOAD ON MAN IN SUMMER AND WINTER ALASKAN CLIMATES. Special Rep., Nov. 1953, 43pp. Arctic Aeromedical Lab., Alaskan Air Command, Ladd AFB, Alaska. (Cornell University Medical College).

11,531

To evaluate the thermal characteristics of the summer and winter climates of interior Alaska, two methods of measurement were used. The first was direct measurement (panradiometer) of the total radiation incident on man and, by computation from these measurements, the mean temperature of the environment. The second was direct measurement of mean radiant temperature of the environment (thermo-radiometer) and, by means of computation, the solar contribution to the total radiation. Variations in solar radiation and environmental temperature and the resultant heat load on man are discussed and shown graphically. Factors involved in observed variations are discussed. T. G. R 14

11,532

Vickers, T.K., & Miller, R.S. RECENT DEVELOPMENTS IN THE SIMULATION OF TERMINAL AREA AND ENROUTE AREA AIR TRAFFIC CONTROL PROBLEMS. IRE Transactions on Aeronautical and Navigational Electronics, June 1956, ANE-3 (2), 51-54. (CAA Technical Development and Evaluation Center, Indianapolis, Ind.).

11,532

This paper describes the air traffic simulation facilities that are now in use at the Civil Aeronautics Administration (CAA) Technical and Development Evaluation Center. Some of the important developments in the study of terminal area and enroute traffic control problems which have been achieved through the use of these facilities are reviewed. G. I.

11,533

Glassman, I. A DYNAMIC AIRCRAFT SIMULATOR FOR STUDY OF HUMAN RESPONSE CHARACTERISTICS. Oct. 1952, 6pp. The Franklin Institute, Philadelphia, Penn.

11,533

A dynamic highspeed jet aircraft simulator is described. The simulator is intended for use in psychological experiments designed to determine the transfer characteristics of a pilot under simulated flying conditions. Two major components of the simulator are (1) an analog computer that solves equations on motion of aircraft in response to control movements and target motion relative to aircraft; and (2) a cockpit which includes a display system and three control elements. Validation of the simulator is described. I. R. 2

11,534

Hay, A.D. A DESIGN FOR COMFORTABLE WORKING CONDITIONS. J. Franklin Institute, May 1954, 257(5), 414-416. (The Franklin Institute, Philadelphia, Penn.).

11,534

This note describes a design for an air conditioning installation which has provided comfortable working conditions during all seasons of the year. Details of room construction and location of supply and return ducts are given. I.

11,536

Felton, W.W. SOME CHANNEL ALLOCATION PROBLEMS IN AIR-GROUND VOICE COMMUNICATIONS. Trans. I.R.E., March 1954, APR-1(1), 41-51. (The Franklin Institute, Philadelphia, Penn.).

11,535

To study problems of channel allocation in air-ground voice communications as used in air traffic control, programs of communications were made at Langley Air Force Base (October to December 1951) and at the Washington National Airport (February to April 1952). All messages on selected frequencies for the channels studied (both IFR, Instrument Flight Rules, and VFR, Visual Flight Rules) were recorded on magnetic tapes and identified as to time of occurrence and length. The data were analyzed to show maximum utilization of a channel (average reaction interval, message length, estimates of channel delay) and the amount of communicating time per aircraft. These factors are discussed in relation to ways to communicate with more aircraft per channel.

G. I.

11,536

Frank, W.E. INSTRUMENTATION REQUIREMENTS IN SENSORY AIDS. Ann. N.Y. Acad. Sci., April 1955, 60(Art. 6), 869-876. (Bioengineering Section, The Franklin Institute, Philadelphia, Penn.).

11,536

This paper discusses instrumentation requirements in sensory aids which lie outside the laboratory or industrial instrumentation. These requirements arise out of the limitations of the information instruments can present, out of the fact that the devices must be closely integrated with actions of people using them, and from psychological and sociological problems over which the researcher has no control.

R 2

11,537

Grier, G.W. THE INFORMATION CONTENT OF AIR-GROUND MESSAGES. Trans. I.R.E., March 1954, APR-1(1), 5-16. (Contract AF 18(600)-26, Electrical Engineering Div., The Franklin Institute Labs., Philadelphia, Penn.).

11,537

This report on information content of air-ground messages is one of a series in a program of research into the role of air-ground communications in the control of landing aircraft. On-the-spot records of communications between pilots and controllers were made at the Washington National Airport and Langley Air Force Base covering a wide range of air traffic and weather conditions. Messages were transcribed, coded according to information content, and transmission rates calculated. The data were analyzed for effectiveness of voice radio in transmitting information required for traffic control. The findings are discussed in relation to possible changes in design or use for improved effectiveness.

G.

11,538

Crook, H.N., Devos, D.B., Hageman, K.C., Hanson, J.A., et al. AGE AND THE JUDGMENT OF COLLISION COURSES. Rep. 57-105, Sept. 1957, 38pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Institute for Applied Experimental Psychology, Tufts University).

11,538

To investigate the effect of age on ability to judge collision courses, an experiment was conducted in which the subject sat in a simulated cockpit and an image representing an approaching aircraft was projected onto a special viewing screen. The task was to judge whether the approaching aircraft was on a collision course with subject's aircraft. The subjects were 165 males with normal vision, good health, and average educational level above the mean of the general population, distributed in age from the middle teens to the late fifties. Responses were scored for (1) errors and (2) time before nearest approach at which correct judgments were made. The results are discussed in terms of their validity for practical application.

T. G. I.

11,539

Decker, C.H. MATHEMATICAL TRAINING FOR APPLIED EXPERIMENTAL PSYCHOLOGY. Canad. J. Psych., 1953, 7 (4), 183-191. (Defence Research Medical Labs., Toronto, Canada).

11,539

This paper presents the case for mathematical training in applied experimental psychology. The need for such training is discussed in terms of the problem of communication with those in related disciplines and the areas of psychology involved. A suggested program of courses extending through seven years to a doctorate is outlined and discussed.

R 28

11,540

Clark, W.B., & Johnson, M.L. THE COURSE OF DARK ADAPTATION AFTER WEARING ORANGE DARK ADAPTOR GOOGLES. Proj. X-430 (Av-230-p), Res. Rep., Feb. 1945, 6pp. Air Training Bases, USN School of Aviation Medicine, Pensacola, Fla.

11,540

To test the effectiveness of orange dark adaptor goggles, the course of dark adaptation was determined in eight previously dark-adapted subjects following exposure to room illumination of 5, 10, and 15 minutes while wearing various types of goggles: Orange Dark Adaptor goggles with both 50 and 5 per cent transmission, standard Navy Red Dark Adaptor goggles, five and ten per cent transmission neutral goggles. The data (elevation of threshold in log micro lamberts and minutes required for return to threshold) were analyzed and shown graphically. The results are discussed in terms of effectiveness of each goggle in protecting dark adaptation at room illumination.

T. G.

11,541

Herman, I.L. THE EFFECT OF TARGET STUDY WITH KNOWLEDGE OF PERFORMANCE UPON AIMING POINT IDENTIFICATION AT DIFFERENT DISTANCES FROM THE TARGET. Proj. 7711, Task 77201, Lab. Note AO 55-2, May 1955, 5pp. Aircraft Observer Research Lab., AFTRC, APDC, Mather AFB, Calif.

11,541

To study the effect of target study with knowledge of performance upon aiming point identification at various distances from the target, error scores (from a previous study) at 30, 20, 15, 10, and 6 miles from the aiming point were analyzed. Five groups of subjects (76 in all) were trained on each one of five different motion picture bomb runs. Half the subjects in each group were informed of the correct aiming point location at 30-second intervals during four trial runs; the other half were not. Both groups were tested immediately and after 72 hours without such knowledge. Differences in error scores at the selected distances were studied for differences between the groups.

T. R 1

11,542

Older, H.J., & Iredell, M.H. HUMAN ENGINEERING OF TEST SETS FOR THE MK 52 MINE. Contract NORD-15618, Rep. 1, Feb. 1955, 8pp. Psychological Research Associates, Washington, D.C.

11,542

This progress report describes the development of a Human Engineering Manual to be used in the design of mine test sets for the MK 52 mine. The format includes common design considerations, controls, indicators, and positioning of panel parts. Sample pages are included. Future plans for this project include human engineering evaluation of present test sets, design recommendations, and fleet experimental evaluation of the redesigned test set.

I.

11,543
Hicks, S.A. LITERATURE REVIEW: TRACKING CONTROL MECHANISMS AND DISPLAYS (LIGHT AIRCRAFT SYSTEM ORIENTED). OCO Proj. TR-300, Tech. Memo. 9-57, Dec. 1957, 13pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Aberdeen, Md.

11,543
This report reviews some of the design problems in anti-aircraft tracking systems as found in a survey of pertinent literature. The primary types of tracking systems are discussed. Types of controls and their arrangement, physical forces inherent in or added to control systems, and the dimensions of control systems are treated. Types of displays, electronic and optical, are cited and discussed in regard to size, power and other aspects. General advantages and disadvantages of each system component are cited.
R-46.

11,544
Harper, R.P. Jr. FLIGHT EVALUATIONS OF VARIABLE LONGITUDINAL HANDLING QUALITIES IN A VARIABLE-STABILITY JET FIGHTER. Contract AF 33(038)-20659, CAL Rep. TB-757-F-12, WADC Tech. Rep. 55-299, July 1955, 47pp. Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

11,544
To permit in-flight variations of the longitudinal handling qualities of aircraft and evaluation of these, an F-94A jet fighter was modified and one pilot made evaluations in flight for a variety of short period dynamics, stick force gradients, and stick displacement gradients. The comments are discussed and related to the time history of the airplane response.
G. I. R 5

11,545
Newell, F. & Campbell, G. EVALUATIONS OF ELEVATOR FORCE GRADIENTS AND TYPES OF FORCE FEEL IN A B-26. Contract AF 33(038)-20659, Cornell Lab. Rep. TB-757 F 10, WADC Tech. Rep. 54-442, Nov. 1954, 58pp. Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

11,545
To evaluate elevator force gradients and types of force feel, a B-26 was modified so that wide ranges of control characteristics could be simulated. Twelve pilots made the evaluations and their opinions were obtained on the desirability of each of four possible artificial feel devices which have been considered for use with elevator control systems. The mean value of optimum and acceptable force gradients are presented for three airspeeds.
T. G. I. R 6

11,546
Newell, F., & Campbell, G. FLIGHT EVALUATIONS OF VARIABLE SHORT PERIOD AND PHUGOID CHARACTERISTICS IN A B-26. Contract AF 33(038)-20659, CAL Rep. TB-757-F-11, WADC Tech. Rep. 54-594, Dec. 1954, 62pp. Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

11,546
To obtain data on the optimum and minimum flyable longitudinal stability and control characteristics for aircraft, a B-26B airplane elevator control system was modified and auxiliary pitching surfaces installed so that a range of short period frequencies and damping ratios could be rated by pilots. These evaluations were done in simulated gunnery runs and with fairly rapid maneuvers. Pilot preferences are discussed.
T. G. I. R 4

11,547
Mauch, H.A., Hall, J.F., & Klerm, P.K. A VENTILATING SYSTEM FOR CLOTHING. Proj. 6330, WADC TR-55-152, April 1955, 44pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,547
A system for ventilating Air Force clothing (including a water impermeable anti-exposure suit) is described. Details of the design and function of this system and its components are presented. The performance of the system was checked experimentally with human subjects for a wide temperature range. A formula is presented which allows prediction of the degree of thermal strain for various stress situations.
T. G. I. R 12

11,548
Jones, L.V., & Bock, R.D. METHODOLOGY OF FREQUENCY MEASUREMENT. Contract DA 19-129-OM-272, Proj. 7-84-15-007, Rep. 13, Sept. 1950, 31pp. USA Quartermaster Research and Development Center, Natick, Mass. (Psychometric Lab., University of Chicago).

11,548
This paper describes a method, for use in preference testing, for selecting a small panel of judges from a larger group of individuals. The judges selected are those who are most representative of the group as a whole. The method is outlined and illustrated with a numerical example.
T. R 19

11,549
Waldram, J.M. DISAPPEARANCE RANGE GAUGE. Rep. 8672, Ref. 5/NC, May 1945, 23pp. Research Labs., The General Electric Co., Ltd., Wembley, Middlesex, England.

11,549
This report describes an instrument, called the Disappearance Range Gauge, designed to be used as an attachment for binoculars or telescopes. By means of this device, the disappearance range of a visible object can be found in full daylight. The range is expressed as a multiple of its actual range. Furthermore, the appearance of the object can be studied as it disappears in haze. The function of the device was tested in an urban area.
T. G. I.

11,550
Ayers, E.W., & Sheldon, J.G. THE DISTRIBUTION OF GAPS IN SPEECH. Res. Rep. 13511, Feb. 1956, 39pp. Post Office Research Station, Dollis Hill, London, England.

11,550
As part of a program of investigation into the statistical properties of speech, measurements were made of the relative frequencies of occurrence of gaps of various lengths. Special equipment was developed and some results are given of measurement of high-quality speech. It is suggested that the data may be of value in the planning of speech interpolation systems and in studies of the loading of common equipment in multi-channel transmission systems.
G. I. R 4

11,551
Eninger, M.U., & Weitz, J. RELATIONSHIPS BETWEEN PERFORMANCE AND PSYCHOMOTOR PERFORMANCE. Contract AF 33(038)-10413, Proj. 509-020-0003, Res. Note PMS 52-1, Jan. 1952, 8pp. Human Resources Research Center, ATC, Lackland AFB, Tex.

11,551
To investigate the hypothesis that rhythmic ability is involved in psychomotor performance, 100 subjects were administered the following tests: (1) simple rhythmic performance tests which consisted of an attempt to synchronize with a visual or an auditory signal for a one-minute period by depressing a telegraph key in coincidence with the signal, and from which a variety of indices were obtained, such as total number of coincidences and of successions, length of longest series of successions, and the like; and (2) psychomotor tests were the Rotary Pursuit, Self-Pacing Discrimination Reaction Time, and the Two-Hand Coordination. The data were analyzed for relationships between performance on the two types of tests.
T.

11,552
Bell, D.A. THE "INTERNAL INFORMATION" OF ENGLISH WORDS. Unno. Rep. 1952, 6pp. Electrical Engineering Dept., University of Birmingham.

11,552
To study the "internal information" of English words a synthetic method of evaluation according to lengths and frequency of use was carried out. By sampling 20 and only selected pages from the Concise Oxford Dictionary numbers of words containing 3, 4, 5, 6, 7, and 8 letters were counted and proportionate numbers for whole dictionary calculated. One and two-letter words were obtained from Dewey's list of frequently used words. An estimate of frequency of use of various word lengths was also taken from Dewey's list. By appropriate weighting procedures the contributions from word structure to the internal information was obtained in "bits" per letter.
T. G. R 6

11,553

Rodahl, K. NUTRITIONAL REQUIREMENTS OF TROOPS STATIONED IN ALASKA. Proj. 7-7954, Rep. 1, June 1955, 103pp. Arctic Aeromedical Lab., Alaskan Air Command, Ladd AFB, Alaska.

11,553

To determine the nutritional requirements of man in the arctic environment, a series of nutritional surveys (together with detailed clinical, physiological and biochemical examinations) was carried out among a group of airmen and a group of infantry soldiers at Ladd Air Force Base in Alaska. All four seasons of the year were covered during the period 1950-1952. Simultaneously similar studies were made among four groups of Eskimos for comparison. Caloric intake and caloric expenditure (estimated on basis of time-activity data) were studied in relation to health and weight changes. Percentages of calories furnished by protein, fat and carbohydrate are given. Mineral and vitamin consumption figures are given. Discussion is related to requirements of each in the daily diet. T. R. 81

11,554

Kossmann, C.E. VENOUS PRESSURE, CIRCULATION TIME, AND CELL-PLASMA RATIO DURING ACUTE PROGRESSIVE ANOXIA IN MAN. Proj. 4, Rep. 1, July 1942, 7pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,554

To determine the effect of a rapidly decreasing oxygen saturation of the blood on venous pressure, circulation time, and cell-plasma ratio, acute progressive anoxia was induced by rebreathing techniques in 19 healthy young male subjects. During the 20 to 25 minute rebreathing period continuous recordings were made of oxygen saturation of the blood, venous pressure, and pulmonary ventilation; pulse rate and arterial blood pressure were determined at frequent intervals; circulation time from right arm to tongue was measured for oxygen saturation of 85 and 75 per cent (approximately); and during last few minutes of rebreathing and first few minutes of breathing room air the electrocardiogram was recorded. These data were compared with similar recordings made under normal circumstances. T. G. R 10

11,555

Mitchell, D.F. A BIBLIOGRAPHY OF AVIATION DENTISTRY. Proj. 391, Rep. 2, April 1946, 8pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,555

This is a bibliography of literature on Aviation Dentistry in the form of an authors index and general subject index. Four main classifications appear: (1) general; (2) aerodontalgia; (3) mandibular mal-position and related symptoms; and (4) others. The last classification includes papers that deal with periodontal disease, saliva, restorative materials, dental identification and flying safety, denture retention, and other less widely studied subjects. R 109

11,556

Cronay, J. EXPERIMENTS WITH LOGARITHMIC RECEIVERS FOR CLUTTER REDUCTION ON RADAR DISPLAYS. A.S.R.E. Tech. Note TX-53-10, Jan. 1954, 42pp. Admiralty Signal and Radar Establishment, Portsmouth, Gosport, Portsmouth, Hants, England.

11,556

This paper reports experiments with logarithmic receivers for reduction of clutter on radar displays; A theory for the action of such receivers on inherent noise, sea clutter, and rain clutter is developed. Results of experiments on both S and X band radars are given. The important design parameters of a logarithmic receiver are also described. I. R 2

11,557

Hess, G.H. THE PROBLEM OF ESCAPE BY PARACHUTE IN ACUTE AERIAL EMERGENCIES IN FLYING TRAINING. Proj. 417, Rep. 1, Sept. 1945, 9pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,557

This report provides an analysis of the problem of escape in 250 acute aerial emergencies resulting in aircraft accidents which involved 468 personnel in flying training. Factors determining the success or lack of success of escape by parachute are discussed in detail. It is recommended that technical research be undertaken with the principle of mechanical ejection of personnel in mind. T. R 5

11,558

Loucks, R.B. ASSESSMENT OF INSTRUMENT FLYING PERFORMANCE TECHNIQUES FOR AUTOMATIC GRAPHING OF AN AIRCRAFT'S FLIGHT PATH. Proj. 383, Rep. 1, Aug. 1945, 5pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,558

This paper describes four methods for making a permanent tracing of an aircraft's flight path in azimuth by means of equipment carried in the plane. One of the methods was tested in a C-47; the others are to be flight-checked in the hope of developing adequate means of assessing instrument flying performance and evaluating various types of flight instruments. I.

11,559

Mitchell, D.F. A BIBLIOGRAPHY OF AVIATION DENTISTRY. Proj. 391, Rep. 1, May 1945, 5pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,559

This is a bibliography of 67 titles having to do with dental problems directly related to aviation. The subjects covered are: aerodontalgia, mandibular mal-position and symptoms, periodontal considerations, and other general miscellaneous problems. R 67

11,560

Senturia, B.H. THE EFFECT OF EXPOSURE TO AIRPLANE NOISE ON AUDITORY ACUITY. Proj. 205, Rep. 1, Dec. 1943, 5pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,560

To study the effect of exposure to airplane noise on auditory acuity, pure tone auditory thresholds were obtained on 100 enlisted trainees before entrance into primary pilot training and repeated on the 74 subjects of the group of 100 who had successfully completed nine weeks of training. The percent of ears showing an elevation of threshold of 15 decibels or more is given as well as the frequencies at which this elevation most frequently occurred. T. G. R. 8

11,561

Masland, R.L. REPORT OF ACCIDENTS RESULTING FROM ANOXIA IN AIRCRAFT. Proj. 206, Rep. 1, Nov. 1943, 17pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,561

This report concerns 17 deaths due to anoxia, occurring in flights of heavy bombardment aircraft, and three accidents (two fatal) occurring in pursuit aircraft. Abstracts containing the important facts of these flights and a summary table of essential features are given. The discussion concerns (1) cause of death, (2) personnel involved, (3) time required for death, and (4) suggested indoctrination procedures. T.

11,562

Louska, R.B. DEVELOPMENT OF A SIMPLIFIED TABLE MODEL OF THE SAN MULTIDIMENSIONAL PURSUIT TEST. Proj. 214, Rep. 1, Dec. 1943, 4pp. AAF School of Aviation Medicine, Randolph Field, Tex.

11,562

This report describes a modification of the original research model of the Multidimensional Pursuit Test for use in the classification of aircrew candidates. The test samples eye-hand coordination and capacity to attend to a variety of tasks at the same time. The apparatus, calibration procedure, test procedure, rationale of the test, and rationale of the scoring procedure are given. The designation S.A.M. Multidimensional Pursuit Test, Form C is given to the modified test.

11,563

Hase, G. A STUDY OF FACTORS WHICH OPERATE AGAINST THE SUCCESSFUL ESCAPE OF OCCUPANTS FROM AIRCRAFT. Proj. 249, Rep. 1, May 1944, 7pp. AAF School of Aviation Medicine, Randolph Field, Tex.

11,563

To determine why occupants of falling aircraft often do not use the parachute, 12 reasons for non-use or unsuccessful use were listed. Three case reports illustrate one reason, namely, immobilization of occupants in aircraft by force generated by spinning of airplane during its fall to the ground. These reports were analyzed and recommendations formulated for escape procedures to be used in these circumstances.

11,564

Rowland, W.M., & Rowland, Louise S. ASPECTS OF NIGHT VISUAL EFFICIENCY. Proj. 106, Rep. 1, AAF School of Aviation Medicine, Randolph AFB, Tex.

11,564

To study the relationships among several aspects of visual function in dim illumination, 103 subjects were adapted to darkness for 20 minutes. The minimum intensity was measured at which each subject could perceive light, locate a dark object (airplane) against a dimly illuminated background, and distinguish its form (identify heading of airplane). Directions were given to use a roving fixation for all tests and no time limitation was set for exposure. Retests were made on 39 individuals. Threshold data were studied by correlational procedures to determine degree of relation. Comparisons were made with measurements of night sky brightnesses and the type of test needed for classification of differences in night visual efficiency discussed.

T. G. R. 1

11,565

Bond, D.D. A STUDY OF THE EMOTIONAL FACTORS INVOLVED IN A GROUP OF THIRTY (30) CONSECUTIVE NAVIGATION CADETS IN THE PROCESS OF ELIMINATION FOR SEVERE AIRSICKNESS. Proj. 136, Rep. 1, April 1943, 12pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,565

To determine the importance of emotional factors in the etiology of airsickness, thirty cadets in the process of being eliminated from flying training for severe airsickness were each interviewed for an hour. The case histories of these men are presented in the report and an attempt is made to order and evaluate the findings.

T.

11,566

Ogden, F.W. STUDY OF ALTITUDE CHAMBER AERO-OTITIS MEDIA. Proj. 147, Rep. 1, May 1943, 3pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,566

This is a report of a study of the incidence and characteristics of altitude chamber aero-otitis media over a period of three months at Randolph Field, Texas. Statistics were obtained on 667 individual student flights in the low pressure chamber at simulated altitude of between 28,000 and 38,000 feet. The tympanic membranes were examined before and after flight and the students reported any aural symptoms which had developed during flight. The number of cases and degree of aero-otitis media are reported for this series.

G.

11,567

Karpovich, P.V. A COMPARATIVE STUDY OF THE BEHNKE AND THE HARVARD STEP-UP TESTS FOR PHYSICAL FITNESS. Proj. 148, Rep. 1, Aug. 1943, 7pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,567

To determine the value of the Behnke and the Harvard Step-up tests in measuring the physical fitness of soldiers, 558 aviation students were given these tests in a gymnasium and the Army Air Forces and Pre-flight School tests in the field. Correlations between the various tests are used as the index of test adequacy.

T. G.

11,568

Grether, W.F., & Smith, P.K. CRITERIA OF ANOXIA TOLERANCE. II. VALIDATION OF A GROUP OF PSYCHOMOTOR TESTS AS MEASURES OF THE EFFECTS OF PARTIAL ANOXIA UPON HUMAN PERFORMANCE. Proj. 89, Rep. 2, Dec. 1942, 8pp. AAF School of Aviation Medicine, Randolph Field, Tex.

11,568

To evaluate a group of psychomotor tests as measures of the effects of partial anoxia on human performance, the group of paper and pencil and apparatus tests were given in the altitude chamber while subjects were receiving oxygen by mask at simulation of 18,000 feet and again 15 minutes after the oxygen was turned off. Test scores were analyzed to determine the degree to which the various tests served as measures of the degree of impairment due to oxygen deficiency.

T.

11,569

Taylor, C.R. THE TOXICITY OF BERYLLIUM. Information Circular 15, Oct. 1949, 43pp. Defence Research Labs., Dept. of Supply and Development, Victoria, Australia.

11,569

The available information on the toxic and lethal properties of Beryllium and its compounds is reviewed in this report. Abstracts of papers are given under the following headings: skin lesions; lung injury; industrial processes and hazards; and methods of protection.

R. 63.

11,570

Hannen, P.T. FINAL REPORT ON PROJECT TED PTR EL-612 INDICATOR LIGHTS, EVALUATION OF. Serial No. ET-323, May 1948, 6pp. Electronics Test Div., Naval Air Test Center, Patuxent River, Md.

11,570

Laboratory tests and the opinions of pilots and engineers who made observations during both day and night flights in various types of aircraft were used to evaluate Korry indicator lights. The indicators were compared with standard lights and certain recommendations made as a consequence of the various observations and tests.

I.

11,571

Benaroff, R.W., & Wilks, S.S. DYNAMIC THORACIC PRESSURE-VOLUME RELATIONSHIPS WITH MASK AND TANK RESPIRATORS. Rep. 55-24, April 1955, 8pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,571

In this study, thoracic pressure-volume relationships were determined during intermittent mask and tank pressure breathing by measuring simultaneously the esophageal and mask pressures, the tidal volumes, expiratory reserves and vital capacities of six normal male subjects in order to evaluate and compare some of the physiological characteristics of these two pressure breathing methods.

T. G. R. 7

11,572

Duerfeldt, C.H. TESTING OF PROTOTYPE AD-5 WINDSHIELD WIPER. Proj. TED PTR AR-6314, Final Rep. 1, April 1958, 3pp. Naval Air Test Center, Patuxent River, Md.

11,572

This report covers the evaluation of a prototype windshield wiper installation on an AD-5 airplane under light and moderate rain conditions. The effectiveness at airspeeds up to 200 knots, the adequacy of the area cleared, and the ease of selecting wiper speed were tested.

I.

11,573

Swerling, P. SOME FACTORS AFFECTING THE PERFORMANCE OF A TRACKING RADAR. Res. Memo 989-1, Sept. 1954, 62pp. USAF Project RAND, Rand Corp., Santa Monica, Calif.

11,573

This report presents an analysis of tracking errors due to circuit noise in split-gate range tracking and monopulse angle tracking radars, with emphasis on the situation prevailing for low input signal-to-noise ratios. Approximate probability distributions are derived for tracking errors. A performance criterion called "loss rate" is defined which is helpful in defining the maximum range of a tracking radar; equations are given for loss rate in terms of signal-to-noise ratio, repetition rate, servo parameters, and target motion. An analysis of transient errors occurring during lock-on and probability of detection curves are also given.

G. I. R 6

11,574

Duerfeldt, C.H. THE AERO IA RECORDER AND ASSOCIATED GROUND PLAYBACK EQUIPMENT (NADAR) IN F2H-4: TEST AND EVALUATION OF. PRELIMINARY REPORT. Proj. TED PTR AR 42015-3, Rep. 1, Nov. 1955, 3pp. USN Air Test Center, Patuxent River Air Station, Md.

11,574

To evaluate the usefulness of the Aero IA Recorder and Associated Ground Playback Equipment (NADAR) for recording and reproducing radar scope attack displays, a functional evaluation was made. The NADAR recorder was installed in F2H-4 aircraft and used during 13 flights. Comparisons of the reproduced display with the pilots' impressions of the attack presentation seen in flight, and the film record of the radar scope display with a Hughes Remote Scope Recorder were made. Stability of equipment was noted. Recommendations are included.

11,575

Little, J.D.C. A LINEAR MODEL FOR A SUPPORT PERSONNEL CALCULATION. May 1956, 7pp. Combat Operations Research Group, Continental Army Command, Fort Monro, Va.

11,575

This report considers the problem of calculating the numbers and kinds of support troops (those who provide services) for given numbers and kinds of combat troops (those who man the weapons). A linear model is presented wherein the explicit solving of the problem is equivalent to inverting a matrix. Expressions are set up for showing the effect on given kinds of support personnel of changes in coefficients arising from changes in the level of support.

11,576

Keil, P.C. PUPILLARY SIZE IN RELATION TO DARK ADAPTATION. Proj. 16, Rep. 1, April 1942, 5pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,576

To study the relationship between pupillary size and light or visual acuity threshold under dark adapted conditions, measurements were made on 33 subjects with the Becht Adaptometer and the Miles Illuminous Disc Adaptometer. After 25 minutes of dark adaptation a flashlight photograph taken with an open shutter was made of each subject's eyes. Duration of flash was less than twelve hundredths of a second. Pupil size was then measured by means of a photograph of a millimeter ruler on the same scale as the photograph. The data were analyzed for possible relationships.

T. I. R 3

11,577

Ahles, F.H. Jr. WINTER FIRE-FIGHTING IN THE ARCTIC: STUDY OF CLOTHING, EQUIPMENT, AND METHODS. Proj. 22-1202-0002, Special Rep. 43, June 1952, 23pp. Arctic Aeromedical Lab., Ladd AFB, Alaska.

11,577

To study the equipment, methods, and clothing of winter fire-fighting in the Arctic, one observer was placed with the Ladd Air Force Base Fire Department for 14 days and later with the Fairbanks Fire Department for ten days. He answered all calls during these periods and actually became a member of the department. Temperatures ranged from -33 to -53 degrees Fahrenheit. All articles of clothing were evaluated as to speed of donning, warmth, water repellency, durability, and fireproof qualities; the fire-fighting equipment was evaluated for effectiveness of functioning in the cold; and the methods were evaluated for efficiency. Specific recommendations are made in all three areas.

I.

11,578

Alder, A.V. THE BINOCULARLY INDUCED PHI MOVEMENT AS A METHOD OF MEASURING BINOCULAR FIXATION DISPARITY. June 1957, 4pp. Indiana University.

11,578

To investigate the use of the phi phenomenon in the retinal periphery as a technique for measuring binocular fusion disparity, three series of determinations were made by three subjects. Fusion stimuli (fixation points or peripheral rings 2.9 to 32 1/2 degrees of arc at the eye) were presented in a haploscopic device. Maintaining constant fusion and fixation the subject adjusted a flashing light to a position of fusion with an alternately flashing light and then to a position where the lights appeared to be in the same direction and phi movement was eliminated. This position was taken as the disparity measurement. Six vergence positions from phoria were tested. The data were analyzed for accuracy or repeatability of measurements.

G. R. 18

11,579

Sidman, M. DRUG-BEHAVIOR INTERACTION. Proj. 6-60-10-016, Subtask 1, WRAIR-120-56, June 1956, 24pp. Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.

11,579

This report describes some of the relations between certain temporal characteristics of behavior and such pharmacologic agents as amphetamine, alcohol, sodium pentobarbital, and reserpine. Data are presented from a series of laboratory studies on animals. Types of behavior induced by experimental control were appetitive, aversive, timed, anticipatory and anxiety and the effects of drugs were studied on such behaviors. The need for systematic behavioral investigation prior to drug investigation in an attempt to bring order into the facts of drug-behavior interaction is discussed.

G. R 20

11,580

Randall, W.C., Peiss, C.N. & Hertzman, A.B. AN ANALYSIS OF THE DESICCATING CAPSULE TECHNIQUE IN THE MEASUREMENT OF REGIONAL WATER LOSSES FROM THE SKIN. Contract AF 38 (600) 96, WADC TR 6680, Part 14, Dec. 1953, 16pp. USAF Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio (St. Louis University, St. Louis, Mo.).

11,580

This paper summarizes experiments concerning the capabilities of the desiccating capsule technique in the measurement of regional water losses from the skin. The technique is described and its accuracy, reproducibility and ease of administration are compared with those of other accepted procedures for measuring cutaneous heat loss.

T. G. I. R 10

11,581

Neely, K.R. THE MEASUREMENT OF NOISE. Academy of Medicine, Toronto Bull., Dec. 1956, 4pp. (Defence Research Medical Labs., Toronto, Canada).

11,581

This paper discusses the increased noise levels to which people are exposed today and gives some typical overall noise levels in tabular form. The measurement of noise is discussed in terms of standard types of measurements and purposes for which they are used. The noise measuring equipment, factors to be considered in selection, calibration of equipment, errors in measurement, and ways of presenting noise measurement data are considered.

11,582
Francis, S.A. & Hawkins, G.E. RADAR ROOM LIGHTING. A REPORT ON THE EXPERIMENTAL INSTALLATION AT AN AIR DEFENSE DIRECTION CENTER SITE P-10. Contract AF 19(604) 1545. AFRC TN 55-75, Nov. 1955, 25pp. Francis Associates, Marion, Mass.

11,582
This report outlines the problems of an ambient lighting system for a radar room and suggests control methods for producing higher lighting levels than heretofore possible without reducing operator efficiency. The theory and research on which the recommendations are based are detailed under the following topics: (1) methods of reducing the non-specular reflections related to lighting intensity (hood, polaroid filters, and selective spectrum lighting systems); (2) methods of reducing the glare component (lowered ceiling, light source, equipment arrangement), and (3) combined reduction of specular and non-specular reflections (fluorescent materials, wall and floor color). An experimental installation at an Air Defense Direction Center SITE P-10 is described in detail and recommendations for research are made. T. G. I. R 11

11,583
Hortsmann, A.B., Randall, W.C., Peiss, C.N., & Adams, J.G. CUTANEOUS THERMOSENSORY RECRUITMENT OF SWEATING. 15TH OF A SERIES OF REPORTS ON STUDIES ON CUTANEOUS HEAT LOSSES. Contract AF 18(600)-96, RDO 696-69, WADC TR-6680, Dec. 1955, 17pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (St. Louis University).

11,583
To study the effects of sudden changes in ambient temperature (and of local heating and cooling) on sweating, a series of experiments were performed. Sweating was recorded by capillary sample every three minutes or by sweat prints every 30 seconds before, during, and after sudden transfer of subject from one temperature to another. Sublingual, axillary, and skin temperatures were recorded automatically. The same procedures were used when only the hand was heated or cooled. Six subjects were used. The data were analyzed to show rate of change as function of experimental conditions. The findings are discussed in relation to the role of cutaneous thermal receptors in eliciting changes in sweating levels. T. G. R 8

11,584
Bolt Beranek and Newman, Inc. CAPABILITIES AND LIMITATIONS INVESTIGATION OF LONG-RANGE PUBLIC ADDRESS EQUIPMENT. PHASE 3: CONSTRUCTION OF INSTRUMENTATION FACILITY MAY 1955 TO OCTOBER 1955. Contract DA 36-039-sc-64503, Proj. DA 3-99-12-022 and 3-27-01-015, Proj. SC 132B and 2121E, Final Rep. 406, Dec. 1956, 144pp. Bolt Beranek and Newman, Inc., Cambridge, Mass.

11,584
This is the final report of Phase Three of a study of the capabilities and limitations of long-range public address systems for the transmission of speech under varied meteorological and terrain conditions. The construction and operation of a transportable instrumentation facility for gathering data are described in detail and a comprehensive block diagram given. The major part of the report describes the various components, such as the Sound Radiating System, Sound Receiving System, Temperature and Wind Speed Gradient Measuring Systems, Thermistor, Vane, and Cup Anemometer Turbulence Measuring Equipment, Meteorological Equipment, and Power Supplies. Operating procedures, wiring diagrams, schematics, and maintenance instructions are included. T. G. I.

11,585
Reaser, P.B. COOLING GRADIENT CALORIMETRY. A TECHNIQUE FOR STUDYING PERIPHERAL CIRCULATION. I. METHOD AND PROCEDURE. Proj. 6-64-12-028, Rep. 124, Oct. 1953, 8pp. USA Medical Research Lab., Fort Knox, Ky.

11,585
A new approach to the study of vascular response is presented. Three variations of calorimeters based on three variables concerned in cold are described: a disc calorimeter, a titration calorimeter, and a cooling gradient ice calorimeter. The method and procedures for using these calorimeters in studies of cooling rate, heat loss rate, and temperature are described. The application of this technique to the study of a variety of problems is discussed. G. I. R 4

11,585
Reaser, P.B. COOLING GRADIENT CALORIMETRY. III. THE ROLE OF POSITION IN PERIPHERAL VASCULAR RESPONSES. Proj. 6-64-12-028, Rep. 128, Nov. 1953, 7pp. USA Medical Research Lab., Fort Knox, Ky.

11,586
To determine if cooled hands are more susceptible to position change than warm hands; the relationship between cooling and position of hands relative to heart level at temperatures between 23 and ten degrees Centigrade were studied on 13 subjects. An ice calorimeter was used to measure heat output rate at the various temperatures with the hand at, above, or below heart level. Some observations were made of response to venous occlusion (cuff pressure applied to arm). The heat output data are analyzed for effect of position and hand temperature--a possible explanation of the findings on a physical basis is offered--implications for manipulative tasks in cold environment are pointed out. T. G. I. R 10

11,587
Shambaugh, G. TEMPERATURE RECEPTORS, AN ANNOTATED BIBLIOGRAPHY. Proj. 7-64-12-004C, Tech. Rep. EP-24, April 1956, 55pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,587
This bibliography on temperature receptors is divided into four sections. The first three are introduced by summary comments followed by annotated references listed chronologically. The areas treated are: (1) temperature receptors in man, (2) temperature receptors in other animals, and (3) the effects of chemicals on temperature receptors. A final section presents an alphabetical listing of all references cross-indexed, together with additional pertinent references. T. R 246

11,588
USA Board NR2. TEST OF SCOTCHLITE REFLECTIVE SHEETING FOR VEHICLE REFLECTORS. Proj. 1898, April 1955, 10pp. USA Board NR2, Fort Knox, Ky.

11,588
To determine the suitability of reflective sheeting (Scotchlite) to replace all glass and plastic reflectors on Army motor vehicles, a series of tests were conducted. Methods prescribed by the manufacturer were followed in applying disks to the painted surfaces of vehicles and time was recorded for each method. Reflective characteristics were compared with standard reflectors by measuring the respective distances at which each could be detected under various conditions of night illumination. Evaluations were also conducted over a period of one year of field use and during normal tactical exercises. Observations were made as to adhesive and reflective characteristics, durability, and tactical recognition symbols. Recommendations are included. G. I.

11,589
Keys, A., Taylor, H.L., & Brozek, J. NUTRITION AND PERFORMANCE CAPACITY. Contract DA44-109-qm-1526, Proj. 7-84-12-011, Res. Proj. Rep. 8 (Phase), June 1953-Sept. 1956, 88pp. Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (University of Minnesota).

11,589
This report presents data obtained during an investigation of nutrition and performance capacity. The subjects were 13 men divided into "restricted" and "unrestricted" groups. During an 11-day control period all subjects were given 3,190 calories per day; a 12-day restriction period followed with the groups being given 580 and 3,190 calories per day respectively; and finally, a 15-day rehabilitation period where both groups were given 3,988 calories per day. Unlimited water was supplied and a measured amount of exercise. The data include measures of body composition and compartments, basal data, aerobic and anaerobic work, Harvard Fitness Test results, ballistocardiography, and psychomotor performance.

11,590

Swearingen, J.J. DESIGN AND CONSTRUCTION OF A CRASH DUMMY FOR TESTING SHOULDER HARNESS AND SAFETY BELTS. Preliminary Report. April 1951, 15pp. Civil Aeronautics Medical Research Lab., CAA Aeronautical Center, Okla.

11,590

A dummy is described which attempts to simulate human body dimensions, center of gravities, joint movements, muscle resistance, muscle return, and compressibility and resiliency of tissues. It is proposed for studies of crash injury, and the testing of protective devices. T. I. R 8

11,591

Fish, R.E. FINAL REPORT ON VIBRATION TEST OF STANDARD ARMORED INFANTRY VEHICLE (AIV) T73 AND MODIFIED AIV T73. 4th Rep. on Proj. TTI-198, Proj. 548-12-001, Jan. 1957, 67pp. Development and Proof Services, Aberdeen Proving Ground, Md.

11,591

To determine the effects of various suspension and sound absorption modifications of the standard Armored Infantry Vehicle T73 with respect to reduction of fatiguing vibrations and crew compartment noise level, a series of tests were made. An unmodified vehicle was instrumented and operated to provide data on vibration and noise level. The vehicle was modified by installation of crowned support and idler wheels, cushioned sprockets, and interior soundproofing and the measurements were repeated. The data were compared and discussed in relation to comfort levels. Recommendations are included. G. I.

11,592

Hemingway, A. SURVEY OF RESEARCH ON THE PROBLEM OF AIRSICKNESS IN THE ARMY AIR FORCES. Proj. 381, Rep. 1, April 1945, 36pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,592

This report is a survey of research on the problem of airsickness in the Army Air Forces. A brief history of the problem is presented and the symptoms are described. The incidence of airsickness among aviators is discussed. This leads to a chapter emphasizing the importance of selection and outlining the various procedures which have been used to gauge susceptibility to motion sickness. T. G. I. R 48

11,593

Hegnauer, A.H., & Angelakos, E. HAND AND FINGER BLOOD FLOW RATES UNDER DIFFERENT TEMPERATURE CONDITIONS. Contract AF 18(600)-65, WADC TR 55-501, Dec. 1953, 51pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Boston University School of Medicine).

11,593

This is a review of the existing literature on hand and finger circulation under different temperature conditions. What is known about circulation through the hand and fingers, volume flow in relation to ambient temperature and its reflex control and role in body thermal balance is reviewed. The vascular anatomy of the hands and fingers is described and their importance in temperature response emphasized. The two chief methods (calorimetrically or plethysmographically) of estimating blood flow rates are discussed and range of variation included. T. G. R 82

11,594

Rulon, P.J. & Horowitz, M.W. STUDY OUTLINE FOR TRAINING ANALYSIS OF PILOT'S TASK IN TRANSITIONING TO JET VTOL AIRCRAFT. Contract N 61339 74, Letter Order 2, March 1957, 14pp. Educational Research Corporation, Cambridge, Mass.

11,594

This study plan outlines the major operational problems for the pilot involved in making the transition to jet vertical-take-off-and-landing (VTOL) aircraft. It is essentially a plan of study for a man-machine task analysis. Results anticipated are: a statement of training requirements, characteristics of simulators and training aids, and possible recommendations for changes in design and operational procedures.

11,595

USA Personnel Research Branch. ANNUAL CUMULATIVE PROGRESS REPORT. Dec. 1953, 41pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

11,595

This report presents brief summaries of progress on government supported research in the following areas: personnel selection (11 studies reported), personnel classification (ten studies), personnel assignment (six studies), and personnel utilization (15 studies). Most of the studies were performed with the military situation in mind, but some have more general significance. R. some

11,596

John A. Hinckley and Associates. HAND WARMING IN UNDERWATER OPERATIONS. Prepared under Contract Monr-1402(00), Final Rep., Feb. 1956, 18pp. John A. Hinckley and Associates, Chicago, Ill.

11,596

This is a final report on an investigation of specific methods which might be used to warm hands in underwater operations. Experiments were made with infrared radiators focused on blackened hands, attempts were made to construct gloves of electrically conducting materials, and the use of high frequency alternating current to develop heat at the hand-water interface was tried out. The potential of these methods is evaluated and compared with that of a method by which warmed water is supplied to the hands. G. I.

11,597

Divari, N.B. VARIOUS ARTICLES. (I. RELATION OF THE LUMINOSITY OF THE NIGHT SKY TO THE AZIMUTH. II. EFFECT OF EXTINCTION OF FLUORESCENCE ON THE LUMINOSITY OF THE NIGHT SKY. III. A NEW METHOD OF SEPARATING THE COMPONENTS OF THE NIGHT SKY LUMINESCENCE). Rep. ATIC 242118, 1955, 13pp. Air Technical Intelligence Center, Wright-Patterson AFB, Ohio. (Akademiya Nauk Kazakhskoy SSR Izvestiya Astrfizicheskogo Instituta, 1, 1-2).

11,597

This report contains three papers concerned with luminosity of the night sky. The first describes observations made of night sky brightness on the shore of Lake Issyk-Kul at a point of latitude about 42 degrees, 22 minutes. Calculations of the atmospheric component of the luminescence are related to the azimuth. The second paper considers the question of the possible influence of two-body collisions on the observed intensity of the green line of luminescence of the night sky. The last paper considers a new method of separating the components of the night sky luminescence which has been developed. (Graphs that originally accompanied these papers are omitted in this copy.) T. R 28

11,598

Reynolds, S.R.M. SUMMARY OF UNIT OXYGEN OFFICERS' OPINION OF DEMAND EQUIPMENT. Proj. 80, Rep. 1, Sept. 1942, 18pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,598

This is a summary of opinion on the merits of oxygen demand equipment (including both masks and regulators). The information was derived from questionnaires answered by 418 Unit Oxygen officers upon completion of their course. Tables summarize the results. The questionnaire itself is included in an appendix. T.

11,599

Kotter, R.V., & Holmen, M.G. INFANTRY OCS EVALUATIONS AND COMBAT PERFORMANCE. Tech. Rep. 8, June 1954, 9pp. Human Resources Research Office, The George Washington University.

11,599

The objective of this research was to find out which evaluation devices in Officer's Candidate School (OCS) were useful in predicting future performance of lieutenants in Infantry combat divisions. Ratings by their commanding officers were obtained on the performance of 259 graduates of the OCS who served in divisions in Korea in 1953. These ratings were compared with eight OCS ratings and four pre-OCS ratings. The results are analyzed and conclusions offered. T. G.

11,600
Hall, E.L. A REPORT ON INTEGRAL INSTRUMENT
LIGHTING. Rep. FM-576, May 1955, 24pp.
Cranair, Fort Worth, Tex.

11,601
This report summarizes information that has been
gathered for a study of integral instrument illumination
for aircraft. The topics discussed are: theory, theories
or basic principles of existing lighting systems (ring
lighting, edge lighting, two-panel system, edge lighting,
center lighting, tunnelillumination, and panelmount light-
ing), standards and specifications which exist, techniques
and methods of light measurement, and the objectives of
this particular program. Future plans are indicated.
I. R. 21

11,602
Miller, E.R. SHIVERING INDUCED BY THE COMBINED
USE OF HYPERVENTILATION AND EXPOSURE TO COLD
AIR. Rep. No. 11 CR, March 1944,
9pp. Fort Monmouth Signal Lab., Signal Corps
Ground Signal Agency, Fort Monmouth, N.J.

11,603
The effect of reduced alveolar carbon dioxide induced
by hyperventilation was investigated in relation to the
mechanism of shivering under the following conditions:
(1) subjects, clothed in indoor winter dress, were kept
in warm room with hands and feet exposed to cold atmos-
phere of ice-jacketed boxes, (2) same as above but hands
and feet were not cooled, and (3) subjects were kept in
a cool room and amount of exposed body surface was varied.
Observations included skin and rectal temperatures,
muscle action potentials, and samples of alveolar air.
The data were analyzed in terms of changes due to hyper-
ventilation and shivering. Some information on control
of shivering is discussed.
T.

11,604
Ablander, K.L., & Henrysson, S. SELECTION OF RANGE
FINDERS IN THE SWEDISH NAVY. Rep. 14, Feb. 1955, 2pp.
Psychological Lab., University of Stockholm.

11,605
This report describes the development of a group test
of depth perception and its use in the selection of range
finders in the Swedish Navy. The individual test from
which the group test was developed was based on a stereo-
scope and the Halfrich pictures produced by Zeiss in
Jena. The same pictures were used for producing a three-
dimensional film which could be viewed by 30 subjects
at a time. Some preliminary data on test validity are
given.
T.

11,606
Peterson, G.E. THE INFORMATION BEARING ELEMENTS OF
SPEECH. 1952, 8pp. Bell Telephone Labs., Inc.,
Murray Hill, N.J.

11,607
This study deals with those aspects of speech which
are phonetically significant. A technique is described
which has been developed for obtaining phonetically
equivalent speech samples in different phonetic contexts
and from different speakers. Data on two front vowels
by different types of speakers are discussed (the figures
presenting these data are not included with this report).
The technique has also been applied to the evaluation of
words containing these vowels. The relation of the find-
ings to phonetic theory is discussed.
R. 9

11,608
Craig, E.R. THE HUMAN CONTROL DYNAMIC ANALYSIS FACILITY.
Res. & Devel. Rep. 615, July 1955, 7pp. USN Electronics
Lab., San Diego, Calif.

11,609
This report describes a facility for the dynamic ana-
lysis of human controller characteristics. The problems
to be investigated are the information handling capaci-
ties, transfer functions, and servo characteristics of
man as related to the control operations, information
processing, and monitoring aspects of electronic equip-
ment and systems. The major items of equipment are de-
scribed; the present status of operations and projected
plans are discussed.
T.

11,610
Rappaport, A., & Schwartz, L.S. THE ROLE OF
COST IN FORMULATING MERIT CRITERIA FOR COMMUNI-
CATION SYSTEMS. Contract AF 33(616)-1540,
presented before meeting of Operations Research
Society of America, May 1956, 9pp. New York
University.

11,611
This paper demonstrates the manner in which cost de-
termines the formulation of merit criteria in communi-
cation systems. The problem treated is one-way communi-
cation between a transmitter and a receiver over a channel
into which noise has been introduced. Cost of operation
is then treated in terms of specified conditions - amount
of information, reliability, noise density, and latency.
Basic parameters which determine cost - power, bandwidth,
time - are defined and a possible set of cost relation-
ships for the three merit parameters developed. Steps
for determining power, bandwidth and time are given.

11,612
Fox, W.R. VISUAL DISCRIMINATION AS A FUNCTION
OF STIMULUS SIZE, SHAPE, AND EDGE GRADIENT.
Contract AF 33(616)-3405, Tech. Note 138, Aug.
1957, 22pp. Physical Research Labs., Boston
University.

11,613
To investigate the effects of stimulus (target) size,
shape, and edge gradient on detection and recognition,
54 targets consisting of six shapes (circle, square,
triangle, star, cross, and irregular) each constructed at
three different edge gradients, three sizes, and five
contrasts were presented randomly to two subjects. The
subjects were asked first to tell whether or not they
saw anything and then to identify the figure. The con-
tract threshold data were analyzed and functions estab-
lished showing their dependence for detection and rec-
ognition on the size, shape and edge gradient of the vi-
sual stimuli. The relation of detection to recognition was
further studied.
T. G. I. R 62

11,614
Fisher, V.E. THE EFFECT OF STRIAE ON IMAGE
QUALITY. Contract AF 33(616)-3405, Tech. Note
139, May 1957, 61pp. Physical Research Labs.,
Boston University.

11,615
To investigate the effect of striae in optical glass
on image quality, five optical glass blanks were selected
and prepared so that defects other than striae were at a
minimum. The samples were graded for striae content
(National Bureau of Standards test procedure) and per-
centage of light deviated in the image plane measured
with the Scatterometer. This device measures the light
intensity distribution in the plane of an image of a
point source and time may be used to indicate the amount
of scattered light introduced by a plane-parallel blank
glass. The data were analyzed for effects of amount and
grade of striae. The implications for aerial photo-
graphic reconnaissance are discussed.
T. G. I. R 12

11,616
Moffitt, O.P., Jr., Lett, J.E., & Tonndorf, J. AVIATION
OTOLARYNGOLOGY. SAM Textbook 4, April 1956, 135pp.
USAF School of Aviation Medicine, Randolph AFB, Tex.

11,617
This volume is a revision of a textbook published by
the School of Aviation Medicine during World War II. It
was prepared by present and former members of the staff
of the Department of Otolaryngology and is intended for
flight surgeons and students of aviation medicine. Ma-
terial to be found in standard reference works is not
covered. The various parts cover: (1) the otolaryngo-
logical examination, (2) the upper air passages, (3)
otology, and (4) the vestibular apparatus. In all in-
stances, the physiology, testing or clinical examination,
diseases, and injuries are treated and a brief list of
suggested references for further study is given.
T. G. I. R 48

11,605

Lieber, L.M., Greider, M.R., & Senceteris, L.J. EFFECTS OF MODERATE HEAT STRESS, ALTITUDE, AND TIME ON THE DEHYDRATION RATE OF SUBJECTS WEARING THE VENTILATED FULL PRESSURE SUIT. *Aviation, Space, and Environmental Medicine*, June 1957, 7pp. Air Crew Equipment Lab., NACA, Philadelphia, Penn.

11,606

To determine the degree of hydration that can be anticipated by ventilated flying personnel wearing impermeable garments under moderate heat stress, two subjects (wearing the ventilated full pressure suit) were exposed to two states of comfort (comfortable and comfortably warm), two altitudes (sea level and 15,000 feet), for two different durations (two and four hours). Each subject went through each condition twice. Total weight loss, body weight deficit, and per cent evaporation were measured to determine extent of dehydration as functions of time, altitude and heat stress conditions. Possible effects of prolonged flights in a comfortably warm environment with high ventilating air flow are discussed. C. R. 3

11,610

Mohler, I. ORIENTATION BY AURAL CLUES. "Die Pyramide". *Wissenschaftliche Monatsschrift*, May 1957, 6 (7), 15pp. (Contract AF 61(514)-585, USAF European Office of AFMC, Brussels, Belgium).

11,610

To explore the possibilities and limitations of orientation by means of sound, an extended series of studies was undertaken. Methods of investigation were developed which permitted measurement of the "obstacle sense" (avoidance of obstacles without visual aid) in large numbers of subjects. Optimum conditions of orientation and the restrictions imposed by the hearing capacity of the human ear were investigated. A sonic guiding device to be worn by the subject was developed and tested for its effectiveness in extending the "acoustic protective zone" both in laboratory and field conditions. The effect of training on the "obstacle sense" was studied. Practical implications of these findings are discussed. C. I. R. 3

11,611

Kibel, E.R. THE RELATIONSHIP BETWEEN LEG STRENGTH, LEG ENDURANCE, AND OTHER BODY MEASUREMENTS. *Unmo. Proj.*, Jan. 1950, 11pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Kansas).

11,611

To investigate the relations between leg strength, leg endurance, and other body measurements, 590 potential pilots and pilots were used as subjects. Using especially designed apparatus, leg strength (pressure, in pounds, that could be exerted by extension of hip and leg on foot pedal) and leg endurance (time, in seconds, that a force of 290 to 310 pounds could be maintained on foot pedal) were measured. In addition, data relative to the following were secured: height, weight, age, and lower leg length. For some groups total leg length, sitting height, girth of thigh and leg, and grip strength were measured. The data were analyzed by correlational techniques to study relations between measures. T. G. I.

11,612

Dunlap and Associates, Inc. HUMAN ENGINEERING STUDIES OF THE FLEET BALLISTIC MISSILE SYSTEM. Contract NORD-17719, Prog. Rep. 2, June 1957, 7pp. Dunlap and Associates, Inc., Stamford, Conn.

11,612

This is a progress report on the human engineering studies of the Fleet Ballistic Missile System (FBM). These studies include all aspects of the FBM system - navigation, fire control, launching, instrumentation, environmental factors, systems analysis - where human operators or maintenance personnel are involved. A brief summary of the work to date is given along with plans for future investigation. I.

11,613

Morris, R.C. DEVELOPMENT OF AN EFFICIENT SET OF DIMENSIONS FOR DESCRIPTION OF AIR FORCE GROUND-CREW JOBS: PART II. TECHNICAL APPENDIX. Contract AF 33(038)-13474, Proj. 7700, AFTRC-TN-56-63, June 1956, 36pp. Personnel Research Lab., AFTRC, ARDC, Lackland AFB, Tex. (Teachers College, Columbia University).

11,613

This is a technical appendix for use with Part I, Rating Dimensions, of this study. The following data are presented: (1) intercorrelations between ratings of 130 worker-job characteristics on 150 Air Force jobs; (2) factor loadings of 130 worker-job characteristics; and (3) final rotated factor loadings of 130 worker-job characteristics. T.

11,614

Neely, K.E., Lewis, R.E.P., & MacKinnon, W.D. DESIGN OF CONSOLES AND VOICE COMMUNICATION SYSTEMS FOR AERODROME CONTROL TOWERS. *Canad. Aero. J.*, Jan. 1957, 3(1), 17-20. (Proj. D 77-94-20-37, DRML Rep. 207-1, Defence Research Medical Labs., Toronto, Ontario, Canada).

11,614

To study the problems associated with the introduction of ultra high frequencies and the resultant increase in number of radio channels in Aerodrome Control Towers, studies were made of the literature pertaining to air traffic control procedures and voice communication systems. A mock-up of a Control Tower and associated control consoles was then built. Various arrangements, designs, and procedures were tried out. In light of these procedures, recommendations are made for the design of control consoles and voice communication equipment for use in Control Towers. Principles for the guidance of Control Tower planners are stated. I. R. 1

11,615

Wheeler, L.J., & Dickson, E.D.D. THE DETERMINATION OF THE THRESHOLD OF HEARING. *J. Laryng. & Otology*, Aug. 1952, 66(8), 379-395. (Acoustics Lab., RAF Central Medical Establishment, London, England).

11,615

To determine the absolute value of the threshold of hearing under carefully controlled conditions which can be used as a reference standard for the calibration of audiometers, 514 otologically normal male subjects (age range 18 to 23) were tested. Threshold determinations (minimum audible pressure) were made at seven frequencies from 256 to 8,192 cycles per second for earphone listening. Distribution curves of the data (decibels below a sound pressure level of one dyne per square centimeter) were analyzed to gain figures representing absolute values for threshold of hearing for each of the seven frequencies. Comparison is made with results of other similar studies. T. G. I. R. 1

11,616

Dadson, R.S., & King, J.H. A DETERMINATION OF THE NORMAL THRESHOLD OF HEARING AND ITS RELATION TO THE STANDARDIZATION OF AUDIOMETERS. *J. Laryng. & Otology*, Aug. 1952, 66(8), 366-378. (National Physical Lab., RAF Central Medical Establishment, Teddington, England).

11,616

To provide additional data, obtained under controlled conditions, which may assist in establishing a reference standard for the calibration of audiometers, the normal threshold of hearing (minimum audible pressure) by earphone listening was determined for 99 otologically normal subjects (ages between 18 and 25 years) over a frequency range of 80 to 15,000 cycles per second. The objective basis of calibration as used at the National Physical Laboratory (England) was described. The threshold data obtained were compared with those from other such surveys and the need for international discussion indicated. T. G. I. R. 11

11,617

Wijberg, L. INSTRUCTION MANUAL FOR THE PEAK PULSE BRIGHTNESS PHOTOMETER. LON-0188, April 1955, 15pp. Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

11,617

This manual describes a peak pulse brightness photometer and gives instructions for its use in making brightness comparisons. The various sections describe the optical system, the electronic circuits, principles of operation, operating procedure, and instrument adjustment and calibration. Circuit diagrams, calibration curves, and photographs are included. G-1.

11,618

LePage, W.K., Balabanian, M., & Goldman, S. STUDY AND INVESTIGATION OF METHODS OF COMBATING MULTIPATH TRANSMISSION EFFECTS. Contract AF 30(635)-2862, SUM Rep. EE350-565F, Final Rep., March 1956, 15pp. Rome Air Development Center, Rome, N.Y. (Syracuse University Research Institute).

11,618

This is the final report of a project whose object was to find a reliable means of communication transmission over long ranges (3,000 kilometers maximum) in the two to 30 microcycle carrier frequency range. An analysis of the problem led to a search for a signal in which information could be extracted after going through a link having severe multipath effects. Using various ideas and mathematical techniques of information theory a frequency code communication was developed and described. The solution has not yet been verified by building equipment in accordance with the conclusions of the study. I.

11,619

Smith, P.K., & Hemingway, A. EFFECT OF HYOSCINE (SCOPOLAMINE) ON SLEEP SICKNESS AND ON PERFORMANCE. Proj. III, Rep. I, March 1943, 2pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,619

To determine the effect of hyoscine hydrobromide (scopolamine) on sleep sickness and performance, subjects who became ill during a 20 minute swing were used. One group received one-half milligram of hyoscine and the other a placebo before swinging a second time. From the symptoms exhibited and minutes elapsed before vomiting, if it occurred, an arbitrary score was assigned in which ten represented optimum performance. In addition, a group of psychomotor tests (addition, code, steadiness, and pursuit) were given with and without oxygen in a high altitude chamber (18,000 feet) approximately two to three hours after oral administration of hyoscine or placebo. The data were analyzed for differences between the two groups.

11,620

McCullom, I.W. FINAL REPORT TO THE SCIENTIFIC OFFICER. Prepared under Contract Monr-1268(01), Proj. NR 145-075, Dec. 1956, 10pp. San Diego State College Foundation.

11,620

This is a final report on a program of work in conjunction with development of the Human Engineering Guide for Equipment Design by the Joint Services Committee. A brief summary of assigned tasks and procedures is given. These include provision of supporting service to the chairman of the committee, building a Human Engineering bibliography, development of special bibliographies and abstracts, translation of German publications, participation in experimental studies, special reports and projects, and preparation of illustrations for the Guide. Lists of publications, technical reports, and other materials developed are included. R 13

11,621

Kambacher, W.C., & Gallup, M.P. HUMAN ENGINEERING INVESTIGATIONS OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT: INVESTIGATIONS INTO THE OPTIMAL CHARACTERISTICS OF VISUAL WARNING AND CAUTION SYSTEMS. Etc. TED MAN EL-62004, NANC ACCL-299, Part 7, Aug. 1956, 13pp. Air Crew Equipment Lab., NANC, Philadelphia, Penn.

11,621

To investigate the effect of varying the temporal characteristics of warning lights on attention-getting and attention-holding values, 12 subjects were given a tracking task and required to respond to both the onset and offset of four small lights on a warning panel. These stimuli consisted of a steady, a flashing, or an alternating light against a homogeneous background at an angle of 31 to 43 degrees from line of sight. Both day and night lighting conditions were used. The data (reaction times to onset and to offset) were studied by analysis of variance techniques for differences due to kinds of light and to offset or onset of lights. T. I. R 2

11,622

Touger, M.L. (Proj. Dir.). PRODUCT IMPROVEMENT. AIC-10 ACOUSTICAL COMPONENTS. Contract AF 33(600) 33172, Rep. 7-8, April 1957, 77pp. Radio Corporation of America, Camden, N.J.

11,622

This is a progress report of a study to determine the characteristics of a sound powered telephone structure with an end objective of determining which parts may be lightened to reduce weight and size and the changes necessary to improve acoustical efficiency. Summary sheets are presented which break the program down into specific items (ear protector, headsets, microphones, and the like) with present status indicated for each item and reference to where more specific information may be obtained. Appendices contain detailed reports on methods for increasing apparent volume of an earcushion, information gathered on Air Force Base visits, psychoacoustic testing, and measurement of varying boom lengths on M-33 microphone. T. G. I. R 20

11,623

Gardner, A.J., Gifford, F., Jr., Mitchell, R.L., Giclas, H.L., et al. OPTICAL STUDIES OF ATMOSPHERIC TURBULENCE. Contract AF 19(604)-953, AFRCR-TR-261, 1956, 53pp. Lowell Observatory, Flagstaff, Ariz.

11,623

The studies reported here were concerned both with the properties of telescopic images that are atmospherically induced and with the probable nature of their causes. Scintillation, image motion, and image quality were observed by various electronic and photographic techniques, and the dependence or independence of these observables on one another and on various physical and meteorological parameters were investigated. Other studies included the distribution of light in telescopic images and the effects of terrain and temperature on atmospheric seeing. T. G. I. R 2

11,624

Van Cott, H.P., Berkun, M.M., & Purifoy, G.R. Jr. HOW TO DETERMINE JOB KNOWLEDGE CONTENT: THE APPLICATION OF A PROCEDURE TO SEVERAL AIR FORCE JOBS. Contract AF 18(600)-1205, Proj. 7714, Dec. 1955, 40pp. Training Aids Research Lab., AFTRC, ARDC, Chanute AFB, Ill. (American Institute for Research, Pittsburgh, Penn.).

11,624

This paper reviews the need for encoded "conceptual" or "knowledge" content of a job to support training and job performance. Criteria for a procedure for deriving conceptual supports are listed and reference made to a previous report outlining this procedure. Illustrations are given of the application of the procedure to data from typical Air Force jobs. Behaviors from four different jobs (jet engine and ground control approach equipment maintenance, crash crew operations, and helicopter pilot) were selected and each step involved in determining conceptual support for each behavior is demonstrated. T. G. R 1

11,625

Rulon, P.J. & Schweiker, R.F. THE TRAINING OF FLIGHT-SIMULATOR MAINTENANCE PERSONNEL: A PROPOSED COURSE THAT EMPHASIZES TROUBLESHOOTING. Contract AF 18(600) 1325, Proj. 7709, Task 37390, Tech. Mem. ML TM 56-17, July 1956, 77pp. USAF Maintenance Lab., Lowry AFB, Colo.

11,625

From detailed information on required maintenance activities in B-47 flight-simulators and analysis thereof, a training course oriented toward trouble-shooting is outlined. Situational factors (characteristics of trainees, length of training, competence of graduates), course, organization and coverage and instructors' directions are discussed. Training materials devised for the course are described in detail and samples of these presented.

I.

11,626

Carman, P.D., & Brown, H. DIFFERENCES BETWEEN VISUAL AND PHOTOGRAPHIC CALIBRATIONS OF AIR SURVEY CAMERAS. Photogrammetric Engng., Sept. 1956, 623-626. (National Research Council, Ottawa, Canada).

11,626

To explore the effects of spectral differences between visual and photographic calibrations of air survey cameras, a number of special measurements were made on two Wild RC5A cameras. Spectral response curves of (1) the eye to standard illuminant "C" (approximation to daylight); (2) a photographic approximation to the visual condition (Super XX Aero emulsion with Wratten 13 filter to mean noon sunlight); and (3) the combination used in photographic calibration. Chromatic difference of distortion was measured at a number of field angles. The camera was further tested on the photographic calibrator using two different filter arrangements with the usual "mean noon sunlight" and the data compared with simulated visual calibration data plotted on the photographic distortion curve. G. R 2

11,627

Riendeau, R.P., Welch, B.E., Crisp, C.E., Crowley, L.V., et al. THE RELATIONSHIPS OF BODY FAT TO MOTOR FITNESS TEST SCORES. Proj. 6-60-11-020, Rep. 209, Aug. 1957, 4pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

11,627

To examine the role of body fat on motor activities, 61 young men on active duty with the armed forces were selected randomly to serve as test subjects. Body fat was computed from body density which was determined by the Archimedian Principle using specific gravity techniques. A battery of representative motor fitness tests (pushups, squat thrusts, situps, standing broad jump, 75-yard dash, and 220-yard dash) were administered (three times) as outlined in the United States Army Physical Training Manual. The data were analyzed by correlational methods to show relationships between per cent body fat and the selected motor fitness tests. Body weight was similarly analyzed.

T. R 8

11,628

Levy, L.M., Bernstein, L.M., Francis, E., Harding, R.S., Krzywicki, H.J., et al. AN ASSESSMENT OF THE POSSIBLE TOXIC EFFECTS TO HUMAN BEINGS OF SHORT-TERM CONSUMPTION OF FOOD STERILIZED WITH GAMMA RAYS. Proj. 6-60-11-020, Rep. 203, March 1957, 16pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

11,628

To assess possible toxic effects to human beings of short-term consumption of food exposed to gamma rays of three million roentgen-equivalents-physical (rep), 18 volunteers consumed such food for short periods of time (15 days). Four studies were conducted in which 35, 60, 80, and virtually 100 per cent of the calories were supplied by irradiated items of food. These studies were separated by intervals of several months. Careful clinical and laboratory observations for toxic effects were made during and for a year following the feeding. Analysis of the data were made to determine deleterious effects to general health and damage to blood forming organs, liver, or kidneys due to the irradiated food. Recommendations for further tests are made.

T. G. R 24

111 2-1095

11,629

Welch, B.E., Crisp, C.E., Isenstein, R.S., & Roemer, W.C. THE EFFECT OF THE LEVEL OF EXPIRATION ON BODY DENSITY MEASUREMENT. Proj. 6-60-11-020, Rep. 207, July 1957, 8pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

11,629

To determine the effect of the level of expiration on body density measurements, body density was measured for 26 normal healthy adult males by the underwater weighing method. Vital capacities were measured at the same time. Maximum expiration levels were established by several trials under water and when consistent values were obtained body density was determined. The same technique was used to determine body capacity for one-half maximum expiration. Four determinations were made for each subject. The results were analyzed for differences due to level of respiration. Recommendations for measurement procedures are made.

T. G. R 9

11,630

Welch, B.E., Riendeau, R.P., Crisp, C.E., & Isenstein, R.S. RELATIONSHIP OF MAXIMAL OXYGEN CONSUMPTION TO VARIOUS COMPONENTS OF BODY COMPOSITION. Proj. 6-60-11-020, Rep. 208, July 1957, 9pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

11,630

To study the relationship of maximal oxygen consumption to body weight, body fat, and body weight minus body fat and bone, 26 young men served as subjects. Maximal oxygen consumption was determined by measurements made of expired air while running a treadmill at grades of 6, 8.5, and 11 per cent. Body density was determined by the Archimedian principle using a specific gravity technique; body fat and bone weight were computed. The data were analyzed by correlational techniques for the relation of each component of body composition to oxygen consumption. The results are discussed in terms of the validity of the practice of using maximal oxygen consumption as an index of man's maximal circulatory capacity.

T. R 20

11,631

Welch, B.E., Levy, L.M., Consolazio, C.F., Buskirk, E.R., & DeGee, T.E. CALORIC INTAKE FOR PROLONGED HARD WORK IN THE COLD. Rep. 202, March 1957, 24pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo. (USA Medical Nutrition Lab., & USA Quartermaster Research & Development Command, Natick, Mass.).

11,631

To obtain information concerning "maximal" caloric requirements for prolonged hard work in the cold; caloric intake, fluid balance, and body composition were studied in a group of 26 men during a 28-day stay at Fort Churchill, Manitoba, Canada. The first seven days were spent in a pre-bivouac situation and remaining days in the field in a moving self-sustaining bivouac (camp broken and established each day and equipment hauled by sled cross-country for 9 to 12 miles per day). The data were analyzed for changes at progressive time periods during the study. A maximal caloric consumption is recommended and the need for assessing physical activity level in a given environment in relation to food consumption is stressed.

TM G. R 23

11,632

Bilodeau, E.A. STUDIES OF TARGET SIZE AND THE CONTROL OF PSYCHOMOTOR BEHAVIOR THROUGH SYSTEMATIC TRANSFORMATION OF KNOWLEDGE OF RESULTS. Proj. 7707, AFPTTC TN-56-13, Jan. 1956, 8pp. Skill Components Research Lab., AFPTTC, ARDC, Lackland AFB, Tex.

11,632

This paper summarizes a series of experiments concerned with relations among target size, knowledge of results, and psychomotor skills. The first section discusses skilled behavior as a function of target size. Results from practice on a Rudder Control test with wide or narrow targets and degree of transfer from one to the other are presented and the hypothesis that different targets can elicit the same behavior is stated. Some results from lever displacement and knob turning tasks are offered in support of the hypothesis. A review of the target-size function in terms of inflating or deflating the error leads to a final treatment of scaling of knowledge of results as a function of the response.

G. R 9

11,633

Torrence, E.P., & Ziller, R.C. RISK AND LIFE EXPERIENCE: DEVELOPMENT OF A SCALE FOR MEASURING RISK-TAKING TENDENCIES. Proj. 7713, Res. Rep. AFPTTC TN-57-23, Feb. 1957, 38pp. Crew Research Lab., AFPTTC, ARDC, Randolph AFB, Tex.

11,633

To develop and validate a biographical inventory scale to measure risk-taking tendencies against external measures of risk-taking behavior, a preliminary scale, Risk and Strategy, which had been developed through a study of fighter-interceptor combat effectiveness and a Life Experience Inventory were administered to 370 combat aircrewmen. On the basis of item analyses and correlational studies a revised Risk Scale was established. Four external measures of risk-taking behavior were obtained for 73 bomber pilots from a written test and from responses to nine statements of survival and in-flight emergencies encountered by Air Force personnel. Scores on the Risk Scale were studied by correlational procedures for validity in terms of the four criteria measures.

T. R 10

11,634

Torrence, E.P. TECHNIQUES FOR STUDYING INDIVIDUAL AND GROUP ADAPTATION IN EMERGENCIES AND EXTREME CONDITIONS. Proj. 7713, Tech. Doc. Rep. series AFPTTC TN-56-17, Jan. 1956, 286-297. Crew Research Lab., AFPTTC, ARDC, Randolph AFB, Tex.

11,634

The need for scientific information about adaptation of individuals and groups to emergencies and extreme conditions is discussed in relation to survival training. Four studies are described that illustrate situations in which quantitative information has been gathered - individual and group behavior in both actual emergencies and in simulated survival conditions. The techniques used in each situation are described and their usefulness evaluated. These techniques include the use of official escape and evasion reports, of the Q-sort technique, of test-retest design (simulated experiences), interviews with all participants or survivors, and observations of group behavior episodes.

11,635

Swanson, R.A., Lumsdaine, A.A., & Aukes, L.E. TWO STUDIES IN EVALUATION OF MAINTENANCE TRAINING DEVICES. Proj. 7714, Task 77241, Tech. Doc. Rep. series AFPTTC TN-56-8, Jan. 1956, 267-275. USAF Training Aids Research Lab., AFPTTC, ARDC, Lackland AFB, Tex.

11,635

To demonstrate the need for an analytic approach to the evaluation of classroom training aids, two studies of maintenance training devices are reported. In the first, identical lectures were given to three groups of experienced Air Force mechanics on the rudder control system of the B-47 aircraft using a realistic mock-up, a two-dimensional symbolic diagram, or pictorial charts. Evaluation of the device was based on scores on a post-lecture information test. The second test also used lectures and either a mock-up or a diagram to instruct unskilled men on certain specific training objectives. The findings are discussed in relation to need for incisive analysis of training objectives as a basis for selecting training aids.

T. G. I. R 6

11,636

Thomas, F.H., French, Elizabeth G., & Travers, R.H.W. VARIABLES RELATED TO PROBLEM-SOLVING EFFECTIVENESS IN TWO DIFFERENT TYPES OF PROBLEM SITUATIONS. Proj. 7703, Tech. Doc. Rep. series AFPTTC TN-56-22, Jan. 1956, 276-185. Personnel Research Lab., AFPTTC, ARDC, Lackland AFB, Tex.

11,636

To investigate variables related to problem-solving effectiveness, mechanical problems of two types were constructed. In one type level of difficulty was mainly a result of complexity (or number of elements involved) while in the second the difficulty was due to inhibitory sets (initial false starts). These problems were administered to 235 subjects together with tests of intellectual ability and rigidity-flexibility. Problem-solving performance (successful solution) on each type of problem was studied by correlational methods for degree of relationship to intellectual ability and rigidity. The findings are discussed in relation to the needs of a program of research in trouble-shooting skills.

T. R 2

11,637

French, R.S. EVALUATION OF A K-SYSTEM TROUBLE-SHOOTING TRAINER. Proj. 7709, Task 77152 and Task 77161, Tech. Doc. Rep. series AFPTTC TN-56-15, Jan. 1956, 260-155. Armament Systems Personnel Research Lab., AFPTTC, ARDC, Lackland AFB, Tex.

11,637

This report describes general features of the Malfunction and Circuitry simulator (MAC Trainer) for the K-type Bombing Navigational System of B-47 aircraft. The use of the trainer for demonstration and practice of trouble-shooting procedures in the classroom is discussed. An evaluational study is then reported in which the effectiveness of training conducted on the MAC Trainer alone was compared with training on actual equipment. Forty apprentice mechanics, divided randomly into two groups, were given a battery of written tests before and after a period of training. An additional performance test was given upon completion of training. Gains in knowledge of data flow and system functioning were analyzed and final performance of the two groups compared.

T. I.

11,638

Stallones, R.A., Gauld, R.L., Dodge, H.J., & Lamers, T.F.M. AN EPIDEMIOLOGICAL STUDY OF HEAT INJURY IN ARMY RECRUITS. Proj. 6-61-13-004, Subtask 1, WRAIR 172-56, Oct. 1956, 20pp. Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.

11,638

An epidemiological study of heat injury in Army recruits at Camp Chaffee, Arkansas, from 12 June to 27 August 1955 involved 138 cases occurring in 132 persons. The daily maximum dry bulb temperature and various heat stress indices were related to the number of daily cases to find the most reliable index for predicting the likelihood that cases of heat injury would occur. The cases were also analyzed for relationships with acclimatization, age, race, physique (height and weight) and activity at time of occurrence. The findings are discussed in relation to the development of sound preventive measures.

T. G. R 5

11,639

Lippert, S. A COMPREHENSIVE GRAPH FOR THE COLLECTION OF NOISE AND VIBRATION DATA. Rep. SM-18731, no date, 13pp. Santa Monica Div., Douglas Aircraft Co., Inc., Santa Monica, Calif.

11,639

To make possible a consideration of available data on noise and vibration at the same time and to assemble such data rapidly into comparable form, a comprehensive graph is presented and described. Data may be spotted in one set of units and interpreted in other units with grid work possible of extension to include any magnitudes of noise or vibration units. Directions and precautions in the use of the standard reference curves are given. Examples of the assembly of data in the literature are made to illustrate the use of the graph together with some interpretation of data in other units.

T. G. R 15

11,640

Gold, T., Potter, E., Wiener, B., & Peterson, E. AN OPERATIONAL FLIGHT EVALUATION OF AN APPROACH ZONE SLANT VISIBILITY MEASURING SYSTEM. Contract AF 19 (604) 1372, AFRCR TR-57-269 & Sperry Rep. 3245-4079, May 1957, 150 pp. Aeronautical Equipment Div., Sperry Gyroscope Company, Great Neck, N.Y.

11,640

This report presents the detailed results of an operational flight evaluation of an approach zone slant visibility measuring system at the Newark Airport. The system for determining slant visibility involves meteorological measurements by ceilometer and transmissionometer, photometric measurements by terrain illuminometer and horizon photometer, and relationships combining these measurements with visual data for the human pilot based on flight observations.

T. G. I. R 9

11,641

Gold, T., Potter, E., Wiener, B., & Peterson, E. AN OPERATIONAL FLIGHT EVALUATION OF AN APPROACH ZONE SLANT VISIBILITY MEASURING SYSTEM. SUMMARY REPORT. Contract AF 19(604) 1372; AFRC TR 57 270, & Sperry Rep. 3245 4080, May 1957; 43pp. Aeronautical Equipment Div., Sperry Gyroscope Company, Great Neck, N.Y.

11,641

This report summarizes the results of an operational flight evaluation of an approach zone slant visibility measuring system at Newark Airport. The system involves meteorological measurements by ceilometer and transmissometer, photometric measurements by terrain illuminometer and horizon photometer, and relationships combining these measurements with visual data for the human pilot. Approximately 1400 airline pilots reported initial runway threshold contact during instrument approaches between Nov. 1955 and Nov. 1956. These data were compared with threshold contact heights computed by the slant visibility measuring system. Recommendations are included.

T. G. R 3

11,642

Moody, J.A., Jerome, E.A., Flynn, J.P., & Connor, T.J. AN AUTOMATIZED TECHNIQUE OF INVESTIGATING DIFFERENTIAL SENSITIVITY TO AUDITORY INTENSITIES. II. THE INFLUENCE OF CATCH TESTS. Res. Rep. Proj. NM 000 019.02.03, Oct. 1956, 14, 789-794. Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md.

11,642

To evaluate the influence of "catch tests" (no signal occurring in an otherwise fixed stimulus schedule) on measures of auditory sensitivity obtained with an automatized stimulus schedule controlled by the subject's response, four subjects were tested. Two experimental sessions of 100 ascending and 100 descending series were utilized, five with and five without catch tests. Catch tests occurred on 30 per cent of the trials in the series where used; the regular stimulus schedule was one stimulus every 1.5 seconds. The threshold data were analyzed for differences due to experimental conditions.

T. R 4

11,643

Moody, J.A., Jerome, E.A., Flynn, J.P., & Connor, T.J. AN AUTOMATIZED TECHNIQUE OF INVESTIGATING DIFFERENTIAL SENSITIVITY TO AUDITORY INTENSITIES. III. THE INFLUENCE OF RANDOMIZING THE STARTING POINT OF THE STIMULUS SERIES. Res. Rep. Proj. NM 000 019.02.04, Oct. 1956, 14, 803-808. Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md.

11,643

To compare two conditions for presenting the stimulus series when measuring differential sensitivity to auditory intensities obtained with an automatized version of the method of limits, measurements were made on three subjects. In one condition stimulus magnitudes were started either 0, 1, 2, or 3 steps beyond terminal stimulus magnitude. In the other, the magnitude of the initial stimulus of an ascending or descending series was determined by the magnitude of the terminal stimulus in the immediately preceding series. Two runs were made for both conditions at rates of 20, 30, and 60 stimulus presentations per minute. Threshold data were compared for differences due to experimental conditions.

T. R 6

11,644

Rosenberg, I. CAMOUFLAGE PARACHUTE CANOPIES. Proj. 6104, Tech. Note 57-6, July 1957, 8pp. 6511th Test Group (Parachute), AF Flight Test Center, El Centro, Calif.

11,644

To determine the color combination to be used in parachute canopies which would provide the most effective signaling and camouflage qualities for the rescue or concealment of downed airmen, 14 different combinations were photographed in color from an aircraft in flight. The tests, simulating aerial search operations, were conducted at various times of day, from all cardinal points of the compass, and with colored segments of parachutes displayed against vegetative, desert, and water background. Various methods of handling the canopies on the ground for concealment of the survivor were tried. Selection was made on basis of effectiveness for global operations.

T. I.

11,645

Hall, J.P. Jr., & Polte, J.W. THERMAL INSULATION OF AIR FORCE CLOTHING. A CATALOG AND PART 4 OF A SERIES. Proj. 7155, WADC TR-66-382, Oct. 1956; 66pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,645

Insulation measurements performed with electrically heated copper manikins on standard and experimental Air Force clothing since Dec. 1953 are presented in the first portion of this report. The second part is a catalog of all clothing items that have been tested by this method. The insulation value in clo units is given for each item. All items are arranged by type and in order of increasing clo value within the respective categories of light (0-1.5 clo), intermediate (1.5-3.0 clo) and heavy (more than 3.0 clo) clothing. Finally, the term, mean effective clothing insulation is explained, a comparison of measured vs. calculated values is presented, and advantages of the term are discussed.

T. I. R 7

11,646

Ferguson, I.D., Christensen, Margaret L., Kappel, J.G., & Hertzman, A.B. FACTORS IN VARIABILITY IN AND PREDICTION OF REGIONAL SWEATING RATES OF HUMANS. Contract AF 33(616)-3357, Proj. 7155, WADC TR-66-312, Dec. 1956, 37pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (St. Louis University).

11,646

This report is an analysis of regional sweating rates of humans. The experimental data used here were presented in a previous report. Sweating rates were obtained by the desiccating capsule technique on ten regions of the body over two and one-quarter hour experimental periods following a uniform period of exposure to test climatic conditions (six subjects). The data were studied by factor analytic methods in an effort to determine the factors involved in regional sweating rates. Differences in topographical patterns of variability and of magnitude of rate were analyzed and prediction of rates from multiple correlations compared with actual rates.

T. R 6

11,647

Seckel, E. THE VARIATIONS OF STEERING ANGLES OF AUTOMOBILES IN STEADY TURNS. Rep. EE-714-P-1, July 1951, 15pp. Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

11,647

This report represents a first step in the interpretation of data on the characteristics of the pneumatic tire used on the modern automobile and the applications to a quantitative study of the stability and control characteristics of automobiles. Approximate expressions were derived for the variation of steering angle with speed for automobiles in steady, constant radius turns. The tire characteristics are assumed linear except that the effect of normal load on the side forces is represented by a parabolic function. A formula is derived, from which the effects of center of gravity location, tire pressure, and tire loading can be calculated.

G. R 2

11,648

Walker, S.H. GUIDANCE FOR A PILOT TRIAL OF SUPPLY CONTROL SYSTEM MODIFICATIONS TO BALANCE SIZED CLOTHING ITEM STOCKS. Staff Paper ORO-SP-23, June 1957, 25pp. Operations Research Office, The Johns Hopkins University.

11,648

This paper presents recommended changes for the Army supply control system as applied to sized clothing items. These recommendations were the results of a study of the system and guidance is given here for a pilot operation of the modified system designed to balance sized clothing items. The modifications require provision of estimates of future stocks on hand by size, which are to be a by-product of present operating procedures; and determination of corrected procurement quantities so as to optimize expected future stock on hand in conformity with regulations. Rules for these procedures are presented as algebraic equations. The relation of the system to electronic computing equipment is discussed.

11,649
Hammes, J.A., Kelly, H.E., McPann, H.H., & Ward, J.S. TRAINING II: A NEW COURSE IN BASIC TECHNIQUE OF FIRE AND SQUAD TACTICS. Contract DA 49-106-qm-1, Proj. 095-50-000, Tech. Rep. 41, July 1957, 42pp. Human Resources Research Office, The George Washington University.

11,649
This study is part of an overall research effort directed at improving the effectiveness of combat rifle men. An experimental course in Technique of Fire and Squad Tactical Training was designed and then compared with the conventional training program. Two hundred twenty inductees were randomly divided into two groups: one was trained in the conventional manner and the other received the experimental phase. Comparisons were made following training by means of three proficiency tests: Squad in Day Defense, Squad in Day Attack, and Squad on Day Combat Patrol. A selected bibliography of books, periodical reports, and government reports, publications and films, together with a description of field devices and training aids developed for the study are included. T. I. R 83

11,650
USMC Equipment Board. GENTEX PILOT'S PROTECTIVE HELMET, TYPE DH 5-3. Proj. EA 1268, Aug. 1957, 10pp. USMC Equipment Board, Quantico, Va.

11,650
To evaluate the Gentex Pilot's Protective Helmet (Type DH-5-3) in terms of its suitability for service use for helicopter pilots and aircrew personnel, ten experienced helicopter pilots tested the item. Flights were made wearing the helmet. It was compared with the standard M-4 helmet and latest APE-5 helmet on the following physical and functional characteristics: comfort fit, stability, ventilation, radio reception, visibility sound attenuation, visor, ear cup/headset assembly, and chin strap. An analysis of the need for a helmet specifically designed for helicopter pilots is made and the physiological aspect of operating a helicopter in regard to headgear and high noise levels is discussed. Recommendations are included. T. I. R 1

11,651
USA Infantry Board. SERVICE TEST OF COVERALLS, PROTECTIVE, MECHANICS, T56-6. REPORT OF PROJECT NR 2730 (ARCTIC). May 1957, 10pp. USA Infantry Board, Fort Benning, Ga.

11,651
This report contains two different evaluations of the suitability of mechanics protective coveralls, T56-6, for Army use in conjunction with cold-wet and cold-dry uniforms in arctic and alpine areas. Service tests were conducted in both cases for use of the garment by maintenance and vehicle crewmen, ease of donning and doffing, adequacy of sizing and fitting, functional suitability, and troop acceptability. Deficiencies were listed with suggested modifications. Recommendations for further development are made. T. I. R 3

11,652
University of Rochester. STUDY OF VISUAL STEREOSCOPIC ACUITY: INTERIM REPORT. Contract DA 44 009 ENG 2882, Proj. 8 35 03 118, Rep. 4, June 1957, 8pp. Institute of Optics, University of Rochester, Rochester, N.Y.

11,652
This is a progress report of a study concerned with determining the optimum conditions of viewing for stereographic map compilation. Thirty observers were trained in the use of the stereograph and multiplex equipment and made height measurements of six natural and six artificial targets. Variability of measurements were compared to determine whether artificial targets could be used for experimental purposes. Far and near vision with the multiplex equipment was completed for the whole group. Near vision with anaglyphic glasses and with separated platens and white light are compared. These data were analyzed for relation between interpupillary distance and stereoscopic acuity. T. I.

11,653
Peacock, L.J., & Marks, R.A. BEHAVIORAL CONCOMITANTS OF COLD ADAPTATION. III. TEMPORAL DEVELOPMENT OF BEHAVIORAL DIFFERENCES. ANML Proj. 6-95-20-001, Rep. 298, July 1957, 5pp. USA Medical Research Lab., Fort Knox, Ky.

11,653
To investigate the time course of development of behavioral differences between normal and cold exposed rats, an operant conditioning situation (Skinner boxes) with radiant heat reward (five second exposure) was used. Six albino rats, shaved over the neck and head, were trained first with regular and then with three to one ratio reinforcement. Two groups were then formed on basis of number of responses given during training. One group continued to live in an ambient temperature of 22 degrees Centigrade, the other in a cold room at 2.5 degrees Centigrade, (test temperature). Fifteen sessions of three to one reinforcement (two each day) followed. Differences in response rate between the two groups were analyzed in relation to time. G. R 5

11,654
Mathers, B.L. SIMPLIFICATION OF THE PANEL LAYOUT ON STANDARD SERIES TANK RADIOS. Contract DA 49-106-qm-1, Proj. 095-50-000, Special Rep. 9, July 1957, 16pp. Human Resources Research Office, The George Washington University. (USA Armor Human Research Unit, Fort Knox, Ky.)

11,654
To study the effect on operator performance of modifying the tank radio controls to increase the distinctiveness of the major controls, armor trainees were trained and tested on standard sets with the eight most important controls coded in one of three ways: 1) painted a single distinctive color, 2) painted three different colors according to function, and 3) numbered according to use. Test performance of these men was compared with that of a control group trained on the standard set. Recommendations on control coding for the tank radio are made. T.

11,655
Rubin, L.S., & Goldberg, M.N. THE EFFECT OF GB ON DARK ADAPTATION IN MAN. III. THE EFFECT OF TERTIARY AND QUATERNARY ATROPINE SALTS ON ABSOLUTE SCOTOPIC THRESHOLD CHANGES ENGENDERED BY GB (U). Proj. 4 08 02 018 04, CWL Rep. 2155, Aug. 1957, 15pp. USA Chemical Warfare Labs., Army Chemical Center, Md.

To test the effect of a tertiary and quaternary atropine salt on the absolute scotopic threshold changes due to exposure to GB (on anticholinesterase), thresholds were measured over the last ten minutes of a 30-minute dark adaptation period. Measurements were repeated at each step of the following sequence: practice (three trials); a two-minute exposure to GB vapor of 2.79 or 2.67 milligrams per cubic centimeter with protective device over eyes; injection with atropine sulphate or atropine methyl nitrate; and post-injection (three hours later). Three subjects were used. Mean absolute threshold measurements and standard deviations were analyzed as functions of practice and experimental conditions. The findings are related to theories of the visual processes. T. G. R 10

11,656

Blackwell, M.R. REPORT OF PROJECT MICHIGAN. OPTICS AND VISION. Contract DA-36-G99-SC-58354. DA Proj. NR-3-69-10-024, Rep. 2144-65-P, June 1957, 25pp. Vision Research Labs., Engineering Research Institute, University of Michigan.

11,656

The progress of the Optics and Vision Program of Project MICHIGAN (research and development of systems and components for combat surveillance) for the period 1 July 1955 to 31 January 1956 is described. Topics discussed include: (1) field test planning and instrumentation; (2) simulator development and tests; (3) basic studies of the elements of the optical surveillance problem (target and background characteristics, the optical properties of the atmosphere, and the operating characteristics of the eye); and (4) development and tests of optical, electro-optical and illumination aids to vision. G. I. R 3

11,657

Beldan, F.B.K. DEVELOPMENT OF AN OPTIMUM ALTIMETER DIAL. Rep. 57/3, March 1957, 5pp. RAF Institute of Aviation Medicine, Toronto, Canada.

11,657

To design an instrument dial that would be optimum for the presentation of altitude information, a large number of current pilots were polled to ascertain the specific forms in which they required such information under varying conditions of flight. Three basic requirements were found and a dial was designed to supply these three requirements in the simplest possible form. Initial investigations of reading accuracy were made by a new technique involving the use of a movie camera. This technique is described. Further evaluations are discussed. I. R 2

11,658

Tyler, D.B. THE EFFECT OF AMPHETAMINE SULFATE AND SOME BARBITURATES ON THE FATIGUE PRODUCED BY PROLONGED WAKEFULNESS. Amer. J. Psychol., Aug. 1947, 105(2), 253-262. (California Institute of Technology).

11,658

To study the effects of some central nervous system stimulants and depressants on fatigue produced during experimental insomnia, subjects were active for different numbers of hours (24, 48, 60-72 and 112) under varying schedules of physical activity and drug dosage, and tested on a representative battery of fatigue indicator tests (for example, reaction time, flicker fusion, auditory acuity, digit span, physical examination). These results are compared among the various drug, placebo and control groups. Psychological changes also are discussed. T. R 14

11,659

Mowbray, G.H. MAN AS A LINK IN COMPLEX MACHINE SYSTEMS. Scientific Monthly, 1956, 83(6), 269-276. (Applied Physics Lab., The Johns Hopkins University).

11,659

This paper discusses briefly the different levels from which the problem of man as a link in complex machine systems may be viewed -- as a series or parallel link and as a link between displays and controls. The design of instrument displays and controls is then treated at more length to illustrate the kind of work done by psychologists engaged in equipment design. I. R 15

11,660

Estah, T.F., Walpole, R.N., & Lawson, G.S. OPERATIONS AT HIGH TEMPERATURES: DETERMINATION OF THE AMOUNT OF HEAT TRANSMITTED TO FIGHTING COMPARTMENT OF TANKS UNDER FIELD CONDITIONS. Proj. 2-22, Aug. 1943, 4pp. USA Medical Research Lab., Fort. Knox, Ky.

11,660

To determine the adequacy, from the standpoint of heat dissipation by crew members, of the limited rate of ventilation that is provided through the gas canister in a gas-protected tank, data were collected during actual driving tests on the range with a full crew in the tank. Tests were made on three different days in both a gas-protected and standard tank and included surface, air, and wet-bulb temperature readings at various locations taken at intervals throughout the test. Observations on the crew included weight loss, body temperatures, water consumption and excretion. Climatic data were also gathered. These data were evaluated in terms of maintenance of a tolerable atmospheric environment within the tank. T. G.

11,661

Signal Corps Engineering Labs. TECHNICAL REPORT ON INSTRUMENTATION FOR DEFENSE SYSTEM, ANTIAIRCRAFT AN/GSC-2(). Proj. 414-A, Rep. TM-1745, April 1956, 35pp. Signal Corps Engineering Labs., Fort George G. Meade, Md.

11,661

This report is concerned with instrumentation for the evaluation of the prototype antiaircraft defense system (AN/GSC-2). A brief introduction to the system is given followed by a description of the design and installation of all instrumentation connected with system testing and the basic methods of data handling. The use of IBM (International Business Machine) punchcards, Esterline-Augus chart records, and Photographic and Magnetic Recording techniques supplemented by a number of innovations are used to meet the requirements of the program. A small representative sample of data acquired through the use of the instrumentation is presented and its reliability discussed. T. I. R 4

11,662

Libber, L.M., Santa Maria, L.J., Graider, H.R., & Tiller, P.R. PHYSIOLOGICAL EVALUATION OF PROTECTIVE IMPERMEABLE GARMENTS FOR CLOTHING SUPPLY OFFICE. Rep. NAMC-ACEL-314, P.O. 10876, Dec. 1956, 5pp. Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,662

To assess the value of vents incorporated in an impermeable protective clothing assembly for relieving heat stress encountered in the wearing of such clothing two assemblies (identical except for the presence of vents in one of them) were compared. Subjects were exposed for one hour to a temperature of 90 degrees Fahrenheit, relative humidity 50 per cent and wind velocity five to ten miles per hour. A prescribed course of exercise was undertaken every fifth minute to simulate a work load. Measures of heat stress (total weight loss, per cent evaporation, respiratory rate, pulse rate, rectal temperature, mean weighted skin and body temperatures) were compared for the two assemblies. Recommendations are included. I. G. R 3

11,663

Fukuda, Y. TECHNICAL STUDIES IN CARGO HANDLING. III. DISTRIBUTION OF DELAY IN THE THREE-STAGE SHUTTLE PROCESS. Prepared under Contract Nonr 233(07), Rep. 57-6, Feb. 1957, 21pp. University of California at Los Angeles.

11,663

This is one of a series of working papers on progress of research in "Technical Studies in Cargo Handling". An analysis of delays found in the three-stage shuttle process is presented. A way to derive the exact distribution of every delay that occurs in transportation of each unit of commodity is demonstrated and basic formulas derived. Several numerical examples are given and the results are illustrated by means of graphs together with computational results. G. R 2

11,664
Rulon, P.J., Sampson, P.B. & Schehan, B. THE EFFECTS OF "G" FORCES ON THE PERFORMANCE OF TELETYPE OPERATORS. USAF Tech. Rep. 6568, Oct. 1951, 43pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio.

11,664
This is a report of a study of the effects of "g" forces on the performance of airborne teletype operators. Twelve Air Force teletypists (hunt-and-peck and touch operators) were tested under straight and level and "g" force flight conditions while facing in three different directions. Performance was measured with physical instruments and supplemented by subjective observations of the operators. Speed and accuracy results are presented and recommendations for further research and teleprinter modifications are included.
T. I.

11,665
Rulon, P.J., Schaeffer, R.F. & Gilbert, A.C.F. ELECTRONICS MAINTENANCE TRAINING: EXPERIMENTAL TRYOUT OF DIAGNOSTIC GRAMS AND BACKTRACKS. Contract AF 18(600) 1355, Proj. 7709, Task 37300, Jan. 1958, 39pp. Educational Research Corporation, Cambridge, Mass.

11,665
This report describes an experimental tryout of a training program for electronics maintenance which derived from an initial study reported elsewhere. The training outline and recommendations were based on certain intellectual tools (job supports) the Diagnostigram and the Backtrack method of trouble shooting. Two groups of subjects (28 high school graduates) were trained; the experimental group received 40 hours of instruction most of which was spent on Backtracks; the control group received 60 hours of instruction most of which was spent in learning basic information with 12 hours on trouble shooting. Both groups were tested on a performance test and a written test and then respective performance compared.
I. R 1

11,666
Saul, E.V., Raben, Margaret M., Seronsy, Louise B., Weiner, L., et al. HUMAN ENGINEERING BIBLIOGRAPHY. 1956 - 1957. Contract N6onr 494(13), ONR Rep. ACR 32, Oct. 1958, 210pp. USN Engineering Psychology Branch, ONR, Washington, D.C. (Institute for Applied Experimental Psychology, Tufts University).

11,666
Personnel responsible for the human factors considerations in the design and development of equipment have a major need for rapid and easy access to the literature pertinent to their work. This bibliography is one of a planned series of annual bibliographies of literature pertinent to human engineering designed to meet this need. There are five main parts: 1) a topical outline that defines over 300 topic headings, 2) an index that relates the bibliographic entries with the topic headings, 3) an alphabetic index of search terms, 4) an annotated bibliography, and 5) an index of authors.
R 1400

11,667
Tolhurst, G.C. NOISE ATTENUATION CHARACTERISTICS OF THREE PERSONNEL NOISE PROTECTIVE DEVICES. Prepared under Contract N6onr-22525, Proj. NR 145-993, Special Rep. 55-6, May 1956, 10pp. USN School of Aviation Medicine, Pensacola, Fla.

11,667
To evaluate three personnel noise protective devices (David Clark Co., 372 series) as to their noise attenuation characteristics two methods were used. Physical measures were obtained from the output of a miniature condenser microphone serving as an "artificial ear" shock-mounted within a plastic manikin head. Subjective measures were responses of ten trained observers to four listening tasks (essentially binaural free-field threshold judgments) once with protective off and once with it in place. The data, attenuation values in decibels and threshold shifts were compared with previous values obtained for the V-51R Ear Warden.
T. G.

11,668
Sisson, R.L. RESEARCH IN METHODS OF SCHEDULING A JOB SHOP. Prepared under Contract N6onr 23302, May 1957, 23pp. University of California at Los Angeles.

11,668
This report reviews research in methods of scheduling a job shop. The job shop is characterized by the fact that the sequence of operations performed on any one lot to be fabricated is independent of the sequence required for any other lot. Scheduling, as used here, is the assignment of sequences in which work is performed (also called sequencing and dispatching). Two categories of models for solving scheduling problems are described: mechanical and stochastic (the latter is here called thermodynamic). Scheduling methods based on these models (priority function and Berners-Lee) are considered. Experimental testing and simulation methods are discussed together with the problems involved. A specific example of use of the Las Vegas simulation approach is given.
R 20

11,669
Hartig, C.R. SENSORY AID DEFINES LIGHTS AND MARKS. Electronics, Feb. 1957, 2pp. (Massachusetts Institute of Technology).

11,669
A miniature electronic device that provides an audible indication of printing, meter readings, or location of maximum ambient light is described. Details of construction and operation are given together with a circuit diagram and photographs. This tool is to be evaluated in terms of usefulness to the blind in various employment situations.
I. R 1

11,670
June, R.K., Batzis, G.W., & Wilcox, J.D. COLOR MEASUREMENTS FOR FIELD EVALUATION OF COLORED SMOKE (U). Proj. 4-04-17-020-04 & 4-04-15-029-03, Rep. 2096, Nov. 1956, 31pp. Chemical Warfare Labs., Army Chemical Center, Md.

11,670
To develop a method for field evaluation of colored smokes, extended chroma Munsell color cards were used to match observed colors of 295 M18-type grenade smokes and the Munsell notations recorded. The importance of subtense angle was considered and a windshed for cloud control described. Results of measurements and several methods of data evaluation are presented. The results are discussed in relation to their usefulness to those working with experimental, developmental, and production lots of colored smoke grenades, and for setting up specifications for grenade colors.
T.G.R9

11,671
Hulburt, E.O. MEASUREMENTS AND ESTIMATES OF SKY BRIGHTNESS FOR ALL ALTITUDES OF THE SUN FOR VARIOUS ALTITUDES OF THE OBSERVER ABOVE THE SURFACE OF THE EARTH. Rep. 4873, Feb. 1957, 13pp. Naval Research Lab., Washington, D.C.

11,671
This paper presents measurements and estimates of sky brightness for the day, twilight, and night sky. All altitudes of the sun and various altitudes of the observer above the surface of the earth (0 to 100,000 feet) are included. The rationale for making estimates is discussed.
T. R 9

11,672
Slecht, R.F. & Wade, E.A. A COMPARATIVE STUDY OF COMFORT. Sept. 1957, American Psychological Association Convention, New York, N.Y. (Tufts University).

11,672
To test subjective comfort of six seats with widely different structural characteristics eighteen subjects of a wide range of body size were asked to sit in each seat until their state of discomfort reached a point when they felt an intense desire to get up. Seats were counterbalanced among subjects and testing sessions for each subject spaced a week apart. Bar graphs showing average voluntary sitting time are presented; pair-wise comparison of seats also is made. Scattergrams were made of results obtained from a ten-point comfort rating scale, (most to least comfortable). Hourly comfort evaluations were made, using a nine-point scale of comfort-discomfort.
G. I.

11,673
Pinneo, L. THE RADIC VISUAL SENSITOMETER.
Proj. UX 12, RADIC TS-57-256, July 1957, 7pp.
Rome Air Development Center, ARDC, Griffiss
AFB, N.Y.

11,673

This paper describes an apparatus developed for the purpose of studying a wide range of visual problems. The "Sensitometer" provides the capability for investigating problems involving the reaction of the human eye to light stimulation of a small physical area. A brief description of its mechanical and optical construction is given. Some of the capabilities and restrictions of the apparatus are discussed.

11,674

Karpovich, P.V., Keeny, C.E., & Alexander, A.A. PHYSIOLOGICAL AND KINESIOLOGICAL METHODS FOR TESTING FOOTGEAR.
Contract DA-19-129-q-309, O.I. 907, Final Rep., June 1957, 78pp. Dept. of Physiology, Springfield College.

11,674

To develop physiological and kinesiological methods for evaluating the effect of military footwear upon the function of the soldier, 30 subjects were studied by:
(1) measuring the energy cost of walking; (2) measuring and recording the time alignment of foot and lower leg;
(3) determining the speed of sprinting thirty yards, time for running a zig-zag course, and the height of vertical jumping; and (4) measuring the pressure exerted on selected areas of the soles of the feet. Three types each of American, British and Canadian footwear were used. In addition to shoe type, the effects of shoe weight, type of sole and medial inserts were analyzed. Several auxiliary devices and techniques were developed and are described.

T. I. R 11

11,675

Birdsall, T.G., Tanner, W.P. Jr., Ristenbatt, M.P., & Hazeltine, B. APPLICATION OF BASIC SCIENCE TO COUNTERMEASURES RESEARCH. Contract DA-36-039-SC-63203, SC Proj. 1948, Prog. Rep. 16, May 1957, 9pp. Engineering Research Institute, University of Michigan.

11,675

This is a progress report of an investigation concerned with those aspects of science of general interest to the countermeasures field with emphasis on those areas of electrical engineering, mathematics, and psychophysics which may contribute to development of improved equipments and systems. The experimental effort of this period was directed toward a study of the method of measuring and the effectiveness of communication in interference; and the ability of the human observer to detect and recognize signals in noise. The application of signal detection theory problems of search and intercept is continuing and work has begun on "programming" the scan of a rapid scanning panoramic receiver as a means of apparent search-bandwidth control.

11,676

Dennis, J.P. A PROGRAM TO SOLVE THE CLASSICAL TRANSPORTATION PROBLEM. Memo DCL-140, Aug. 1956, 14pp. Digital Computer Lab., Massachusetts Institute of Technology.

11,676

This report describes a program that has been written to solve the classical transportation problem on the whirlwind computer using the stepping stone method. The problem is defined mathematically and the process of solution given. The merits of the program are indicated. The appendix contains detailed instructions for the preparation of data tapes for the transportation routine and directions for its use.

T. G. R 2

11,677

USAF Arctic, Desert, Tropic Information Center. THE DESERT SURVIVAL FIELD TEST. ADIC Publ. D 104, Dec. 1956, 83pp. USAF Arctic, Desert, Tropic Information Center, Maxwell AFB, Ala.

11,677

To evaluate the Air Force survival system under actual field conditions in a desert environment, a B-47 crew served as nucleus with two participant observers added. Libya was chosen as test locale. The test consisted of a desert trek under simulated emergency conditions wherein the crew were taken by truck to a known well and left to make their way by foot over 35 miles of desert to destination. Equipment consisted of parachutes, flight gear, A-1 survival kit, and whatever additional survival equipment normally carried. A pre-trek questionnaire elicited personal data and information about survival training. The observers kept field data cards recording details of the trek, personnel, equipment, and techniques of survival. Analysis was based on these records. T. I. R 18

11,678

American Institute for Research. MATERIALS FOR THE TEAM PERFORMANCE RECORD PROGRAM. (5) Prepared under ONR, no date, 56pp. American Institute for Research, Pittsburgh, Penna.

11,678

This is a packet of materials to be used in recording performance of Navy teams. They provide a method for systematic observation and specific actions displayed by the team, stressing the particular incident rather than a generalization about the team or a particular member. The Record is designed to help supervisors, instructors, and evaluators assess the strengths and weakness of teams over a period of time. Included are a manual for use with team performance records and three records: one for general performance of Navy teams, one for Combat Information Center teams, and one for Gunnery teams.

11,679

Miller, H.R., Grundfest, H., Alper, J.M., Korr, I.M., et al. A SIMPLE PROCEDURE FOR WARMING THE HANDS TO MAINTAIN MANUAL DEXTERITY DURING EXPOSURE TO EXTREME COLD. Engng. Memo 18 CR, July 1944, 6pp. Signal Corps Ground Signal Agency, Climatic Research Unit, Fort Monmouth, N.J.

11,679

To determine the effectiveness of a unit (muff and chemical heat pad) designed to warm the hands and restore manual dexterity of personnel exposed to extreme cold, five subjects were tested under various conditions. The subjects first practiced on a manual dexterity test wearing knitted wool gloves with nylon inserts, then dressed in arctic clothing and seated in a cold chamber (-40 degrees Centigrade) repeated the test until impossible to continue, warmed their hands and repeated test as before. This was repeated until other factors required discontinuation of tests. The entire procedure was repeated with only a muff or another pair of mittens. Dexterity was analyzed by comparing performance on all conditions with practice performance.

G. R 2

11,680

Miller, H.R., Grundfest, H., Alper, J.M., Korr, I.M., et al. CHANGES IN MUSCLE TEMPERATURE OF LIMBS EXPOSED TO COLD. Engng. Memo 19 CR, Aug. 1944, 14pp. Army Service Forces, Signal Corps Ground Signal Agency, Climatic Research Unit, Fort Monmouth, N.J.

11,680

To determine muscle temperature reactions of limbs exposed to dry cold air, the upper limbs (two to three inches above elbow) and lower limbs (five to six inches above knee) of young male subjects were exposed to a temperature of minus four to minus ten degrees Centigrade in ice-jacketed boxes. Room temperature where subject was seated was twenty degrees Centigrade. Muscle temperatures of the exposed limbs were measured with copper-constantan needle thermo-couples; finger and toe temperatures and rectal temperatures were also measured. The data were analyzed as a function of time in the cold (190 minutes). Recovery data were also measured and analyzed.

T. G. R 6

11,681

Shatz, R.M. THE OBJECTIVES AND TECHNIQUES OF WEAPONS SYSTEMS ANALYSIS. Jan. 1957. 28pp. Systems Research Dept., Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

11,681

This paper outlines in broad general terms the new field of weapons systems analysis--the explicit use of scientific methods as an aid to military decision-making. The need for such analysis of weapons systems, the historical background, and current status are discussed. Present objectives are listed. The classes of problems dealt with (weapons systems requirements, comparative evaluations of competing systems, employment including tactical use and strategic effect, and creation of systems specifications or conceptual design of new systems) are discussed with illustrative examples. Finally, techniques used, organizational needs and relation to the designer are reviewed.

11,682

Klein, S.J. THE MEASUREMENT OF STRESS AND ITS RELATIONSHIP TO PERFORMANCE. I. THE RELATIONSHIP OF MUSCLE ACTION POTENTIALS TO THREE MEASURES OF ERGOGRAPHIC WORK IN TASK ORIENTED SUBJECTS. Rep. NAMC-ACEL-326, Feb. 1957. 18pp. Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

11,682

To determine whether the relationship between stress and performance is dependent upon the manner in which the subjects are stressed, muscle action potentials (assumed to be measures of systemic stress) were recorded under various conditions. A finger ergographic task was used with (1) application of cold and warm stimuli to working hand and (2) slow and fast rate of lift. Each of 13 subjects performed twice under each condition. Measures of performance were output (total distance weight was lifted), accuracy (average error of individual excursions from deviation line), and precision (variance of error). Muscle action potential data and performance data were studied by analyses of variance for effects of stressors and by correlational methods for relationship to stress. T. R 20

11,683

Marcou, P.; & Daguet, J. A SPECIFIC PROPERTY OF THE VOICED SPEECH SOUND AND A FEW PRACTICAL APPLICATIONS. (Une Propriete Particuliere de la Parole et quelques-unes de ses Applications). ATIC-238150-A, June 1954. 9pp. Air Technical Intelligence Center, Wright-Patterson AFB, Ohio. (Centre National d'Etudes des Telecommunications)

11,683

This report shows how a normal telephone current can be transformed into a signal of the form $\cos \phi(t)$ equivalent to it as far as intelligibility and timbre of the voice are concerned. Based on this new property of speech, a few possible applications are given. A summary description of two applications is given: (1) a radio-telephone communication on single sideband, with a Class C transmitter; and (2) a telephone transmitter with very narrow bands.

11,684

Dwyer, P.S. THE PROBLEM OF OPTIMUM GROUP ASSEMBLY. Contract AF 18(600)-1050, Proj. 7713, Tech. Doc. Rep. series AFPTRC-TN-56-18, Jan. 1956, 104-114. Crew Research Lab., AFPTRC, ARDC, Lackland AFB, Tex. (University of Michigan).

11,684

The Air Force problem of the determination of the efficient assignment of crew and subsequent consideration of the general group assembly problem are covered in this report. The mathematical problem involved is stated and the method of reduced matrices, which serves as a basis of the solution, is described. Implications of the research for Air Force problems in group assembly and for other problems are considered. T. R 9

11,685

Nighland, R.W., Neuman, S.E., & Waller, H.S. A DESCRIPTIVE STUDY OF ELECTRONIC TROUBLE SHOOTING. Proj. 7709, Tech. Doc. Rep. series AFPTRC-TN-56-26, Jan. 1956, 173-198. Armament Systems Personnel Research Lab., AFPTRC, ARDC, Lowry AFB, Colo.

11,685

To investigate the knowledge and skills associated with successful trouble-shooting (locating malfunction sources), 360 experienced radar mechanics were required to take written tests covering electronic fundamentals, knowledge of the functioning of an oscilloscope, and reasoning ability. Each mechanic then attempted to locate six malfunctions which had been inserted into an oscilloscope kit. Problem-relevant behaviors (type of measurements, adjustments, and checks made; studying the schematic, wire tracing and visual checks; and time of occurrence of each) were recorded by trained observers and analyzed in terms of their relation to successful trouble-shooting, to technical knowledge, and to reasoning ability. The findings are discussed in relation to training and measurement problems. T. G. R 5

11,686

Arnault, M.D. RECOGNITION OF SHAPES FOLLOWING PAIRED-ASSOCIATES PRETRAINING. Proj. 7706, Tech. Doc. Rep. series AFPTRC-TN-56-12, Jan. 1956, 9pp. USAF Skill Components Research Lab., AFPTRC, ARDC, Lackland AFB, Tex.

11,686

To study transfer of paired-associates pretraining to a recognition task, five groups of subjects (400 total) were given training in relating a nonsense shape to a verbal symbol. The five groups corresponded to five levels of meaningfulness of the responses (familiarization, nonsense syllables, arbitrary, modal, or unique meanings); the frequency with which each shape appeared varied from one to 15 times during 48 trials. Following pretraining all groups took a recognition test in which they had to select the shapes on which they were trained from a group of similar shapes. They were then tested on ability to recall the proper name for each shape. Performance was analyzed as a function of amount of pretraining, meaningfulness of responses, and difficulty of task. T. G. I. R 17

11,687

Fitts, P.M., Bennett, W.F. & Bahrack, H.P. APPLICATION OF AUTO-CORRELATION AND CROSS-CORRELATION ANALYSIS TO THE STUDY OF TRACKING BEHAVIOR. Contract AF 33(038) 10528 & AF 18(600) 1201, Proj. 7707, Tech. Doc. Rep. series AFPTRC-TN-56-9, Jan. 1956, 125-141. USAF Skill Components Research Lab., AFPTRC, ARDC, Lackland AFB, Tex. (Ohio State University, Columbus, Ohio).

11,687

This report outlines a rational basis for deriving analytic measures of tracking studies, in particular, correlation functions. Some empirical data are given showing the application of auto-correlation and cross-correlation techniques to a study of tracking behavior. The implications for a general theory of measurement relative to motor performance are considered. G. I. R 8

11,688

Welch, B.E., Marcinek, J.G., Buskirk, E.R. & Iamietro, P.F. CALORIC INTAKE AND ENERGY EXPENDITURE OF EIGHT MEN IN A TEMPERATE ENVIRONMENT. Proj. 6 60 11 020, Rep. 196, Jan. 1957, 11pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

11,688

This study is one of a series of experiments designed to quantify caloric intake and expenditure in several environments with a well-defined regimen of physical activity. The test site for this study was the temperate environment at Natick, Massachusetts in late August and early September (mean ambient temperature daylight hours, 22.2 degrees Centigrade, mean relative humidity, 68 per cent, mean wind speed, 2.8 miles per hour). Caloric intake and expenditure (marching and other activities) were recorded for eight men over a 12-day period. Body weight, body density, and body fat measurements were made. The data were discussed in terms of need to account for energy expenditure for estimating man's caloric requirements in diverse environments. T. G. R 10

11,682

Wavter, Helen J., & Konishi, F. AN EVALUATION OF FOOD ACCEPTANCE BY SOLDIERS UNDER AN AD LIBITUM REGIMEN. Proj. 6-60-11 020, Rep. 198, Feb. 1957, 54pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

11,689

To determine the acceptability of individual foods consumed by soldiers under an ad libitum regimen, food consumption was recorded for 100 men for a period of 28 days. The menu included 173 items, all of high quality, prepared in as natural a form as possible under the highest possible standards. Free selection of any of the foods on the day's menu was permitted in as much quantity as was desired. Acceptability of the individual foods was expressed as the percentage of the persons at a meal who took a food item. The average quantity of food consumed was also calculated. The results are discussed in relation to factors affecting food preferences and to previous preference studies.
T. R. 26

11,690

Stockbridge, H.C.W. LEARNING TO AIM AT MOVING TARGETS WITH KNOWLEDGE OF RESULTS. Rep. 68, July 1956, 9pp. Clothing and Stores Experimental Establishment, Directorate of Physiological and Biological Research, Ministry of Supply, London, England.

11,690

To investigate the effect of knowledge of results on aiming and tracking, 12 subjects learned to aim a sight bar at a moving target. Two matched groups were formed on the basis of learning trials and given eight days of further practice, one group only being given their numerical score and immediate auditory knowledge of results. Both groups were then given test trials without knowledge of results. Subjects were asked to estimate how well they thought they had done. Time-on-target scores, recorded electrically, were analyzed for differences between the groups. Judgments of performance were compared with actual performance. The implications of the results for acquisition of skill and formation of standards are discussed.
T. I. R. 15

11,691

Josephson, D.V. ODOR AND FLAVOR PROBLEMS IN RADIATION STERILIZATION OF FOODS. Contract DA 19-129-qm-375, Proj. 7-84-01-002, Rep. 9, Final Rep., May 1955-Dec. 1956, 31pp. Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (Pennsylvania State University).

11,691

To gain insight into the radiation-induced flavor and odor problem of skim milk, the effects of ionizing (gamma radiation at two dosages (minimal and medium sterilization levels) on skim milk and certain of its fractions were studied. Each lot of radiated samples was evaluated organoleptically by from five to ten experienced judges for changes in odor and flavor. Additional changes in composition were investigated. Volatiles produced were collected by distillation techniques, fractionated by gas chromatography, and individual compounds identified by mass spectrometry. Flavor thresholds for a group of disagreeable compounds were determined and some off-flavor preventive mechanisms noted. Implications of this research for investigative techniques and for food sterilization are discussed. T. G. I. R. 12

11,692

USAF Flight Control Lab. LIGHTING, INTEGRAL, INSTRUMENT, GENERAL REQUIREMENTS FOR. WLSI 4 1, Amendment 1, Oct. 1954, 12pp. USAF Flight Control Lab., Wright-Patterson AFB, Ohio.

11,692

This report covers the general requirements for integral lighting of the indicia of panel mounted aircraft instruments. Applicable specifications, publications, and drawings are listed. Specific requirements, tests to be conducted, picking instructions, and notes relating to test equipment, ordering data, and suggested methods to attain specified lighting requirements are given.
I.

11,693

USAF Air Materiel Command. LIGHTING EQUIPMENT, AIRCRAFT, GENERAL SPECIFICATION FOR INSTALLATION OF MILITARY SPECIFICATION. MIL L 6503A (USAF), March 1954, 29pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio.

11,693

This specification covers the requirements for the installation of exterior and interior aircraft lighting, except lighting required for instrument illumination. Conventional aircraft, gliders, rotary wing, and amphibious aircraft are included. In addition, a list of references to applicable specifications, standards, drawings, and publications is given along with sampling, inspection and test procedures.
T.I.R. 86

11,694

USA Board MRI. EVALUATION OF UNITED KINGDOM COMPASS. REPORT OF TEST, PROJECT MR FA 3253, Aug. 1954, 3pp. USA Board MRI, Fort Sill, Okla.

11,694

To evaluate the United Kingdom compass (hand-held instrument for measuring magnetic azimuths) for field artillery use, the following tests were performed: (1) physical characteristics determined by observation, by subjecting to normal handling, and by submerging in water for two hours; and (2) operational characteristics determined by measuring azimuths during day and night under various weather conditions for repeatability of measurements, time for operation, and maintenance problems. Comparisons were made in both tests with Compass M-2 and the Swiss Compass. Deficiencies are enumerated and recommendations included.
T. J. R. 3

11,695

USAF Air Materiel Command. LIGHT, PANEL, AIRCRAFT, INDIVIDUAL INSTRUMENT. MILITARY SPECIFICATION. MIL L 5057A, Jan. 1953, 13pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio.

11,695

This specification, approved by the Department of the Army, Navy, and Air Force, covers individual instrument lights which mount to and illuminate flange-mounted type instruments employed in military aircraft. Individual instrument lights are classified in two types: normal angle of vision and wide angle of vision lights. The following items are included: applicable specifications, standard drawings, and publications; requirements; sampling, inspection, and test procedures; preparation for delivery; and notes on usage, ordering data, provision for qualification tests, and definitions.
T. G. I. R. 25

11,696

USAF Air Materiel Command. LIGHT, RUNWAY MARKER, ELEVATED, TYPE C-1. MILITARY SPECIFICATION. MIL L 5904B, May 1951, 14pp. USAF Air Materiel Command, Wright-Patterson AFB, Ohio.

11,696

This specification, approved by the Departments of Army, Navy, and Air Force, covers one type of high-intensity runway marker light, designated Type C-1, to be used for outlining runways not over 200 feet in width, under all weather conditions. Items included are: applicable specifications and other publications; requirements; sampling, inspection, and test procedures; preparation for delivery; and notes on ordering data and provisions for qualification tests.
C. I. R. 14

11,697

Christman, R.J., & Doherty, W.J. HUMAN FACTORS ANNOTATED BIBLIOGRAPHY ON SPEECH COMMUNICATIONS JAMMING. Tech. Rep. 57-25, Feb. 1957, 14pp. Rome Air Development Center, ARDC, Griffiss AFB, Rome, N.Y.

11,697

This report is a non-critical compendium in annotated form of recent (1942-1956) literature related to communications jamming. Studies dealing directly with the specification of signals to be used against voice communications and oriented toward the human operator component of the communications systems are included. The principal section is on jamming of speech; two smaller sections provide partial coverage on intelligibility testing and general reports on both topics.
R. 16

11,698
Reckow, H.R. EFFECTS OF VIBRATIONS ON CONTROL DEEP-SPACE AND GAIN ON TRACKING PERFORMANCE. Proj. 7199-71635. WADC TR-57-126. Sept. 1957. 12pp. Army Medical Lab. WADC, WDC. Wright-Patterson AFB, Ohio.

11,699
To investigate the effects of joint variations in control response and gain on the efficiency of a first-order manual control system, six experienced subjects performed on a two-dimensional tracking device. Four levels of control response (none, one, two and three degrees) were combined with three levels of gain (1:1, 5:1, and 10:1) to produce twelve conditions. Each subject practiced on all conditions on two separate days. Mean percent time-on-target (the display line was within a 0.2 inch scoring zone at center of display) scores were studied by analysis of variance for significance of differences due to the experimental conditions. Applicability of the findings to use for design engineers is discussed.
T. G. R 3

11,700
Wiesner, J.B., Harvey, G.C., & Zimmerman, H.J. QUANTITATIVE PROGRESS REPORT. July 1957. 100pp. Research Lab. of Electronics, Massachusetts Institute of Technology.

11,701
This is a quarterly progress report covering the three month period ending May 31, 1957. A review of the research activities of the laboratory in the following area is given: physical electronics, microwave gaseous discharges, solid state physics, microwave spectroscopy, nuclear magnetic resonance, microwave electronics, atomic beams, statistical communications theory, process analysis and synthesis, information processing, and transmission, transistor and diode studies, noise in electron devices, statistical thermodynamics, speech analysis, mechanical translation, communications biophysics, neurophysiology, circuit theory, network synthesis, and microwave theory. A list of personnel, publications and reports is presented.
T. G. I. R 15

11,702
Shenesh, A. CINERADIOGRAPHIC OBSERVATIONS OF A REFLEX CONTRACTURE OF THE ARCH OF THE FOOT DURING WALKING. Proj. 6-59-08-012, Rep. 327. Jan. 1952. 16pp. USA Medical Research Lab. Fort Knox, Ky.

11,703
To study the physiologic action of the arch in weight bearing, 35 millimeter x-ray moving pictures of the feet of 35 walking men were taken with cineradiographic machine. Observations and measurements of bone movement were made from enlargements of the film sequences. The action of the foot was described graphically by plotting height of displacement of bones against the time of exposure on the movie film. Recommendations are included for more comprehensive study.
G. I. R 8

11,701
Fletcher, J.L., & Silver, C.A. ATTENUATION CHARACTERISTICS OF FOUR EAR PROTECTIVE DEVICES. Proj. 6-95-20-001, Rep. 322. Jan. 1958. 21pp. USA Medical Research Lab Fort Knox, Ky.

11,701
To determine the attenuation characteristics of four ear protective devices (Quartermaster helmet, Centex helmet, H-63 headset, and Radio Corporation of America headset), two tests were conducted. The first was a physical calibration using a condenser microphone in the right ear of a dummy head and measuring the sound pressure level of microphone response with and without the protective devices. An articulation test (96 subjects) was given with masking noise similar to that found at the Commander's station of vehicle T-41-E2. Each subject responded to one list of words wearing each headgear. The data, attenuation in decibels and percentage correct answers, were analyzed for differences due to protective devices.
T. G. R 4

11,702
Sall, H.G. ECONOMICS IN THE STEELWORKS. Summary 109, no. 1926, 2p. British Iron and Steel Research Association, London, England.

11,703
A brief summary of the results of a survey and of ergonomic research in two large steelworks is presented in two parts: 1) design of equipment--this deals with master controllers, the layout of controls, and display systems; 2) physical conditions of work--this is concerned with seating, visibility, and protection from heat.

11,705
Bond, D.D. PSYCHOPATHOLOGIC REACTIONS TO AIRCRAFT ACCIDENTS. Proj. 183, Rep. 1, Sept. 1943. 10pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,705
To investigate the etiology of anxiety concerning flying, a study was made of the case histories of flyers who had developed such fears. Common precipitating factors and psychopathologic reactions were summarized, and several representative case histories given. Recommendations regarding administrative policy, need for additional follow-up studies, and further study of treatment procedures are included.

11,704
Hawley, L.K. CRANE CONTROLS FOR IRON-AND STEEL-WORKS. PART III. PROTOTYPE MASTER CONTROLLER TRIALS. FE-5/67/53, March 1954. 10pp. Plant Engineering Division, The British Iron & Steel Research Association, London, England.

11,704
This report gives a final account of evaluations of prototype designs of master controllers for cranes in steelworks. The controllers consisted of new four-start design sponsored by the British Iron and Steel Research Association and other single start designs originated by the manufacturers as alternative answers to the problem. Eleven controllers were installed in steelworks cranes for periods of from one to three years and given extended trials. Installation details and performance data are presented in tabular form.
T. R 11

11,705
Mott, R.L. A HIGH-SPEED TIME BASE FOR PPI RADAR DISPLAY. Rep. ERB-289, Aug. 1952. 11pp. Radio and Electrical Engineering Division, National Research Council of Canada, Ottawa, Canada.

11,705
This report describes the development and operation of a high-speed time base featuring a continuously variable scale from 400 to 10,000 yards. Details of a "package-type" radar system which is used in conjunction with the time base are included. Specifications of the console-type Navigational and Docking Radar are given. In addition to schematic diagrams and photographs of the equipment, a number of operational pictures of the Plan Position Indicator display have been included. The use of the equipment for navigation in confined waters and harborways is discussed.
1.

11,706
Moseley, H.G. USAF OPERATIONAL EXPERIENCE WITH ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. Pub. no. M-24-56, Sept. 1956. 21pp. Directorate of Flight Safety Research, Norton AFB, Calif.

11,706
This report presents an analysis of emergency escapes from high performance aircraft by use of the ejection seat. The number of known ejections was 877 over a period from August 1949 through May 1956. Causes of ejection fatalities and major injuries are analyzed along with altitudes and airspeeds relative to injury. A review of circumstances leading to fatalities (whether or not escape was attempted) is presented. Problems of aeromedical and design concern are discussed.
T.

11,707

Neill, P.C. Jr. USE OF RED LIGHT TO FACILITATE DARK ADAPTATION. Proj. 115, Rep. 1, Feb. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,707

To demonstrate that red illumination is feasible for use in alert rooms in place of red pre-adaptation goggles six subjects were exposed to light from a 40-watt natural ruby red Mazda lamp for 20 minutes. The light was directed down on a white card (36 inches square), and the subject was required to read during the adapting period. The rate of adaptation was measured on the Becke Adaptometer. The data were compared with those from a previous experiment with red dark adapter goggles. The advantages of the illumination method are discussed.

G. R. 1

11,708

Karpovich, P.V. RELATION BETWEEN BEARS AND PHYSICAL FITNESS. Proj. 132, Rep. 1, Oct. 1943, 2pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,708

To determine whether the incidence and severity of bears occurring at high altitude are related to physical fitness, 197 aviation students were given simulated flights in an altitude chamber at 35,000 feet for three hours. Oxygen was used above 10,000 feet; rate of ascent, 2000 feet per minute; rate of descent 27 millimeters Hg (pressure) per minute. At the same period in their training the students were given the Pre-Flight School Physical Fitness Test. The data were studied by comparing the mean physical fitness scores of the groups that did not get the bears (157) with the group that had to be brought to ground level before end of flight because of bears (30).

R. 1

11,709

Karpovich, P.V. IMPROVEMENTS IN THE FRICTIONAL BICYCLE ERGOMETER. Proj. 65, Rep. 1, July 1942, 4pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,709

This report describes two modifications of the frictional bicycle ergometer used for exercising subjects in various experimental situations. The modifications suggested increase the accuracy and ease of handling the ergometer. Photographs are included.

I.

11,710

Nass, G. THE RELATIONS BETWEEN PILOT ERROR AND MULTIPLE AIRCRAFT ACCIDENTS. Proj. 153, Rep. 1, July 1943, 12pp. USAF School of Aviation Medicine, Randolph Field, Tex.

11,710

To examine the relations between pilot error and multiple aircraft accidents, the flight records of 14 pilots having two or more accidents were studied. The frequency, rate of succession, and repetition of error were analyzed. Recommendations are made concerning standard system for recording deficiencies in flight performance from the beginning of training.

11,711

Davidson, H.O. Jr. BIOLOGICAL EFFECTS OF WHOLE-BODY GAMMA RADIATION ON HUMAN BEINGS (U). Tech. Memo ORO-T-357, Dec. 1956, 95pp. Operations Research Office, The Johns Hopkins University.

11,711

To estimate the short-term effects on humans of chronic whole-body exposure to gamma radiation and to organize results in a form suitable for fallout defense planning, results of chronic-irradiation experiments on animals together with data on single-pulse irradiation of animals and humans were analyzed. Approximate principles for prediction of human response to fallout radiation were derived and combined with a fallout decay function to permit computation of an effective dose. Graphical solutions are presented for application of this computation to various types of fallout defense problems, and some general conclusions for planning are suggested. The problem of delayed effects is briefly surveyed.

T. G. R. 54

11,712

Barfield, C.M. SERVICE ACCEPTANCE TRIALS OF MODEL T-340 AIRPLANE STABILITY AND CONTROL TRIALS. Proj. TED 815 21190, Letter Rep. 1, Final Rep. 1, Final Rep., Sept. 1955, 13pp. Naval Air Test Center, Patuxent River, Md.

11,712

To test the model T-340 airplane (two place tandem, single engine, primary trainer, Beechcraft Aircraft Corporation) for stability and control characteristics, standard flight test methods and data analysis procedures were used. The tests consisted of an evaluation of the following: cockpit and flight control systems; ground handling, take-off, stall, spin, landing and wave-off characteristics; and longitudinal, lateral, and directional stability and control. The results discussed in terms of acceptability and compliance with standard requirements include recommendations.

G. R. 12

11,713

Wright, L.C., & Thomas, C.F. FLIGHT COMPANION OF A STANDARD A-2 MODEL ZERO READER AND A MODIFIED SLAVED DIAL ZERO READER COMBINED INDICATOR. TM NCT-54-25, 3-655-1604-1, July 1954, 60pp. Directorate of Flight and All-Weather Testing, WADC, AFMTC, Wright-Patterson AFB, Ohio.

11,713

To determine which of two Zero Reader Flight Instrument Combined Indicators (rotating card versus settleable card-rotating needle) best displays required flight information, both indicators were installed in the instrument panel of a C-47 aircraft - one in the pilot's panel and one in the co-pilot's panel. The test consisted of approximately 20 minutes of hooded flight for each of 35 pilots using each instrument. The test pattern flows was the same for each instrument and included a series of turns and a simulated Ground Control Approach landing. A preference questionnaire was completed by each pilot. The results were analyzed for differences between performance on and preference for the indicators. Recommendations are included.

I. R. 1

11,714

Perkins, C.D. (Ed.) AGARD FLIGHT TEST MANUAL. VOL. I: PERFORMANCE. Contract AF 18(600)-1323, Jan. 1956, 12 chapters. Air Force Office of Scientific Research, AFOSR, Washington, D.C. (Princeton University).

11,714

This report contains portions of Volume I of the Flight Test Manual as follows: the last few pages of Chapter 2, thrust and power determinations; and Chapters 10, 11, and 12, performance testing of helicopters, effect of the ground on the performance of a helicopter, and transition performance of a helicopter following a sudden loss of power. This material has been collected from many sources and assimilated in a form that provides a basic reference work in the flight testing field. Terminology lists and references are given for each chapter.

G. I. R. 24

11,715

Perkins, C.D. (Ed.) AGARD FLIGHT TEST MANUAL. VOL. II: STABILITY AND CONTROL. Contract AF 18(600)-1323, Jan. 1956, 75pp. Air Force Office of Scientific Research, AFOSR, Washington, D.C. (Princeton University).

11,715

This report contains three chapters in Volume II of the Flight Test Manual as follows: Chapter 9, Part II, high speed stability and control problems; Chapter 12, routine handling tests for helicopters; Chapter 13, study of the handling characteristics of helicopters; and Chapter 14, a survey of flight flutter testing techniques. This material has been collected from many sources, assimilated and put in a form that provides a basic reference work in the flight testing field.

G. I. R. 7

11,716

Dunlap and Associates, Inc. HUMAN ENGINEERING EVALUATION OF THE DOPPLER SONAR. Contract N ord-17719, Memo Rep. 2, April 1957, 4pp. Dunlap and Associates, Inc., Stamford, Conn.

11,716

The Doppler sonar was evaluated from the human engineering viewpoint. The following aspects of the equipment are discussed: function, operation (warmup and tuning), and operational difficulties. Recommendations for some equipment modifications are made.

11,717

Hess, G. THE RELATIONS BETWEEN INJURIES DUE TO AIRCRAFT ACCIDENTS AT BROOKS FIELD, TEXAS, IN 1942, AND THE CAUSES AND NATURE OF THE ACCIDENTS. Proj. 144, Rep. 1, April 1943, 13pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,717

To study the relations between injuries due to aircraft accidents at Brooks Field, Texas in 1942 and the causes and nature of the accidents, accident reports of the Aircraft Accident Examining Committee were reviewed. Causes assigned by the committee were tabulated according to frequency and degree of injury. The nature of the accidents were similarly tabulated. The findings were discussed in relation to possible underlying factors such as lack of experience, lack of familiarity with the specific model being flown, stress and strain of long hours of flying, type of training program. Improved techniques for reporting accidents are suggested.

11,718

Technical Information & Library Services. BIBLIOGRAPHY OF INFORMATION ON SERVOMECHANISMS AND RELATED SUBJECTS. ADDENDUM NO. 2. Servo. Lib. Ref. 2 28, Sept. 1955, 124pp. Technical Information & Library Services, London, England.

11,718

This bibliography on Servomechanisms is an addendum to a previous publication (Nov. 1950). It contains brief abstracts of unclassified reports that have been added to the Servo Library since the issue of Addendum No. 1, Nov. 1953. Topics covered in Part I, Automatic Control, are general theory, analysis and design of control systems, components and sub-units of control systems, applications, tests and performances. Part II, Manual Tracking, covers manual control studies and tracking theory. An author index is included.

R 547

11,719

Theilen, E.O., Gregg, D.E., & Rotta, A. JOINT REPORT WITH ANDEAN INSTITUTE OF BIOLOGY, LIMA, PERU. EXERCISE AND CARDIAC WORK RESPONSE AT HIGH ALTITUDE. Proj. 6-60-13-017, Subtask 6, AMSGS-26-55, Sept. 1955, 10pp. Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D.C.

11,719

To study the extent and adequacy of the response of the heart of man to the stress of chronic anoxia at high altitudes, 26 male subjects were studied either at Morococha, Peru (elevation 14,900 feet) or at Lima, Peru (elevation 590 feet). These subjects included natives indigenous to both altitudes. Control determinations of hemoglobin, hematocrit, cardiac output, heart rate, systemic blood pressure and oxygen consumption were made with the subject standing on a treadmill. The treadmill was started and rate and duration of work adjusted in attempt to create a heavy cardiac work load (from four to seven miles per hour from three to ten minutes); measurements were then repeated. Comparisons of the data were made between high altitude and sea level subjects.

T. G. R 17

11,720

Swartz, K.T. RELATION OF HEAT PROCESSING LEVELS TO CONSUMER PREFERENCE OF CANNED YORK AND GRAVY AND CANNED BEEF STEW. Proj. 7-84-06-031, Problem 01-32a, Interim Rep., March 1955, 5pp. Quartermaster Food and Container Institute, Chicago, Ill.

11,720

To obtain information concerning the possibilities of utilizing process reduction to improve marginally acceptable canned meat items for ration use, a sensory evaluation of pork and gravy and beef stew was conducted. Three different canners prepared and processed the pork and gravy in accordance with military specifications except that F_0 values (sterilizing values of processes used) were 0.1, 1.0, 3.0, 5.0, 7.0, and 9.0 (usual values range from 3.0 - 6.0). The beef stew was prepared at the Institute. A consumer preference type test was used to evaluate both products. The results were analyzed in terms of relation of heat processing level to consumer preference.

T. G.

11,721

Strackee, L. BIBLIOGRAPHY ON HYDROPHONES. Rep. TDCE 6430, Jan. 1956, 11pp. Technical Documentation Center for the Netherlands.

11,721

This bibliography lists titles of reports and articles with abstracts on the subject of hydrophones. The period covered is from 1942 to 1955.

R 20

11,722

Vilbig, P. IMPROVEMENT AND SIMPLIFICATION OF THE SCANVOCODER AND ITS CONNECTION TO A CORRELATION PULSE CODE SYSTEM. AFRC TR-56-113, June 1956, 5pp. Communications Lab., Electronics Research Directorate, AFRC, Bedford, Mass.

11,722

This paper describes an improved and simplified Scanvocoder, a speech-bank compression system based upon envelope detection, a modification of the basic Vocoder principle. The modification of the Scanvocoder allows changing the number of channels in the time domain rather than the frequency domain. Typical speech patterns may be obtained by using the Scanvocoder analyzer and formant extraction technique so that when connected to a correlation pulse code system, matching instantaneous speech pattern can be accomplished. Block diagrams are included.

R 3

11,723

Yustein, S.E. REPORT OF RESEARCH AND DEVELOPMENT OF SURFACE PREPARATION AND PAINT REMOVING METHODS ON BRIM AND CROWN STRENGTHS OF SAFETY HELMETS. Lab. Proj. 4526-30, Final Rep., NS-18-613, Dec. 1955, 7pp. Naval Lab., USN Shipyard, Brooklyn, N.Y.

11,723

To investigate the influence of surface preparation and paint removing methods on the brim and crown strengths of safety helmets, a number of helmets from Navy stock (fibrous glass reinforced polyester and phenolic helmets) were tested. Based upon a survey of methods employed by different Naval shipyards in preparation of helmets for painting, the following representative treatments were used: 1) hand-sanded and sprayed with yellow lacquer, 2) lightly sandblasted and sprayed, 3) immersion in hot caustic soda solution, and 4) application of paint remover liquid. Samples from the brim and crown were tested for strength in flexure. The load producing a break was reported in pounds. An untreated specimen was used for comparison. The findings are discussed in terms of optimum method of treatment.

T. R 3

11,724

Audo, P.D., & Ashby, A.T. INVESTIGATION AND STUDY OF A CHAIN RADAR SYSTEM EVALUATOR. Contract DA 36-839-ac-56745, Interim Prog. Rep. 55-3A (Supplement 1), May 1955, 18pp. Cook Research Labs., Skokie, Ill.

11,724

This is a progress report of a research study of the chain radar system at the White Sands Proving Ground to determine the feasibility of incorporating an automatic or semiautomatic evaluation system into the chain. This report contains a description of field tests conducted to determine the relationship between the percent modulation of the echo pulse train at the output of the receiver of a tracking radar set and the angular tracking error as recorded by the bore-sight camera. The tests were conducted with radar sets during missile firing. A description of the equipment used and the results obtained are included. A tentative modification of the originally proposed system for deriving the figure of merit of a tracking radar set and recommended tests are discussed.

G. I. R 3

11,725

Hass, G. AN INQUIRY INTO CIRCUMSTANCES FAVORING THE OCCURRENCE OF A SERIES OF FATAL AIRCRAFT ACCIDENTS ATTRIBUTED TO AN ACUTE LOSS OF ORIENTATION DURING NIGHT TRAINING MISSIONS. Proj. 154, Rep. 1, Sept. 1943, 3pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,725

To inquire into factors that contributed to the occurrence of 14 fatal night accidents of undetermined cause, an analysis of the accident reports was made. For each case the following salient factors were tabulated: time, date, place, atmospheric conditions, orientation, maneuver before fall, manner of fall, attitude on contact, result of accident, type of aircraft, status of pilot, number of pilot hours--day, night, instrument, flight record, accident record, vertigo record. The pattern of contributory causes was examined in terms of the previous findings pointing to acute loss of orientation. A list of aids for the diagnosis of loss of orientation is presented with recommendations for reducing their incidence. T.

11,726

Rushmer, R.P., & Hass, G.M. A COMPARISON OF CRASH INJURIES IN MAN AND IN LABORATORY ANIMALS. Proj. 471, Rep. 1, March 1946, 8pp. AAF School of Aviation Medicine, Randolph Field, Tex.

11,726

To determine the usefulness of direct experimentation on laboratory animals in the study of the effects of large decelerative forces on man, a comparison was made of the internal injuries encountered during post-mortem examination of flying personnel killed in aircraft accidents with the pathologic lesions produced by abrupt deceleration of these species of laboratory animals--cats, rabbits, and mice. The post-mortem cases selected were ones in which the victim had apparently been seated facing forward at moment of impact. The laboratory experiments included a variety of positions and restraints. Differences in decelerative forces obtaining during deceleration between the accident victims and animals were unknown. Discussion of the findings is in terms of degree of similarity of injuries. T. G. I.

11,727

Hass, G. RELATIONS BETWEEN THE TIME OF DAY, OCCURRENCE OF AIRCRAFT ACCIDENTS AND INJURIES TO OCCUPANTS OF AIRCRAFTS AT RANDOLPH FIELD, TEXAS, IN 1942. Proj. 120, Rep. 1, Feb. 1943, 2pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,727

To study relations between time of day, occurrence of aircraft accidents, and injuries to flying personnel, 269 accident reports from Randolph Field (1942) were studied. Accidents attributed to failure of personnel (193) were analyzed for effect of: 1) time of occurrence, 2) type of injury to personnel, and 3) event preceding injury. The amount of flying done by a training group of pilots at various periods of day and night and the average number of planes in the air were tabulated for one month and regarded as representative throughout the year. A comparison was made between the two sets of data. The findings are related to the role of fatigue in accidents and re-examination of training schedules. T. G.

11,728

Rowland, W.H. THE SAM PORTABLE NIGHT VISION TESTER. Proj. 69, Rep. 4, Jan. 1944, 1p. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,728

This report outlines a procedure for mounting the SAM (School of Aviation Medicine) Portable Night Vision Tester on its own box thereby securing a steady base during use. A recommendation concerning a detail of test procedure is included. I.

11,729

Weitz, J. EFFECT OF SHAPE OF HANDLES AND POSITION OF CONTROLS ON SPEED AND ACCURACY OF PERFORMANCE WHEN VISUAL CUES ARE RESTRICTED. Proj. 351, Rep. 1, March 1945, 3pp. AAF School of Aviation Medicine, Randolph AFB, Tex.

11,729

To determine the effect of shape coding on the habit interference resulting from changing the position of controls either coded or uncoded with respect to the appropriate response, the control panel was placed behind a screen that concealed the controls but did not restrict movement. Eight trials were given in the original position followed by eight trials with the position of the controls changed. Control groups practiced only on the second position. Four groups of 50 subjects each practiced on one condition only. Total correct scores and errors were analyzed for changes due to position changes of coded and uncoded controls. The implications for standardizing aircraft controls are discussed. T.

11,730

Hauer, S. THE APPLICATION OF FLOW CHART METHODOLOGY TO THE GROUND SUPPORT AREAS OF MILITARY OPERATIONS RESEARCH. May 1956, 4pp. Weapon Systems Development Labs., Hughes Aircraft Co., Culver City, Calif.

11,730

This paper demonstrates how the flow chart can be used to analyze a specific ground handling problem of military operations research. It describes the columnar headings of the chart and how they have been designed to answer any who, what, where, how or when question relative to handling aircraft on the ground. Purpose of operation, measure of its effectiveness, and improvement of effectiveness are related to the information content of the chart. Further applications of this methodology are discussed. I.

11,731

Carriago, E.A. Jr., & Gondek, A.J. REPORT OF PROJECT NR 2738-SERVICE TEST OF FINDER, RANGE, STADIA, T45. Proj. DA 513-05-004, May 1957, 19pp. Rocket and Recoilless Dept., USA Infantry Board, Fort Benning, Ga.

11,731

To determine the suitability of Finder, Range, Stadia, T45 (a hand-held instrument similar in shape to binoculars which enables one man to range in on stationary or moving objects) for Army use, field tests were conducted at Fort Benning, Georgia. The speed and accuracy with which distance of stationary and moving objects could be determined were compared for the test range finder, for a control range finder (Sight, Stadia, M920), and for eye estimation. Determinations were made under varying weather conditions. Further comparisons were made with the Rifle, Spotting, Caliber .50, M6 for accuracy as range determining devices. Additional tests of physical characteristics, ruggedness and durability and general utility were made. Recommendations are included. T. I. R 6

11,732

USAF Directorate of Bombardment-Observer-Navigator Training Research. GRIDS FOR AIMING POINT IDENTIFICATION TESTS. Proj. 21 06 003, Res. Notes AOB 50 2, April 1950, 2pp. USAF Directorate of Bombardment-Observer-Navigator Training Research, Mather AFB, Calif.

11,732

To determine the type of grid that would permit greatest speed and accuracy in locating points, three types of grids were tested; one rectangular coordinate and two designs of a polar coordinate. A printed test for each grid was compiled; each test had five grids with eighteen points to be located and spaces for writing the coordinates. The score was total number of responses given in a six-minute period. Each of three Navigator Class were given a combination of two of the grids in double-fatigue order, and one Bombardier Class was tested. The data were analyzed first for differences due to type of grid and then for differences due to type of testee - bombardier vs. navigator. The use of the results for an "Aiming Point Identification Test" is indicated. T. I.

11,733

USAF Rome Depot Maintenance Engineering Services Div. (NEMT). BRIGHTNESS SETTING OF RUNWAY AND APPROACH LIGHTS, AIRFIELD LIGHTING EQUIPMENT. Tech. Order 08 20 76, May 1954, 4pp. USAF Rome Depot Maintenance Engineering Services Div. (NEMT), Griffiss AFB, N.Y.

11,733

This is a technical order providing control tower operators with instructions for the proper adjustment of the brightness setting of airfield runway, overrun, and approach lights. A description of the problem of adjustment, of all switches on standard control panels, and of procedures to follow in maintaining proper switch connections is included. A table of brightness control switch positions for the various circuits is given. Further instructions as to conditions under which deviations may be allowed, and tests and maintenance of the equipment are included.

T.

11,734

Lazo, J.L. NOTES FROM AERO MEDICAL EQUIPMENT LABORATORY. No date, 5pp. USN Aero Medical Equipment Lab., NMC, Philadelphia, Penn.

11,734

This report contains notes on current projects of the Human Engineering Branch, Naval Air Materiel Center, United States Naval Base Station, Philadelphia. The notes state the problem, the need giving rise to it, and make informal comments and suggestions. Topics include dark adaptation, exterior lighting, cockpit lights at high altitudes, cockpit dimensions, coloration, layout, visors, attending getting devices, target detection, radar sighting, camouflage detection and chlorophyll goggles, projected instrument readings, displays, and visibility of objects at sea.

R 6

11,735

US Technical Development & Evaluation Center. LIST OF TECHNICAL DEVELOPMENT REPORTS AND NOTES. Sept. 1955, 8pp. US Technical Development & Evaluation Center, CAA, Indianapolis, Ind.

11,735

This is a listing by title and number of available technical development reports and notes of the Technical Development and Evaluation Center of the Civil Aeronautics Administration, Indianapolis, Indiana. The time period covered is from 1936 to 1955.

R 165

11,736

Times Review of Industry. EFFECTIVE MANAGEMENT. POWER OF COMPREHENSIVE WORK STUDY. Times Rev. Industr., May 1955, 2pp.

11,736

This paper discusses the use of work study as a technique for improving industrial efficiency. The advantages of this method are pointed out and some examples of proved achievements are cited. Two basic divisions - method study and work measurement - are defined; the steps involved in each are described; and the outcomes are discussed. Some common misconceptions of work study methods are pointed out.

11,737

Tinker, M.A. BASIC REQUIREMENTS IN SCHOOL LIGHTING. J. Amer. Med. Assoc., 1950, 143, 362-364.

11,737

Fundamental requirements in school lighting are examined critically within the framework of experimental evidence that is the basis for existing recommendations. This experimental background is discussed and reinterpreted (under the topics: color, intensity and distribution of light) and recommendations are set forth.

T R 22

11,738

Thornike, R.L., Hagen, E. & Rosner, B. EVALUATION OF A TECHNIQUE FOR CHARACTERIZING THE JOB REQUIREMENTS OF SELECTED AIR FORCE JOBS. Contract AF 18(600) 1208, Quar. Repts. 1, 2, 3 & 9, Dec. 1956, 6pp. Teachers College, Columbia University, New York, N.Y.

11,738

This document includes several quarterly reports of progress on the construction and evaluation of a Job Activities Blank for selected Air Force jobs.

11,739

Lyman, J. SOME ASPECTS OF RESEARCH PLANNING FOR THE PSYCHOPHYSIOLOGICAL ENVIRONMENT IN MANNED SPACE TRAVEL. Dec. 1957, 12pp. Dept. of Engineering, University of California.

11,739

This paper discusses some problems that must be solved in providing for the psychophysiological environment of men in space travel. Taking the stages of manned flight to be global atmospheric flight, global space equivalent flight, circumplanetary space flight, and interplanetary space flight, present progress is discussed. Four major psychophysiological problem areas of space environment connected with prolonged flight are then discussed along with suggestions for needed research. These areas are: weightlessness, man-environment maintenance exchanges, morale and comfort in isolation for prolonged periods, and the effects of radiation.

R 19

11,740

Hake, H.W. CONTRIBUTIONS OF PSYCHOLOGY TO THE STUDY OF PATTERN VISION. Contract AF 33(616)-2918, Proj. 7192-71598, WADC TR-57-621, Oct. 1957, 118pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (The Johns Hopkins University).

11,740

A survey is presented of major research topics in psychology having relevance to patterned vision. Included are: threshold measurements, visual distortion, form discrimination, constancy in form perception, memory for form, and training problems. Although purely theoretical considerations are excluded insofar as possible, a logical analysis of the task required of the visual system in sensing the form or pattern of visual stimulation is presented and used to evaluate the results.

R 332

11,741

Kessler, I.J., & Beyer, M.S. AIRLINE MAINTENANCE MANAGEMENT. Operations Analysis Paper 65, AF00A 11-4004, Aug. 1955, 304pp. USAF Assistant for Operations Analysis, Operations Headquarters, Washington, D.C.

11,741

This volume presents a composite of policies, procedures, and techniques of aircraft maintenance management employed by the airlines of the United States (1945-1960). The data were collected by studying eight airlines selected as representative of the industry. The several chapters cover: the history of the airline as a major common carrier; government regulation; operations planning; organization; maintenance responsibilities; practices, and planning; production control planning and hangar floor overhaul; quality control in maintenance; manpower expenditures; personnel management; spare parts and supply; and plant facilities.

T. G. I.

11,742

Berndt, R.J. (Proj. Engineer). UNITED STATES AIR FORCE PARACHUTE HANDBOOK. Proj. 6078, WADC TR 55 265, Dec. 1956, ca. 200pp. USAF Equipment Lab., Wright-Patterson AFB, Ohio.

11,742

The United States Air Force Parachute Handbook is a collection of information, test results, and other technical data pertaining to the application, design, construction, and testing of parachutes, parachute systems, and accessories. The contents represent the state-of-the-art of parachute development, design, fabrication, and testing. The contents will be revised periodically as new and reliable data become available. A glossary of standard terms and standard symbols is included.

T. G. I. R 152

11,743

Documentation Incorporated. UNITERM INDEX TO BIBLIOGRAPHY FOR INTEGRATED PRESENTATION OF FLIGHT INFORMATION. Ref. 1-12, 235, 1956. Documentation Incorporated, Washington, D.C.

11,743

This Uniterm Index represents a consolidation of all previously issued indexes prepared in connection with the Office of Naval Research - Douglas Instrumentation Project. The index is a guide to abstracts that cover all aspects of flight information and is designed and printed so that any page can be opened with any other page for direct comparison of Uniterns (single-word concepts) and their abstract numbers. Directions for retrieving information are given. In addition to the Uniterns, there are sections giving equipments and systems, sources and companies and authors.
R-12,235

11,744

Ely, J.H., Bowen, H.W., & Orlansky, J. MAY-MACHINE DYNAMICS. CHAPTER VII. Contract AF 33(616)-419, Proj. 7180, WADC TR-57-582, Nov. 1957, 113pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Dunlap & Associates, Inc., Stamford, Conn.).

11,744

This report identifies and discusses factors affecting human performance in tracking and watchkeeping (vigilance) tasks, and makes recommendations toward improving the performance of such systems. Whenever these recommendations are the direct outgrowth of published research the appropriate titles are cited. Other recommendations have been developed by the authors from their own experiences. There are three main parts: (1) general information describing closed-loop systems and human responses to various inputs; (2) important design factors in closed-loop systems (pursuit and compensatory displays, intermittency machine dynamics, aided tracking, quickening); and (3) human time lags (basic information, factors affecting watchkeeping). A table of contents and subject index are provided as aids to the user. G. I. R 116

11,745

Egly, J.H. COMBAT HELMET DEVELOPMENT. Contract DA 19-129-G-416, Rep. OG-998-D-2, Jan. 1957, 30pp. Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

11,745

This report describes the study and development of a one-piece (shell with no liner) general purpose combat helmet based on designs that had previously been made. The main feature was increased head coverage for maximum protection achieved by movable visors. Following study of requirements for stability, comfort and fit, a prototype was made of the new shell and suspension and checked for compliance with product requirements. Further developmental studies were made of suspension arrangements for the T53-2, M-1, and T54-3 helmets. Noise attenuation experiments were performed to determine modification potential for improving the T54-3 helmet. Recommendations are included.
G.I.

11,746

Rosso, D.A., Jr. DEVELOPMENT OF EMERGENCY FLIGHT DATA PANEL. Proj. TED NAM AE-9140, Rep. NAES-INSTR-24-52, April 1952, 5pp. Aeronautical Instruments Lab., NAMC, Philadelphia, Penn.

11,746

This report describes an emergency flight data panel (Panic Panel) for use in Naval aircraft not equipped with provisions for such information. A human engineering evaluation of a prototype panel is included in this report. Psychological factors relating to the value of the panel in emergency situations are reviewed and limitations of the construction features, mounting, material content and display features of the panel design are listed. Recommendations for changes are included.
I. R 5

11,747

Page, I.H. DETECTION OF RADAR ECHOES. NRL Reprint 36-53, March 1953, 15pp. Naval Research Lab., Washington, D.C.

11,747

This paper presents a method of accounting for operator effects, in any radar system, as a function of indicator and viewing conditions. From a critical study of experimental data in the literature, agreement is found for a number of parameters. Based upon a consideration of these factors an equation is derived that is useful in determining what actual received power is necessary for a given probability, under specified conditions, of an operator detecting a target. A more sophisticated nonlinear approach to the detection problem is further discussed and an equation derived which relates all of the considered parameters.
G. R 7

11,748

Lawrence, W. THE SYNTHESIS OF SPEECH FROM SIGNALS WHICH HAVE A LOW INFORMATION RATE. 1952, 8pp. Signals Research and Development Establishment, Christchurch, England.

11,748

This paper deals with one aspect of the problem of reducing the channel capacity required for the transmission of telephonic speech. From an analysis of an electrical generating system analogous to speech generation, two functions are isolated and the minimum number of parameters needed for synthesizing intelligible speech hypothesized. Experimental apparatus was constructed - the Speech Generator and Controller. Parameters specified the resonant frequencies of the vocal cavity system and the excitation applied to it. A few short phrases were synthesized and evaluated for intelligibility and information content. Future developments are discussed.

11,749

Glaser, R. DESCRIPTIVE VARIABLES FOR THE STUDY OF TASK-ORIENTED GROUPS. Prepared under Contract N70nr-37008, Proj. NR-154-079, Tech. Rep., June 1956, 13pp. American Institute for Research, Pittsburgh, Penn.

11,749

This report describes the development of a set of terms or dimensions for the description of task-oriented groups. A brief review is given of studies of task-related behavior of individuals and resulting group behavior from sociometry, communication network study, graph theory, and activity category analyses. Three classes of descriptive variables are described - communication, time sequence, and process. Illustrations from military groups are presented. Some suggested directions for further research on development of refined measurement procedures and of testable hypothesis are discussed.
G. R 13

11,750

Gerstner, H.B. MILITARY AND CIVIL DEFENSE ASPECTS OF THE ACUTE RADIATION SYNDROME IN MAN. Rep. 58-6, Nov. 1957, 29pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,750

To present a unified clinico-pathologic concept of radiation sickness in man (acute effects of human whole-body exposure to penetrating ionizing radiation) from the standpoint of the practical physician and medical officer, a comparative analysis is made of human data derived from nuclear accidents, Japanese bomb casualties, and radio therapy patients. The clinical picture of the acute radiation syndrome with its three subdivisions - hematopoietic, gastrointestinal, and cerebral forms - is described. Dependency of the picture on dose level and individual susceptibility is discussed and the therapeutic management outlined. Problems facing the practical physician - personnel, supplies, housing - under catastrophic conditions are evaluated.

11,751
Keatinge, G.F. RADIATION CATARACT IN INDUSTRY. Summary 96, ca. 1955, 2pp. British Iron and Steel Research Association, London, England.

11,751
This is a brief summary of the original report. The incidence of radiation cataract in iron-rolling mill workers was determined by ophthalmological examination of 44 of these men as compared to 104 "control" men of similar age. The results are stated in percentages for the groups as a whole and as a function of age (below and above 50).
R 13

11,752
Tinker, M.A. RELIABILITY AND VALIDITY OF INVOLUNTARY BLINKING AS A MEASURE OF EASE OF SEEING. J. educ. Psychol., Nov. 1950, 417-427. (University of Minnesota).

11,752
The results of a number of studies on reliability and validity of involuntary blink rate as a measure of ease of seeing are evaluated and coordinated. For the reliability measure, performance (blink rate) was compared for successive short periods with: 1) lower case versus capital text, 2) book versus newspaper type, 3) dim versus high illumination. For validity, the same experimental conditions also were employed to compare blink rate and rate of reading. These findings and those of other researchers are discussed and conclusions regarding the soundness of blink rate as the aforementioned criterion are reached.
T. R 27

11,753
ACF Industries, Incorporated. TRANSLATING FROM ORDINARY DISCOURSE INTO FORMAL LOGIC. A PRELIMINARY SYSTEMS STUDY. Contract AF 19(604) 1582, Sci. Rep. AFRC TN 56 770, Nov. 1956, 110pp. Avion Div., ACF Industries, Incorporated, Alexandria, Va.

11,753
This report presents a study of some problems involved in systematizing translations from ordinary discourse into formal logic. The general characteristics of the process of translation (specified as F translation) are described by contrasting formal logic with natural languages and F-translation with ordinary translation. Three stages of F-translation are defined: developmental paraphrase, analytic paraphrase, and symbolization. A general method is outlined and illustrated for the initial phase, development of sentences from their context. A scheme of patterns and notational system are provided to implement development and serve the needs of the subsequent stages. Intermediate and final stages of translation are considered briefly and from a systems point of view. R 27

11,754
Trenchard, K.I. & Crissy, W.J.E. TRENDS IN THE USE OF CERTAIN ATTENTION-GETTING DEVICES IN NEWSWEEKLY ADVERTISING. J. exp. Psychol., Aug. 1951, 25(4), 287-288. (Fordham University & Queens College).

11,754
To determine the pre- and post-war trends in the use of attention-getters, namely size, position on page, color and illustration, in advertisements appearing in Time and Newsweek, a tabulation of these factors was made on a representative sample. The percentage differences were computed and significant trends indicated.
T.

11,755
Tinker, M.A. LIGHTING AND COLOR. Hum. Factors in Undersea Warfare, 1949, 357-374. (University of Minnesota).

11,755
A sampling of the literature on artificial illumination in terms of: 1) spectral quality of light, 2) intensity of light in relation to visual acuity, speed of vision, brightness contrast and efficiency of performance, and 3) distribution of illumination and brightness plus the literature on the role of color in terms of: 1) pleasingness, 2) reflectance, 3) quality of light used, and 4) coordination with light used has been reviewed and applied to the lighting and painting of submarines. Problems for further research in this specific setting are indicated.
R 34

11,756
Tinker, M.A. INVOLUNTARY BLINK RATE AND ILLUMINATION INTENSITY IN VISUAL WORK. J. exp. Psychol., Aug. 1949, 32(4), 558-560. (University of Minnesota).

11,756
To measure blink rate while doing normal reading under a very low and a relatively high level of illumination (two and 100 foot candles respectively), these rates for the first and last five minutes of a 55 minute reading period were compared for 42 subjects. Means, standard deviations and critical ratios were obtained and the t-test of significance computed. These results are compared to those of other researchers and the discrepancies noted.
T. R 3

11,757
Tinker, M.A. DERIVED ILLUMINATION SPECIFICATIONS. J. appl. Psychol., Dec. 1951, 32(6), 377-380. (University of Minnesota).

11,757
The Weston-Crouch system of computing illumination intensities for a specified percent of maximum visual performance is evaluated by comparing intensities necessary for fastest reading of newspaper and book print with corresponding intensities derived through computation. Reading performance under standard illumination and under six illumination levels (one to 100 foot candles) was compared on the Chapman-Cook Speed of Reading test printed in newspaper and book type. Discrepancies between computed and experimental results are discussed and explanations offered.
T. R 13

11,758
Tiffin, J. & Wirt, S.E. DETERMINING VISUAL STANDARDS FOR INDUSTRIAL JOBS BY STATISTICAL METHODS. Trans. Amer. Acad. Ophthalm. & Otolaryng., Nov.-Dec. 1945, 1-25. (Purdue University).

11,758
The need for sound visual standards in industry is shown to be advantageous to employee, employer and professional eye man. The bases for such visual job standards by statistical determination is discussed in terms of: 1) individual differences in visual skills, and 2) individual differences in job performance. Two methods of setting such standards are described and several sample jobs (electric solderers, assemblers, loopers) are analyzed accordingly.
T. G. I. R 2

11,759
Rulon, P.J., Schaefer, R.J., Griggs, T. & Sampson, P.B. SUPPLEMENT TO 1951 REPORT ON 100 INSTRUMENT APPROACHES. April 1951, 61pp. Educational Research Corporation, Cambridge, Mass.

11,759
This is a supplement to a previous study of the proficiency of itinerant instrument pilots during which 100 instrument approach flights were conducted and analyzed. This supplement supplies additional information regarding procedures used in conducting the flights and in scoring the pilots' performance. It also contains a complete statistical tabulation of items in the check sheets used on those flights.
T.

11,760
Raffa, S.W. DOCUMENTATION PROCEDURES. Contract AF 33(038)-20568, Proj. XA-3A Flight Test Arms SP-4003, Rev. 3, Jan. 1957, 12pp. Arms Div., American Bosch Arms Corp., Roosevelt Field, Garden City, N.Y.

11,760
This report presents the final procedures for planning and scheduling documentation work concerned with the prosecution of the XA-3A Fire Control System Test Project. The documentation work is divided into two broad categories of information: (1) what is to be done, (2) what has been done. The Project is subdivided into four programs and the programs in turn are subdivided into phases, each of which defines specific objectives and activities. The various portions of this document give information on distribution, reporting, coding, and listing procedures.

11,761
George Washington University. BIBLIOGRAPHY OF REPORTS. HUMAN RESEARCH DIVISIONS, AND HUMAN RESEARCH UNITS. 1956 SUPPLEMENT. March 1957, 5pp. Human Resources Research Office, George Washington University, Washington, D.C.

11,761
This bibliography includes reports issued during 1956 by the Human Resources Research Office and Human Research Units which are available to interested users. It serves as a supplement to the previously issued listing (see 11,762).
R 23

11,762
George Washington University. BIBLIOGRAPHY OF REPORTS. HUMAN RESEARCH DIVISIONS, AND HUMAN RESEARCH UNITS. May 1956, 12pp. Human Resources Research Office, George Washington University, Washington, D.C.

11,762
This bibliography includes reports issued through 31 December 1956 by Human Resources Research Office and Human Research Units and which are still available to interested users. Directions for ordering are included.
R 97

11,763
USA Quartermaster Research and Development Center. BIBLIOGRAPHY OF PUBLICATIONS AND TECHNICAL PAPERS FOR 1956. QMRC TR 12, Feb. 1957, 31pp. USA Quartermaster Research and Development Center, Natick, Mass.

11,763
This bibliography lists the publications and technical papers (1956) issuing from Headquarters, Quartermaster Research and Development Command, Quartermaster Research and Development Center, Natick, Massachusetts. The various divisions covered include chemicals and plastics, environmental protection research, field evaluation, food and containers, mechanical engineering, pioneering research, textile, clothing and footwear. An author index is included.
R 332

11,764
Kidd, J.S., & Kraft, C.L. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL. Contract AF 33(616)-3612, Proj. 7192, Rep. 6, Dec. 1957, 16pp. Wright Air Development Center, ARDC, Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation).

11,764
This sixth quarterly progress report summarizes the work completed or current on the research project, Human Engineering Aspects of Air Traffic Control (ATC). Progress is reported on six aspects of the research program: operational analyses of existing ATC systems; systems research on simulated ATC operations; technical studies and supporting basic research; theoretical formulations; design and development of research equipment; and liaison activities. A bibliography of 30 reports is also included.
R 30

11,765
American Power Jet Company. HUMAN ENGINEERING FACTORS AFFECTING ARCTIC AIRCRAFT MAINTENANCE. DATA SOURCES AND PROJECT BIBLIOGRAPHY. Proj. 7957.1, AAL TR 57-12, APJ Rep. 1722, Dec. 1957, 66pp. American Power Jet Company, Ridgefield, N.J.

11,765
This bibliography on human engineering factors affecting Arctic aircraft maintenance does not duplicate listings available in standard sources such as the Arctic Bibliography. References pertinent to the specific problem are included and listed alphabetically by author. These cover the following general areas: (1) Arctic maintenance experience - aircraft and ground handling equipment, (2) cold weather tests and functional evaluations, (3) Arctic facilities, (4) Arctic environmental vectors affecting human performance, (5) human engineering - Arctic and general, (6) psychology and physiology of man in the cold, (7) winter training, and (8) maintenance performance and its evaluation.
R 566

11,766
Ohio State University. PUBLICATIONS: 1950-1957. 6pp. Laboratory of Aviation Psychology, Ohio State University, Columbus, Ohio.

11,766
This is a list of publications from the Laboratory of Aviation Psychology, The Ohio State University. The arrangement is chronological and covers the period 1950 through 1957.
R 71

11,767
Rohy, T.B., & Lanzetta, J.T. A LABORATORY TASK FOR THE STUDY OF INDIVIDUALS OR GROUPS. Proj. 7713, Res. Rep. AFPTRC TN-57-124, Oct. 1957, 15pp. Operator Lab., AFPTRC, ARDC, Randolph AFB, Tex.

11,767
This report describes the apparatus and the research potentials of a laboratory task developed for the study of both individual and group performance. Circuit diagrams and recording circuits are given. The theory underlying the development of the apparatus is discussed.
T. I. R 9

11,768
Ray, W.S. VERBAL COMPARED WITH MANIPULATIVE SOLUTION OF AN APPARATUS-PROBLEM. Amer. J. Psychol., June 1957, 70(2), 289-290. (Res. Rep. AFPTRC TN-57-117, AFPTRC, ARDC, Lackland AFB, Tex.).

11,768
To investigate the effect on manipulative solution of an apparatus problem of preceding talking about the problem, two groups (6 subjects each) of basic airmen were asked to turn off a light by using switches presented on a panel. There were seven switches and it was necessary to use two simultaneously in order to turn on the light. Only one group was asked to talk about the problem before manipulating the switches. Manual behavior was recorded mechanically (number of trials) and verbal work by the experimenter (criterion of success in latter was appearance of hypothesis of multiple-switches). The data were analyzed for differences between groups on the manipulative solution.

11,769
Bramley, L.N. CRANE CONTROLS FOR IRON AND STEEL WORKS. PART II. SUGGESTED CRITERIA FOR THE DESIGN OF CRANE CABS. PE/B/63/51, ca. 1951, 31pp. Plant Engineering Division, The British Iron & Steel Research Association, London, England.

11,769
Part I of this paper presented a comprehensive study of the controllers suitable for use in steelworks crane cabs and control pulpits. The present part deals with the possibilities of designing crane cabs to ergonomic principles using the new controllers. The particular aspects of the layout of the control point considered are seating of the operator, working heights and areas, visibility, realism and pattern of controls, distribution of controls, and distinguishability of control handles. Suggested designs of control layouts for two multi-motion cranes and a charging machine are presented. Items for further investigation are listed.
I. R 12

11,770
Duncan, C.P. & Underwood, B.J. THE EFFECT ON TRANSFER OF VARYING STIMULATION DURING TRAINING. Contract AF 33(616) 308, Proj. 7197, WADC TR 56-279, Dec. 1957, 35pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Northwestern University, Evanston, Ill.).

11,770
To study the effect on transfer of variation and amount of training, perceptual-motor paired-association tasks were constructed wherein the motor response remained constant and the stimuli (to be paired with the response) were varied. Different groups of subjects were trained with 1, 2, 5, or 10 tasks (different sets of stimuli) for 2, 5, or 10 days. Some additional groups were trained for a like number of days with ten different re-pairings of the responses to the stimuli within a given task. Following training all groups were tested for transfer to three, in some cases four, new sets of stimuli. The data (correct responses on transfer tests) were analyzed for effects of the training variables. Implications for design of training equipment are discussed. T. G. I. R 29

11,771
Houston, R.C. & Green, M.R. TRAINING EVALUATION OF AN INSTRUMENT PANEL HOMOGENEOUS WITH RESPECT TO THE PRINCIPLE OF THE MOVING PART. Contract AF 33(616) 3000, Proj. 5190, Task 71573, WADC TR 57-551, Nov. 1957, 59pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois, Urbana, Ill.).

11,772
To investigate the effectiveness of the use of an instrument panel on which the moving indices of the individual displays consistently represent aircraft performance in training naive flight students to fly instruments, 20 such subjects were trained in a modified Link trainer to fly ILS (Instrument Landing System) approaches in a C-47 aircraft under simulated instrument conditions. Ten subjects were trained on the experimental panel and ten on a conventional panel. Six subjects in each group flew the C-47 on ILS approaches under simulated instrument conditions. Objective records of performance during ground training and in the air were analyzed for differences attributable to panel design. Effects of learning and stress were discussed.
T. G. I. R 31

11,772
Branley, L.N. CRANE CONTROLS FOR IRON AND STEEL WORKS: PART I-MODERN DEVELOPMENTS IN MASTER CONTROLLERS. J. Iron and Steel Inst., Jan. 1953, 172, 53-59. (British Iron and Steel Research Association, London, England).

11,772
This paper deals with master controllers for use in steel-works crane cabs and control pulleys. After an examination of the limitations in the operation of present-day cranes, the basic requirements for master controllers were determined. A new controller, and its novel features, is described. An interim report on trials in steelworks is also given.
I. R 5

11,773
Rath, R.R. INVESTIGATION OF A TECHNIQUE FOR IMPROVING AIRCRAFT RESPONSE USING A COMPLEMENTARY OPTIMUM-RESPONSE MODEL. Proj. 1364, WADC TN-56-475, Sept. 1956, 74pp. Flight Control Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,773
The pitch response of an F-89 aircraft to a command input, fed into both the airframe-hydraulic servo combination and a black box represented by an "ideal" transfer function of the same order as the airframe transfer function, was investigated. The two outputs were compared and some function of the difference feedback to the airframe-servo system. The response of the system with a particular feedback was determined analytically for seven different flight conditions of the F-89. A computer solution was obtained and the "best" fixed gains for the seven conditions determined. The results were examined for agreement with "ideal" transfer function.
T. G. I. R 3

11,774
Mock, R.O. ACCEPTABILITY TEST OF LIQUID MEATS. Proj. 7156, WADC TN-57-63, Feb. 1957, 7pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,774
To determine the acceptability of liquid meats and to obtain information for improving acceptability to guide future development, a field test was conducted at the Air Force Flight Test Center. Two experimental liquid chicken and two liquid ham formulations were tasted by two groups of pilots on the ground. Each pilot filled out a food preference questionnaire for each item which included a nine-point hedonic rating scale from "like extremely" to "dislike extremely". Mean preference ratings and per cent disliking an item were derived as well as information about specific characteristics of the foods which were liked or disliked.
T. R 2

11,775
Kopstein, F.F. & Morgan, R.L. HUMAN FACTORS CONSIDERATIONS IN THE DESIGN PROPOSALS FOR A BALLISTIC MISSILE UNIT PROFICIENCY SYSTEM. Proj. 7197, WADC TN-57-352, Dec. 1957, 12pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,775
This paper outlines some of the major human factor considerations in the preparation of proposals for training and proficiency measurement (Unit Proficiency System) of ballistic missile systems. Since the characteristics of the Unit Proficiency System depend upon the nature of the training job and measurement job, steps are outlined for describing these two - task analysis, estimation of characteristics of trainee prior to training, and selection of measures to give a valid and reliable indication of over-all status proficiency and which permit a diagnostic evaluation of deficiencies.
R 9

11,776
Hunt, D.P. & Warrick, M.J. ACCURACY OF BLIND POSITIONING OF A ROTARY CONTROL. Contract AF 18(600) 50, Proj. 7182, WGLD Tech. Note 52 106, March 1957, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

11,776
To investigate the accuracy of blindly positioning a bar type rotary control knob, four subjects made both right- and left-handed settings with a tapered and with a parallel-sided knob. A reference scale of 180 degrees was visible but the controls were not. The mean, constant error, and average error of five settings made by each subject for each of nine angular positions (from ten to 170 degrees) were recorded. Discrepancies between right- and left-hand performance were compared for both types of knobs at each angular setting. The results are applied to knob design and spacing between discrete positions of the control.
T. G. R 3

11,777
Grunzke, M.E. QUALITATIVE PERSONNEL REQUIREMENTS INFORMATION FOR WEAPON SYSTEM 401L (C-132). Proj. 8716, Task 87281, Devel. Rep. AFPTTC-TN-57-61, May 1957, 32pp. Air Force Personnel and Training Research Center, ARDC, Lackland AFB, Tex.

11,777
To develop qualitative personnel requirements information for the operation and maintenance of the C-132 transport aircraft (heavy, long-range turbo-prop), a survey-type approach was used to gather information. Visits were made to the aircraft plant (Douglas) to obtain design information having personnel implications and to the 170th Test Squadron, Military Air Transport Service, Kelly Air Force Base, Texas, to study operation and maintenance procedures on turbo-prop aircraft. The information was carefully reviewed to identify points applicable to Weapon System No. 401L (C-132). Recommendations are included.
T. G. R 6

11,778
Ewing, Lora M., Karpovich, P.V., & Hale, C.J. THE PHYSIOLOGY OF LOAD CARRYING: XII. THE USE OF STRAP PRESSURE AS A CRITERION FOR EVALUATING ARMY COMBAT PACKS. Proj. 7-83-01-005B, Tech. Rep. EP-69, Oct. 1957, 21pp. USA Quartermaster Research and Engineering Center, Natick, Mass. (Dept. of Physiology, Springfield College).

11,778
To compare army combat packs of different design, measurements were taken of the pressure exerted by the straps of five different packs (40 pounds each) on the front and top of the shoulders of 26 young men. Pressures were taken before, during, and after a walk on a treadmill (2.8 miles per hour). A technique was devised for measuring the area of contact between the strap and chamber of a pressure meter so that total pressure (pounds) could be converted into pressure per unit area (pounds per square inch). These data were analyzed for significant differences among the five packs. The use of this methodology for testing new designs of packs is discussed.
T. G. I. R 3

11,779

Hale, C.J., & Karpovich, P.V. THE PHYSIOLOGY OF LOAD CARRYING: XIII. PERFORMANCE TESTS FOR THE EVALUATION OF ARMY COMBAT PACKS. Proj. 7-83-01-0058, Tech. Rep. EP-70, Oct. 1957, 17pp. USA Quartermaster Research and Engineering Center, Natick, Mass. (Dept. of Physiology, Springfield College).

11,779

To evaluate the effect of various army packs upon the performance of selected physical activities comparable to those used by the Infantryman during combat, 12 performance tests were performed by 24 men. Tests were performed without and with each of three packs (United States Standard, United States Experimental 53-8, and British Experimental UK-22). The tests were: running, creeping, rolling, jumping, climbing, throwing, falling, getting up from the ground, changing direction, agility, and balance. Time of performance and reaction time were measured in all tests. The data were analyzed for differences due to pack design. The suitability of such tests for evaluative purposes is discussed.

T. G. I. R 4

11,780

Tan, E.H., Hale, C.J., & Karpovich, P.V. THE PHYSIOLOGY OF LOAD CARRYING: XIV. EVALUATION OF ARMY COMBAT PACKS BY MEASURING ENERGY COSTS AND SPEED OF MOVEMENT. Proj. 7-83-01-0058, Tech. Rep. EP-71, Oct. 1957, 15pp. USA Quartermaster Research and Engineering Center, Natick, Mass. (Dept. of Physiology, Springfield College).

11,780

To determine whether the energy cost and the time of performance of selected performance tests could be used as a basis for evaluating pack designs, ten male subjects performed six tests (running, jumping, falling and getting up, creeping, rolling, and climbing) once without a pack and once each with three different combat packs (United States Standard, United States Experimental, and British Experimental). A subjective rating based on comfort and freedom from interference with movements was completed after testing. The data were studied for differences due to pack design.

11,781

McGinnis, J. QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: V. HANDBOOK OF CRITERIA USED BY TROOPS IN EVALUATING QUARTERMASTER CLOTHING AND PERSONAL EQUIPMENT. Proj. 7-83-01-0058, Tech. Rep. EP-74, Dec. 1957, 41pp. USA Quartermaster Research and Engineering Center, Natick, Mass.

11,781

The effects of climate and six personal variables on the criterion that troops employ most frequently in evaluating thirteen selected families of Quartermaster equipment and clothing (field and garrison) are summarized in condensed tabular form for easy reference. The tables are intended for the use of designers of Quartermaster items and for use in planning future studies of soldier preferences for Quartermaster items. The background leading to the development of the tables are described briefly and directions are given for their use and interpretation.

T. R 24

11,782

Kurbjun, M.C. NOISE SURVEY UNDER STATIC CONDITIONS OF A TURBINE-DRIVEN FULL-SCALE MODIFIED SUPERSONIC PROPELLER WITH AN ADVANCE RATIO OF 3.2. NACA Tech. Note 4172, Jan. 1958, 17pp. National Advisory Committee for Aeronautics, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).

11,782

Overall sound-pressure levels and frequency spectra of the noise emitted from a ten-foot diameter, 1700 rotation per minute, three-blade modified supersonic propeller mounted on a turbine-powered airplane were measured under static conditions around a circle with a 100-foot radius about the propeller hub. The results were compared with results from a supersonic and a conventional subsonic propeller. The effects of power and rotational speed change on the noise levels and spectra were also determined.

T. G. I. R 5

11,783

Groth, Hilde, & Lyman, J. EFFECTS OF SURFACE FRICTION ON LIGHT-MANIPULATORY PERFORMANCE. Contract DA 19-122-gm-525, Rep. 57-83, Nov. 1957, 27pp. USA Quartermaster Research and Development Center, Natick, Mass. (Dept. of Engineering, University of California at Los Angeles).

11,783

To study the effects of surface friction upon performance of a simple manipulatory task, changes in friction were produced by application of either a coat of wax-benzene paste or of silicone grease to the bare finger tip of a leather glove. Twelve subjects performed the task which required discrete movements of an aluminum cylinder on a formboard under all conditions of friction. Mean prehension force, time per transport, and number of transports were recorded. The data were analyzed in terms of relationship of friction to effort (prehension force), to speed, and to output rate of performance. The implications of the findings for hand gear design are discussed.

T. G. R 12

11,784

McCroskey, R.L. Jr. A RESEARCH NOTE ON THE EFFECT OF NOISE UPON FLICKER FUSION FREQUENCY. Joint Proj. Rep. 70, Contract N6onr 22525, Proj. NR 145-993, (Ohio State University Research Foundation); and Bu Med Surg Proj. NM 18 02 99, Rep. 70, July 1957, 6pp. USN School of Aviation Medicine, Pensacola, Fla.

11,784

To explore the effects of noise upon flicker fusion frequency (FFF), forty subjects made fifteen consecutive judgments of FFF in noise (94 decibels) and in quiet. The two conditions were administered in three orders: quiet-quiet, quiet-noise, noise-quiet. The mean of the last ten judgments for each condition were taken as the criterion and analyzed for effect of conditions of quiet and noise and order of their presentation. Implications of the findings are discussed in relation to conditions for operator efficiency.

T. G. R 9

11,785

O'Neill, J.J. A RESEARCH NOTE ON INTELLIGIBILITY UNDER VARIED LEVELS AND SPEECH-TO-NOISE RATIOS. Joint Proj., Contract N6onr 22525, Proj. NR 145-993, (Ohio State University Research Foundation); and Bu Med Surg Proj. NM 18 02 99, Rep. 72, Aug. 1957, 8pp. USN School of Aviation Medicine, Pensacola, Fla.

11,785

To compare listener reception for speed of several speech-to-noise ratios and sound-pressure levels, 105 subjects were divided into six panels. Each panel heard 48 lists of multiple-choice intelligibility tests as recorded by one voice at a constant level through a condenser microphone, linear amplifiers, and an Ampex recording system. Each list represented a randomly chosen condition of the 42 combinations of seven speech-to-noise ratios (from -15 to +15 decibels) and six speech levels (from 50 to 100 decibels). Mean intelligibility listeners scores were determined and compared to results reported in the literature.

T. G. R 5

11,786

Doehring, D.G., & Harbold, G.J. THE RELATION BETWEEN SPEECH DISTURBANCE AND PSYCHOPHYSIOLOGICAL CHANGES RESULTING FROM DELAYED SPEECH FEEDBACK. Joint Proj., Contract Nonr 1151(02), Proj. NR 146-092, (Central Institute for the Deaf, St. Louis, Mo.); and Bu Med Surg Proj. NM 13 01 99, Rep. 5, Sept. 1957, 5pp. USN School of Aviation Medicine, Pensacola, Fla.

11,786

To investigate the hypothesis that severity of speech disturbance is inversely related to the magnitude of changes in psychophysiological responses during delayed speech feedback, twenty subjects read aloud simple printed passages without and with delayed (0.15 second) speech feedback. Three measures of speech disturbance (speech rate, level and fluency) and three of psychophysiological response (forearm tension, skin resistance, and heart rate) were employed. Changes in response were determined and correlations between magnitudes of changes were calculated. The original hypothesis is discussed in light of the findings and reformulated.

T. R 2

11,787
Tolhurst, G.C. DELAYED RESPONSE: EFFECTS UPON SPEECH RECEPTION AND SPEAKER INTELLIGIBILITY. Joint Proj., Contract W6006 22525, Proj. NR 145-993, (Ohio State University Research Foundation); and BuMed Surg Proj. NM 18 G2 99, Rep. 74, Aug. 1957, 15pp. USN School of Aviation Medicine, Pensacola, Fla.

11,787
To investigate the effect of response time delay upon speech reception and speaker intelligibility, six incremental steps of delay from zero to five seconds with verbal material of multiple-choice type steps were used. Additional data were obtained on two delay times (one and five seconds) using FB (Phonetically Balanced) word lists. Twelve panels of listeners (15 to 24 per panel) and 48 speakers listened to multiple-choice word groups and delayed response (marking paper or speaking) until a signal tone was heard. Other groups (30 and 24) responded to FB word lists with similar instructions. Mean panel scores were studied by analysis of variance for differences due to delay times.
T. G. R 12

11,788
USAF Flight Control Lab. SYMPOSIUM ON THE USAF FLIGHT CONTROL DISPLAY INTEGRATION PROGRAM. Feb. 1958, 307pp. USAF Flight Control Lab., Wright-Patterson AFB, Ohio, & Cook Research Labs., Chicago, Ill.

11,788
This report contains the papers given at the Air Force Control-Display Integration Program symposium. Some of the specific topics covered are: control units and remote indicators for airborne electronic equipment, systems integration, whole panel cockpit instrumentation, information input rates to human users, data computers, vertical take-off and landing displays, horizontal situation displays, integrated engine instrumentation, flight simulator uses, servo driven vertical indicators, systems integration, communications between engineers and engineering psychologists, aircraft instrument lighting, heading compatibility and display, chart design, and several types of experimental techniques.
T. G. I. R 21

11,789
Chiles, W.D. PSYCHOLOGICAL STRESS AS A THEORETICAL CONCEPT. Proj. 7193, WADC TR-57-457, July 1957, 16pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,789
This paper examines some typical treatments of psychological stress. The approach of construing stress as analogy to physical and physiological concepts is rejected since it has not led to quantifiable insights into the action of stress with respect to human behavior. A systematic approach is then proposed along with the framework for the quantification of psychological stress as a theoretical concept. Some of the implications of this approach with respect to performance variables are discussed.
I. R 14

11,790
Brown, J.L. REVIEW OF THE CONE-TO-ROD EFFICIENCY RATIO AS A SPECIFICATION FOR LIGHTING SYSTEMS. Contract AF 33(038)-22616, Proj. 7186, WADC TR-57-448, Aug. 1957, 21pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio. (Columbia University).

11,790
The theoretical basis for the use of red light for systems of illumination to afford maximum stimulation of the eye at low luminances is reviewed. Several methods for the practical specification of illumination, which are based on a cone-to-rod luminous efficiency ratio, are analyzed and compared in terms of the actual physical significance of numerical values yielded. The general problem of specification is related to a number of underlying practical problems and conclusions are drawn concerning the practical uses of the cone-to-rod luminous efficiency ratio. Areas needing further experimentation are discussed.
G. R 27

11,791
Pack, C. HIGH-INTENSITY LIGHT SOURCE. Contract AF 33 (616) 3681, Proj. 6332, Task 77653, WADC TR 57 740, Dec. 1957, 48pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Electronics Corporation of America, Cambridge, Mass.).

11,791
A high-intensity light source for use in a study of flash blindness resulting from nuclear detonations is described. The radiant-energy source is a 24-inch Army searchlight modified to permit operation at a higher arc current. The normally divergent beam is highly converged. A system of electronics is integrated with the light source, and a slow-motion camera, to record effect on fundus during exposure, is provided. Details of the modification are discussed and illustrated, and a manual of operating procedures is included.
T. I.

11,792
Chiles, W.D. EFFECTS OF ELEVATED TEMPERATURES ON PERFORMANCE OF A COMPLEX MENTAL TASK. Proj. 7193, Task 71615, WADC TR-57-726, Dec. 1957, 9pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,792
To measure the effects of moderate deviations from normal temperature on the performance of a complex mental task, eleven subjects were tested at four different effective temperatures: 76, 81, 86, and 91 degrees Fahrenheit. The subject's task was to compare each of 20 moving cards with each of ten stationary cards with respect to the number of differences between a set of six symbols appearing on each. Speed of card movement was such that one decision was required every 5.4 seconds; testing session was 25 minutes. The performance data (errors and omissions) were analyzed for differences due to subjects, temperatures and sessions.
T. I. R 5

11,793
Gardner, J.P. THE EFFECT OF MOTION RELATIONSHIP AND RATE OF POINTER MOVEMENT ON TRACKING PERFORMANCE. Proj. 7189-71571, WADC TR-57-533, Sept. 1957, 20pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,793
To study the rate of pointer movement and its interaction with the "fly to" and "fly from" principle of motion indication, 43 subjects, using an aircraft-type control stick, attempted to keep cross-pointers centered on a simulated display despite random disturbances. Four rates of Gaussian output (bandwidths of 0.5, 1.0, 2.0 and 4.0 radians per second) with both types of stick-to-display movement were used. Each subject performed for 40 trials of 50 seconds. The data (error scores) were analyzed for effect of rate of movement and control movement relationship on performance and on learning.
T. G. I. R 18

11,794
Gardner, J.P., Lacey, R.J., Seeger, C.M., & Wade, J.E. IN-FLIGHT COMPARISON OF PILOT PERFORMANCE ON A STANDARD USAF AND AN EXPERIMENTAL INSTRUMENT PANEL. Proj. 7189-71571, WADC TR-57-270, Sept. 1957, 18pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,794
To compare the ability of United States Air Force pilots to make Instrument Landing System (ILS) approaches on two different panel configurations (standard Air Force and experimental, employing an aircraft reference type of presentation using the "principle of the moving part"), six pilots each flew 24 ILS approaches using each panel. For each series of 24 approaches, half were flown using the ID-249 cross-pointer type instrument and half using a Zero Reader instrument for primary glide path and localizer information. Error scores (glide path, localizer, and end point deviations) were analyzed for differences due to the various modes of presentation.
G. I. R 13

11,795
Ahlgren, A. A TRANSLATION OF BACKACHE - PREVENTATIVE MEASURES - WORKING POSITIONS. PE NE 12 58, March 1958, 20pp. Plant Engineering and Energy Division, The British Iron & Steel Research Association, London, England.

11,795
This paper deals with back troubles and stresses the importance of corrective gymnastics at home and at work. Graphic illustrations are presented of various working positions.
I.

11,796
Heintz, R.M. Jr. RADAR OBSERVER TRAINING DEVICES: I. DEVELOPMENT OF AN AIRBORNE VIDEO RECORDING SYSTEM. Contract AF 18(600)-550, Proj. 7711, Task 47002, AFTRC-TR-57-3, Part I, July 1957, 53pp. Operator Lab., AFTRC, ARDC, Randolph AFB, Tex.

11,796
This report describes the first phase of a program of research on the technical aspects of recording and reproducing radar signals for radar observer training devices. The design and construction of an experimental video recording system for use with the AN/APS-23 radar are detailed. The system is designed to record 360 degrees scan Plan Position Indicator (PPI) radar signals and to provide for future recovery of the signals on one or more conventional radar indicators with sufficient fidelity to permit accurate target identification. Operational tests are described which verify the overall feasibility of the system with respect to the electrical and mechanical parameters considered. Recommendations for future development are included.

I. R 1

11,797
Heintz, R.M. Jr. RADAR OBSERVER TRAINING DEVICES: II. INSTRUCTIONS FOR OPERATION AND MAINTENANCE OF VIDEO PLAYBACK CONSOLE. Contract AF 18(600)-550, Proj. 7711, Task 47002, AFTRC-TR-57-3, Part II, July 1957, 50pp. Operator Lab., AFTRC, ARDC, Randolph AFB, Tex.

11,798
Eilbert, L.R., Glaser, R., & Hones, R.M. RESEARCH ON THE FEASIBILITY OF SELECTION OF PERSONNEL FOR DUTY AT ISOLATED STATIONS. Contract AF 41(657)-74, Proj. 7776, AFTRC-TR-57-4, July 1957, 54pp. Personnel Lab., AFTRC, ARDC, Lackland AFB, Tex.

11,798
To investigate possible criteria and identify variables that offer some promise for prediction of personal adjustment of airmen assigned to isolated Arctic bases, enlisted personnel (648) in eight such bases in the Northeast Air Command were studied. Supervisory nominations, the criterion measure of adjustment, (defined as ability to function in isolated Arctic environment) were used to establish two criterion groups: "well adjusted" (116) and "poorly adjusted" (83). A series of measures covering personal background, personality characteristics and medical complaints were administered. The data were analyzed for variables differentiating the two groups. Recommendations concerning the use of the findings for screening or selection procedures are included. An annotated bibliography is appended. R 32

11,799
Wilcox, L.R. PROBABILITY OF SEEING FUNCTIONS FOR NEAR INSTANTANEOUS FOVEAL THRESHOLDS. RADC-TR-56-104, Sept. 1956, 19pp. USAF Rome Air Development Center, ARDC, Griffiss AFB, N.Y.

11,799
To investigate foveal threshold values obtained within a short period (0.22 seconds) following cessation of adapting luminance, frequency of seeing measurements were made on three subjects. Adaptation luminances ranged from near cone threshold to 10,000 millilamberts; stimulus was a circle 30 minutes in diameter; test flash duration 50 and six milliseconds for a group of 7, 9, or 11 luminances; each flash was presented 20 times. A complete frequency of seeing function was obtained for each adapting luminance (14). The data (percentage of times out of 20 presentations that stimulus was detected) were analyzed as a function of stimulus intensity. The findings are discussed in relation to a "quantal" type of theory of the threshold effect.

T. G. R 5

11,800
Kraus, R.M. THE AIR FORCE HEARING CONSERVATION PROGRAM. Review 3-58, Sept. 1957, 11pp. Dept. of Ear, Nose, and Throat. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,800
This paper describes the Hearing Conservation Program of the United States Air Force. The testing equipment includes automatic audiometers so that all individuals can be given examinations upon enlistment and at periodic intervals. Protective devices, the 7-5LR ear defender and a suitable ear muff, are available for use and research is continuing on development of such devices. Reduction of noise at the source represents a continuing effort. Induction procedures for educating the individual in the need for ear protection are described.

G. I.

11,801
Astrand, P.O. A TRANSLATION OF PHYSIOLOGICAL VIEWPOINTS ON WORKING POSITIONS AND WORK KINETICS. FE/NE/11/58, March 1958, 11pp. Plant Engineering and Energy Division, The British Iron & Steel Research Association, London, England.

11,801
This paper treats the subject of workers' positions and movements from a physiological viewpoint. The analysis includes the following: 1) effect of position, 2) muscle activity in static and dynamic work, and 3) muscle tension in various movements. A series of pictures are attached.

I.

11,802
Forgays, D.G., & Levy, B.I. COMBAT PERFORMANCE CHARACTERISTICS ASSOCIATED WITH CHANGES IN THE MEMBERSHIP OF MEDIUM-BOMBER CREWS. Proj. 7713, Task No. 77225, Res. Rep. AFTRC-TR-57-140, Dec. 1957, 27pp. Operator Lab., AFTRC, ARDC, Randolph AFB, Tex.

11,802
To describe the effects on combat performance of the changes that were made in the membership of 85 medium-bomber crews during a ten-month period of actual operations, a team of military and civilian psychologists (Air Research and Development Command) gathered performance data in 1953 during the last months of active conflict in Korea. Crew changes were recorded for each B-29 crew during initial crew training; advanced crew training; and part of the combat tour in the Far East. The crews were divided into three groups, nearly equal in size, on the basis of membership changes. An analysis of variance technique was used in comparing low, medium, and high change groups. The findings are discussed in relation to crew integrity policies.

T. R 7

11,803
Horowitz, M.W. & Fromer, R. A SET OF DISCRIMINABLE SURFACE COLORS AND SYMBOLS FOR CODING IN ANIMATED TRAINING PANELS. Contract N 61339-294, Proj. 20 CS 52, ERC Proj. 49-3, Letter Order 3, Dec. 1958, 19pp. Educational Research Corporation, Cambridge, Mass.

11,803
The purpose of the present experiment was to develop surface color code systems most appropriate to animated training panels requiring 9 to 14 colors and to select, from conventional and new symbols, codes of from 3 to 8 symbols to be used in conjunction with the colors previously selected. For color coding, Landolt broken rings of various colors in four positions were discriminated against pre-selected background panels. For symbol coding, pairs of symbols presented in two different spatial orders were ranked by two experimenters. The codes are given.

T. I. R 4

11,804
Barton, J.M. AN INVESTIGATION OF TRACKING PERFORMANCE IN THE COLD WITH TWO TYPES OF CONTROLS. Proj. 6-95-23-001, Rep. 384, Sept. 1957, 13pp. Experimental Psychology Dept., USA Medical Research Lab., Fort Knox, Ky.

11,804
To determine whether there is a differential change in performance when movement controls and pressure controls are used under conditions of low ambient temperature, 12 subjects performed a position tracking task under six temperature conditions: 24, 0, -5, -10, -15, and -20° Centigrade. Each subject was given 20 trials under each condition on each type of control. Time-on-target and error scores were recorded and studied by analysis of variance techniques for effects of subjects, trials, tasks (movement or pressure) and conditions (ambient temperature) and their interactions. The findings are discussed in relation to those of other similar studies.
T. G. R 3

11,805
Gagel, W.C. AN EXPERIMENTAL CONSTANT IN THE PERCEPTION OF STEREOSCOPIC DEPTH. AMEL Proj. 6-95-23-001, Rep. 316, Feb. 1952, 24pp. Experimental Psychology Dept., USA Medical Research Lab., Fort Knox, Ky.

11,805
To determine whether the amount of binocular disparity necessary to perceptually duplicate a frontal object in depth is (1) proportional to the angular size of the frontal object, (2) independent of converging distance, and (3) particular for a subject, two experiments were conducted. Two revolvable systems were used to present a disc of light and a horizontal horizontal line separated by short vertical lines. The subject (binocular observation) adjusted the disc to duplicate in depth a designated portion of the line. Experiment I: four groups of eleven subjects, two conditions of convergence, full on half duplication of horizontal object. Experiment II: 18 subjects, two conditions of convergence, full duplication. Analysis of data was in terms of statistical properties. T. G. R 4

11,806
Doehring, D.G. THE RELATION BETWEEN MANIFEST ANXIETY AND RATE OF EYEBLINK IN A STRESS SITUATION. Joint Proj. NM 13 01 90, Subtask 1, Rep. 6, Contract Noor-1151 (102), Central Institute for the Deaf, St. Louis, Miss., Dec. 1957, 20pp. USN School of Aviation Medicine, Pensacola, Fla.

11,806
To study the relation between rate of eyeblink and manifest anxiety, a free association test of 11 words was administered to 24 naval aviation cadets. The test was composed of words classified as stressful, mildly stressful, and non-stressful and eyeblink responses to each word were recorded. Measures of manifest anxiety were obtained from scores on the Taylor Anxiety Scale and the Deylow Screening Inventory. The data were studied by correlational methods. The use of rate of eyeblink as an indication of anxiety in a verbally induced stress situation is discussed.
T. G. R 13

11,807
Webb, W.E., Miller, E.E., & Seale, L.W. FURTHER ATTEMPTS AT CODING AIRCRAFT ACCIDENTS. BuMed Surg Proj. NM 15 01 11, Subtask 1, Rep. 2, July 1957, 8pp. USN School of Aviation Medicine, Pensacola, Fla.

11,807
To investigate the problem of reliable coding of aircraft accidents into psychological categories, a study was made of one specific accident event - the carrier landing phase of flight training. Codes were derived from intensive follow-up interviews with accident participants. Three coders independently coded 38 pilot-caused accidents using the five psychological categories. Four separate coding sessions were held. Preceding each coding session the codes were thoroughly discussed. The percentage of agreement among the coders was analyzed as well as percentage of code overlap. Sources of error in such coding are discussed.
T. R 3

11,808
Bellman, R.C. THE PERCEPTION OF VERTICAL IN THE PRESENCE OF INCREASED ACCELERATIVE FORCES. BuMed Surg Proj. NM 17 01 11, Subtask 1, Rep. 45, Oct. 1957, 11pp. USN School of Aviation Medicine, Pensacola, Fla.

11,808
To investigate the relationship between the vertical as estimated by a person tilted to his side and that determined during the orthographic illusion, nine normal persons were tested. The task in each situation (tilted sideways at 20, 45, 60, and 65 degrees in a chair and exposure to rotational speeds of 10, 15, 25, and 50 rotations per minute on a human centrifuge) was to adjust two luminous lines, one to the perceived vertical and the other to a position parallel with the body axis. The data (errors of estimation from actual position) were compared for differences in the two situations and for both kinds of estimation.
T. G. R 7

11,809
Fradley, D.C., Barth, E.G., & Cohen, E.A. IDENTIFICATION OF THE IMPORTANT SKILLS IN FAULT-LESS LAND NAVIGATION. Contract DA 44-106-qs-460, DA Proj. C95-33-000, Tech. Rep. 43, July 1957, 25pp. Human Resources Research Office, The George Washington University, (USN Armed Forces Research Unit, Fort Knox, Ky.).

11,809
To identify the skills most important in effective land navigation and to try out a short convenient method of testing land navigation ability, 95 recent graduates of basic combat training were given a battery of 18 tests: the Key Patrol Test (criticism field test), Location Test (short method), two compass skills tests, four location skills tests, and five standard aptitude tests (reading and vocabulary, arithmetic reasoning, pattern analysis, spatial orientation, spatial visualization). Test scores were analyzed by factor analysis procedures to evaluate the importance of the skills and attributes in the criticism test and to check the adequacy of the Location Test as a convenient substitute. The results are discussed in relation to training needs in field navigation. T. G. R 2

11,810
Smith, G.F.M., & Scott, B.N. SOME PHYSICAL PARAMETERS OF PFI DISPLAYS USEFUL IN PREDICTING RELATIVE DETECTABILITY THRESHOLDS OF TARGETS. BuMed Proj. 163, Rep. 163-14, PCC Proj. 877-94-29-22, Nov. 1957, 6pp. Defense Research Medical Lab., Toronto, Ontario, Canada.

11,810
To investigate changes in detectability thresholds of a PFI (Plan Position Indicator) target that are associated with changes of scope size, six subjects were required to detect the same pips on three scope sizes: 7, 10, and 14 inches. Targets were first displayed at brightness below detectability level then brightened one decibel on each successive rotation of the sweep line until reported seen by the subject who then reported its location in range and azimuth. The score was the attenuation of the original signal voltage. Six ranges and azimuths were used in each display size. From the analysis of the data a regression equation was estimated for expressing and predicting detectability threshold from PFI display geometry. T. G. R 2

11,811
Bellman, R. ON A TRANSPORTATION PROBLEM. Research Memo 648, July 1951, 4pp. USAP Proj. RAND, Rand Corp., Santa Monica, Calif.

11,811
A method of solution (systematic procedure involving a reasonable amount of time which yields the optimal routing and the minimum time) for the following transportation problem is presented. Given three ports each with a certain number of ships and cargoes that have to be transported to the other two, what is the optimal routing for accomplishing the shipping in a minimum time? The method given is applicable to more general, similar problems.

11,812
Kremel, E.S., & Platter, R.L. DESK CALCULATOR DETERMINATIONS OF HUMAN DYNAMICS. Prepared under Contract Nonr-15711(C). Proj. NR 116-025, Final Tech. Rep. F-2490-1, Oct. 1957. 25pp. Franklin Institute, Philadelphia, Penn.

11,812
This study demonstrates the possibility of computing describing functions and remarks for the study of human dynamics with relatively cheap digital equipment. Procedural aids are furnished to simplify the hand calculation checking of complex computing programs intended for high-speed digital machines. The selection of the sampling interval on the basis of the transport delay of the system as well as the Shannon sampling theorem is discussed. Representative computations are presented for a specific example (tracking).

11,813
Chase, S. DIFFERENTIATE NOTES ON EVALUATING TESTS FOR COMPARISON SYSTEMS. Contract AF 19(604)-1243, AFMTC-12-124, Final Sci. Rep., March 1956, 27pp. College of Engineering, New York University.

11,815
General theorems on the forward channel capacity of information feedback systems are derived for the conditions of both noiseless and noisy feedback. Simple upper bounds for loss in capacity with feedback are also determined. An appendix considers the general relation for the signal entropy of the configuration-denial process.

11,814
Fleishman, E.A. FACTOR STRUCTURE IN RELATION TO TASK DIFFICULTY IN PSYCHOMOTOR PERFORMANCE. Ed. Fitch, J. Psych., 1957, 17 (4), 522-532. (Yale University).

11,814
To investigate the effect of varying the difficulty of perceptual motor tasks on the aptitudes measured by the task, a visual discrimination and reaction psychomotor task was used. The apparatus (Response Orientation Test) allowed the display (16 lights in a circular pattern) to be rotated and the corresponding response panel of buttons to remain stationary. The subjects, 200 basic trainee airmen, were given four one-minute trials at each of eight degrees of rotation (from zero to 315). Total number of correct responses was the score. A battery of aptitude tests and printed perceptual, spatial and visualization tests were also administered. The data were studied by factor analysis methods. The factors measured by the task as a function of degree of stimulus rotation (task difficulty) were described. R 12

11,815
Fleishman, E.A. ANALYSIS OF POSITIONING MOVEMENTS AND STATIC REACTIONS. J. exp. Psych., 1959, 55 (1), 13-23. (Yale University).

11,815
To study interrelationships among skills in the areas of positioning movements and static reactions, a series of tasks was developed and standardized for measuring these skills. The complete battery (24 tests) was administered to 200 subjects. Test scores were analyzed by correlational and factor analysis methods. The extent to which these two types of movements are related is discussed. Use of printed tests designed to reproduce positioning variance in apparatus tasks is also discussed. G. I. R 9

11,816
Fleishman, E.A. COMPARISON OF TWO TYPES OF VERBAL GUIDANCE ON PERFORMANCE OF A PERCEPTUAL-MOTOR TASK. Percept. Motor Skills, 1956, 6, 272. (Yale University).

11,816
To evaluate the relative effectiveness of two types of verbal guidance on performance of a perceptual motor task, 150 basic trainee airmen performed on the Pursuit Confusion Test. The task was to keep a stylus in contact with a variable speed target moving through a slot, visible only by mirror image. Performance scores were time-on-target and number of errors for eight one-minute trials. The subjects were assigned randomly to three groups (perceptual set, motor set, and control) with instructions designed to give the proper set for each. The data were analyzed for differences among the groups due to type of verbal guidance.

11,817
Fleishman, E.A. A COMPARATIVE STUDY OF APPLIED PATTERNS IN UNTRAINED AND TRAINED PSYCHOMOTOR PERFORMANCE. J. exp. Psych., 1957, 51 (4), 263-272. (Yale University).

11,817
To examine aptitudes involved in early and late stages of proficiency in psychomotor performance, a cross-sectional and longitudinal comparison was made. Trained airmen were given to 200 basic trainee airmen on seven different psychomotor tasks, constituting four groups. One group was given on one of these (Complex Coordination Test) and used as a criterion task. A battery of printed reference tests was also administered. Factor analysis techniques were applied to the experimental data. Patterns were defined by the reference tests and the resulting loadings of these in different stages of practice were described. The results are related to previous work and the implications discussed. G. I. R 13

11,818
Chapman, A. A RATE OF MAKING COMPLEX DECISIONS. Amer. J. Psych., Dec. 1957, 70, 450-452. (The Johns Hopkins University).

11,818
To study the rate at which successive choices or decisions can be made in a real life situation, a test was conducted on one individual exposed to the task of classifying about 10,000 references into appropriate categories for a bibliography. A test sample of 1000 cards was selected haphazardly from the main collection and distributed into twelve subsamples of 100. The time to process each subsample (two on each of three successive mornings and afternoons) was measured at a time when the subject was about half time and the subject thoroughly practiced. The times required to process the cards were analyzed by information techniques. R 4

11,819
Brown, R.H. "EMPTY-FIELD" TROUBLE AND VISIBILITY OF DISTANT OBJECTS AT HIGH ALTITUDES. Amer. J. Psych., Sept. 1957, 70, 376-385. (Naval Research Lab., Washington, D.C.).

11,819
To test the effectiveness of a collimated reticle in improving the detection of small targets in an otherwise empty visual field, a method was used to simulate search for other aircraft against a bright uniform background. Fourteen subjects identified the position of a target dot (1 1/2, 4 1/4, or 8 1/2 degrees from center of visual field), seen at optical infinity, using binocular vision. Cues for rear vision were such as those provided by cockpit and wind screen. The minimal size of the target for detection was measured with no reticle and with three different reticles (dot, checkerboard, gunsight) present. The data were analyzed for differences due to reticles, position of target, and individuals. G. I. R 14

11,820
Brown, R.H. THE EFFECT OF EXTENT ON THE INTENSITY-TIME RELATION FOR THE VISUAL DISCRIMINATION OF MOVEMENT. J. Comp. Physiol. Psych., April 1957, 50 (2), 109-114. (Naval Research Lab., Washington, D.C.).

11,820
To determine how extent affects the intensity-time relation for visual discrimination of movement, monocular luminance thresholds were measured for a small circular spot of white light moving at ten speeds (between 6.7 and 4,750 minutes of visual angle per second) and four extents (between 1.7 and 52 minutes). The midpoint of stimulus travel was centered in the dark circle the subject regarded. Travel movement was horizontal (left or right) and the subjects' (four) task was to indicate the direction of movement. The data were analyzed in terms of effect of direction, speed, and extent. The intensity-time relation was examined. The findings were interpreted in terms of visual theory. G. I. R 16

11,821
Byrnes, V.A., Brown, D.V.L., Rose, R.W., & Ciolek, P.A. CHROMATIC FLICKER THRESHOLDS PRODUCED BY ATOMIC FLASH. *AMA Arch. Ophthalmol.*, March 1956, 53, 351-364. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

11,821
To study chromatic flicker produced by atomic flash a theoretical consideration of the physical factors involved and the effect of these factors on the eye was made. To verify resultant predictions for distances at which flicker could be expected, 700 projected rabbits were exposed (one time each) during six different night the atomic explosions at the Nevada proving grounds. Distances from detonation point varied from two to 80 miles. Ophthalmological examinations were made to identify and describe retinal lesions. Preliminary pathological findings are reported. The findings are discussed in relation to distances of potential danger to the retina. A therapeutic use for visible and infrared radiation of the eye is suggested.
G. I. R 2

11,822
Brown, J.L. SUBJECTIVE PREFERENCE AMONG DIFFERENT MODES OF CLOSED-LOOP OPERATION OF THE CENTRIFUGE FOR FLIGHT SIMULATION. Rep. TRD ADC AR-1410 (NR 11 02-12.6), NA-3-3535, Dec. 1957, 4pp. *USAF Air Development Center, Dayton, Ohio.*

11,822
To investigate subjective preferences for different conditions of centrifuge operation for realism in flight simulation, four simulations (based on direction of rotation and presence or absence of an input to the inner gimbal which compensated for angular accelerations of the centrifuge arm) were studied. Four subjects (one was an experienced pilot) performed a series of eight maneuvers under each condition. Subjective impressions, recorded after each maneuver, were rated by three trained judges for implied position or lack of it. The four conditions were then ranked in order of total "realism" scores.
T.

11,823
Rappeport, X. HUMAN ENGINEERING: AN AID TO IMPROVING ELECTRONIC EQUIPMENT. *IRE Trans. Indust. Elect.*, March 1957, PG-4, 11pp. (Stanford Research Institute, Menlo Park, Cal. 11.).

11,823
This paper presents a fairly broad definition of the term human engineering and outlines some of the general research areas that human engineers have worked on in the past. One specific application is given in detail in the area of pattern discrimination ability of man and its use in converting certain auditory signals into visual presentations. A psycho-statistical relation used frequently for discovering sources of important error variability in systems of man and machines is discussed. And finally other areas where human engineering may be employed to increase the life, reliability, and operational efficiency of electronic equipment are pointed out.
G. I. R 2

11,824
Malcolm, D.G. (Ed.) REPORT OF SYSTEM SIMULATION SYMPOSIUM. 8th National Convention of American Institute of Industrial Engineers, May 1957, 106pp. (New York, N.Y.) *American Institute of Industrial Engineers.*

11,824
Included in this report are brief descriptions and reviews of 18 papers that have as their fundamental purpose the simulation of a system - industrial or military. This method of inquiry into management systems, controlling systems, and integrated systems of men, machines, and facilities is termed System Simulation. Simulations discussed include inventory-control, profit planning, waiting line problems, peak hour bus operation, cargo handling, job shop scheduling, top management decision-making, Air Force training system, Army battalion maintenance, aircraft engine management, Quartermaster problems, and the Rand System Research Laboratory.
T. G. I. R 18

11,825
Smith, P.G. & Smith, G.W. A RE-EVALUATION OF TRADITIONAL CUES FOR DISTANCE. Contract Nona 601 (14), Dec. 1957, 10pp. *Cornell University, Ithaca, N.Y.*
To determine the effectiveness of traditional "cues" and conditions (when taken singly or in combination) for the visual perception of distance, observations were made by 7 subjects. The test space was the front surface of a perfect semi-cylinder and each cue, condition or combination (linear perspective, binocular disparity, movement parallax, interposition, light and shade, form transformations, gradients of texture, and distance of observation) was drawn on a white paper jacket and fitted to the cylinder. The observer reported verbally what he saw in the test area as well as its shape. Results were analyzed in terms of degree and frequency of departure from veridicality, both in overall reduction of curvature and in flattening of portions of surface. Cf. 11,502

11,826
Whiteside, R.C.D. TARGET DETECTION AND NUMBER OF OBSERVERS. *FFAC 1022*, Oct. 1957, 3pp. *RAP Institute of Aviation Medicine, Farnborough, Hants, England.*

11,826
This report attempts to determine the amount of improvement of target detection obtainable when there are several observers. Based on statistical probability theory, two graphs are presented, showing the increase in probability of seeing when several observers (from two to six) look and the percent increase when a second or third observer takes part in search.
T. G.

11,827
Truss, C.V. CHROMATIC FLICKER FUSION FREQUENCY AS A FUNCTION OF CHROMATICITY DIFFERENCE. *J. Opt. Soc. Amer.*, Dec. 1957, 47 (12), 1130-1134. (Prepared under Contract NS-DRI 166, Proj. NR 145-089, Rep. 166-I-200, The Johns Hopkins University).

11,827
To measure the chromatic flicker fusion frequency (ccff) as a function of chromaticity difference, fusion points were determined by two subjects for each of fifteen pairs of six colors at equal luminance for five levels of luminance (from nine to 67 trolands). The six colors were of high chromatic purity with dominant wavelengths covering a range of 445 to 67 millimicrons in nearly equal steps. Chromaticity differences were estimated from Judd's Uniform Chromaticity Scale in linear distance (millimeters) between members of each pair. A second set of values were derived from data giving equally noticeable small color steps over the CIE (Commission Internationale de l'Eclairage) chromaticity diagram (Wright). Log reciprocals of ccff were analyzed in terms of luminosity and chromatic separation. T. G. R 13

11,828

Stransted, H.E., Ernst, A.A., & Sigro, J.P. AN ANALOG-DIGITAL SIMULATOR FOR THE DESIGN AND IMPROVEMENT OF MAN-MACHINE SYSTEMS. NBS Proj. 1204-20-5764, NBS Rep. 5719, Dec. 1957, 19pp. Data Processing Systems Div., National Bureau of Standards, Washington, D.C.

11,828

This report describes the design of a simulator facility for research on man-machine systems. The simulator is specifically intended for experimentation on such control systems as air traffic control, ground control of interceptors and control systems in general. It is to be equipped for the dynamic representation and simulation of control systems which have human operators as elements of the closed loop. Some design considerations peculiar to this class of simulator are presented; the present prototype is described, and refinements that might profitably be incorporated in the final facility are indicated.

11,829

Stransted, H.E. COMBINED ANALOG-DIGITAL SIMULATION OF SAMPLED DATA SYSTEMS. Conf. Paper 57-855, ASEE Summer General Meeting, Montreal, Quebec, Canada, June 1957, 7pp. National Bureau of Standards, Washington, D.C.

11,829

This paper describes work in progress at the National Bureau of Standards in constructing a simulator for studying man-machine systems. The development of simulation techniques for automatic systems is described and the characteristics of a simulator for a system which includes the human operator are distinguished. For simulation of this latter system, certain analog-digital techniques are described. Work in interconnecting the Bureau of Standards' digital computer (SAC), an electronic analog computer, and human operator display and control equipment is set forth. The ground controlled interceptor (GCI) problem, as used in the first experiments, is used for illustration.

11,830

Gessett, Lorna J. SPACE ALLOWANCES FOR MEAL PREPARATION AND SERVICE IN THE SOUTHERN RURAL HOME. U. Tenn. Agr. Exp. Sta. Bull., Oct. 1957, 274, 31pp. (University of Tennessee Agricultural Experiment Station, Knoxville, Tenn.).

11,830

To study the space needs related to the meal preparation and meal service area in rural homes in the South, basic information regarding family possessions and patterns of family living from two extensive regional surveys were studied. Based on this information, three kitchen-dining areas were arranged and equipped. Eight homemakers from rural areas of Tennessee, selected on basis of representative body measurements, cooked and served typical meals to members of their own family (three to six) in each arrangement. Activity records (written record, motion picture film, foot-track patterns) of the homemaker were analyzed in terms of space for dining area, space for dish and utensil storage, for food preparation, and most preferred arrangement. T. I. R 29

11,831

Gerard, H.B., & Shapiro, H.W. DETERMINING THE DEGREE OF INCONSISTENCY IN A SET OF PAIRED COMPARISONS. 1955, 24pp. Bell Telephone Labs., Inc., Murray Hill, N.J. (Research Center for Human Relations, New York University).

11,831

This paper describes a method developed to measure an individual's certainty (or uncertainty) concerning the probable success of some future undertaking. The data used were sets of paired comparisons of judgments from a previous experiment. A definition of consistency is given and two types identified - intransitivity and separation. Formulas are developed which enable the counting of each type of inconsistency in a set of data. Proofs are provided.

11,832

Brown, R.N., & Carl, J.M. VISIBILITY IN AN EMPTY VISUAL FIELD. NML Rep. 5072, Proj. NA 433-003, Jan. 1958, 7pp. Naval Research Lab., Washington, D.C.

11,832

To study the relationship of visibility in an empty field to some common visual parameters, measurements of the minimum visible (threshold diameter of a black dot seen against a uniform white background) were made on eight observers. The observer's task was to scan, with binocular vision, the visual field (17 inches in diameter) for a target (two dots varying in size from 1.66 to 0.16 minutes of visual angle) which appeared in various locations (3/4 or 1/2 minutes from center). On half the trials a reticle (ring of dots 1.36 minutes in diameter subtending 60 minutes at the eye) was used. The threshold data, in minutes of visual angle, were analyzed for differences due to observers, position of target, and presence of reticle. The results are discussed in relation to other work. T. G. R 10

11,833

Wayne, H.E. A CLINICAL COMPARISON OF THE SYMPTOMS OF HYPOXIA AND HYPERVENTILATION. Rep. 57-128, Sept. 1957, 8pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,833

To investigate the possibility of differentiating between hypoxia and hyperventilation on clinical grounds, a total of 165 to 183 subjects (approximately half of whom were medical officers) was exposed to hypoxia at 25,000 feet and hyperventilation at ground level. Each subject had as an end point muscular incoordination as evidenced by illegibility of handwriting. Symptoms were recorded in all cases. A comparison was made of the type of symptoms and their frequency for both conditions. Medical and dental group reports were further analyzed. Recommendations are presented to help the pilot having symptoms at high altitude to take the proper corrective action.

11,834

Reuzel, A.A., & Milch, L.S. EFFECTIVENESS OF PROCYCLIDINE HYDROCHLORIDE AND CERCIZINE HYDROCHLORIDE IN THE PREVENTION OF APOXIS. Rep. 53-20, Nov. 1957, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,834

To determine if procyclidine hydrochloride and cercizine hydrochloride, active anti-Parkinson drugs, possessed significant anti-motion-sickness effectiveness, 32 young, healthy, unselected basic airmen were tested. The subjects were divided into four equal groups corresponding to four drug treatments. Placebo and diphenhydramine treatments were provided for controls. The subjects were taken on a flight consisting of an hour of standardized, simulated turbulence. Incidence of vomiting was used as a basis for evaluating the effects of the drugs. The percent protection was calculated for each treatment. Side effects were noted by the subjects upon termination of the flight and were tabulated.

11,835

Pearson, R.G. THE EFFECTS OF MOTION-SICKNESS PREVENTIVES ON ORIENTATION IN SPACE. Rep. 59-7, Nov. 1957, 7pp. USAF School of Aviation, Randolph AFB, Tex.

11,835

To evaluate the effects of three of the more effective motion-sickness drugs - meclizine, cyclizine, and promethazine - on ability to orient one's self in space, 96 subjects were tested in a dark room on a luminous rod-and-frame apparatus under upright and body-tilt conditions. Following this they were randomly assigned in equal numbers to six drug treatment groups (dextroamphetamine sulfate, a mixture of scopolamine with diphenhydramine chloride, and a lactose placebo were added), then were tested again. Analysis of constant errors in adjusting the rod to the perceived vertical for post-treatment data was made to find significant drug effects.

11,836
Shelove, W., & Elford, M. (Eds.) RADIATION AND WAR. Bull. Atomic Scientists, Jan. 1956, 14(1), 64pp.

11,836
This special issue is devoted to papers dealing with radiation and war. The papers are grouped under four headings as follows: (1) basic data - defining radiation; somatic and genetic effects, and global radiation limits; (2) nuclear tests and radiation - distribution and effects of fallout, evaluating fallout from weapons tests, and rice contamination in Japan; (3) peacetime radiation - medical use, exposure incidental to medical practice, and public health aspects of radioactive wastes; and (4) broad studies - reports from National Academy, Medical Council, Congressional hearings, and United Nations. Nuclear weapons and war are discussed in a supplement. A glossary of terms is included. T. G. I. R 19

11,837
Bolt, R.H. (Ed.). ACOUSTICS LABORATORY QUARTERLY REPORT. OCTOBER-DECEMBER 1955. 53pp. Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.

11,837
This report is one of a series of quarterly reports that include brief statements of all significant research progress in the Acoustics Laboratory. Included here are several reports on the production of speech and speech sound systems, the development of various components in communications systems, and some acoustic measurements. Publications, papers, and activities of the laboratory's personnel are listed. T. G. I. R 32

11,838
McGrath, J.E. A FRAMEWORK FOR INTEGRATION OF SMALL GROUP RESEARCH STUDIES. A PILOT STUDY. Contract AF 49(638)-47 (Psychological Research Assoc., Va.), and Contract AF 49(638)-256, AFOSR-TR-57-57, Feb. 1958, 118pp. AF Office of Scientific Research, Washington, D.C. (Human Sciences Research, Inc., Arlington, Va.)

11,838
This is a pilot study, within a long range program of research, concerned with small groups. A working bibliography of items was compiled. A syntactical classification of nine categories was developed and applied to the bibliography. The syntactical principle of classification was extended to develop procedures for compiling research information and applied to a sample (57) of group productivity studies. The information thus compiled was analyzed for significant functional relationships. Gaps in distribution of research effort were also identified as well as productive and unproductive areas. Implications of this study for continuation of the research program are discussed. R 1279

11,839
USN Bureau of Medicine and Surgery. SUBMARINE MEDICINE PRACTICE. NAVMED P 5054, 1956, 357pp. USN Bureau of Medicine and Surgery, Washington, D.C.

11,839
This volume presents a comprehensive guide that can be utilized for training and indoctrinating regular and reserve Medical Department personnel with the many problems connected with submarine medical practice. Discussions include personnel selection and assessment procedures, improvement of submarine habitability factors, solution of human engineering problems aboard submarines, submarine escape and rescue operations, deep sea diving, diving with self-contained underwater breathing apparatus, and the medical aspects of all undersea operational problems directed toward improving the military effectiveness of the Submarine and Amphibious Forces. T. G. I.

11,840
Donaherty, Dora J., Houston, R.C., & Nicholas, D.R. TRANSFER OF TRAINING IN FLIGHT PROCEDURES FROM SELECTED GROUND TRAINING DEVICES TO THE AIRCRAFT. Contract AF-71-16, MATTHEWSON Proj. 20-L-5, Tech. Rep. 71-16-16, Sept. 1957, 91pp. USN Training Device Center, Fort Washington, N.Y. (Aviation Psychology Lab., University of Illinois).

11,840
To obtain information on methods of training pilots to perform in-flight normal and emergency procedures, the effectiveness of four different ground training devices (a photographic mock-up of the cockpit, a partly activated trainer, an aircraft flight simulator, and the combination of a part task, procedures trainer, and time shared tracking task) were compared. Five groups of private pilots were trained, four being given five periods of ground instruction on one of the devices followed by five periods in a T-6 aircraft; the fifth (control) was trained for ten periods entirely in the aircraft. Performance scores (procedural and flight errors) were analyzed for amount of transfer from trainer to aircraft. Implications of the results for training decisions are discussed. T. G. I. R 17

11,841
Hatchinson, R.C. GEOMETRIC EQUATIONS OF A THREE-DIMENSIONAL ENCOUNTER WITH A TWO-DIMENSIONAL DISPLAY. Contract AF 33(616)-3082, Proj. 32-14C, E-576, July 1956, 117pp. Instrumentation Lab., Massachusetts Institute of Technology.

11,841
This report presents a complete geometrical description of an encounter of two aircraft, an interceptor and a target. Equations describing relative location, orientation, and velocity of the aircraft are derived. Included are equations required to present, in a two-dimensional display (oscilloscope screen), a simplified representation of the target as it appears to the interceptor pilot. Consideration is given to ballistic aspects. The equations are general, allowing for twelve degrees of freedom, six for each aircraft; approximations are made only at the end of the derivations. The mathematics consists primarily of coordinate transformations: rotations, translations, and projections. The applicability of the equations and display methods to a variety of problems is suggested. T. G. I. R 5

11,842
Hendler, E., Crosbie, R.J., & Hardy, J.D. MEASUREMENT OF SKIN HEATING DURING EXPOSURE TO INFRARED RADIATION. Proj. DA-17 01 13 2, NANC-ACEL-332, March 1957, 14pp. Air Crew Equipment Lab., NANC, Philadelphia, Penn.

11,842
This report describes a sensitive radiometric device developed for measuring surface temperatures of the skin when exposed to long-wave, non-penetrating infra-red radiation. Measurements were made on the unbleached human skin exposed to 265 millicalories per second per square centimeter and on an inert substance (masonite) for durations of two minutes. The mean value of "thermal inertia for surface heating" for the skin was calculated. Comparison was made between temperature changes obtained and changes predicted from theoretically derived heat flow equations. Further uses for the device are discussed. T. G. I. R 3

11,843
Hierly, E.J., & Goldfein, S. LIGHTWEIGHT CAMOUFLAGE NETS. DAProj. 8-31-02-100, Rep. 1148, May 1956, 112pp. USA Engineer Research and Development Labs., Fort Belvoir, Va.

11,843
This report covers the development of a lightweight camouflage net for the concealment of military vehicles and equipment. Two net materials (woven or saran multifilaments and saran monofilaments) and four garnishing materials (two embossed vinyl films, a mat of bonded saran fibers, and a flexible isocyanate foam) were developed and tested extensively. The physical and optical breaking strength, flame resistance, color, infrared reflectance, texture, light transmission were determined in the laboratory; aurability and effectiveness against aerial and ground visual detection were measured in the field. Comparisons were made with the standard cotton net garnished with strips of colored burlap. Recommendations are given. T. I.

11,844
USN Bureau of Yards & Docks. ARCTIC ENGINEERING...
NAVJAGS TP PW 11, March 1955, 350pp. USN Bureau of
Yards & Docks, Washington, D.C.

11,844
This publication provides the basic data required
by Civil Engineering Corps officers and civilian per-
sonnel concerned with design, construction, maintenance,
and operation of facilities and equipment in areas of
extremely low temperatures. Chapter 1 presents general
information relating to responsibilities and data for
recognizing and evaluating control factors imposed by
the environments. Chapter 2 contains technical data use-
ful in development of engineering design. Chapter 3 pre-
sents information essential to the accomplishment of con-
struction or development projects. Chapter 4 is devoted
to maintenance and repair facilities and engineering
equipment.
T. C. I. R 108

11,845
USN Aviation Board. TEST OF PRODUCTION MODEL H-13H
HELICOPTER. Proj. NR AVN 2866, May 1957, 22pp. USN
Aviation Board, Fort Rucker, Ala.

11,845
To evaluate a production model H-13H Helicopter in
terms of suitability of design changes or modifications
incorporated as the result of an earlier service test,
the helicopter was flown and maintained by personnel of
the United States Army Aviation Board for 100 hours in
various weather conditions during the period November
1956 through January 1957. Analysis of the results was
accomplished by comparing present performance and design
with deficiencies reported from the previous test.
Recommendations are included.
I. R 2

11,846
Fishering, J.E., & Telbot, J.M. SOME PRACTI-
CAL CONSIDERATIONS IN THE USE OF RADIOISOTO-
PES. Special Rep. 4, March 1951, 44pp.
USAF School of Aviation Medicine, Randolph
Field, Tex.

11,846
This paper discusses the unique problems of me-
chanical laboratories in the design of equipment, facili-
ties, and protective devices. The problem of detection
of radiation is presented and practical rules given for
survey of laboratory operations, air monitoring, survey
of surfaces, personnel monitoring, and hands, feet, and
clothing monitoring. Design features of the laboratory
are considered with specific recommendations for each.
Recommendations for the disposal of radioactive wastes
(e.g., radionuclides, phosphorus 32, carbon 14, or any
radioisotopes) are made. Regulations for work in Radio-
biology Tracer Laboratory and a glossary of terms are
added.
T. R 10

11,847
Neek, R.A. A TECHNIQUE FOR DEVELOPING DEPOT
MAINTENANCE FACILITIES REQUIREMENTS TO SUP-
PORT NEWLY PROGRAMMED AIRCRAFT. Master's
Thesis, June 1957, 54pp. Syracuse University.

11,847
This paper develops and describes a facilities plan-
ning technique for Air Force depot maintenance aircraft
accessories shops. The complexity of the problem is out-
lined and the need discussed. Utilizing certain supply
tables on new aircraft, a method for converting the in-
formation and obtaining workload data on aircraft acces-
sories is developed. From these data it is shown that
shop space, utilities, machinery and equipment, services,
and manpower requirements can be predicted. Methods of
handling the information are described. I. R 23

11,848
Maritime Cargo Transportation Conference. THE SS. MARICE.
AN ANALYSIS OF AN EXPORT TRANSPORTATION SYSTEM FROM SHIP-
PER TO CONSIGNEE. Contract N70R 29149, P-1. 33p, Nov.
1954, 50pp. Maritime Cargo Transportation Conference,
National Academy of Sciences-National Research Council,
Washington, D.C.

11,848
This is an initial study in a program of research
undertaken to provide guidance on means and techniques
leading to improvement in the sea transportation of
general cargo. The military system from points of origin
of the cargo in the United States to delivery at destina-
tion in Germany was studied and analyzed in terms of an
actual operation of a vessel, the S.S. Warrior. The
system was divided into its logical segments - domestic
movement, receipt and storage, loading, voyage, dis-
charge, receipt and handling, and delivery - and each
analyzed from the points of view of time, cost, and man-
power.
T. C. I.

11,849
Green, D.J., & Lear, W.P. A NEW APPROACH TO
NAVIGATION. PART I. THEORETICAL CONCEPTS OF
NEW AIRBORNE NAVIGATION SYSTEMS. PART II.
NEW PRINCIPLES IN THE DESIGN OF SUPERIOR COM-
MUNICATIONS, NAVIGATION, AND MISSILE GUIDANCE
SYSTEMS. 24pp. Lear Inc., Santa Monica,
Calif.

11,849
Two basic classes of airborne navigation systems,
self-contained and externally referenced, are reviewed
and their present limitations defined. The self-con-
tained class of equipments (primary measurements made
within the moving vehicle) includes inertial and doppler
types as well as dead reckoning; the externally referenced
class (relying on radiations from or communication with
remote data sources) includes all of the radio, radar
and optical methods. A new hybrid class of system is de-
fined and its possible advantages described. The SCAN
(Self-Correcting Automatic Navigator) system and its
philosophy of statistical data filtering is given as an
example. A second paper discusses the use of information
theory, statistical techniques, and computers for the
design of various systems. G. I.

11,850
Warfield, J.W. SYSTEMS ENGINEERING. Contract
NORD-7958, Aug. 1955, 24pp. Ordnance Research
Lab., Pennsylvania State University.

11,850
The aim of this report is to provide the systems en-
gineer with material helpful to him in the engineering
of a system. Material common to most systems problems
are considered with technical discussions omitted. The
introduction sets forth the purpose of system engineer-
ing, defines the system engineer, enumerates the fac-
tors in a typical problem, and outlines the design pro-
cess. The systems survey and organized project plan are
discussed and a check-list given for each. Product de-
velopment is examined from the system-engineering view-
point, system tests are treated, and a check-list is
given. The report closes with a discussion of the com-
pletion and reinitiation of projects.
I.

11,851
Sperry Gyroscope Co., Inc. MONTHLY PROGRESS
REPORT ON AIR TRAFFIC CONTROL. Contract W28-
099-ac-189, Rep. 16, Nov. 1947, 14pp. Sperry
Gyroscope Co., Inc., Great Neck, N.Y.

11,851
This is a monthly progress report on a research and
development program for an air traffic control system.
The general status of the program in terms of equipment
improvement and flight testing is set forth. Items of
component apparatus described are a combined R-theta
pilot indicator, and a ground display system. A detailed
report on the status of the ARC/16 modification and
frequency modulation unit for the ground transmitter is
given. Details of antenna development are discussed.
G. I.

11,852

Broadbent, D.E. AN EFFECT OF NOISE ON AN INTELLECTUAL TASK. R.N.P. 57/672, O.E.S. 298, July 1957, 7pp. Royal Naval Personnel Research Committee, Medical Research Council, London, England. (Applied Psychology Research Unit, Cambridge, England).

11,852

To examine both immediate and after-effects of noise on complex intellectual performance, three groups of subjects worked for two sessions each at a subtraction task involving a considerable immediate memory load. One group had both sessions in relative quiet (70 decibels), a second had the first session in noise (100 decibels) and the second in quiet, and the third group had noise and quiet in reverse order. All subjects were given an intelligence test and a personality inventory. Performance scores (time to solve the problem) were analyzed in terms of the various noise conditions. Individual differences were related to performance.

T. G. I. R 5

11,853

Moodhead, Marjot M. EFFECTS OF BURSTS OF LOUD NOISE ON A CONTINUOUS VISUAL TASK. R.N.P. 57/691, O.E.S. 297, July 1957, 10pp. Royal Naval Personnel Research Committee, Medical Research Council, London, England. (Applied Psychology Research Unit, Cambridge, England).

11,853

To discover whether brief loud noise affects operator performance, a visual matching task was given to two groups each of 12 subjects. Task duration was four minutes with four noise bursts (100 decibels) at irregularly spaced intervals. One group received more information about the test than the other and also received verbal encouragement and knowledge of results. Performance scores were analyzed for effects of noise, effects of prior verbal alerting, and instruction. The practical significance of the findings are discussed.

T. G. I. R 5

11,854

Geoghegan, B., Roberts, D.F. & Wilson, J.O.C. MISCELLANEOUS FUNCTIONAL MEASUREMENTS OF NAVAL PERSONNEL. R.N.P. 57/695, O.E.S. 299, July 1957, 3pp. Royal Naval Personnel Research Committee, Medical Research Council, London, England.

This report presents miscellaneous anthropometric measurements made from photographic records taken during a survey of naval personnel (1953). The data were compiled to supply information for the following problems of equipment design: tailoring, seat design, working surfaces and clearances, and design of diving suit urinals. For each problem a different sample of the records was used.

T.

11,855

Erwood, M.K. METHOD OF THRESHOLD DETERMINATION IN THE HUMAN CENTRIFUGE. FFSO 1029, Dec. 1957, 9pp. Flying Personnel Research Committee, Air Ministry, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

11,855

A method of threshold determination in the human centrifuge is described. Visual blackout is utilized as the end point with thresholds capable of being varied by the use of suitable filters. The variables can be specified precisely, and thresholds determined with a minimum of discomfort. Some results of initial investigations of the method are presented.

T. G. I. R 5

11,856

Krendel, E.S. THE MECHANICAL POWER OUTPUT OF MAN. Contract NOME 2150(00), Proj. NR 196 006, Final Tech. Rep. F A1962, Jan. 1958, 66pp. Franklin Institute Laboratories, Philadelphia, Penna.

11,856

A scheme for designing man-powered devices for optimal power transfer from the human operator to the mechanism is discussed. Data indicating the feasibility of such a design are presented. Such data as were available for unusually high as well as for average power production in cranking, pedaling, and other tasks are presented in a systematic fashion.

T. G. R 52

11,857

Appely, (See Appleweig) M.H. (Ed.). PSYCHOLOGICAL STRESS AND RELATED CONCEPTS: A BIBLIOGRAPHY. Prepared under Contract Nour-995(02), Proj. NR 172-228. Tech. Rep. 7, Dec. 1957, 195 pp. Connecticut College.

11,857

This bibliography contains 2611 references, arranged alphabetically by author, on psychological stress and related concepts such as emotional conditioning, ego-involvement, and so forth. Papers dealing with methodology and measurement have also been included to aid the would-be investigator in the field.

R 2611

11,858

Kurke, M.I. DETERMINING CRITERIA FOR EVALUATING MAN-MACHINE LINKS IN WEAPON SYSTEM ANALYSIS. Operations Pers. Dec. 1957, 2(6): 826-829. (USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.).

11,858

To establish a method for evaluating interactions between operators and equipment in a multi-purpose weapon system (naval tank), instructional materials such as manuals, training films and lesson plans were examined. An analysis of operations, based on these materials, was made in terms of number and type of man-machine links, and their significance in establishing a model for the system. The use of the technique thus developed in place of complete activity analyses is discussed.

T. R 9

11,859

Davis, R.C. ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL. MUSCULAR ACTIVITY DURING STEADY NOISE AND ITS RELATION TO INSTRUCTED RESPONSES EVOKED BY AUDITORY SIGNALS. Rep. 55-124, Dec. 1956, 14pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University).

11,859

To study the effects of a prolonged tone (about 12 minutes duration, 1000 cycles at 90 decibels) upon muscular activity, 32 subjects were run under noise and under quiet conditions. The subject was required to make flexion or extension movements of a lever operated with a wrist-bending according to auditory signals occurring about one per minute. Action potentials were recorded from the right and left extensors and flexors. The data were studied by analysis of variance for effect of noise, serial position, response direction and individuals.

T. G. R 12

11,860

Davis, P.C. ELECTROCARDIOGRAPHIC FACTORS IN AIRCRAFT CONTROL. RESPONSE AND ADAPTATION TO BRIEF NOISES OF HIGH INTENSITY. Rep. 55-127, Dec. 1956, 7pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Indiana University).

11,860

The effects on muscle action potentials of brief auditory stimuli varying from 100 to 117 decibels were examined. Sixteen subjects were given four stimulus intensities four times each in counterbalanced order, with instructions to remain as relaxed as possible. Records of action potentials were taken from both arms and analyzed for their relation to stimulus intensity and repetition.

T. G. R 8

11,861

Hasty, G.T., Payne, R.E., & Bauer, R.O. EFFECTS OF NORMAL AIR AND DEXTRO-AMPHETAMINE UPON WORK DECREMENT INDUCED BY OXYGEN IMPOVERISHMENT AND FATIGUE. Rep. 56-125, Dec. 1956, 6pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,861

To study means by which the deterioration in performance caused by hypoxia and fatigue might be counteracted, 64 subjects were first given extensive practice on a compensatory pursuit task. Following administration of either a placebo or five milligrams of dextro-amphetamine, subjects were required to perform the task for four hours. With the exception of the third hour of work, all subjects were subjected to an insufficiency of oxygen (2012). Performance scores were analyzed for the single and joint effects of dextro-amphetamine and normal air.

T. G. R 4

11,862

Bradley, J.V. GLOVE CHARACTERISTICS INFLUENCING CONTROL MANIPULABILITY. Proj. 7182, WADC TR 57-389, Aug. 1957, 25pp. Aero Medical Lab., WADC, ARDC, Wright-Patterson AFB, Ohio.

11,862

This report describes a method for defining and measuring certain glove characteristics which affect the speed of operation of instrument controls by a gloved hand. Correlations were obtained between speed of gloved operation of controls and the degree to which the gloves possessed certain characteristics.

T. G. R 5

11,864

Gardner, R.A. PERCEPTION OF RELATIVE FREQUENCY AS A FUNCTION OF THE NUMBER OF STIMULUS AND RESPONSE CATEGORIES. AMEL Proj. 6-95-20-001, Rep. 328, April 1958, 15pp. USA Medical Research Lab., Fort Knox, Ky.

11,864

A prediction response was used to study a form of decision behavior. Categories of stimulus events represented by black letters of the alphabet were presented to 240 subjects (ten groups of 24 each) in a series of 420 trials. The number of categories varied from two to eight and each category was associated with a different response category. The only property of the stimulus-event that could be used for prediction was relative frequency (either .70 or .60 for most frequent). The response data were analyzed for effect of practice and number of categories.

T. G. R 7

11,865

Harbold, G.J. & Deehring, D.G. A RATING SCALE MEASURE OF SPEECH DISTURBANCES THAT ACCOMPANY DELAYED SPEECH FEEDBACK. Joint Proj., Ohio State University Research Foundation Contract NMR 22525, Proj. NR 145 993, and Bu Med Surg Proj. NM 18 02 99, Rep. 71, Dec. 1957, 12pp. USA School of Aviation Medicine, Naval Air Station, Fla.

11,865

The rating scale technique was used to quantify speech disturbances that accompany delayed speech feedback (delayed side-tone). Fluency judgments of both delayed and non-delayed speech (ten speakers) were obtained from three panels of judges (23, 36, and 10). Measures of speech-rate and speech-level were also obtained. The fluency ratings were analyzed for reliability and the speech-rate and speech-level data for relation to the delayed speech condition.

T. G. R 17

11,866

Dusick, E.R. STANDARDIZATION OF TESTS OF GROSS MOTOR PERFORMANCE. Proj. 7-63-01-0058, Tech. Rep. EP-81, Jan. 1958, 43pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

11,866

This report presents a series of studies designed to establish a battery of tests that could be used as standard devices for evaluating the effects of clothing restriction. A series of 13 tests of gross motor performance (body flexion) were performed by 37 subjects on two different occasions. The data were analyzed for test reliability, norms, and the interrelationships exhibited. Four studies were carried out using the Steadiness aiming test with the arm at different elevations, and planes, and with varied amounts of shoulder and arm restriction. Analyses were performed as before. Recommendations are included.

T. G. R 16

11,867

Wright, Natalie, L. & Seminars, J.L. READABILITY THRESHOLDS OF LETTERS AND NUMBERS BACKLIT BY RADIOACTIVE ILLUMINANTS. DA Proj. 5A12-15 023, Proj. TAZ 2106A, Tech. Rep. 2471, March 1958, 36pp. USA Samuel Feltman Research Lab., Picatinny Arsenal, N.J.

11,867

To determine optimum colors, brightness levels, and letter sizes in connection with the use of radioactive self-luminous compounds to backlight panel markings, radioactive illuminants of three colors and five brightness levels were used with four sizes of words, numbers, and nonsense syllables. Readability thresholds were established on five subjects by moving the stimuli toward or away from the subject and treated by analysis of variance for effects of variables and their interactions.

T. G. R 17

11,868

Kiss, J.S. SMALL GROUP EFFECTIVENESS IN THE PERFORMANCE OF COMPLEX TASKS. Contract 49(638)-236, R.F. Proj. 794, Rep. 1, March 1958, 4pp. Ohio State University Research Foundation.

11,868

This is the first quarterly progress report on a research project investigating small group effectiveness in the performance of complex tasks. Work was initiated on three major projects: (1) the development and construction of a low-cost, universal group-task apparatus, (2) the creation of detailed specifications for a set of tasks that would utilize the apparatus, and (3) the first group experiment.

11,869

Solomon, P. SENSORY DEPRIVATION AND THE HUMAN MIND. ONR Res. Rev., April 1958, 9-11. (Harvard Medical School).

11,869

This paper describes briefly an attempt to determine whether living in a respirator leads to transient mental abnormalities. Male volunteers remained in a respirator for periods up to 36 hours. Although data were being processed at the time of writing, certain findings in regard to stress reactions to sensory deprivation are discussed and the implications pointed out.

11,870

Gell, C.P., Hays, E.L., & Correale, J.V. Jr. THE NAVY'S FULL-PRESSURE SUIT. ONR Res. Rev., April 1958, 12-21. (Air Crew Equipment Lab., NAMS, Philadelphia, Penn.).

11,870

This paper reviews the development of the Navy's full-pressure suit, going back some 15 years to World War II. The various problems along the way and the manner in which they were solved are presented, as well as full descriptions of the six prototypes and its development by B. F. Goodrich Company. Progress to January 1957 is outlined. Subsequent developments which have led to the light weight high-altitude protective system now in limited operational use are not included.

T.

11,871

Wallis, D. AUDITORY AND VISUAL SEARCH PROBLEMS. July 26-27, 1957. 5pp. International Symposium on Military Psychology, Brussels, Belgium. (Dept. of the Senior Psychologist, Admiralty, London, England).

11,871

This paper describes a series of experiments dealing with problems of auditory and visual search. The subjects (12 naval officers and 12 aircrew) were tested, two at a time, in separate mock-up of an aircraft cockpit. Each was required to maintain an intensive watch on two independent search systems - a radar plan-position indicator display and auditory signals through headphones. One group experienced five successive three-hour sessions at weekly intervals; the other group at daily intervals. Measurements included "expectancy" or threshold data and "non-expectancy" or search thresholds. These data were analyzed in terms of effect of interpolated tasks, length of search, area of search, and individual differences.

T. R. 12

11,872

Boyle, J.A. SAFETY AND OPERATING ADVANTAGES OF IMPROVED ILLUMINATION UNDERGROUND. Mining & Geology, 4(23), no date, 4pp. (US Steel Corp., New York, N.Y.).

11,872

This paper discusses a new objective of the coal mining industry - the provision of improved underground illumination. The progress of the industry in providing safe working conditions is reviewed and the need for attention to the illumination problem is stressed. The end results of safer working conditions are pointed out.

11,873

Lockheed Aircraft Corp. DESIGNING FOR ELECTRONIC MAINTAINABILITY. June 1953, 58pp. Missile Systems Div., Lockheed Aircraft Corp., Van Nuys, Calif.

11,873

This booklet is prepared to guide the designer of electronic equipment into consideration of maintainability. Each major guide or "rule" is illustrated with cartoons. At the end of the booklet are checklists that can be used to be sure that all parts and pieces, the chassis, and the console are designed for: (1) ease of handling, (2) ease of identification, and (3) ease of adjustment and repair. A final safety checklist is also included.

T. R. 4

11,874

Garvey, W.D., Henson, Jean B., & Gullledge, Irene S. EFFECT OF LENGTH OF OBSERVING TIME ON EARTH SATELLITE VISIBILITY. NRL Proj. NR 579-000, Problem A02-18, Rep. 5094, Feb. 1958, 9pp. Naval Research Lab., Washington, D.C.

11,874

This report describes an investigation to determine the extent to which an observer's ability to detect a satellite through a telescope is reduced after prolonged periods of search ranging from 5 to 120 minutes. The results are analyzed and certain recommendations for maximum probability of detecting an earth satellite at moonwatch stations follow.

T. G. I. R. 3

11,875

Johansson, G., Backlund, F., & Bergstrom, S.S. STUDIES ON MOTION THRESHOLDS: I. SHORTEST PERCEPTIBLE LENGTH OF MOTION TRACK AS A FUNCTION OF STIMULUS VELOCITY. Rep. 1, Nov. 1957, 22pp. The Psychological Lab., University of Uppsala, Sweden.

11,875

To determine the length of motion track (displacement) thresholds as a function of stimulus velocity, two experiments were conducted using 14 subjects. Threshold determinations consisted of adjusting the shortest visible displacement of a moving target (dot) with reference to a black static hairline. Five velocities were used ranging from 0.22 to 3.48 minutes of visual angle per second (both infra-perceptible and perceptible motion). The relationship between the displacement threshold and velocity is analyzed and described in terms of its mathematical function.

T. G. I. R. 11

11,876

Brown, F.R. A STUDY OF THE APPLICABILITY OF INDIRECT ILLUMINATION METHODS TO INDIVIDUAL AIRCRAFT INSTRUMENTS. Rep. TED NAM EL-318, May 1949, 15pp. USN Aeronautical Medical Equipment Lab., NAMC, Philadelphia, Penn.

11,876

To explore the use of indirect illumination for aircraft instruments, a number of methods devised for use with certain shipboard instruments were studied in relation to the specific aircraft requirements. A series of nine instrument face mock-ups incorporating some features of indirect illumination were evaluated by relating their demonstrated features to the requirements of an ideal aircraft instrument lighting method. Recommendations for further development are included.

T. R. 12

11,877

Hays, E.L. EVALUATION OF THE MARINE CORPS SEAT RELEASE COMPOSITE QUICK DISCONNECT ASSEMBLY. Rep. TED NAM AE 519059.1, Part II, July 1948, 16pp. USN Aeronautical Medical Equipment Lab., NAMC, Philadelphia, Penn.

11,877

The Marine Corps Seat Release Composite Quick Disconnect Assembly was subjected to leakage, pressure drop, general operational and ejection seat tests by the Navy. The results are evaluated in terms of the Assembly's operating characteristics and its practicability for use in Naval aircraft. Recommendations are included.

G. I.

11,878

Webster, J.C., & Thompson, P.O. RECORDED GROUP AUDIO-METER TEST COMPARISONS AT THE 1956 SOUTHERN CALIFORNIA EXPOSITION. J. acoust. Soc. Amer., Aug. 1957, 29(8), 895-899. (USN Electronics Lab., San Diego, Calif.).

11,878

To study various aspects of two group audiometer tests used by the Navy (Medical Research Laboratory, MRL, and Navy Electronics Laboratory, NEL), recorded series of 4000 cycles per second absolute threshold tests were administered over earphones to 1919 people in groups of eight or less. Half of the subjects received a test and retest on the MRL, the other half on the NEL. The data were analyzed in terms of test-retest reliability, differences due to test stimuli (pure versus warble tones), effectiveness of 4000 cycle per second acuity as an indicator of general auditory fitness and relationship of hearing loss to noise history and age.

T. G. R. 13

11,879
Warren, M.O., Ford, J.S., & Schuster, D.H. DEVELOPMENT OF A TROUBLE LOCATOR AND EVALUATION OF A GENERALIZED ELECTRONIC TROUBLESHOOTING COURSE. Contract AF 41 (657) W4, Proj. 7709, AFTRC TR 58-1, Jan. 1958, 7pp. USAF Maintenance Lab., Lowry AFB, Colo.

This report summarizes 2 investigations. The first concerned a trouble-locating aid that combined a system-oriented approach with a procedure-oriented approach. Limited evaluation indicates that this type of job aid would facilitate the work of relatively inexperienced mechanics and would be of some value to experienced personnel. In the second study the effectiveness of the Generalized Electronic Troubleshooting (GETS) Trainer, the related training curriculum, and test problems were evaluated. The California Test of Mental Ability and 16 standardized tests of special mental abilities were used. Results obtained for 90 high-school males indicate that this systematic training in troubleshooting developed skill in using symptom information to solve abstract troubleshooting problems and decreased tendency to make redundant actions and to arrive precipitantly at incorrect solutions.

11,880
Thorndike, R.L., Hagen, Elizabeth P., Orr, D.B., & Rosner, B. AN EMPIRICAL APPROACH TO THE DETERMINATION OF AIR FORCE JOB FAMILIES. Contract AF 18(600)-1208, Proj. 7719, AFTRC TR 57-5, Aug. 1957, 46pp. Personnel Lab., AFTRC, ANDC, Lackland AFB, Tex.

11,880
This report deals with a new technique for assessing job requirements and for grouping Air Force jobs into homogeneous job families. Men who worked on a particular job were asked to indicate how often they did each of a series of specific activities. These profiles of job requirements were set up for 25 Air Force jobs. Subsequently, job clusters were determined. Finally, the effectiveness of the technique is evaluated.

11,881
Nadel, A.B. HUMAN FACTORS REQUIREMENTS OF A MANNED SPACE VEHICLE. RM 5810P 10, April 1958, 35pp. Technical Military Planning Operation, General Electric Co., Santa Barbara, Calif.

11,881
This report presents an analysis of human factors requirements of a manned space vehicle in light of present knowledge. One section deals with the physical environment of the operator, covering the effects of physical stimuli from space external to the craft, their possible effects on the operator and protective measures needed. Another section is concerned primarily with inputs from space received via the sensory system of the operator. Phenomena apprehended through the perceptual system are described together with their possible effects and practices recommended to avoid undesirable effects. The information processing function (information items needed, displays, and display-control relations) is discussed at length.

T. G. I. R 34

11,882
Jerison, W.J. & Argenteau, J. TIME JUDGMENTS, ACUSTIC NOISE, AND JUDGMENT DRIFT. Proj. 7193, WADC TR 57 454; Task 71614, Jan. 1958, 29pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

11,882
To study the effect of noise on performance, six subjects made time judgments in a rate projection situation with five rates and four noise conditions. The task involved observing a target that moved at a constant rate and then disappeared behind a mask, imagining that the target continued on its course, and squeezing a trigger when it was believed to be under a cross-hair on the mask. Noise program included steady high and low noise levels (108.5 and 70 decibels) and noise that shifted from high to low, or the reverse, when target disappeared. Time judgments were analyzed for effects of noise, rates, and practice.

T. G. I. R 12

11,883
Vogel, J. SUMMARIES OF RESEARCH REPORTED ON DURING CALENDAR YEAR 1957. Dec. 1957, 16pp. USN Medical Research Lab., Naval Submarine Base, Conn.

11,883
This publication presents a summary of each of the research reports published during the calendar year 1957 in the Naval Research Laboratory's regular chronological series, and lists titles of reports issued in the memorandum series. Also included is a list of articles published by members of the staff during the same period.

R:69

11,884
Wood, C.L. & Bitterman, M.E. BLINKING AS A MEASURE OF EFFORT IN VISUAL WORK. Amer. J. Psychol., Oct. 1950, LXIII, 584-588. (Cornell University & University of Texas).

11,884
To test the hypothesis that blink-rate is an inverse correlate of performance, rather than a direct correlate of effort, subjects were instructed to work rapidly, with maximal efforts (on a cross-out test) during one period, and slowly, with minimal effort, during another period. Frequency of blinking was measured continuously during the experimental periods. Significance of the difference between the results under the two conditions was calculated and the results are discussed in relation to the hypothesis selected.

T. R 15

11,885
Siechta, R.F., Wade, E.A., Carter, W.K. & Forrest, J. COMPARATIVE EVALUATION OF AIRCRAFT SEATING ACCOMMODATION. Contract AF 33(616) 3068, Proj. 7215, WADC TR 57 136, April 1957, 112pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University).

11,885
To investigate the problems of seat comfort, a series of seats currently in use in operational aircraft were tested experimentally for adequacy in limiting pilot and crew fatigue and discomfort. The subjects (18), selected to represent a wide range of body sizes in the Air Force population, were seated in each of six seats for periods up to seven hours duration. Hourly assessment of comfort was made by means of a questionnaire and post-test interviews. The data (sitting time, hourly ratings of degree of comfort, hourly indications of discomfort location, evaluation of seat parts, and so forth) were analyzed in terms of seat design, and for information about nature of seating discomfort.

T. G. I. R 19

11,886
McFarland, R.A. & Domey, R.G. BIO-TECHNICAL ASPECTS OF DRIVER SAFETY AND COMFORT. Jan. 1958, 49pp. Society of Automotive Engineers, Inc., New York. (Harvard School of Public Health).

11,886
This paper presents and discusses some illustrative principles of bio-technology as applied to truck driver safety and comfort, together with criteria pertinent for design in terms of human capacity and limitations. The findings from a human engineering evaluation of truck models produced in 1956 are presented and design features of the vehicles discussed in terms of the sensory input and response output of the operator task.

R 9

11,887
Torre J.P., Jr., & Sanders, L.A. AN INVESTIGATION OF SYMBOL MEANING COMBINATIONS FOR USE IN RADAR DISPLAYS. Proj. TBI-1000, Tech. Memo 1-58, March 1958, 18pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

11,887
This report describes attempts to derive a set of symbol forms which could be used to designate "enemy", "friendly", and "unknown" targets on a radar scope. Two hundred enlisted men served in two experiments. In the first, subjects were required to draw a symbol for each of the three concepts; in the second experiment, the three most representative symbols were selected from those which occurred most frequently in the first experiment.
T. I.

11,888
Fooks, G., Sweeney, E.J., & Dimmick, P.L. PILOT STUDIES OF A SCOTOPIC SENSITIVITY TEST. BuMed Surg Proj. NM 23 01 20, Rep. 1, Subtask 4, NMRL Rep. 285, June 1957, 7pp. USM Medical Research Lab., Submarine Base, New London, Conn.

11,888
This paper presents studies designed to determine whether a newly devised test of night sensitivity might be improved by 1) using a sampling procedure rather than a more extended psychophysical technique, 2) using multiple stimuli as a time-saving device, and 3) reducing the number of testing sessions. The results are given and evaluated.
T. G. R 3

11,889
Appley, (see Applezweig) M.W. & Moeller, G. PSYCHOLOGICAL STRESS AND RELATED CONCEPTS: INDICES TO A BIBLIOGRAPHY. Contract NMR 996(02), Proj. NR 172 228, Tech. Rep. 7, Jan. 1958, 35pp. Dept. of Psychology, Connecticut College.

11,889
This document contains a subject and author index for use with a bibliography (see Accession No. 11,857) in the area of psychological stress. The primary purpose of both bibliography and indices was to aid an active program of research, therefore completeness or systematic coverage are not claimed.

11,890
Preston, G.M. & Pesman, G.J. ACCELERATIONS IN TRANSPORT-AIRPLANE CRASHES. NACA TN 4158, Feb. 1958, 76pp. Lewis Flight Proulsion Lab., NADC, Cleveland, Ohio.

11,890
Full-scale aircraft crashes were made with low-wing pressurized and high- and low-wing unpressurized transport airplanes to determine the crash loads that result from a variety of crash events. The crashes simulated take-off and landing accidents involving fuselage damage ranging from moderate to severe. Accelerations were measured by accelerometers installed on the cabin floor. The data (peak magnitude of acceleration, time required to attain peak magnitude, and the time duration and the direction of the acceleration) were analyzed in terms of impact survival possibilities for the various airplane configurations and crash circumstances.
T. G. I. R 6

11,891
Martin, R.E. OAK RIDGE FITTING TRIALS OF NON-COMBAT AND CIVILIAN PROTECTIVE MASKS. CALR 57, Proj. 4-80, 02-012, Interim Rep., March 1953, 30pp. USA Chemical & Radiological Labs., Army Chemical Center, Md.

11,891
Fitting, donning and comfort tests of the E5R15 Non-Combat Protective Mask and the Civilian Protective Mask were conducted. Preliminary acceptance tests of the E2 and E3 Infant Protectors were also made. The subjects were of a variety of racial, ecological, socioeconomic and age group ranging from infants of a few months to 60 years. Experienced personnel conducted the selection of mask size, the subject donned and adjusted mask and wore the mask for periods of one hour or less while engaged in normal activity. Observations by the test personnel and comments from subjects were analyzed in terms of adequacy of size ranges, comfort, ease of donning, and suggested design changes.
T. G. I.

11,892
Rollins, R.N., & Franko, W.J. LAND-HOVER LIGHTS (FLOODLIGHTS) ON THE HRS-3 HELICOPTER, INSTALLATION AND EVALUATION OF. Proj. TED PTR AN 8028.3, Rep. 1, Final Rep., May 1957, 5pp. Electronics Test Div., Naval Air Test Center, Patuxent River, Md.

11,892
To improve illumination for landing and hovering operations, land-hover lights (floodlights) were installed on a model HRS-3 helicopter. Two lights were used for illumination of the forward ground surface and one for the surface beneath the helicopter. The effectiveness of the lights is evaluated and certain recommendations are offered.
I.

11,893
Mitkin, H.A. PERCEPTION OF BODY POSITION AND OF THE POSITION OF THE VISUAL FIELD. Psychol. Monographs, 1949, 62(7), 1-46. (Brooklyn College).

11,893
To investigate factors involved in perception of body and visual field position, several experiments which employed a tilting room-tilting chair apparatus were performed. These included: 1) judging body and room orientation during changing relations between body and field, 2) adjusting body or room position to true upright, 3) adjusting body position to upright with and without visual field, 4) judging body and room position and adjusting pointer to upright. Qualitative differences in performance including illness brought on by unstable visual field are discussed. Quantitative differences in performance are discussed as a function of the relative importance of visual and postural sensations.
T. G. I. R 7

11,894
King, H.F., & Speakman, D. AGE AND INDUSTRIAL ACCIDENT RATES. Brit. J. Indust. Med., 1953, 10, 51-58. (Nuffield Research Unit, Psychological Lab., Cambridge, England).

11,894
The methods and results of investigations into the relation of age and industrial accident rates are surveyed and discussed. The following topics are discussed with relation to accident frequency; criterion of accidents, role of occupation, the relationship of age and experience, the handling of physical and physiological conditions (fatigue, falls and lapses), length of absence, and type of injury. The discussion deals with differences of interpretation, methods of recording and collecting data, and errors of omission. Suggestions are made for an approach to the problem which would lead toward a better understanding of the relation between age and accident rates.
T. G. R 35

11,895
 Final report summarizing products of Task No. 37300, Conditions of Effective Learning of Skills and Concepts in Performing Maintenance Tasks. Approach and findings are described for several studies concerned with the definition of fundamental concepts required in technical training, and methods of insuring efficient learning and retention of these concepts. Specific findings relate to the description of a prototype core training course for fighter-interceptor maintenance, a course for flight simulator mechanics, and studies of effectiveness of these training techniques. A second group of studies dealt with fundamental physical-science concepts of a type relevant to maintenance training, techniques for identifying training content and for its effective teaching, as well as training conditions that may affect mastery of materials have been described.
 R 11

11,896
 Billinski, C.R. ERRORS IN THE USE OF TEST INSTRUMENTS ATTRIBUTABLE TO DESIGN. MEL Rep. 810, Nov. 1957, 9pp. USN Electronics Lab., San Diego, Calif.

11,896
 This report describes a human engineering study undertaken to develop information on errors in test instrument operation so that optimum design of equipment might be achieved and electronic maintenance facilitated. (Interviews with personnel were conducted and operations were observed). The factors primarily responsible for errors in the use of test instruments are discussed and certain recommendations are made.
 T. G. I.

11,897
 Hamilton, P.M. UNDERWATER HEARING THRESHOLDS. J. acoust. Soc. Amer., July 1957, 29 (7), 792-794. (USN Electronics Lab., San Diego, Calif.)

11,897
 Underwater hearing thresholds were measured at frequencies of 250, 500, 1000, 2000, and 4000 cycles per second on four Aqualung-equipped divers with normal hearing in air. The minimum audible fields, in decibels, are given for the frequency range investigated and the shape of the threshold vs. frequency curve is discussed.
 G. I. R 5

11,898
 Heger, V.G. & Pflaum, J.V. A TECHNIQUE FOR MOTION-PICTURE RECORDING OF SONAR SCOPES. SW 08401, NE 070926 1 (NEL G1 1), MEL Rep. 719, Oct. 1956, 9pp. USN Electronics Lab., San Diego, Calif.

11,898
 This report describes a technique for motion picture recording of sonar scopes. An ultraviolet lamp and a projected bearing-ring light make it possible to obtain records useful in data analysis.
 I. R 5

11,899
 Mackworth, J.F. & Mackworth, M.H. EYE FIXATIONS REDUCED ON CHANGING VISUAL SCENES BY THE TELEVISION EYE-MARKER. AFU 320/58, Jan. 1958, 10pp. Applied Psychology Research Unit, MRC, Cambridge, England.

11,899
 A modification of the corneal reflection method of eye-movement recording through use of television techniques is described. By this technique it is possible to record the position of a subject's gaze upon a moving visual scene with considerable accuracy. The usefulness of the technique is discussed in relation to three broad categories of human performance: (1) visual aiming, (2) visual search, and (3) thinking.
 I. R 22

11,900
 USN Aviation Safety Center. FLYBOY, A PRIMER FOR PILOTS. 1957, 44pp. USN Aviation Safety Center, Norfolk Air Station, Va.

11,900
 The material presented in this publication is an accumulation of reprints from Volumes 1 and 2 of Approach, the Naval Aviation Safety Review, and its predecessor, the Naval Aviation Safety Bulletin. The material on aviation safety is written to appeal to the active pilot.
 G. I.

11,901
 Bash, L.M.W. (Ed.). ERDL-TULANE SYMPOSIUM ON FLICKER. Contract DA-44-009-ENG-2448 (Mod 2), Proj. 8-18-06-003, April 1957, 268pp. (New Orleans, La.). USA Engineer Research and Development Labs., Fort Belvoir, Va., & Tulane University School of Medicine.

11,901
 This is a report of a symposium of flicker sponsored by Tulane and the U. S. Army Engineer Research and Development Laboratories in April 1957. A condensed version of the Tulane experiments on flicker is presented, as well as some twelve papers given at the meetings. A phenomena is given, as well as certain conclusions about the effects of flicker on the functions of the human nervous system.
 T. G. I. R 268

11,902
 Moser, H.M., Dreher, J.J., O'Neill, J.J. & Oyer, H.J. COMPARISON OF MOUTH, EAR, AND CONTACT MICROPHONES. Contract AF 19(604) 1577, Proj. 7681, AFRC TN 56-58, Tech. Rep. 37, Oct. 1956 (revised Jan. 1958), 24pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C. (The Ohio State University Research Foundation).

11,902
 To evaluate existing and easily obtainable transducers and microphones, the efficiency with which speech signals were transmitted was measured on a first-order differential noise cancelling microphone (RCA M-33/AIC) and selected ear, throat, and bone transducers. The noise cancelling microphone was used as control and two simultaneous recordings were made for each of three recording conditions (quiet, 100 decibels and 111 decibels noise) for each of the four comparison microphones. The recordings (Harvard Phonetically Balanced words) were presented to trained listeners in both quiet and noise. The data were analyzed for differences due to type of equipment.
 T. I. R 16

11,903
 Bouman, M.A., & Walraven, P.L. SOME COLOR NAMING EXPERIMENTS FOR RED AND GREEN MONOCHROMATIC LIGHTS. J. opt. Soc. Amer., Sept. 1957, 47(9), 834-839. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

11,903
 To investigate the predictability of verbal descriptions of monochromatic flashes of light, one observer, a normal trichromat, was studied. The stimuli (wavelengths between 550 and 700 millimicrons) were presented to the dark-adapted right eye each three seconds and the observer indicated whether the perception was reddish, yellowish, greenish, bluish, whitish, colorless or absent. In addition to wavelength, exposure time and area of test stimulus were varied. Frequency of seeing curves are constructed from the data. Comparison is made with quantum theoretical studies previously conducted for absolute threshold data.
 G. I. R 12

11,904
Bauer, R., Johnson, J.M. & Goshoff, L.L. A GENERAL METHOD FOR ESTIMATING TRAFFIC FLOW IN A ROAD NETWORK. Report 38, Oct. 1957, 17pp. Institute of Transportation and Traffic Engineering, University of California, Los Angeles, Calif. (Reprinted from Highway Res. Board, Sept. 1957, 22(10), 35-45).

11,905
This paper deals with the license plate method for studying the utilization of a segment of highway network. The theory is outlined and mathematical formulas developed for analyzing percentage flow when entrance and exit (modified origin and destination) data are simultaneously obtained on sampling basis. A procedure is outlined whereby the count of vehicles between any sets of license plate numbers can be readily obtained through the use of a high-speed digital computer. A specific application of the theory to a study of weaving in one section of the Hollywood Freeway in Los Angeles is presented.
T. L. R. 5

11,906
Bauer, R.F. DRIVERS' GMS IN TRAFFIC. *Psychol. Sci.* 1957, 2, 389-394. (Institute of Transportation and Traffic Engineering, University of California, Los Angeles, Calif.).

11,907
To investigate the relationship between drivers' galvanic skin response (GSR) and changes in traffic situations, three trained observers made a record of the occurrence of a GSR and a record of the traffic event that presumably elicited the GSR while a subject drove a prescribed route through city streets. Data for 280 traffic incidents were obtained from 21 subjects and analyzed in terms of type of incident (degree of infringement upon an idealized driving path) in relation to degree of clarity in the GSR settings. The results are discussed in terms of the usefulness of this method of studying driver behavior.

11,908
Rothman, J.M. & Bauer, R. DRIVERS OF HIGHWAY VEHICLE ACCIDENT INCIDENCE. Bull. 161, 30 data, 5pp. Highway Research Board, Washington, D.C. (Institute of Transportation and Traffic Engineering, University of California at Los Angeles).

11,909
The authors analyze some of the factors that limit or possibly preclude the use of mileage as the risk measure in accident rates when this measure is used to provide bases for technical decisions. They offer arguments for the use of traffic volume-based indexes for the most appropriate representation of motor vehicle rates. Recommendations for such a practice are made.
I. R. 3

11,907
Cohen, J. & Sanders, Virginia L. THE EFFECTS OF ABSOLUTE AND CONDITIONAL PROBABILITY DISTRIBUTIONS ON INSTRUMENT READINGS. III. A COMPARISON OF A LINEAR SCALE AND TWO SCALES WITH EXPANDED CENTRAL PORTIONS. Contract AF 33(616) 3404, Proj. 7186, WADC TR 57 65, March 1958, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College).

11,907
To determine whether expanding the central portion of a scale would improve overall accuracy of scale reading when a preponderance of settings occur in that portion, two such expanded scales (sigmoid progression of scale intervals and a modified linearly graduated scale with the two ends compressed and center expanded) were each compared to a linear scale. Random and orderly sequences of pointer setting were presented with both a rectangular and normal distribution of settings. Following a practice session, the dials were exposed tachistoscopically; 16 subjects in each comparison. Error scores were analyzed and effects of main variables studied. Implications of the results for nonlinear scale design were discussed.
T. G. I. R. 5

11,908
Cohen, F.A. & Anderson, C.D. PERIOD TEST OF THE CONFUSION-SCALE FILE IN SPEECH COMMUNICATION. J. Acoust. Soc. Amer., Dec. 1957, 29(12), 1748-1752. (Hearing and Communication Lab., Indiana University).

11,909
To determine the value of the constant-rate rule for use in speech communication when relatively unpracticed subjects are used and when the confusion matrix for the master set is obtained with one group of listeners and confusion matrices for the subjects with a different group, a ten-item master set was tested (ten five-item subsets) with 80 naive subjects. The data of 40 listeners were used to determine the master confusion matrix, and of the remaining 40 listeners to determine the subject matrices. Obtained articulation scores and call errors in the subject matrices were compared with predicted values from the constant-rate rule.
G. R. 4

11,909
Pallack, L. & Torres, J. STANDARDIZED COMMUNICATIONS AND MESSAGE RECEPTION. J. Acoust. Soc. Amer., Dec. 1958, 30(1), 42-44. (NSF Operational Applications Lab., Belling AFB, Washington, D.C.).

11,909
To demonstrate experimentally the effect of standardized communications on message reception, the reproduction of messages, selected from defined information sources, was studied in a multi-channel listening task (identifying and responding to a message carrying a particular identification call sign while listening to two talkers). The subject was required to pilot a simulated airplane and monitor visual displays while responding. Standardization of message procedures was controlled independently of standardization of message reproduction. Accuracy of reproduction was studied for effects of standardization of message, of procedure and joint standardization.
T. G. R. 3

11,910
Cohen, J. & Dinnenstein, A.J. A COMPARISON OF A LINEAR SCALE AND THREE LOGARITHMIC SCALES ON THE TIME FOR CHECK READING. Contract AF 33(616) 3404, Proj. 7186, WADC TR 57 63, March 1958; 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College).

11,910
To explore some design aspects in the use of non-linear scales, four circular dials three with logarithmic scales with varying degrees of skewness and one with a linear scale, were compared on the basis of the exposure time required to read them. Before each trial a number was read by the experimenter and the subject reported whether or not that reading was correct to the nearest marked scale on the dial exposed; 64 subjects were used. Difference scores between each of the logarithmic scales and the linear scale were studied by analysis of variance. The results are discussed in terms of design and use of logarithmic scales.
G. L. R. 5

11,911
Dardano, J.F. & Donley, R. EVALUATION OF RADAR SYMBOLS FOR TARGET IDENTIFICATION. OOD Proj. TBI 100C, Tech. Memo 2 58, March 1958, 27pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

11,911
To investigate the discriminability of geometric forms for use as radar symbols, five symbols capable of being generated by sine-wave derivation were studied. Other independent variables included density (24 or 48 symbols in display) and proportion (ratio of number of symbol to be discriminated to total number - 1:1, 1:2, and 1:5). Twenty subjects were tested using an optical stimulation of a radar scope. Target symbol omissions were analyzed for the relative discriminability of the five symbols. Implications of the results for use in encoding radar information are discussed.
T. G. I. R. 13

11,912
Harris, J.D. STUDY OF THE EFFECT OF TRAINING ON THE ABILITY TO IDENTIFY ALTITUDE INFORMATION. Proj. 6190-71573, AF 33(616) 3000, March 1958, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

11,912
To determine the optimum characteristics of a very brief acoustic stimulus used to test auditory ability, six highly experienced subjects were used in a series of three experiments. Threshold judgments were made to series of simple stimuli (controlled by subject) and to continuous stimuli (controlled by experimenter). The test of attack of wave envelope, total energy in stimulus, total stimulus energy, the peak energy, and total peak energy in the stimulus were varied. The threshold data were analyzed for effects of these variables. Recommendations for the kind of stimulus to use for more precise testing are made.
T. G. 1. R. 1

11,913
Mengele, R.F. & Houston, R.C. INVESTIGATIONS OF VERTICAL DISPLAYS OF ALTITUDE INFORMATION: I. COMPARISON OF A MOVING-TAPE AND STANDARD ALTIMETER ON A SIMULATED FLIGHT TASK. Contract AF 33(616) 3000, Proj. 6190-71573, AF 33(616) 3000, March 1958, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois).

11,913
As the first study in a series planned to investigate, under dynamic display conditions, some of the problems associated with vertical display of altitude information, a comparison was made of the performance of experienced pilots on a standard altimeter and a vertical, moving tape altimeter. Twenty subjects flew a specified series of flight tasks in a link trainer using each altimeter. Deviations from desired altitudes were recorded and analyzed for differences attributable to type of instrument. The results are discussed in terms of further evaluations of design and training problems.
T. G. 1. R. 6

11,914
Mengele, R.F. & Houston, R.C. INVESTIGATIONS OF VERTICAL DISPLAYS OF ALTITUDE INFORMATION: II. THE EFFECT OF PRACTICE ON PERFORMANCE OF A SIMULATED FLIGHT TASK USING A MOVING-TAPE ALTIMETER. Contract AF 33(616) 3000, Proj. 6190-71573, AF 33(616) 3000, March 1958, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois).

11,914
This is the second study in a planned series of investigations of vertical displays of altitude information. To determine the effects of practice with a moving-tape display on performance of experienced pilots as compared to performance using a standard altimeter, 14 subjects were given practice on the vertical display. The task was to fly a specified series of maneuvers in a link trainer. Following practice the subjects were retested on the same task using both the moving-tape and standard altimeter. Performance was scored as deviations from desired altitude and analyzed in terms of practice effects.
T. G. 1. R. 1

11,915
Mengele, R.F. & Houston, R.C. INVESTIGATIONS OF VERTICAL DISPLAYS OF ALTITUDE INFORMATION: III. THE EFFECT OF AN EXPANDED SCALE ON PERFORMANCE OF A SIMULATED FLIGHT TASK USING A MOVING-TAPE ALTIMETER. Contract AF 33(616) 3000, Proj. 6190, AF 33(616) 3000, March 1958, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois).

11,915
This experiment, third in a series of studies in the vertical display of altitude information, compared an expanded scale moving-tape altimeter with a standard altimeter on a simulated flight task. The scale factor was 2.375 inches per 1000 feet, each 1000-foot level was numbered with index marks every 100 feet. Two groups of subjects, ten from the earlier studies and 12 Air Force pilots, completed a series of maneuvers using each altimeter. Average deviations of five-second observations of altitude were compared for differences due to altimeter used.
T. G. 1. R. 2

11,916
Schwartz, I. VISION ABILITY: THE PROFESSIONAL VS. THE NON-PROFESSIONAL PILOT. Proj. 6190-71573, AF 33(616) 3000, March 1958, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

11,916
To determine any differences in results of acuity examinations of large groups of personnel as made by examiners with no professional training but with instruction in administration of acuity tests and as made by examiners with professional optometric training, a group of test results for 159 eyes obtained by ten examiners (five professional and five non-professional) were obtained. Differences in scoring were analyzed and the possible bases for differences discussed.
R. 1

11,917
Squires, P.C. STRENGTH IDENTIFICATION. Proj. 6190-71573, AF 33(616) 3000, March 1958, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

11,917
To determine whether some observers can learn to identify apparent steps of stereo distance, cylindrical cues having cylindrical, two subjects (seven failed to qualify on preliminary tests) were tested. The task of the first subject was to identify four apparent distance steps, set into a Stereoscopic Trainer, as they were presented in random order. Twelve training periods were utilized with knowledge of results in some of them. The second subject was trained on a haploscope with three trials conducted under dark room conditions. For each correct identification and number of errors were analyzed. Implications for three-dimensional radar displays are noted.
T. R. 2

11,918
Squires, P.C. NEW DIGIT DESIGNS FOR USE UNDER REFLECTED RED LIGHT OF LOW BRIGHTNESS. Proj. 6190-71573, AF 33(616) 3000, March 1958, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

11,918
To design a set of digits uniquely appropriate for use under reflected red light of low brightness, especially for use on rotating dials, an experimental set was designed to conform with number perception habits. Test dials, white digits on black background, were prepared with the experimental digits and the KAMEL designs (Naval Air Material Equipment Laboratory, Philadelphia). Form thresholds for each digit, presented in an upside down position and with red illumination, were obtained by a Luckiesh-Mess visibility meter. The data for the KAMEL digits were used as criterion for evaluating the readability of the experimental set. Suggested applications of the findings are made.
T. 1. R. 11

11,919
Spatz, Laura H. PRODUCTIVITY: A BIBLIOGRAPHY. Bull. 1226, Nov. 1957, 182pp. US Dept. of Labor, Washington, D.C.

11,919
This bibliography presents the literature on productivity, particularly as it relates production to the input of labor. Excluded is literature on time and motion studies at the job level, and in the field of psychology dealing with aptitudes and individual differences. The time period covered is roughly from 1953 to June 1957 and references are from periodical articles, books, reports, speeches, conferences, conference proceedings, and theses with foreign periodicals. Major sections are: industry and sector measures, productivity at plant level, international studies of productivity, concept and measurement, factors affecting productivity, productivity and the economy, significance of productivity change, wages and prices, and labor management relations.
R 900 (approx.)

11,920
Van den Brink, G., & Rennie, M.A. VISUAL CONTRAST THRESHOLDS FOR MOVING POINT SOURCES. *J. Opt. Soc. Amer.*, Jan. 1959, 49(1), 613-619. (Institute for Perception, P-200, Stockholm, The Netherlands)

11,921
To obtain quantitative information on the visibility of moving targets, contrast thresholds for moving point sources were measured over a wide range of brightness of the adapting field, with four color combinations of stimulus and adapting field as a function of length of covered track, for different exposure times. General aspects of the data were considered in the light of fluctuation theory as it relates to threshold functions. T. G. R 12

11,921
Hollifield, C. (Chm.). THE NATURE OF RADIOACTIVE FALLOUT AND ITS EFFECTS ON MAN. PART I. Hearings before the Special Subcommittee on Radiation of the Joint Committee on Atomic Energy, May-June 1957, 1206pp. Joint Committee on Atomic Energy, Washington, D.C.

11,921
This volume presents the first four days of congressional hearings (prepared statements and discussion, statements and papers submitted for the records) covering the major aspects of the fallout problem from its inception in nuclear weapons' explosions to its effect on man. The statements of 25 witnesses, all experts from the major scientific areas involved are covered. Approximately 60 additional papers and additional information for the record are included. T. G. I. R 95

11,922
Hollifield, C. (Chairman) THE NATURE OF RADIOACTIVE FALLOUT AND ITS EFFECTS ON MAN. PART II. Hearings before the Special Subcommittee on Radiation of the Joint Committee on Atomic Energy, June 1957, 1056pp. Joint Committee on Atomic Energy, Washington, D.C.

11,922
This volume presents the last four days of the congressional hearings covering the major aspects of the fallout problem from its inception in nuclear weapons' explosions to its effects on man. The statements of seventeen witnesses, all experts from the major scientific areas involved, are given together with the related discussion. In addition, other papers, statements, and information for the record are given. T. G. I. R 58

11,923
Tanner, W.P., Jr. & Birdsall, T.G. DEFINITIONS OF d' AND n AS PSYCHOPHYSICAL MEASURES. Contract AF 19(604) 2277, AFOSR TR 57, Tech. Rep. 80, Feb. 1958, 24pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C. (Dept. of Electrical Engineering, University of Michigan).

11,923
The theory of signal detectability is reviewed in sufficient detail for definition of two psychophysical measures d' and n . The efficiency (n) is defined as the ratio of energy required by an ideal receiver to the energy required by a receiver under study when the performance of the two is the same. The measure of d' is that value of $(2E/N_0)^{1/2}$ necessary for the ideal receiver to match the performance of the receiver under study, where E is signal energy, and N_0 the noise power per unit bandwidth. The measure is extended to include recognizability of the two signals. G. I. R 15

11,924
Erkman, R.L. & Myers, R.D. THE EFFECT OF NUMBER OF SIGNAL PULSES UPON SIGNAL DETECTABILITY ON PPI SCOPES. Proj. 7185, AFOSR TR 58 43, March 1958, 17pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C.

11,925
The effect of the number of signal pulses upon detectability was studied for an ACF-75-3 radar indicator with associated simulation and monitoring equipment. The number of pulses contained in the signal ranged from one to 32; each pulse was two microseconds in duration; pulse voltage varied from 0.07 (vacuum-free) to 3.2 volts; and grid bias ranged from plus one to plus six volts from 0V1 (aluminum bias required from sweep detection). Four separate threshold determinations were made on each of two dark-adapted observers for each condition. Analysis was made in terms of detectability as functions of these physical variables and their interrelationships. T. G. I. R 9

11,925
Fellack, J. & Yocco, J. SPEECH ANNUNCIATOR WARNING INDICATOR SYSTEM. PRELIMINARY EVALUATION. J. Appl. Soc. Amer., Jan. 1958, 30(1), 58-61. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

11,925
To evaluate the principle of a speech annunciator as a warning signal indicator, three experiments were conducted each using the master warning signal (buzzer) for comparison. The first comparison involved warning signal identification time with the operator engaged in two tasks: self-paced discrete tracking and monitoring 24 instruments, adjusting them when required. The second comparison added a third task, reproduction of speech signals, to test for interference of annunciator with message reception; and the third investigated the effect of combining the two warning signals. T. I. R 6

11,926
Nickens, E.B. & Tenker, M.A. EFFECT OF VARIATIONS IN COLOR OF PRINT AND BACKGROUND UPON EYE MOVEMENTS IN READING. *Amer. J. Optom. & Arch. Acad. Optom.*, July 1957, 34(7), 354-359. (Dept. Psychology, Temple University and Dept. of Psychology, University of Minnesota).

11,926
To investigate the effect of various color combinations of print and paper backgrounds upon eye-movement patterns during reading, stimulus material (form B, Chapman-Cook Speed of Reading Test) were printed in seven combinations of colored ink and colored paper. Subjects (49) read each selection in each color combination. Photographic records of eye-movements during reading were taken and the following measurements obtained: fixation frequency, pause duration, perception time, and regression frequency. The analysis of variance technique was used to evaluate the results. T. R 6

11,927
Kidd, J.S. & Kraft, C.L. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL. Contract AF 33 (616) 3612, Proj. 7192, Rep. 690 7, March 1958, 14pp. Ohio State University Research Foundation.

11,927
This is the seventh quarterly progress report on this contract. Activities of the past quarter are detailed for (1) operational studies of existing Air Traffic Control systems (ATC), (2) systems research on simulated ATC operations, (3) technical studies and supporting research, (4) theoretical formulations, (5) design and development of research equipment, and (6) liaison. A list of submitted reports is included. R 30

11,923
Rosen, R.A., Barker, J.J., Oyer, R.J., O'Brien, J.J., & Schenkman, L.J. DISCRIMINATION IN SENSORY DEPRIVATION. Contract # 19(604) 1377, Proj. # 664, Tech. Rep. # 44, AFMFP # 1735, Oct. 1957, 22pp. USAF Human Resources Lab., Bolling AFB, Washington, D.C. (The Ohio State University Research Foundation).

11,928
To determine the effects of pre-exposure upon accuracy of performance in identifying and discriminating messages, listening panels of foreign and American citizens were given printed lists of monosyllabic words, polysyllabic words, and air traffic instructions. They were then asked to decide whether these printed messages agreed or disagreed with correspondingly numbered aural messages which were presented in radio. In addition, different clues on probable occurrence of agreeing or disagreeing stimuli were given. Errors in identification were analyzed for effects of expectancy, differences due to language background, and to type of message.
G. R. 4

11,929
Rabin, R.M. VIDEO RECORDING TRAINS RADAR OBSERVERS. Electronics, Sept. 1957, 4pp. (Stanford Research Institute, Menlo Park, Calif.).

11,929
This article describes a trainer for radar observers which consists of two basic pieces of equipment—an airborne recorder and a playback system. The airborne unit is designed around a conventional PPI (plan position indicator) radar indicator and records video output of the operating radar directly on 35 millimeter film. Ground-based playback consoles, with range and azimuth mark generators, permit trainees to measure or interpret target situation. Block diagrams of the system are given.
1.

11,930
Leiderman, R., Mendelson, J.H., Moxler, D., & Solomon, P. SENSORY DEPRIVATION: CLINICAL ASPECTS. A.M.A. Arch. Int. Med., Feb. 1958, 101, 389-396. (Harvard Medical School).

11,930
Practical applications in clinical medicine of knowledge derived from investigations in sensory deprivation are presented in this paper. Reports on a number of patients in whom mental abnormality occurred during the course of severe illness are given. In each case there was sensory deprivation in the form of darkness, silence, and solitude, and the treatment consisted of restoring sensory stimulation and subsequent relief of mental symptoms. These observations are discussed, and implications are drawn from them for the fields of general medicine and public health.
R. 35

11,932
Roby, T.B. ON THE MEASUREMENT AND DESCRIPTION OF GROUPS. Behavioral Sci., April 1957, 2(2), 119-127. (Tufts University).

11,932
This report points out crucial issues in group measurement. Data of human groups are examined in terms of the task of prediction. Three classes of measures are distinguished: (1) the raw data of the response aggregate, (2) the behavior indexes, and (3) the so-called "endogenes" comprising the basic character of the group. Various aspects of these measures are discussed. An approach to problems of measurement and prediction is proposed.
T. R. 31

11,933
Geldard, F. (Chairman). ENGINEERING PSYCHOLOGY: A BRITISH PSYCHOLOGICAL SOCIETY SYMPOSIUM. Q. J. Psychol., Oct. 1957, 9pp. (US Office of Naval Research, London, England).

11,933
Some portions of a symposium on engineering psychology are reported here. The introductory remarks attempt to define the field of this branch of psychology and to clarify its situation with regard to basic and applied research. Comments upon the six papers that were read are also given.

11,934
Tisher, R.A. EFFECT OF COINED TYPE UPON READABILITY OF PRINT. J. Appl. Psychol., 1957, 41(4), 220-221. (University of Minnesota).

11,934
To investigate changes that occur in speed of reading and in visibility of words when the reading copy is curved, 104 subjects were tested individually. The test materials (reading texts and word texts) were presented either flat or on a curved surface (cylinder eight inches in diameter) and horizontally at 45 degree angle or vertically. Mean reading scores (average number of words taken to read 15 paragraphs of 30 words each) and mean visibility scores (four test words) were analyzed for effect of text curvature at various reading angles. The results are discussed in relation to marginal text in large magazines and books.
T.

11,935
Lansky, C., & Burger, F.M. A HYPERBOLIC EQUATION FOR CYCLING AND CHIRPING. J. Appl. Psychol., Nov. 1956, 41(3), 499-500. (Netherlands Institute for Aviation Medicine, Lelystad, Netherlands).

11,935
The need for a cycle organometer in which the energy converted to heat (product of distance per unit of time and the braking power) remains constant independent of changes in rotation rate is discussed. The apparatus and a device for gradually increasing magnetizing current for the organometer are described.
J. R. 14

11,936
Bellamy, R.M. OLDER PEOPLE AND HEAVY WORK. Brit. J. Indust. Med., 1956, 12, 309-319. (Maddick Research Unit, Psychological Lab., Cambridge, England).

11,936
To investigate the age distribution of persons employed on heavy work in industry, a comparison of age distributions for 23 heavy operations employing 1,240 men with 23 light operations employing 853 men was made. A detailed study was also made of a one per cent sample from the 1951 census wherein all recognizably heavy occupations and laboring jobs were compared with skilled and less heavy occupations in the same industry. The findings are discussed in relation to the commonly accepted formula that older people should be given light work.
T. R. 25

11,937
Brown, J.L., Ellis, W.H.B., Webb, R.G., & Gray, R.F. THE EFFECT OF SIMULATED CATAPULT LAUNCHING ON PILOT PERFORMANCE. Proj. # 11-02-12-2, NADC-NA-5719, Rep. 1, Dec. 1957, 22pp. USAF Aviation Medical Acceleration Lab., NADC, Johnsville, Penn.

11,937
To determine the effect of exposure to transverse accelerations (similar to those encountered in catapulting) on motor performance, four subjects were exposed to acceleration patterns ranging from four to twelve G. Subjects were trained in a task that required stabilization, by manipulation of a control stick, of disturbances of a standard pitch and roll indicator. Scores for performance were obtained during a control period prior to and immediately following acceleration exposure. Heart rate was recorded during the experimental period and subjective comments obtained. The data were analyzed in terms of performance decrements, effect on heart rate, and subjective effects due to acceleration patterns.
T. G. T. R. 11

11,938
Gatto, J., & Gifford, E.C. COCKPIT DESIGN STUDIES: STANDARD COCKPIT MOCKUP: DEVELOPMENT OF WORKSPACE AND SIZING CRITERIA THROUGH A FACTOR ANALYTIC TECHNIQUE. PART 3. NANC ACCEL 372, TED NAM AE 7052, Feb. 1958, 8pp. USAF Air Crew Equipment Lab., NANC, Philadelphia, Penn.

11,938
In an attempt to provide workspace and sizing (hand wear) criteria, anthropometric data from a previous study were studied by the diagonal factor analytic technique. Intercorrelations of measurements on 11 morphological features considered critical for workspace design and on eight features important for hand wear were analyzed to find the minimum number of variables that might be used in each case. Recommendations are included.
T. R. 6

11,939
Gulfa, A.O.M. NOISE FROM JET ENGINES. Rep. 112, April-May 1957, 4pp. Advisory Group for Acoustical Research and Development, NATO, P. 14, France.

11,939
To investigate jet engine noise in relation to its effect on aircraft structure, four field noise measurements were made for a range of jet engine velocities. Two representative turbojet engines, one of them operating with an afterburner. Contours of equal noise pressure in the horizontal plane containing the axis of the jet are presented for a range of engine velocity for overall noise pressure and for noise pressure in specified octave frequency bands in noise spectra. The results are discussed in relation to problems of the designer: definition of noise loads on a structure and structural response to noise.
T. G. R. 7

11,940
Westbrook, C.B., & Schurr, B.T. AIRCRAFT NOISE QUALITIES AND PILOT RESPONSE CHARACTERISTICS. AGARD Rep. 125, May 1957, 21pp. Advisory Group for Acoustical Research and Development, North Atlantic Treaty Organization, Paris, France.

11,940
In this paper the evolution of aircraft handling qualities (stability and control characteristics, flying qualities, and so on) requirements in the United States Air Force is traced. Two approaches are discussed in some detail: the subjective or pilot opinion method and the direct or curve technique. Some of the research techniques that have been or are being pursued to improve the definition of "what makes a good airplane" are outlined.
T. G. R. 10

11,941
Lisette, J.T., & Roby, T.B. GROUP LEARNING AND COMMUNICATION AS A FUNCTION OF TASK AND STRUCTURE. "J. Abnorm. Soc. Psychol.", July 1957, 25(1), 121-131. (University of Delaware and Tufts University).

11,941
This study is an extension of earlier experiments on relationships between communication structure and group performance on a forced-choice information processing task. The focus was upon the effect of practice upon performance and communication behavior under two structure conditions (low and high autonomy), three loads (rate of change of information or speeds), and two operation procedures (volunteering and soliciting information). Three-man groups were given nine trials on one of the combinations of experimental conditions. Mean error performance, average number of messages transmitted, average length of message, and proportion of trial interval spent in communication were analyzed as functions of the experimental variables.
T. G. R. 12

11,942
Murrell, K.F.H., Gilew, S., & Tucker, W.A. AGE STRUCTURE IN THE ENGINEERING INDUSTRY: A PRELIMINARY STUDY. Organ. Psychol., July 1957, 19pp.

11,942
To provide information on the age structure of workers in industry, a study was made of seven light engineering firms in the South-West of England. The age, occupations, and length of service of all male employees on the shop floor were analyzed for age differences associated with various jobs. One firm was studied in detail for changes which had taken place over a period of eight years. Some subsidiary aspects of ageing are discussed: age of engagement, internal migration, productive versus non-productive work, and retirement.
T. G. R. 8

11,943
Kraft, J.A. A FOLLOW-UP SURVEY OF HUMAN FACTORS IN SEWER IN AIRCRAFT, MISSILES, AND SUPPORTING INDUSTRIES. Feb. 1958, 3pp. Military Operations Research Engineering Div., Lockheed Aircraft Corp., Marietta, Ga.

11,943
To ascertain both the rate of growth and significant changes in human factors research in aircraft and related industries, a questionnaire survey was made of 36 companies. Of these companies, 30 had responded to an earlier survey in 1956. The responses were analyzed for (1) type of company, (2) organizational level at which the group reports, (3) size and specialty composition of the group, (4) present and expected strength, and (5) activities of the group.
R. 1

11,944
Stephani, E.R., & Dwyer, B.C. AIR POLLUTION LAB. REPORTS FROM LOS ANGELES. REPORT II. J. Franklin Inst., Feb. 1958, 265(2), 148-152.

11,944
This note reports selected analyses of the gaseous constituents of the atmosphere in Los Angeles. Long-path infrared spectroscopy was utilized by the Franklin Institute mobile air pollution laboratory for measuring the important pollutants in the atmosphere as a function of time and meteorological conditions. Results of measurements of chosen pollutants (carbon monoxide, hydrocarbon, ethylene, acetylene, nitrogen oxides, ozone and peroxyacetyl nitrate) or made from before the morning traffic rush until well after the evening rush on several days in fall and early winter are presented and discussed.
G. R. 6

11,945
Stockbridge, M.T.M. THE EFFECT OF THE ANTICIPATORY STARTLE PATTERN ON AIMING A RIFLE. J. Appl. Psychol., 1957, 41(3), 141-149. (Ministry of Supply, London, England).

11,945
To investigate the effect of anticipatory startle pattern on aiming a rifle, nine subjects were studied with a photographic technique. Each subject fired eight live rounds, eight blank rounds, and eight times with an empty firing chamber. Mean traversal and elevation errors were measured in minutes of arc from the photographic records and corrected for observer bias. The data were analyzed for differences attributable to the three conditions and discussed in relation to startle pattern and marksmanship.
T. R. 8

11,946
Harris, O. (Chm.). AUTOMOBILE SEAT BELTS. Report of the Special Subcommittee on Traffic Safety of the Committee on Interstate and Foreign Commerce. House Rep. 1275, Union Calendar 493, Aug. 1957, 7pp. Committee on Interstate and Foreign Commerce, Washington, D.C.

11,946
This is a report by the Special Committee on Traffic Safety (United States House of Representatives) of its hearings on automobile seat belts. The testimony of men engaged in research on this safety device, of automobile manufacturers, government officials, and medical experts is summarized. Recommendations of the committee are included.

11,947
Bonjer, F.H. PHYSIOLOGICAL RESPONSES TO ENVIRONMENTAL STRESS. International Congress on Occupational Health, Helsinki, Finland, 1957, 1, 71-72. (The Netherlands).

11,947
This paper presents a brief discussion of the area of environmental stress for which the human engineer should provide practical knowledge to the engineer engaged in designing displays and controls. The influence of lighting, noise, vibration, and climate are illustrated by a common example, the crane cabin.

11,948
Applied Psychology Research Unit, Medical Research Council. LIST OF EARLY A.P.U. REPORTS STILL AVAILABLE. MRC 48/282, 1944-1950, 4pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

11,949
This is a listing of Applied Psychology Research Unit (Medical Research Council, Psychology Laboratory, Cambridge) reports issued prior to 1951 and which were noted as still available at the time the list was made up.
2 i04

11,949
Applied Psychology Research Unit, LIST OF REPORTS BETWEEN OCTOBER, 1951 AND MAY, 1955. 4pp. Applied Psychology Research Unit, MRC, Cambridge, England.

11,949
This is a listing of Applied Psychology Research Unit (Medical Research Council, Psychological Laboratory, Cambridge) Reports that were produced between October, 1951 and May, 1955. The reports of general interest are published material but the list also refers to unpublished research reports on current work. A chronological order is used.
R 78

11,950
Max-Planck Institute for the Physiology of Work. WORK AND REST. INF/9/53, Dec. 1953, 2pp. Max-Planck Institute for the Physiology of Work, Dortmund, Germany.

11,950
This is a brief summary of the results of investigations on the heaviness of work in drop forges and the rest periods required. Time study of the job and several physiological indices of 14 male workers on the job were the primary bases for this first approximation of the proper relation between work and rest periods.
G.

11,951
Smith, F.F. INDICES OF HEAT STRESS. Memo. 29, 1955, 51pp. Medical Research Council, London, England.

11,951
To consider two scales of warmth, effective temperature and sweat-rate scale, and their respective advantages, a statistical study was made of previously gathered data. The measurements were (1) those of environmental conditions, (2) amounts of sweat lost by subjects during four hours to these conditions, and (3) rectal temperatures at end of exposure. The subjects were overall and shorts or shorts only for both work and rest conditions. A comparison of the accuracy of prediction of the physiological reactions from the two scales of warmth was made, the limitations of effective temperatures investigated, and a method for making due allowance for work rate in using the effective temperature scale was derived.
T. G. R 14

11,952
Chambers, E.G. PSYCHOLOGICAL TESTS FOR ACCIDENT PRONENESS AND INDUSTRIAL PROFICIENCY. Memo. 31, 1955, 30pp. Medical Research Council, London, England.

11,952
This memorandum presents a summary of the main conclusions reached in the course of investigations over 15 years on psychological tests for accident proneness. Approximately 4000 subjects were tested and more than 30 different tests used. In this report the tests are classified and described; the interrelations of the tests given and discussed; the concept of and the nature of accident proneness defined; the relationship between accident incidence and sickness, age, experience, temperature, reporting of accidents, and test scores summarized; the relationship between test scores and industrial proficiency pointed out; and finally, the effect of accident incidence of selection for proficiency is discussed.
T. G. R 10

11,953
Birtle, W.J. THE PHYSIQUE OF YOUNG ENGLISH MALES. Memo. 23, 1949, 64pp. Medical Research Council, London, England.

11,953
To make a statistical examination of the physique of young adult males in Great Britain, the records of the Medical Boards held in England, Scotland and Wales containing the details of examinations of 91,153 men between the ages of 20 and 21 years were obtained. This group, comprising all men examined between the passage of the Military Training Act of 1939 and the outbreak of World War II, are considered representative of this age group in the country. A full analysis of anthropometric measurements, medical grades, and standards of eyesight, first for the whole country, and then by regions, was made. The material is displayed so as to illuminate, wherever justifiable, questions of broad social interest.
T. R 15

11,954
Weston, H.C. THE RELATION BETWEEN ILLUMINATION AND VISUAL PERFORMANCE. Rep. 67, 1953, 51pp. Industrial Health Research Board, Medical Research Council, London, England.

11,954
This report describes three investigations intended to test a method for determining the illumination required for the efficient performance of any kind of work involving visual discrimination. The first study investigated the effect of size of illumination wherein 18 subjects performed a cancellation task (Landolt broken rings) in six sizes (from one to ten minutes of visual angle) and under six illuminations (from 0.16 to 500 foot-candles). Two studies were made of the effect of brightness contrast with 15 and 12 subjects, the same task (black on white and the reverse) with illuminations from 0.5 to 500 foot-candles. Speed and accuracy data were analyzed in terms of the variables.
T. G. R 4

11,957
Wyatt, S. A STUDY OF VARIATIONS IN OUTPUT. Emergency Rep. 5, 1944, 16pp. Industrial Health Research Board, MRC, London, England.

11,957
To ascertain whether, and to what extent, a reduction in the weekly hours of work in a number of factories (England) in 1942 had a measurable effect on output, weekly records of piecework earnings of a representative group of workers were examined for the week prior to and for three weeks after reduction. Other factors affecting output such as absences, mechanical and material difficulties, technical improvements, reorganization and personal factors were recorded. In a few factories the output on different shifts were compared. The production data were analyzed for differences that might be attributed to a shortened work week. Implications for industry are discussed.
T. G. R 1

11,958
Committee on Electro-Acoustics, Medical Research Council. HEARING AIDS AND AUDIOMETERS. Special Rep. Series 261, 1947, 71pp. Committee on Electro-Acoustics, Medical Research Council, London, England.

11,958
This is the report of a committee appointed to determine (1) the practicality of designing a single type of electrically-operated hearing aid which would be small, light-weight, reasonably cheap to produce and would benefit the majority of persons who need them, and (2) to determine satisfactory performance specifications for pure-tone audiometers, for use in early diagnosis and assessment of hearing loss. Herein are set forth the committee's work - the background of theory and experiment together with recommended specifications. The appendices contain details of many of the investigations and recommendations.
T. G. R 11

11,959
Bedford, T. ENVIRONMENTAL WARREN AND ITS MEASURE-
MENT. War. Min. 17, 1946, 40pp. Medical Research
Council, London, England.

11,959

This is a reference publication on the standard
technique of measuring environmental warren as adopted
by the British Royal Navy. The section headings are
introduction, body heat production and heat loss, in-
strumental measurements, effective temperature and cor-
rected effective temperature, procedure in making tests,
ventilation reports, and work at extreme temperatures.
The appendices add a table of relative humidity, calcu-
lation of the total heat of the air, and formulae for
the Kats thermometer.
T. G. I. R 57

11,960

Pierson, M.M., Marriott, F.H.C., & O'Doherty, E.F.
INDIVIDUAL DIFFERENCES IN NIGHT-VISION EFFICIENCY.
Special Rep. Series 294, Feb. 1957, 83pp. Medical
Research Council, London, England.

11,960

This report describes a series of investigations
assessing the part played by sensory acuity in percep-
tion with the use of specialized visual tests adminis-
tered at low illuminations to dark-adapted subjects.
In general, the procedure was to measure the luminance
levels required to resolve black Landolt rings of dif-
ferent sizes by young adult male subjects. The fixa-
tion-and-flash method (detailed in appendix) was used.
The findings are discussed in relation to the filter
and quantum theories. A hitherto unpublished war-time
report on methods of carrying out simple tests of
visual efficiency at low illuminations with formulae
for scoring and estimating accuracy of tests is ap-
pendix.
T. G. I. R 57

11,961

Garry, R.C., Passmore, R., Wainock, Grace M. & Durnin,
J.V.G.A. STUDIES ON EXPENDITURE OF ENERGY AND CONSUMP-
TION OF FOOD BY MINERS AND CLERKS, FIFE, SCOTLAND, 1952.
Special Rep. Series 289, June 1955, 70pp. Medical Re-
search Council, London, England.

11,961

To study diet and energy requirements in two differ-
ent types of work, a complete record was made of the
food eaten by 19 underground miners and by ten colliery
clerks during one week, and of the calorie expenditure
of these men in all their varied activities both at work
and off duty. The individual inventory method was used
in the dietary survey and the Kofranyi-Michaelis respi-
rometer was used to assess energy expenditure. The data
were analyzed in terms of daily intake and expenditure
in energy (calories). An analysis of the nutritive
value of the diet and the principle sources of energy
in the diet was made. Comparisons between sedentary and
hard work are drawn and discussed.
T. G. I. R 25

11,962

Walls, G.L. AN AUTODEMONSTRATION OF THE "PHYSIOLOGIC
NYSTAGMUS". Amer. J. Ophthalm., Feb. 1952, 35(2), 231-
235. (University of California at Berkeley).

11,962

A brief historical review of "physiologic nystagmus"
and the theories describing its influence on visual reso-
lution indicates the need for further experimentation to
resolve the conflicting data. Because such work has re-
quired very elaborate equipment and definitive study, a
simple means of obtaining a lot of data ("crude-but-val-
uable") was deemed worthy and therefore is described.
R 18

11,963

Macnair, K.H. RESEARCHES ON THE MEASUREMENT OF HUMAN
PERFORMANCE. Special Rep. Series 268, April 1950, 156pp.
Medical Research Council, London, England.

11,963

Several series of investigations are reported here
on psychological research problems relating to men
fighting a war. An attempt was made to develop control-
led methods for studying and measuring behavior in se-
quence and for determining the relations of the items
of behavior as they occur in sequence. The experiments
and results are described under the general categories:
(1) vigilance tests or psychological factors in detec-
tion of either faint visual or auditory signals, and
(2) environmental stress, or effects on human performance
of abnormal atmospheric environments (non-lethal war
gases and high temperatures).
T. G. I. R 95

11,964

Hemelt, S.A., & Gilbert, M.S. THE DEVELOPMENT OF AN
AIRPORT TAXI GUIDANCE SYSTEM. Tech. Rep. 171, June
1952, 14pp. Technical Development and Evaluation
Center, CAA, Indianapolis, Ind.

11,964

This report discusses the need for and describes the
development of a system of signs to furnish guidance by
day and night to pilots who are taxiing on an airport.
The recommendations of the CAA (Civil Aeronautics Admi-
nistration) Taxiway Sign Evaluation Committee, which were
proposed for adoption as a standard by the CAA, are in-
cluded in an appendix.
T. G. I. R 1

11,965

McBuer, D.T. & Krendel, E.S. DYNAMIC RESPONSE OF
HUMAN OPERATORS. Contract AF 33(616) 3080, Proj.
1365, and Contract AF 33(616) 2804, Proj. 1182,
MADC TR 56 524, Oct. 1957, 248pp. USAF Flight Con-
trol Lab., and USAF Aero Medical Lab., Wright-Patterson
AFB, Ohio. (Control Specialists, Inc., and The
Franklin Institute, Philadelphia, Penn.).

11,965

This report presents the results of a concerted ef-
fort to arrive at a suitable mathematical description
of human operator dynamic response. Of primary concern
were operations in which continuous closed-loop control
is exerted in a visual input, manual output tracking
situation subjected to excitation by random appearing
forcing functions. A large body of data, available
from earlier studies and also from concurrent experi-
ments, were studied. A portion of the report is devoted
to the mathematical basis for the models derived and
measurements taken, and possible sources of the remnant.
T. G. I. R 95

11,966

Ballard, S.S. & Knoll, H.A. (Eds.). THE VISUAL FACTORS
IN AUTOMOBILE DRIVING. Summary Report of Vision Research
Symposium Sponsored by the Armed Forces - NRC Committee
on Vision. Publ. 574, Nov. 1957, 25pp. National Academy
of Sciences - National Research Council, Washington, D.C.

11,966

This is a summary report of the papers and
discussion at a symposium called for the task of
delineating the total visual task in driving a car -
to organize what is now known and help define what is
not known. The papers were organized about (1) the
visual requirements for vehicle driving, (2) the
environment (visual effects of atmosphere and light
levels for night driving), and (3) the visual
capabilities of the driver (detection and recognition
by day and night, color vision, highway sign legi-
bility and visibility, effects of glare, and visual
dynamics in driving).
R 72

11,967

Tanner, W.P., Jr. WHAT IS MASKING? Contract AF 19 (604) 2277, AFRC TM 57 64, Dec. 1957, 13pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C. (Engineering Research Institute, University of Michigan).

11,967

To re-examine the auditory masking concept three types of experiments on the change in detectability of a tone (through the introduction of white noise, in the presence of an additional pure tone, and when the observer knows that it might have been a different tone) were performed. The results were analyzed in terms of a conventional definition of masking and a masking index conforming to this definition. The implication of the findings for the definition of masking is discussed.
G. R 10

11,968

Calabi, L. & Parke Mathematical Lab., Inc. Staff. MATHEMATICAL DESCRIPTION AND EVALUATION OF FUNNEL SYSTEMS WITH AN APPLICATION TO THE NEW YORK TERMINAL AREA. Contract AF 19(604) 1399, Tech. Rep. 4, AFRC TM 57 576, July 1957, 75pp. USAF Navigation Lab., Bolling AFB, Washington, D.C. (Parke Mathematical Lab., Inc., Carle, Mass.).

11,968

In an investigation of systems of airways that would solve the landing aspect of the air traffic problem in the vicinity of a group of airports, the "funnel system" (patterns of well delimited airways conveying all the landing aircraft from pre-established town-to-town airways to the desired landing strip) were selected for intensive study. This report presents a mathematical formulation of those properties of a funnel system which are independent of shape and location, indicates how such a system may be evaluated and suggests a procedure to improve the system. An example for the New York terminal area is given in detail.
T. G. I.

11,969

Grundmeier, E. SURVEY OF LITERATURE ON CHEMICAL TRACKING AIDS. Proj. 590R 6875, WADC TR 57 7, Aug. 1957, 121pp. USAF Directorate of Aircraft Missile Test, Holloman AFB, N.M.

11,969

To determine what work has been done in the smoke tracking aid and related fields, reports on chemical smokes most applicable to these fields published up to 1953 were reviewed. This report presents the results of the literature survey. Topics covered are: optical theory and methods of comparing smokes, smoke producing agents, principles of atomization and nozzle design, and smoke generators. The bibliography (significant articles are annotated) is cross-indexed to the text.
R 361

11,970

McGary, Virginia E., Shipman, Margaret E., Levy, L.M., & Bernstein, L.M. ACCEPTABILITY OF IRRADIATED FOOD CONSUMED BY HUMAN SUBJECTS. Proj. 6-60-11-020, Rep. 200, March 1957, 22pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

11,970

To estimate the acceptability of radiation preserved food items, nine or ten human subjects participated in four separate studies consisting of two 15-day periods each. During the first period one-half the subjects consumed a diet of irradiated food items while the other half consumed a similar diet of non-irradiated food. The pattern was reversed in the second period. Percentages of irradiated food items in each diet varied as follows: 35, 61, 80, and 100. Acceptability data were obtained by use of questionnaires with an arbitrary hedonic scale and by personal interview. The data were analyzed for differences between irradiated and control food items.
T. R 22

11,971

Fickelstein, Beatrice, & Pippitt, R.G. EFFECT OF ALTITUDE AND OXYGEN UPON TASTE. Proj. 7156, WADC TR 57 261, April 1957, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

11,971

To determine whether taste perception and identification are affected by altitude or breathing pure oxygen, ten young adult males made taste determinations on the ground and after one to two hours in an altitude chamber (25,000 feet, breathing 100 percent oxygen). A separate session was devoted to determining sensitivity to each of four primary tastes (salt, sour, sweet, and bitter). The two sets of data were analyzed and compared as to: taste perception levels, taste identification levels, and ability to identify tastes. The results are discussed in relation to food acceptability problems in high altitude flight.
T. G. R 6

11,972

Kohl, O.A., & Searle, W.F., Jr. SUBJECTIVE AND ARTICULATION TESTS OF DEEP AND SHALLOW WATER DIVERS COMMUNICATION. Proj. NS185-005, Rep. 1-58, Aug. 1957, 2pp. USN Experimental Diving Unit, Naval Gun Factory, Washington, D.C.

11,972

To evaluate a system of communication for use with Lightweight Diving Equipment, qualitative articulation testing was conducted. The tests were patterned after those developed for aviation voice communication systems and are described in detail. In order to provide some comparative data, articulation tests were also conducted for the United States Navy Standard Deep-Sea Diver's Helmet. Subjective analyses are reported and recommendations for further development are made.
T. I. R 7

11,973

Wetmore, J.W. CONSIDERATIONS ON TAKE-OFF MONITORS. Presented at the 11th Annual International Air Safety Seminar, Atlantic City, N.J., Nov. 9-13, 1956, Rep. 1 392, 26pp. Langley Research Center, NASA, Washington, D.C.

11,973

In this paper, some of the factors involved in take-off monitoring are pointed out, some of the possible take-off monitor arrangements are discussed, without reference to actual hardware, and the types of indication that might be expected in certain take-off situations are illustrated for three types of monitor.
T. G. I.

11,974

Griffin, E.P. TEST AND EVALUATION OF THE INTERIM STEREOPLOTTER, TOPOGRAPHIC, PROJECTION TYPE, HIGH PRECISION. Proj. 8-35-03-215, Rep. 1493-IR, Aug. 1957, 70pp. USA Engineer Research & Development Labs., Fort Belvoir, Va.

11,974

This report summarizes the engineering and service tests of the Interim Stereoplotter, Topographic, Projection Type, High Precision, a commercially available stereomapping instrument. Tests were conducted to determine conformance of the instrument to the military characteristics, and its suitability for base plant use as a high precision stereoplotter in the event immediate emergency procurement is required. Comparative data are presented on the relative accuracy of the Interim Stereoplotter and the Multiplex.
T. G. I.

11,975

Dunlap and Associates, Inc. REVISED HUMAN ENGINEERING EVALUATION OF THE DOPPLER SONAR. Contract NORD-17719, May 1957, 6pp. Dunlap and Associates, Inc., Stamford, Conn.

11,975

The Doppler sonar whose function is to provide ship speed over ground, was evaluated from a human engineering point of view to determine human operator difficulties. Recommendations are included.

11,976
Dunlap and Associates, Inc. HUMAN ENGINEERING EVALUATION OF THE JOG LOG. Contract NORD-17719, Memo. Rep. 6, May 1957; 6pp. Dunlap and Associates, Inc., Stanford, Conn.

11,976
The Jog Log (Geomagnetic Electrokinetograph), a shipboard navigation system used to determine local surface current velocity and ship's speed through the water, was evaluated from the human engineering point of view to identify human operator sources of error. Techniques for minimizing these errors are recommended.

11,977
David, E.E., Jr. SIGNAL THEORY IN SPEECH TRANSMISSION. Lab. Transmittion & Circuits Theory, Dec. 1956, CT-3, 232-244. (Bell Telephone Lab., Murray Hill, N.J.).

The process of speech production imposes certain well defined constraints upon the resulting acoustic wave. The constraints are derived from the anatomy of the vocal mechanism which can be described quite accurately as a time-varying linear system excited by a source containing only frequencies much higher than the variational rate. Signals produced by such a process can be represented by parameters which change at the slower rate. These parameters, in effect, describe the constants of the dynamic system and its excitation. They make more efficient use of transmission channelspace than does the original speech, and may be used to synthesize a near replica of the original according to a rate procedure. Some of the systems operating on this principle have been described. They form a group of devices designed to handle signals whose properties confine them to a specific class. As such, they represent an application of the philosophy underlying the signal theory approach to the design and analysis of systems and networks. As this philosophy becomes more widely appreciated, it is to be hoped that these techniques will find wider application and that new contributions to solve the many remaining problems particularly on the instrumentation side will be forthcoming.

R 32

11,978
Schaffer, P.W. & Franke, W.J. LANDING-LIGHT INSTALLATION ON THE YHUL-1 HELICOPTER; EVALUATION OF. FINAL REPORT. Proj. TED PTR AE 8028.6, Rep. 1, Sept. 1957, 5pp. USN Air Test Center, Naval Air Station, Md.

11,978
To determine the optimum landing light system for the YHUL-1 helicopter which would minimize the excessive reflective glare from the ground onto the plexiglass cockpit enclosure, a modified light assembly was installed and flight tested. A modified Grimes D-4340A light assembly was mounted directly beneath the helicopter. Five different types of lamps were evaluated with and without a glare shield during various flight maneuvers. The optimum combination is described.

I. R 4

11,979
Rollins, R.H., & Franke, W.J. LAND-HOVER LIGHTS (FLOODLIGHTS) ON THE HUP-1 HELICOPTER, INSTALLATION AND EVALUATION OF. Final Report. Proj. TED PTR AE 8028.4, Rep. 1, Sept. 1957, 7pp. USN Air Test Center, Naval Air Station, Md.

11,979
To evaluate the usefulness of land-hover lights (floodlights) for improving illumination for landing and hover operations, lights were installed on a model HUP-1 helicopter. Flight evaluation was made at night under various weather conditions. The land-hover lights were compared with existing landing lights when flying over various terrain and water at different altitudes. The results were discussed in terms of most advantageous adjustments of lights and illumination provided at various altitudes. Recommendations are included.

I. R 4

11,980
USA Arctic Test Board. SERVICE TEST OF BOOTS, COMBAT, RUBBER, INSULATED, COLD-DRY, T55-5. Proj. M2 2731 (Arctic), July 1957, 30pp. USA Arctic Test Board, Fort Greely, Alaska.

11,980
To determine the suitability of the T55-5, Combat, Rubber, Insulated, Cold-Dry, T55-5 for Army use under Arctic winter conditions, 200 pairs of boots in sizes from six to 11 and in narrow, medium, and wide widths were service tested. Tests included adequacy of sizing and fitting, instructions, functional suitability for performance of normal duties (marching, skiing, etc.), vehicle operators and parachutists use, durability, military characteristics, and use by aviators and mechanics. Deficiencies were listed and discussed. Recommendations are included.

I. R 5

11,981
Ritter, R.M., Payne, R.B., & Mastey, G.T. THE EFFECTS OF DRUGS AND CONTROLLED PROGRESS FEEDBACK UPON TWO-MEMBER TEAM BEHAVIOR. Rep. 57-58, March 1957, 7pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

11,981
To explore experimentally certain popular beliefs concerning adverse effects of clinical doses of d-amphetamine this study examined the hypothesis that stressful factors in a group-task situation constitute sufficient conditions for the occurrence of such effects. Pairs subjects (96 in all) were trained to operate a two-man coordinator which had been modified to allow dual participation. Following training, the pairs were randomly assigned to eight combinations of four drug treatments, and two misinformative progress-feedback designed to impair intratask harmony. Drug effects were evaluated through measures of task proficiency, manual perspiration, and attitudes toward partner's adequacy.

T. G. R 9

11,982
Dreher, J.J. & O'Neill, J.J. EFFECTS OF AMBIENT NOISE ON SPEAKER INTELLIGIBILITY FOR WORDS AND PHRASES. J. acoust. Soc. Amer., Dec. 1957, 29(12), 1320-1323. (Ohio State University Research Foundation).

11,982
To investigate the effects of noise on speaker intelligibility, 15 naive speakers read words and sentences as noise was delivered to their headsets. Five noise conditions (quiet, 70, 80, 90 and 100 decibels) were used. The speech was recorded without noise and then limited to remove effects of increased vocal intensity. Noise was then added to produce a constant speech-to-noise ratio and played to 200 American listeners. Intelligibility scores were analyzed as a function of noise environment of the speaker. Applications of the results to voice communication devices and audiological testing are suggested.

T. G. I. R 3

11,983
Crocker, W.E. & Hempleman, H.V. THE DECOMPRESSION PROBLEMS OF DIVING TO 600 FEET. R.N.P. 57/887, UPS 136, DP 17, March 1957, 31pp. Royal Naval Physiological Lab., MRC, Alverstoke, Hants, England.

11,983
To learn more about the physiological limitations to the use of helium for diving and to establish the maximum depth at which a diver can do useful work in connection with rescue of survivors from sunken submarines, previous experience with helium diving was first reviewed. The inadequacy of existing tables of helium decompression was demonstrated and a new method for calculating such tables is described. Application of the method to dives of 300, 450, and 600 feet was made. Recommendations for future diving at these depths are included.

T. G. R 8

11,984
Gartmann, E. HAN UNLIMITED. 1957, 214pp.
Pantheon Books Inc., New York, N.Y.

11,985
In this text the author describes the problems and contemporary research pertinent to high-speed, high-altitude flight and the environmental factors which influence man's performance under such conditions. The role of human engineering is exemplified in the discussion of such problems as the effects of g forces, the effect of speed on perceptual performance, and the general problem of space medicine. The book includes illustrations and a selective bibliography.
T. G. R 11

11,985
Saul, E.V., Mills, A.W., Seronsy, L.B., Allen, Patricia S., Bloch, Margery A., Elkind, Jane, & Weiner, L. HUMAN ENGINEERING BIBLIOGRAPHY. Prepared under Contract Nonr 494(13), Rep. ACR-24, Oct. 1957, 306pp. Institute for Applied Experimental Psychology, Tufts University.

11,987
Roberts, D.F. DESCRIPTIVE ANTHROPOMETRY OF NAVAL PERSONNEL. R.M.P. 57/95, O.E.S. 299, July 1957, 5pp. Naval Naval Personnel Research Committee, Medical Research Council, London, England. (University of London, Oxford, England).

Table of anthropometric data, obtained by direct measurement on a small sample (60 to 112) of naval personnel, are presented. Observations on strength and fitness are also included. The subjects originated from all parts of England, were of non-commissioned rank, and ranged in age from 18 to 29 with mean of 23.0 years.
T. R 2

11,988
Pollack, I. & Pickett, J.M. INTERAURAL EFFECTS UPON SPEECH INTELLIGIBILITY AT HIGH NOISE LEVELS. J. Acoust. Soc. Amer., April 1958, 30(4), 293-296. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

11,985
This is a bibliography of the literature pertinent to some fifteen general areas of human engineering. Included are: a Topical Outline of the Literature, an Alphabetical Index, an Author Index, the Code Categories and their subject matter, a complete listing of Citations, abstracts of these articles, and illustrations on the use of the bibliography. Approximately 1400 entries are treated.
R many

11,988
To examine the rate of interaural effects upon speech intelligibility at high noise levels, "mixed" (speech and noise to one ear and noise alone to the other ear), monaural (speech and noise to one ear only), and binaural (speech and noise to both ears) listening conditions were compared. Noise levels were varied over a range of 100 to 130 decibels; interaural noise ratios and phase were also varied. The results (intelligibility scores) were interpreted in terms of interaction between the intelligibility of speech cross conducted to the other ear and apparent localization in space of speech and noise.
T. G. R 8

11,986
Alluisi, E.A. & Sidorsky, R.C. THE EMPIRICAL VALIDITY OF EQUAL DISCRIMINABILITY SCALING. J. exp. Psychol., Jan. 1958, 55(1), 86-95. (Aviation Psychology Lab., Ohio State University).

11,989
Pollack, I. & Pickett, J.M. STEREOPHONIC LISTENING AND SPEECH INTELLIGIBILITY AGAINST VOICE BABBLE. J. Acoust. Soc. Amer., Feb. 1958, 30(2), 131-133. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

11,986
To determine the degree of validity that may be expected with the Equal Discriminability (ED) scaling technique, two experiments were conducted in which subjects made absolute judgments of the sizes of small circles of light. (1) Five subjects made judgments under different conditions of knowledge of results, range of stimulation, spacing between adjacent stimulus categories, and number of categories. (2) Eighteen subjects made absolute judgments of sizes of five, seven, or nine circles selected from an ED scale constructed in (1). Amount of information transmitted and ED scale functions for the varying conditions were analyzed.
G. R 17

11,989
This study examined the role of binaural directional information in listening to speech against a background of voice babble. The reception of monosyllabic words, presented against a babble of one, two, four, or seven talkers, was compared under two conditions: (1) stereophonic listening (two sets of background talkers were presented, one to each earphone, and the test words were presented binaurally, in phase); (2) control listening (a single set of background talkers and the test words were presented to a single ear). The average percentage of words correctly reproduced by five listeners were compared for the two conditions.
G. R 1

11,988
Rosenberg, J.P. A PRACTICE, POINT-READING TEST
FOR MEASURING THE ABILITY TO READ. Technical
Report, No. 7, 1954, Tech. Rep. No. 7, 1954,
Naval Air Station, Jacksonville, Fla.

11,990
This report describes a direct-reading instrument
(range 95 to 125 degrees Fahrenheit) for measurement
of rectal temperature which is simple to use, light-
weight, and portable. It is also adaptable to single
and multi-point recording. Necessary circuit details
are presented as well as allowable tolerances for the
various components, consistent with a measurement accu-
racy of plus or minus 0.1 degree Fahrenheit. The ef-
fects of individual and cumulative inaccuracies are con-
sidered (e.g., tolerance of components, effect of am-
bient temperature, and so forth) and the tolerance
established for each component.
T. R 12

11,991
Zimmerman, S.A. & Soper, S.M. NOT ON VOICE DIRECTION
SEEN CROSS-LINGUISTICALLY. J. Exp. Psych. Mon.,
Feb. 1954, 32(2), 152-153. (Ohio State University).

11,991
To study the influence of a following consonant on
the duration of a vowel, readings of word lists
in two languages (English and Spanish) based on pairs
contrasting in terms of voicing were recorded on magne-
tic tape and subjected to analysis on a sound-spectro-
graph. Measurements were made of the duration of the
stressed vowel in both languages and compared for like-
nesses and differences. The results are interpreted in
terms of linguistic structure.
T. R 3

11,992
Zarriello, J.J., Seale, L.V. & Kersworthy, M.E. THE
RELATIONSHIP BETWEEN CARDIOVASCULAR RESPONSE AND POSITIVE
G TOLERANCE. Unpublished Res. Proj. No. 11-01-11, Subtask 1
Rep. 11, May 1958, App. USN School of Aviation Medicine,
Naval Air Station, Fla.

11,992
To determine the relationship between several pre-
run clinical measures of cardiovascular response and
criteria of visual impairment occurring during centri-
fuge, 52 subjects, ranging from 18 to 35 years of age,
were studied. Five cardiovascular measures were taken
for each subject and related to: (1) g level of grey-
out, (2) time from onset of peak g to onset of greyout,
(3) g level of blackout, and (4) time from onset of
peak g to onset of blackout. The task was to respond
(press a button) to both central and peripheral lights,
presented randomly, while undergoing acceleration. The
results are discussed in terms of prediction of man's
g tolerance.
T. R 9

11,993
Willmuth, H.G., Taylor, E.L., Lichstein, M.B. & Bush, F.L. A FACTOR ANALYSIS OF RATING
SCALE VARIABLES USED AS CRITERIA OF MILITARY LEADERSHIP. Contract AF 18(600) 445, Proj. 2730
(50% 019 0001), Res. Rep. AFPTAC TN 57-104, Dec. 1957, 10pp. NAAC Review for Medical Sciences
Pittsburgh, Randolph AFB, Tex.

Peer ratings of anticipated leadership on a scale covering 14 aspects of effective leaders-
hip and on an over-all leadership ranking were obtained for 117 officers attending the
Squadron Officers Course at Maxwell Field, Alabama. An intercorrelation matrix derived
from these leadership ratings and factual data on rank, age, education, and years of service
was factor analyzed by Thurstone's complete centroid method. The 7 factors obtained were
related orthogonally to the criteria of position, military and single structure, a priori
probable factors were tentatively identified as proficiency in administrative activity,
military service, interpersonal relations, responsibility, ethical officer conduct, and
command presence. Regression weights of the items for the factors were determined as well
as the intercorrelations and reliabilities of the 6 factors identified.
R. 10

11,994
West, L.J. REVIEW OF RESEARCH IN TYPEWRITING LEARNING WITH RECOMMENDATIONS FOR TRAINING.
Proj. 7714, Res. Rep. AFPTAC TN 57-69, June 1957, 101pp. NAAC Review for Medical Sciences
Colo.

This review covers the research in typewriting from the earliest known studies through
mid-1956; it is reported in such a way as to provide explicit guidance for the conduct of
typewriting instruction through the utilization of the training recommendations. The materi-
al is developed and discussed in the following sections: the nature of the typing learning
process; technique aspects of typing learning; learning the typewriter keyboard; developing
typing speed; accuracy development; speed vs. accuracy emphasis; miscellaneous instructional
procedures and materials; equipment factors and the working environment; practice time arri-
gements; fatigue and other motivational factors; typical progress in typing learning; test-
ing, grading and standards of achievement; and summary of recommendations for training.
R. 216

11,988

Walter, J. SELECTING SUPERVISORS WITH PEER RATINGS. *Personnel Psychology*, Spring 1958, 11(1), 75-85.

Four nominations on a 14-item questionnaire were made by a group of life insurance agents. There were 2 general kinds of items: work-oriented and socially-oriented. Some of the agents were subsequently promoted to a supervisory position. After they had been on the job for 6 months, they were rated in terms of how good a job they were doing in their new position. The ranks of peer nominations for each of the items were then related to the criterion rating. It was found that this type of nomination is very useful in identifying potential supervisory personnel and is quite predictive of performance.

S 4

11,989

Wardell, P., Roney, J. & Anderson, J.G. THE PERCEPTION OF CHANGES BY THE EYE. *Journal of Experimental Psychology*, Dec. 1958, 52(4), 744-752. (University of Texas).

11,990

It was the purpose of the present study to determine the distribution of the ability of blind subjects to perceive an obstacle under the usual outdoor conditions. Thirty-four totally blind individuals served as subjects. A four by four foot board was placed at various distances away from the subject on a concrete pavement and the subject was asked to walk along the pavement and signal his arrival at the obstacle. The distribution of mean first perceptions, mean final appraisals, and number of collisions is given.

T. R 5

11,991

Marron, H.B., Schuster, B.M., French, R.S., Latina, R.J., et al. DEVELOPMENT AND EVALUATION OF A TROUBLESHOOTING AID FOR FLIGHT-LINE MAINTENANCE OF A COMPLEX ELECTRONIC SYSTEM. Contract AF 41(657) 44, Proj. 7702, Task 37301, Dev. Rep. AFTRC TN 58-1, Jan. 1958, 29pp. USAF Maintenance Lab., Lowry AFB, Colo.

A study was conducted to determine whether an effective and logical troubleshooting aid for complex electronic systems could be developed for use by relative inexperienced flight-line mechanics. In this study, the investigation of the feasibility of such a troubleshooting aid was made for the K Bombing Navigation System. A Trouble Locator in booklet format was developed and evaluated. A "procedure-oriented" approach to identify malfunctioning loops supplemented by a "symptom-oriented" approach for within-the-loop troubleshooting was found to be desirable; both procedures were incorporated in the final Trouble Locator. A limited evaluation in the field and on a bench mockup demonstrated that this type of troubleshooting aid for complex electronic systems was practical. It is recommended that consideration be given to developing Trouble Locators of this nature as an integral part of position-oriented handbooks.

R 5

11,992

Marron, H.B., Bossett, V.F. & Ford, J.S. AN EXPERIMENTAL ANALYSIS OF ACHIEVEMENT IN A GENERALIZED ELECTRONIC TROUBLESHOOTING COURSE. Contract AF 41(657) 44, Proj. 7709, Res. Rep. AFTRC TN 57-147, Dec. 1957, 36pp. USAF Maintenance Lab., Lowry AFB, Colo.

This report summarizes an experimental study of the effects of a) 3 levels of generalized training practice on troubleshooting problems and b) 3 levels of general ability (California Test of Mental Maturity) on troubleshooting achievement. 16 standardized tests of special abilities were also given. Achievement was measured by scores on a written test designed to measure conceptual understanding of troubleshooting, and on performance on problems presented in the Generalized Electronic Troubleshooting (GETS) Trainer. 3 performance scores were used: number of actions taken, time taken, and a composite score. Subjects were 90 high-school males, 16-19 years old, with mental ages from 156 to 253 months. Apparent relationships of mental age and training level with troubleshooting achievement varied according to the achievement score used. All the achievement scores were more significantly related to specific mental abilities, especially evaluative reasoning, than to general ability, as measured. Effects of increased practice seemed limited to the more difficult problems. In general, the generalized troubleshooting training increased efficiency in utilizing symptom information.

R 16

11,993

Dutk, E.R. ENCUMBRANCE OF ARCTIC CLOTHING. Proj. 7 83 01 005, Tech. Rep. EP 85, April 1958, 35pp. USA Quarter-Master Research & Engineering Center, Natick, Mass.

11,999

To investigate the degree to which Arctic clothing restricts body movements, 15 tests of performance were used. All subjects (71) performed each test under two conditions: in shorts at 70 degrees Fahrenheit and in full Arctic uniform at zero degrees Fahrenheit. Five scores were obtained on each test and analyzed for effects of clothing, interactions and trials. Each test was further evaluated for its usefulness in discriminating clothing effects. The usefulness of the tests as tools in human engineering of clothing and equipment systems is discussed.

T. G. R 7

12,000

Brown, H.L. STRESS SITUATION IN FLIGHT. IV. THE EFFECT OF DIFFERENT MEDIA ON TOLERANCE TO ACCELERATION. RMC 1041, March 1958, 2pp. *Flight Personnel Research Committee*, Air Ministry, London, England.

12,000

The hypothesis covered briefly in this report was that an increase in blood sugar may increase tolerance during acceleration by elevating the substrate supply to the brain. Five experienced carriage subjects, used in the technique of threshold determination, had their mean threshold compared with baseline thresholds measured 20 and 25 minutes after ingestion of 100 grams of glucose in 250 milliliters of water. Blood sugar was estimated by two methods. Results are presented in tabular form and their statistical significance is discussed.

T. R 6

12,001

Silver, C.A. & Fletcher, J.L. LOCALIZATION OF SOUND ON ICE AND SNOW. Proj. 6 95 20 001, Rep. 356, June 1958, 6pp. USA Medical Research Lab., Fort Knox, Ky.

12,001

To investigate the ability of subjects to locate the origin of signals under Arctic conditions, six subjects were required to localize sound for direction over ice and over snow from both prone and standing positions. Stimuli (tones of 400 and 1000 cycles per second) were produced by transducers located either 1.5 or six feet above ground level and spaced 15 degrees apart on a 180 degree arc (30 foot radius). All subjects had 104 training trials preceding the final recorded performance. The data were analyzed for differences due to position and to surfaces.

T. I

12,002

Ames, J. THE RULES OF SENSORY FEEDBACK IN TRAINING AND PERFORMANCE. Report from: "Ergonomics Research Society Symposium on Training at Bristol, April 14, 1958." April 1958, 9pp. (Institute of Experimental Psychology, University of Oxford, England).

This paper was read to the Ergonomics Research Society Symposium on Training at Bristol, 14 April 1958. It concerns the rules of sensory feedback in training and performance. Topics covered are: difficulties which may be found in designing training devices on the basis of apparently well known psychological principles; a discussion of knowledge of results and transfer of training; the effects of the modification of sensory feedback mechanisms with regard to interference of task performance; several experiments on learning a simple skill with controlled variation of augmented feedback or knowledge of results. (DEIAS)

12,003

Ariss, M.M. SOME EFFECTS OF NOISE ON HUMAN BEHAVIOR. OOD Res. Branch Prof. TBI 1000, Tech. Memo 556, June 1958, 21pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

12,025

The effects of noise upon behavior were studied when the presence or absence of noise had fixed temporal relationships to the responses, to the reinforcement, or to neither responses nor reinforcement. The subjects were conditioned (button depressing response) according to a fixed-interval schedule of target presentations after which noise was used as (1) an aversive stimulus, (2) a discriminative stimulus, or (3) a non-contingent agent. The patterns and frequency of response were analyzed as affected by these conditions and discussed in relation to previous studies on noise. T. G. I. R 29

12,004

Baker, R.A. THE DETERMINATION OF JOB REQUIREMENTS FOR TANK CREW MEMBERS. Contract DA 44-109 on 659, Proj. DA 055 30 000, Tech. Rep. 47, May 1958, 56pp. Human Resources Research Office, The George Washington University, Washington, D.C. (USA Armor Human Research Unit, Fort Knox, Ky.).

As a first step in improving tank crew proficiency, this study was conducted to determine what each member of a tank crew needs to know in order to do his job. Training literature and crew activities were studied, and experienced officers were consulted. Lists of job requirements covering the duties and skills for the 4 crew positions (tank commander, gunner, driver, loader) were established. The lists are being used in the construction of an experimental armor replacement training program and are potentially useful in various aspects of training and performance evaluation. R. 20

12,005

Gerlough, D.L. CONTROL OF AUTOMOBILE TRAFFIC - A PROBLEM IN REAL-TIME COMPUTATION. Reprint 66, Dec. 1957, 75-79. Institute of Transportation and Traffic Engineering, University of California at Los Angeles.

12,005

This paper considers the problem of improving automobile traffic by some control system that takes advantage of the abilities of the large-scale automatic computer. The extremes of the control spectrum as seen by the engineer are represented by the manual system (comparing present traffic with stored information on past traffic behavior, and supplying information to the driver as to how to proceed) and the automatic system (driver does not have direct control of the vehicle as long as it is in the system). The advantages and limitations of these systems are discussed and a system of the future is outlined. Problems in development and research are discussed. G. R 15

12,006

Blackman, M.M. COMMUNICATION AS A GAME. Contract DA 36 039 SC 71053, Tech. Memo EDL M102, April 1957, 12pp. Electronic Defense Lab., Sylvania Electric Products, Inc., Mountain View, Calif.

12,006

This paper considers the case of the communicator contending with forces that tend to disrupt communication, both natural and man-made effects. Channel capacity C represents the best the communicator can do against a given type of interference, and communication system capacity K is defined as the best the interferer or jammer can do against a given system. Conditions wherein the jammer can cause information loss by appropriate type of interference and where the communicator can prevent this by use of an appropriate system are defined. Conditions for successful and unsuccessful communications are discussed. R. 3

12,007

Bradley, J.V. & Wallis, R.A. SPACING OF ON-OFF CONTROLS: I. PUSH BUTTONS. Contract AF 33(616)-3404, Proj. 7182, Task 71514, WADC TR 58 2, April 1958, 17pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio.

12,007

To determine performance decrement as a function of the spacing between on-off controls, 36 right-handed subjects performed a standardized control operation in which the center of one of three closely spaced push buttons was reached to and operated while avoiding contact with adjacent controls. Variables were: diameter of controls (1/4, 1/2, and 1 inch), orientation (horizontal and vertical array), and spacing between edges (1/8 to 6/8 in six steps). Reach and operation time, inadvertent touching, or operation of adjacent controls were recorded. The analysis was in terms of best design for efficient and safe operation. T. G. I. R 14

12,008

Briggs, G.E., Fitts, P.M. & Bahrick, H.P. TRANSFER EFFECTS FROM A SINGLE TO A DOUBLE INTEGRAL TRACKING SYSTEM. J. exp. Psychol., 1958, 55(2), 135-142. (Ohio State University).

12,008

To investigate the effect of lag characteristics of a physical system on learning and performance of a complex tracking task, a transfer of training study was performed. The basic task was a two-dimensional compensatory tracking situation with a step-function input. Original training involved tracking through a single stage integration in the X-axis (velocity control system) and transfer to a system requiring tracking through a double integration (acceleration system). Amount of practice on the single integral system was varied for 0, 10, 30, and 50 trials. Performance on the transfer task was evaluated in several ways. T. G. I. R 9

12,009

Briggs, G.E. Fitts, P.M. & Bohrick, H.P. LEARNING AND PERFORMANCE IN A COMPLEX TRACKING TASK AS A FUNCTION OF VISUAL NOISE. *J. Gen. Psychol.*, June 1957, 53(6), 379-387. (Ohio State University).

12,009

To investigate the effect of visual noise (unwanted information) on learning and performance of a complex tracking task a transfer of training study was used. The task simulated an aircraft with a radar fire-control system wherein the subject was required to perform under compensatory tracking conditions. The transfer task contained four amplitude distributions of low frequency visual noise in the feedback channel to the display. Four groups of 12 subjects were given 20 trials on each of five days. All groups first practiced with no noise, then were assigned to conditions of no noise, small, moderate, or mixed amounts of noise, with transfer trials on the mixed condition.

T. G. I. R 8

12,010

Brooks, F.A., Jr. SHIP CONTROL: II. LINEAR AND NON-LINEAR QUICKENING. Contract NAR-2512, EB Tech. Rep. 411-12, June 1958, 5pp. Electric Boat Div., General Dynamics Corp., Groton, Conn.

12,010

This report summarizes experience with nonlinear feedback terms when a quickened (compensating a manually controlled system by permitting the operator to act solely as an amplifier of constant gain) system is employed in the manual control of submarines. The essential conditions for a quickened system in submarine control are analyzed, the types of displays used are described and some performance data are presented.

G. Y. R 2

12,011

Chomsky, N. & Miller, G.A. FINITE STATE LANGUAGES. *Information & Control*, May 1958, 1(2), 91-112. (Massachusetts Institute of Technology).

12,011

A finite state language is defined as a finite or infinite set of strings (sentences) of symbols (words) generated by a finite set of rules (the grammar), where each rule specifies the state of the system in which it can be applied, the symbol that is generated, and the state of the system after the rule is applied. A number of equivalent descriptions of finite state languages are examined and a structural characterization theorem established. The algebra of finite state languages is explored and procedures for calculating the number of grammatical strings of any given length are also described.

I. R 4

12,012

Key, H. INFORMATION THEORY IN THE UNDERSTANDING OF SKILLS. *Occup. Psychol.*, Oct. 1957, 10-16. (Institute of Experimental Psychology, University of Oxford, England).

12,012

This paper, given at a symposium on engineering psychology, discusses the manner in which the adoption of information theory and its analytical methods by psychologists has influenced their thinking about skills. What the theory has to say about perceiving and responding (input and output) is discussed and illustrated by present day research as compared to that existing up to 1940. This research is then examined to see how it accords with other findings in the field.

R 17

12,013

Shaw, M.E. SOME MOTIVATIONAL FACTORS IN COOPERATION AND COMPETITION. *J. Pers.*, June 1958, 26(2), 150-169. (Massachusetts Institute of Technology).

12,013

Two experiments are reported which attempt to isolate the motivational factors in cooperation and competition by using a task which is intrinsically interesting to the subject and by making performance dependent upon the subjects own efforts regardless of whether he believed himself to be in a cooperative or in a competitive situation. Two subjects were used in all experiments. A tracking task was utilized in Experiment I with modifications to permit usage by two persons. Experiment II used a drastically modified version of the Yerkes multiple-choice apparatus. Three experimental conditions were induced for each subject in both experiments: (1) a condition perceived as cooperative by the subject, (2) one seen as competitive, and (3) one in which the subject worked alone.

T. R 19

12,014

Shaw, M.E. SOME EFFECTS OF INELEVANT INFORMATION UPON PROBLEM-SOLVING BY SMALL GROUPS. *J. Pers. Psychol.*, 1958, 27, 33-37. (Dept. of Psychology, Johns Hopkins University).

12,014

This experiment tested the hypothesis that increasing task complexity will increase the relative inefficiency of the more centralized communication net primarily by enhancing the likelihood of saturation. The star and common net were used with 12 groups of four subjects placed in each net. An arithmetic problem-solving task was used with half of the groups in each net being given only problem-relevant information and the other half problem-irrelevant and problem-irrelevant information. Data were treated by analysis of variance. The effect of irrelevant information upon each net is discussed in terms of differences in time to reach solution, the number of message units transmitted, and ratings of satisfaction by the subjects.

T. I. R 6

12,015

Bass, E.M., Flint, A.W. & Pryor, Margaret W. EFFECTS OF STATUS-ESTEEM CONFLICT ON SUBSEQUENT BEHAVIOR IN GROUPS. Contract N7 ONR-35609, Tech. Rep. 10, April 1957, 10pp. USN Research Lab., Washington, D.C. (Louisiana State University).

12,015

This study attempts to reproduce in the laboratory the hypothesized effects of status-esteem conflict under conditions of varying motivation i.e., group effectiveness will decrease if persons of high status are of low esteem. Groups (34) of five ROTC candidates, varying in degree of interest in entering Advanced ROTC, participated in a rank ordering task. Status was determined by sociometric ratings in which each subject evaluated the other subjects in reference to their candidacy to Advanced ROTC. Esteem was determined by each member's evaluation of the other four in his group. Predictions of subsequent effectiveness, cohesiveness and time to reach a group decision were made.

T. R 5

12,016

Alluisi, E.A. CONDITIONS AFFECTING THE AMOUNT OF INFORMATION IN ABSOLUTE JUDGMENTS. *Psychol. Rev.*, 1957, 64(2), 97-103. (Lab. of Aviation Psychology, The Ohio State University).

12,016

This paper presents a review of available data indicating under what conditions of experimentation an estimate of man's channel capacity (maximum amount of information transmitted for specific tasks) might be obtained. In scope, the review is limited to data concerning the absolute judgments of stimuli lying along simple dimensions. Auditory stimuli, visual stimuli, and individual differences are considered.

R 15

12,017
Older, M.J., & Jacobs, J. DESIGNER PSYCHOLOGICAL RESEARCH NEEDS. Contract AF 48(600), FPA Rep. 35-2, April 1955, 23pp. Psychological Research Association, Washington, D.C.

12,017
This is a report of a survey of destroyer operating problems and an attempt to point out ways in which psychological research can contribute to the solutions of some of the problems. The survey was made by direct observations during operations at sea and by interviews with ship personnel. The problems discussed are: control and communication, motivation, operational commitments, training group, and equipment design. A broad program of psychological research is outlined.

12,018
Ralph, D.C. SPECIAL REPORT ON THE WILLIAMSBURG CONFERENCE. Rea. Rev., June 1956, 2(2), 2-11.

12,018
A conference convened "to generate new ideas for traffic-safety research, particularly in the field of human behavior" is reported here. Three major topics were considered and summary reports prepared: (1) a systems approach to traffic flow and driver behavior; (2) the psychology of driver behavior; and (3) the social context of the automobile, its use and regulation. Appendices amplify the research suggestions that are given in the summaries.

12,019
Williams, H.L. RELIABILITY EVALUATION OF THE HUMAN COMPONENT IN MAN-MACHINE SYSTEMS. Elect. Engin., 1956, 76-82. (Nelpar, Inc., Falls Church, Va.).

12,019
The need of the designer of complex systems for quantitative estimates of operator reliability to supplement qualitative estimates is discussed. Probability analysis methods similar to those employed by equipment reliability engineers is proposed as one means of obtaining this information. The use of these methods is illustrated by a specific example. The advantages of the quantitative method are discussed.
T. I. R. 7

12,020
Dwyer, P.S. MATHEMATICAL PROCEDURES AND MULTIPLE CRITERIA FOR ASSEMBLY OF LARGE WORK GROUPS. Contract AF 41(657) 9, Proj. 7713, AFTRC IR 57-9, Oct. 1957, 26pp. USAF Operator Lab., Randolph AFB, Tex.

12,020
To develop mathematical procedures for assembling individuals in large work units and multiple criteria for assembly when group scores are known, the following methods were studied: (1) the method of reduced matrices as applied to the group assembly problem, (2) an approximate solution using deviates, (3) the adaptation of both solutions to electronic digital computers, and (4) the use of the methods in handling problems with multiple criteria, assembly scores subject to error, and related problems.
T. I. R. 19

12,021
Miller, R.S. AN ANALYSIS OF SOME PHASES OF THE CONTROL OF AIR TRAFFIC. Reprint 173, May 1958, 4pp. Franklin Institute Labs. for Research & Development, Philadelphia, Penn.

12,021
To examine the possibility of using speed control to smooth the flow of air traffic arriving at a terminal area, an analytical study was made of the desirable size of the speed control area and methods for insuring that aircraft will stay on schedule while in the area. General equations were developed and some traffic samples were subjected to various speed control rules. Many of the practical considerations were studied. Recommendations for needed research are made.
G. R. 3

12,022
Amundson, R.J., & Kroski, J.S. THE GAME-THEORETIC ASPECTS OF AIR DEFENSE. Bell Telephone Labs. Contract AF 18(600)-422 and NEDC Contract 18(600)-332, July 1955, 7pp. Analytical Research Group, Princeton University.

12,022
This study deals with the problem of air defense from a game-theoretic standpoint. The class of problems considered may be described as follows: there is an attack formed by a number of attacking units and a defense which has at its disposal a number of offensive weapons (missiles). The problem is to decide how many missiles the defender must have available in order to be certain of destroying a definite proportion of attack units. The incompleteness of information available to the defender is studied by making various mathematical assumptions.
T. G.

12,023
Craig, J.H., Scaplan, C.C., Stanton, C.L., & Van Wyman, K.G. STUDY OF AIR TRAFFIC IN THE HIGH-DENSITY AREA OF NORTHEASTERN USA AND FORECASTS FOR 1960-65. Contract DA 36-03950-64567, Task 4, Part 4, Interim Rep., Dec. 1956, 47pp. Air Navigation Development Team, CAA, Washington, D.C. (Bell Telephone Labs., Inc., Murray Hill, N.J.).

12,023
As one phase of a task calling for over-all planning of an air-ground communication network suitable for Air Traffic Control, a study was made of air traffic in a high density area of northeastern United States in order to obtain information concerning number of air planes to be served by the Air Traffic Control system. A statistical approach was used to gather traffic data covering 1955, which were then extended into forecasts for 1960 and 1965.
T. I. R. 14

12,024
Szandner, F. THE DETERMINATION OF THE PRODUCTION OF INDUSTRIAL CONCERNS. ATIC 258560A, FTS 8677/III, 1954, 19pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio. (Budapest, Hungary).

12,024
Production capacity of industrial concerns is here considered to be based upon computations of the production capacities of the single production equipment. The most important elements and procedures of these computations as applied to heavy industry are discussed. An example of these procedures applied in the determination of the capacity of the forging plant of a machine factory is presented.

12,025
Dunlap and Associates, Inc. SOME FACTORS PERTINENT TO A MAN-MACHINE SYSTEMS ANALYSIS OF THE SSGN FOR THE FBW SYSTEM. Contract NORD 17719, Memo. Rep. 8, July 1957, 6pp. Dunlap and Associates, Inc., Stamford, Conn.

12,025
This brief report discusses the specific circumstances in the SSGN system which requires a systems analysis evaluation concurrent with human engineering work on the subsystem, Fleet Ballistic Missiles. The general approach to be used, types of information to be derived and the nature of its application to SSGN human engineering problems are discussed.

12,026
Francis, P.G. THE UTILIZATION OF CERTAIN ELECTRONIC SYSTEMS IN PERFORMANCE OF MANAGEMENT FUNCTIONS. M.A. Thesis, 1957, 59pp. The Ohio State University.

12,026
Following a brief history of communications and definitions of management functions, several electronic systems are described in relation to the management function of planning, organizing, and control. These are: (1) the digital electronic data processing system, (2) microwave and forward scatter communications systems, and (3) mobile two-way radio systems.
R. 37

12,027

The RAND Corporation. SECOND TOOLING-UP REPORT OF LOGISTICS SYSTEMS LABORATORY. (JANUARY-FEBRUARY 1957). RM-1961, Aug. 1957, 181pp. The RAND Corporation, Santa Monica, Calif.

12,027

The objectives of this study were primarily concerned with further development of simulation techniques and secondarily with a comparison of the operation of two Weapon Systems having somewhat different support systems: (1) current Air Force distribution and (2) an alternative set of presumably preferable policies and procedures. This report describes the basic structure of the simulated organization and its laboratory set-up; compares it with a previous simulation; describes the various special experimental conditions; analyzes the output data; and draws conclusions for future simulation projects.

T. G. I. R 4

12,028

Runkap and Associates, Inc. HUMAN ENGINEERING STUDIES OF THE FLEET BALLISTIC MISSILE SYSTEM. Contract WARD-17719, Prog. Rep. 1, May 1957. 5pp. Runkap and Associates, Inc., Stamford, Conn.

12,028

This is a first progress report of the human engineering studies on the Fleet Ballistic Missile (FBM) system. The scope of the contractors' responsibilities is defined and a summary of work to date is given for (1) navigation system, (2) fire control system, (3) launching and handling, (4) systems interrelationships on a submarine mission, and (5) job-task analyses. Future plans are outlined.

12,029

Berkowitz, R.S. TRAFFIC LOAD CONSIDERATIONS FOR GRID COMMUNICATIONS SYSTEMS. DA-36-039-sc-63143, Proj. AC-27-U-M-2, May 1957, 37pp. The Institute for Cooperative Research, University of Pennsylvania.

12,029

This report presents a study of some properties of the army grid system for long distance communications. This system consists of a number of exchanges which are regularly spaced (ten to fifty miles apart) with some form of radio communications linking them. Each exchange has an operator, subscribers, and a dialing system to determine route by which calls are completed. To determine relations between traffic handling capability and amount of equipment used, dialing routines are postulated and criteria set up by which different dialing routines can be evaluated. Methods are also developed for comparing relative effectiveness of different grid arrangements.

T. G. I.

12,030

Legg, J.C., Jr. RADAR-AIR TRAFFIC CONTROL SYSTEMS EXPERIMENT NO. 1, TARGET IDENTIFICATION VS. NO TARGET IDENTIFICATION. NADC TN 57 288, Sept. 1957, 27pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

12,030

To compare radar control of air traffic using continuous clock-code type identification with radar control using no target identification, tests were given which simulated a high density traffic area utilizing one field, one runway, a Ground Control Approach radar, and one subject controller. Several basic problems were tested under both conditions by each of four experienced controllers. Data recorded and analyzed were fuel consumption and control time per aircraft, general off-scope hold time, number of aircraft, and number of heading requests.

T. I. R 6

12,031

Behrck, H.P., Flitts, P.M., & Briggs, G.E. LEARNING CURVES - FACTS ON ARTIFICIAL INTELLIGENCE. Ball, May 1957, 24(3), 256-268. (Ohio Wesleyan University, Delaware, Ohio).

The purpose of the research reported here was to demonstrate how the form of learning curves might be determined in a large measure by changes in the sensitivity of performance in- dicants at various stages of practice. Empirical learning curves based upon the most commonly used performance measures in tracking tasks were examined. These were "time-on-target" scores which reflected the amount of time during a trial that a S was able to remain within an arbitrarily specified region around a moving target. The curves, obtained by scoring an error voltage simultaneously with reference to 3 target sizes, became differentially sensitive to improvement at various levels of skill. One curve might show a rapid improvement while the other failed to reveal any, and vice versa. It was shown that this problem applied to all situations where learning resulted in diminished variance of a response distribution but performance was scored according to an all-or-none criterion. A statistical method was developed to correct for the changed sensitivity of scoring at different stages of practice. The best single measure of tracking performance was the root mean squared error. (MILAS)

R 18

12,032

Cohen, J., Dearmaley, E.J. & Hansel, C.E.M. THE RISK TAK. IN DRIVING UNDER THE INFLUENCE OF ALCOHOL. Brit. Med. J., June 1958, 1, 1438-1442. (University of Manchester, England).

12,032

To assess the effects of alcohol on the complex psychological processes and performances involved in risks which drivers of automobiles take and the hazards which they incur, three groups of experienced bus drivers were studied. The experimental session began after an eight-hour morning shift and a supervised lunch. Alcohol in the form of Scotch whiskey was given to only two groups in doses of two or six British fluid ounces. The driver's task was first to estimate how successful he would be in driving a bus through gaps of varying widths and then to drive the bus through particular gaps. The performance of the three groups was compared.

T. R 15

12,033

Cramer, E.M. & Higgins, M.M. CREATION OF PITCH THROUGH BINOMIAL INTERACTION. *J. acoust. Soc. Amer.*, May 1958, 30(5), 413-417. (Johns Hopkins University, Baltimore, Md.).

This paper is an investigation of the phenomenon which was observed by Higgins in 1953. Higgins found that a binomial stimulus gives a fairly clear perception of pitch although the separate stimuli to the 2 ears give no such perception. The basic stimulus consists of white noise introduced into one ear while the same white noise, phase-transformed in a narrow band of frequencies, is introduced into the other ear. A practiced subject listening to this stimulus reports a faint pitch quality which is judged to sound about the same as narrow-band filtered noise. A forced-choice technique was used in which 6 subjects were asked to judge the direction of the pitch change when the frequency band over which the phase shift occurs was changed. The control consisted of the same stimulus presented to the 2 ears. Data are presented indicating the relationship between the percent of correct judgments and the 3 experimental variables, frequency, band width, and intensity level.

R 4

12,034

Davis, R.C. & Buchwald, A.M. AN EXPLORATION OF SOMATIC RESPONSE PATTERNS: STIMULUS AND SEX DIFFERENCES. *J. comp. path. Psychol.*, Feb. 1957, 30(1), 44-52. (Indiana University).

12,034

To explore somatic response patterning (autonomic and skeletal muscle) changes were recorded from 12 males and 12 females as they were exposed to a series of pictures of widely different contents. Twelve response variables were quantified and their changes plotted as functions of time after stimulus onset. Analysis of the data was made in terms of whether the stimuli produced 1) responses, 2) different responses, and 3) different patterns of responses between the two sexes.

T. G. R 8

12,035

Shoenaker, H.A., Brown, G.H. & Whittenmore, Joan M. ACTIVITIES OF FIELD RADIO REPAIR PERSONNEL WITH IMPLICATIONS FOR TRAINING. Tech. Rep. 48, Task I, May 1958, 116pp. Human Resources Research Office, The George Washington University, Washington, D.C.

In this study data were obtained on the activities of 1,085 field radio repairmen (MOS 296) assigned to a variety of field units in the Continental United States and in the U.S. Army in Europe. Such techniques as questionnaires, check lists, and interviews were used to: a) identify skills and knowledge critical to the repairman's job, b) obtain evaluations from repair and supervisory personnel on training in relation to the job, and c) determine field requirements to be used in developing a field-oriented proficiency test. Recommendations are given for changes in emphasis and modification in the Field Radio Repair Course.

12,036

Sedle, L.M. & Webb, W.B. ACCIDENT DATA, INSTRUCTOR COMMENTS, AND STUDENT QUESTIONNAIRE RESPONSES AS INDICATORS OF TRANSITION TRAINING PROBLEM AREAS. Bu Med Surg Proj. NM 14 01 11, Subtask 7, Rep. 1, April 1958, 7pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,036

To determine whether analyses of accident data, instructor comments, and student responses to training difficulty will yield information relevant to transition effects as students change from a common aircraft to two dissimilar aircraft, such data were gathered from students undergoing Naval Air Training. One group was transitioning from a propeller aircraft to jet powered aircraft; the other to a more advanced propeller driven aircraft. Frequency analyses were made and the findings discussed in a post hoc manner within the transfer of training model.

T. R 2

12,037

Ray, J.T., Passey, G.E., Adams, O.S., Smader, R.C., et al. A TECHNIQUE OF JOB ACTIVITY DESCRIPTION FOR NEW WEAPON SYSTEMS: TASK-EQUIPMENT ANALYSIS. Proj. 7735, AFMTRC TR 57-13, Dec. 1957, 66pp. USAF Maintenance Lab., Lowry AFB, Colo.

The recognized need for early identification of personnel and training requirements for the effective use and maintenance of new weapon systems has led to efforts to develop new techniques that will yield detailed descriptions of job activities before the equipment which generates those personnel requirements has been developed. This report describes work done under Contract No. AF 41(657)-67 by Lockheed Aircraft Corporation, Marietta, Ga., which produced one feasible procedure for preparing position-oriented behavioral descriptions of job tasks--the task-equipment analysis (TEA). This technique resulted from a logical analysis of the problem and experience in developing prototype TEAs for 3 maintenance positions for the C-130A aircraft. The recommended procedure is described in detail with examples. A cross-index of equipment components and job duties is included. Since the procedure was developed in the context of the C-130A aircraft and for maintenance positions only, it may need to be modified for applications to missile systems and operator duties. Further review and test of the procedure is recommended.

R 6

12,038

Prot, E.M. REFLEXIONS GENERALES SUR LA SECURITE DES MATERIAUX ET DES STRUCTURES. AGARD Rep. 151, Nov. 2-6, 1957, 11pp. North Atlantic Treaty Organization, Paris, France.

12,038

This paper discusses some general concepts related to safety testing of materials and structures. It is pointed out that frequency and probability notions are needed to clarify the concept of safety. The nature of accidents, the risks one intends to reduce, and the importance of their consequences also need to be considered. Necessary conditions for an adequate selection of safety coefficients and for testing materials and models are discussed.

R 36

12,039

Green, D.M. DETECTION OF COMPLEX AUDITORY SIGNALS IN NOISE, AND THE CRITICAL BAND CONCEPT. Contract AF 19-604-2277, Tech. Rep. 82, April 1958, 78pp. Dept. of Electrical Engineering, University of Michigan.

12,039

This thesis is concerned with a study of the auditory frequency analysis process, in terms of the critical band theory as proposed by Fletcher. Following a critical review of the literature, two experiments concerning the detection of complex auditory signals in noise are presented. The first experiment employed two sinusoidal stimuli as a complex signal with duration and frequency of separation of the signal as parameters. A mathematical model is presented which describes the data obtained. The second experiment used band limited white Gaussian noise as the signal and a statistical model derived. As a result of both experiments a general model of the receiving mechanism is proposed.

G. I. R 29

12,041

Greer, F.L., Pearson, W.O., & Havron, H.D. EVASION AND SURVIVAL PROBLEMS AND THE PREDICTION OF CREW PERFORMANCE. SUPPLEMENT 1: PREDICTOR INSTRUMENTS. Contract AF 41(657) 65, Proj. 7723, AFTRC TR 57 14, Dec. 1957, 29pp. USAF Office for Social Science Programs, Lackland AFB, Tex.

This research was undertaken to develop a criterion evasion-and-survival field problem that would reflect in kind and in relative importance the critical situations a group of men might encounter if they went down behind the enemy lines. An effort also was made to identify questionnaire-type instruments that would predict crew performance, as measured by the criterion problem. The predictor instruments and scoring keys used in this study of crew performance are reproduced here. The rationale for their development from USAF Survival Training School are presented in the Technical Report to which this is Supplement 1, as well as the findings are presented in the Technical Report to which this is Supplement 1.

12,040

Greer, F.L., Pearson, W.O., & Havron, H.D. EVASION AND SURVIVAL PROBLEMS AND THE PREDICTION OF CREW PERFORMANCE. Contract AF 41(657) 65, Proj. 7723, AFTRC TR 57 14, Dec. 1957, 55pp. USAF Office for Social Science Programs, Lackland AFB, Tex.

This report, which has 2, separately bound supplements, summarizes research and development of a criterion evasion-and-survival field problem designed to reflect in kind and in relative importance the critical situations a group of men might encounter if they went down behind the enemy lines. An effort also was made to identify questionnaire-type instruments that would predict crew performance as measured by the criterion problem. The crew survival capability test (CREVSAT) involved a 6-hour problem covering a 2-mile course. This was administered to 76 crews from USAF Survival Training School. Results for the criterion problem and predictor instruments were analyzed for 60 crews. Comparisons with previous Army studies are made.

R 28

12,042

Greer, F.L., Pearson, W.O., & Havron, H.D. EVASION AND SURVIVAL PROBLEMS AND THE PREDICTION OF CREW PERFORMANCE. SUPPLEMENT 1: CREVSAT: PROBLEM FORM AND MANUAL. Contract AF 41(657) 65, Proj. 7723, AFTRC TR 57 14, Supplement 1, Dec. 1957, 91pp. USAF Office for Social Science Programs, Lackland AFB, Tex.

This research was undertaken to develop a criterion evasion-and-survival field problem that would reflect in kind and in relative importance the critical situations a group of men might encounter if they went down behind enemy lines. An effort also was made to identify questionnaire-type instruments that would predict crew performance, as measured by the criterion problem. This supplement contains forms and observation sheets needed by the umpire to evaluate and critique a crew's performance, as well as instructions for planning and operating the crew survival capability test (CREVSAT) which was developed. The rationale for the test development and the findings of the study made of crews from USAF Survival Training School are presented in the Technical Report to which this is Supplement 1.

12,043

Hahn, J.F. CUTANEOUS VIBRATORY THRESHOLDS FOR SQUARE-WAVE ELECTRICAL PULSES. *Science*, April 1958, 127 (3303), 879-880. (Psychological Lab., University of Virginia).

12,043

To study cutaneous vibratory thresholds for square-wave electrical impulses, threshold determinations were made by three subjects by a modified method of limits (continuous variations, ascending series only in order to avoid adaptation). The upper volar forearm was stimulated with five frequencies (60, 100, 200, 500, and 1000 pulses per second) with pulse duration ranging from 0.1 to 7.0 milliseconds. The data were analyzed for frequency-intensity functions and discussed in relation to results obtained with sinusoidal currents.

T. G. R 6

12,044

Hasbrook, A.H., Palin, J.T., & Guggenheimer, H.R., Jr. AV-CIR CRASH SURVIVAL STUDY. Contract Nonr-401(21), AV-CIR-5-CSS/H-81, Feb. 1957, 30pp. Aviation Crash Injury Research, Cornell University.

12,044

To provide information that might be useful in engineering efforts to improve helicopter design from the point of view of crash safety, photographs are presented with descriptive captions relating to crash-survival details of a Bell H-13 helicopter crash in which two crew members survived without spinal injuries. An accident diagram and damage to cockpit, seats and other components are shown; the injuries sustained by the occupants, and probable injury causes, are described. The method of calculating the crash forces is demonstrated. The findings are discussed in relation to future design.

T. G. I.

12,045

Dunlap and Associates, Inc. HUMAN ENGINEERING EVALUATION OF THE MAGNETOMETER. Contract NORD-17719, April 1957, 4pp. Dunlap and Associates, Inc., Stamford, Conn.

12,045

The magnetometer, used to locate geodetic position, was evaluated from the Human Engineering viewpoint in order to identify operator difficulties. Such difficulties are discussed and recommendations for modification of present equipment are made.

12,046
Fenster, C.B. & Sapon, S.M. AN APPLICATION OF RECENT DEVELOPMENTS IN PSYCHOLOGY TO THE TEACHING OF GERMAN. *Harvard Educ. Rev.* 1958, 28(1), 12pp. (Indiana University Medical Center, & Ohio State University, Columbus, Ohio).

This paper describes a technique for the teaching of German which permits every student to "teach himself" at a rate appropriate to his own skill and which ensures that the student will follow an explicit study process. The reinforcement principle immediately applied to small units of the learner's behavior is the salient characteristic of the instructional materials thus designed. Other psychological principles evident include: small amount of work per reinforcement; controlled introduction of new vocabulary; control of overlearning; conceptual principles learned before verbalized; graded difficulty level; and sufficient practice plus continuous mastery. The material was administered to 28 Ss and each S's performance assessed by vocabulary and English to German translation tests. With a mean time of 47.5 hrs., the Ss learned an amount comparable to that in a first-semester course. Based on specific findings some modifications in the material and methods were derived. (NEIAS)

12,047
Fitts, P.M. ENGINEERING PSYCHOLOGY. *Annual Rev. Psychol.*, 1958, 9, 267-294. (Ohio State University).

12,047
This review includes articles published between January, 1956 and May 1957 inclusive. Primary emphasis has been placed upon scientific work in psychology which supports the professional aspect of engineering psychology. The following topics are covered: (1) professional compilation of handbook-type data, journals and societies and professional training and responsibilities; and (2) scientific-engineering psychology research, man-machine systems, automation, skilled performance, frequency characteristics of human responses, absolute judgments and novel alphabets, legibility and intelligibility, design for safety, methodology and bibliographic sources.
R 149

12,048
Garner, W.R. HALF-LOUDNESS JUDGMENTS WITHOUT PRIOR STIMULUS CONTEXT. *J. exp. Psychol.*, May 1958, 55(5), 482-485. (Johns Hopkins University).

12,048
To explore the feasibility of eliminating context effects in obtaining judgments of loudness, 135 different subjects were required to make a single half-loudness judgment with the method of constants. The task was to state whether the second of a pair of tones was more or less than half as loud as the first upon one presentation and with no practice. The first (standard) tone at 90 decibels was the same for all subjects; the second varied from 55 to 85 decibels for different subjects. The data were analyzed as a function of loudness and a least-squares solution of the normal ogive obtained. The half-loudness value thus derived is discussed in relation to other data.
G. R 5

12,049
Annett, J., Gilly, C.W. & Kay, H. THE MEASUREMENT OF ELEMENTS IN AN ASSEMBLY TASK - THE INFORMATION OUTPUT OF THE HUMAN MOTOR SYSTEM. *Quart. J. exp. Psychol.*, Feb. 1958, 10(1), 1-11. (Institute of Experimental Psychology, University of Oxford, England).

12,049
To compare two techniques for measuring skilled movements, the performance of three well-practiced subjects on an assembly task was analyzed using both an electrical contact technique and high-speed film recording. The task consisted of transferring a row of pegs into a parallel row of holes eight inches away. Difficulty of task was varied by using four different hole diameters. Differences between the analyses were examined and discussed. An information analysis of the output of the motor response was applied to the data and discussed in terms of the constancy of human channel capacity.

12,050
Fletcher, J.L. HEARING LOSSES OF PERSONNEL EXPOSED TO IMPULSE AND STEADY STATE NOISE. AMRL Proj. 6-95-20-001, Rep. 355, Aug. 1958, 9pp. USA Medical Research Lab., Fort Knox, Ky.

12,050
To study hearing loss differences between personnel working for varying lengths of time in impulse or steady state noise, audiograms and hearing - data sheets were collected on a large number of servicemen and civilian employees at Fort Knox, Kentucky. From these records were selected 105 range operators primarily exposed to impulse noise and 60 (Post Ordnance and Automotive Department) primarily exposed to steady noise. Hearing-loss data from the two groups were compared for three different lengths of exposure: one to 39, 40 to 79, and over 80. Recommendations for the practical uses of the results are included.
I. G. R 1

12,051
Gryzbil, A. & Moellner, R.C. A NEW AND OBJECTIVE METHOD FOR MEASURING OCULAR TORSION. *Bu Med Surg. Proj. NM 17-01-11, Rep. 46*, May 1958, 8pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,051
To measure torsion of the eye accurately a procedure was developed which was objective and found to be highly reliable. This procedure consisted essentially of photographing artificial markers on eye and head before, during, and after a test procedure and measuring in the frontal plane, the change in angle between a reference line in the eye and one on the head. Some measurements on two observers are included here to indicate method reliability.
G. I. R 3

12,052
Riggs, L.A. THE HUMAN ELECTRORETINOGRAM. *A.M.A. Arch. Ophthalmol.*, Oct. 1958, 60(Part II), 739-754. (Brown University).

12,052
This paper assesses the progress that has been achieved on the human electroretinogram or ERG. The development of recording techniques over the past 80 years is sketched, and the modern method of using plastic contact lens is discussed. Some of the major results that have been achieved and the problems that remain to be solved are discussed under the following major topics: origin of the human ERG, scotopic components of the ERG, and photopic components of the ERG. The clinical and scientific value of the human ERG is indicated. Discussion of this paper by several individuals is included.
G. I. R 58

12,054
Baker, C.H. THE OBJECTIVE STUDY OF JUDGMENT AND DECISION-TAKING. *Occup. Psychol.*, Oct. 1957, 17-25. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

12,054
Experimental research in the area of judgment and decision-taking is reviewed in this paper, one of several given at a symposium on engineering psychology. Work done in the United States is said to center on discovering how persons make decisions involving varying probabilities of success and using tools such as dice-throwing, card games, betting at race tracks, and the like. In England one line of research concerns risk-taking involving concepts of risk and hazard. Another approach involves the study of decision-taking and the factors remaining human limitations in this capacity. G. I.

12,055
Singleton, M.T., & Simister, R. THE DESIGN AND LAYOUT OF MACHINERY FOR INDUSTRIAL OPERATIVES. *Occup. Psychol.*, Oct. 1957, 31-34. (British Boot, Shoe and Allied Trades Research Association).

12,055
This paper, part of a symposium on engineering psychology, presents and discusses two examples of the work of engineering psychology in the industrial production field. The first concerns a study of human factors in a machine for sewing upper shoe leather, a modification of the design and the evaluation of the new design. The second example concerns a study of the layout of closing rooms in a shoe factory and the procedures used. R 5

12,056
Seymour, M.D. TRANSFER OF TRAINING IN ENGINEERING SKILLS. *Occup. Psychol.*, Oct. 1957, 35-39. Dept. of Engineering Production, University of Birmingham, England).

12,056
This paper, given at a symposium on engineering psychology, discusses the present situation in the study of transfer of training in the field of skills. Experiments on transfer of practice on component elements to the whole task are discussed. Other studies on changes in human performance which occur with improvement in skill are summarized. From a consideration of these studies some suggestions are made as to the type of approach needed to provide the necessary information on transfer. R 6

12,057
Fraser, D.C. ENVIRONMENTAL STRESS AND ITS EFFECT ON PERFORMANCE. *Occup. Psychol.*, Oct. 1957, 40-47. (Institute of Aviation Medicine, Farnborough, Hants, England).

12,057
This paper, given at a symposium on engineering psychology, discusses the concept of "stress" as it has been used in studies on environmental stress and its effect on performance. Some general principles are stated and illustrated with experimental evidence. Physiological pattern of breakdown under heat stress is compared with psychological pattern and cumulative effects of stress are discussed. G. R 1

12,058
Miller, R.B., Meister, D. & Feroplia, M.E. SOURCES OF MAINTENANCE JOB INFORMATION: IV. DEVELOPMENT OF INFORMATION FOR ANTICIPATING MAINTENANCE JOB REQUIREMENTS OF NEW ELECTRONIC SYSTEMS. Contract AF 18(600)-1203, Proj. 7709, ASPRL TX 55 16, Aug. 1955, 23pp. USAF Armament Systems Personnel Research Lab., Lowry AFB, Colo. (American Institute for Research, Pittsburgh, Penn.).

12,058
This report presents the implications of a study of the kinds and sources of information required for anticipating, during early stages of equipment development, the job and training requirements for maintenance of electronic equipment. In the study (reported elsewhere) records and other data from the developmental histories of two Air Force electronic systems were analyzed. Included in this report are the following: overview of maintenance job duties-line and ship, maintenance job information, systems products as sources of information, and the usefulness of products in deriving maintenance job information. T. R 5

12,059
Poulton, E.C. ON PREDICTION IN SKILLED MOVEMENTS. *Psychol. Bull.*, Nov. 1957, 54(6), 467-478. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,059
This article discusses the role of prediction in skilled movements by first analyzing a single activity, pursuit or two-pointer tracking in one dimension. A tabular presentation is made of the kinds of acquisition involved in tracking, the predictions which have been made to carry out each successfully, and suggests names. The second analysis attempts to show how similar principles are involved in everyday skills. Classification of such skills, the predictions needed in each case, and a suggested terminology are presented. T. R 43

12,060
Poulton, E.C. COPYING BEHIND DURING DICTATION. *Quart. J. exp. Psychol.*, Feb. 1958, 11, 47-55. (Applied Psychology Research Unit, Medical Research Council, Cambridge, Eng. and).

Simple prose was presented in groups of 1, 3, or 6 words with silent intervals between groups. The overall rate of presentation was equated for the 3 conditions to about twice as fast as the subjects could print in capital letters. They were instructed to continue printing until they could not remember what came next, and then to start again at once with the next word which they heard. The same passages were presented 3 times. On the first presentation an error-free ear-hand span of 14 words was found. This is within the range of the extreme spans reported by Bryson and Haster, and is larger than the spans reported for other receptors and effectors. Presenting 5 words at a time gave only slightly larger spans than presenting fewer words more frequently. The subjects tended to give up at positions related to punctuation, presumably because they stored the material according to its syntax and meaning. The span size of the differences found between the 3 methods of presentation was partly attributed to this. R 12

12,061
 Poulton, E.C. PURSUIT-TRACKING WITH PARTIAL CONTROL OF THE INPUT. *Brit. J. Psychol.*, Dec. 1957, 70(4), 631-633. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,061
 To investigate the effect upon pursuit tracking performance of partial control by the operator of the input, eight subjects were given practice tracking a simple harmonic and a more irregular input on a pursuit tracking device without any input control and with an added handwheel controlling the frequency of the input. A continuous record of the input frequencies and errors for both conditions was made and analyzed for differences. The results are discussed in terms of the role of anticipation in performance of such tasks.
 T. R 1

12,062
 Conrad, R. & Hille, Barbara A. MEMORY FOR LONG TELEPHONE NUMBERS. *Psych. Office. Telecomm. J.*, Autumn 1957, 10(1), 37-39.

Some experiments are described in which groups of telephone operators were tested to determine how the presentation of long telephone numbers affects their ability to remember them. Numerals vs. letters were first compared using 8-, 9-, and 10-item combinations of all letters, letters and numerals, numerals and letters, and all numerals; all numeral and all letter combinations were found to be inferior to letters and numerals, though all numerals was only slightly inferior and all letters was most difficult. Size of numeral vocabulary--2, 4, or 8--was then varied for 8-, 9-, or 10-digit numbers; memory span was found to decrease not only with longer numbers, but with reduction of vocabulary size. Grouping of digits was then examined; a normal decimal vocabulary of 9-digit numbers was spoken in 1 to 5 subgroups. The 2 sub-group condition was most favorable. Implications for subscriber numbers are described. (NEIAS)

12,063
 Bursill, A.E. THE RESTRICTION OF PERIPHERAL VISION DURING EXPOSURE TO HOT AND HUMID CONDITIONS. *Quart. J. exp. Psychol.*, Aug. 1958, X(3), 113-129. (University of Aberdeen, Scotland).

12,063
 To investigate the effects of high thermal condition on attention (defined here as the degree to which an operator can successfully notice and respond to peripheral stimuli while engaged upon a continuous central task), 11 heat-acclimatized subjects were exposed to temperatures of 70/60 and 105/90 degrees Fahrenheit on a dry/wet bulb scale (air velocity 120 feet per minute). They were required to respond to peripheral visual signals, presented randomly in order and time, at six positions, 20, 50, and 80 degrees left and right of point of fixation, while engaged in a continuous pursuit meter task. Performance data on both tasks were analyzed for effects of thermal stress.
 T. G. R 21.

12,064
 Poulton, E.C. MEASURING THE ORDER OF DIFFICULTY OF VISUAL-MOTOR TASKS. *Ergonomics*, May 1958, 1(3), 234-239. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,064
 To investigate a technique for measuring the relative difficulty of visual-motor tasks, two dial-watching operations in which the subject was required to respond each time the dial-hand reached certain points were studied. A two-dial and a six-dial task, with identical total rate of required responses were performed by a control group of six subjects. A simple listening task was performed by a comparable group of six and then combined with the dial-watching tasks with instructions to give first consideration to the dials. Error scores for the various conditions were analyzed for relative difficulties of the two tasks with and without the subsidiary auditory task.
 T. R 6

12,065
 Jones, C.E., Kobrick, J.L. & Gaydos, H.F. ANTHROPOMETRIC AND BIOMECHANICAL CHARACTERISTICS OF THE HAND. Proj. 7 83 01 005, Tech. Rep. EP 100, Sept. 1958, 16pp. *USA Quartermaster Research & Engineering Center*, Natick, Mass.

12,065
 Descriptive data are presented on the structural and functional characteristics of the human hand, which are of interest to engineers concerned with the design of handwear and manually operated equipment. The first section deals with the anthropometric dimensions of the hand and shows the centile distribution of component hand sizes in several military population samples. The second section reviews data on the biomechanics of the hand in terms of direction, range, and forces involved in typical functional movements.
 T. I. R 14

12,066
 Wilkinson, R.I. THE EFFECTS OF SLEEP LOSS ON PERFORMANCE. A.P.U. 323/58, April 1958, 36pp. *Applied Psychology Research Unit*, Medical Research Council, Cambridge, England.

12,066
 This report presents eight of ten experiments aimed at defining more precisely the task situation in which performance is likely to be impaired by moderate sleep loss (approximately 30 hours without sleep). A wide variety of task situations (e.g., short tests, both complex and simple; vigilance tasks; prolonged complex tasks; and serial reaction tests) were included in the experimental procedure. Data are discussed in relation to the effect of sleep loss on each type of task. Conclusions are discussed in detail and prospective areas for further research are indicated.
 T. G. I. R 12

12,067
 Pepler, R.D. WARMTH AND LACK OF SLEEP: ACCURACY OR ACTIVITY REDUCED? APU 286/58, July 1958, 12pp. *Applied Psychology Research Unit*, MRC, Cambridge, England.

12,067
 Evidence was sought on whether moderate warmth and the loss of sleep would have similar effects on the performance of skilled tasks. Twelve subjects performed a pursuit-tracking task for 30 minutes and a serial-choice task for the following 20 minutes on two successive weeks; in each week the subjects worked once with and once without sleep on the previous night, once in normal and once in a high temperature. Both quantitative and qualitative data were analyzed and compared for the two conditions.
 T. G. R 9

12,068

Wickens, D.D. & Cotterman, T.E. THE EFFECT OF DISPLAY INTERRUPTION ON TRANSFER OF TRAINING BETWEEN TASKS OF DIFFERENT CONTROL SENSITIVITY. Contract AF 33(616) 3076, Proj. 7197-71635, WADC TR 57-548, March 1958, 21pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University).

12,068

To investigate the relationship between amount of transfer of skill in two-dimensional tracking and degree of similarity between training and test control sensitivity when the display is interrupted periodically during both, groups of subjects were trained on one of two control-display ratios. All groups were tested while using the lower ratio. In Experiment I, two groups were employed under conditions of interrupted displays; in II, these groups were replicated and two groups added with non-interrupted display. Time-on-target scores were analyzed for effects of these conditions.
T. G. R 10

12,069

Cohen, J. & Dinnerstein, A.J. FLASH RATE AS A VISUAL CODING DIMENSION FOR INFORMATION. Contract AF 33(616) 3404, Proj. 7186, WADC TR 57-64, May 1958, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College).

12,069

To determine the relationship between flash frequency of a light and ability to identify flash rate, ten subjects made absolute judgments of nine flash rates which varied from one flash per four seconds to twelve per second. The stimuli were presented by a high intensity blue-white strobotron tube masked to a point source. The data were analyzed in terms of (1) information transmitted (in bits) for each flash rate, (2) discriminability of the rates, and (3) average response time for identification. The results are discussed in relation to encoding information through flashing signals.
T. G. I. R 12

12,070

Nicklas, D.R. A HISTORY OF AIRCRAFT COCKPIT INSTRUMENTATION 1903-1946. Contract AF 33(616) 3000, Proj. 6190, WADC TR 57-301, April 1958, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., University of Illinois).

12,070

An historical review of aircraft cockpit instrumentation from 1903 to 1946 is presented. The attempt is made to describe how information is sensed, transmitted, and displayed and what principles are related to these processes. The evolution of instruments is traced, stressing instrument combination, simplification, and arrangement. Primary attention is given to instruments in operational aircraft.
I. R 390

12,071

Boynton, R.M., Elworth, C. & Palmer, R.M. LABORATORY STUDIES PERTAINING TO VISUAL AIR RECONNAISSANCE. Part III. Contract AF 33(616) 2565, Proj. 7157, WADC TR 55-304, April 1958, 61pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Rochester).

12,071

This is the third and final part of a three-stage report of an investigation of relevant variables involved in air reconnaissance. A further investigation was made of the variables previously studied - subject-target distance, number of forms in the array, and percent contrast. A mathematical relationship is worked out which yields the contrast required for 60 per cent recognition as a function of these variables. Translating experimental variables into practical terms predictions are made about how performance should vary as a function of altitude. A preliminary attempt is made to investigate parafoveal form recognition, visual acuity, and eye movements in terms of individual differences.
T. G. I. R 14

12,072

Kidd, J.S., Shelly, R.W., Jeantress, G. & Fitts, P.M. THE EFFECT OF ENROUTE FLOW CONTROL ON TERMINAL SYSTEM PERFORMANCE. A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33(616) 3612, Proj. 7192, WADC TR 57-663, April 1958, 32pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., Ohio State University and OSU Research Foundation)

12,072

To determine the effect of regularization of approach traffic in time, place, and sequence upon the safety and efficiency of a human-operated terminal radar air traffic control system, a laboratory study using simulation techniques was performed. Enroute flow control facilities were simulated by preprogramming arrivals at the terminal boundary. The terminal system (OSU Electronic Air Traffic Control Simulator) was manned by a two-man pattern-feeder control team. Six pairs of experienced air force controllers participated. The control zone included two landing fields and each controller handled aircraft for each field. Data were recorded and analyzed for 2880 movements of mixed types.
T. G. I. R 15

12,073

Devos, D.B. SURVEY OF HUMAN FACTORS EFFORTS IN SAGE. AFRC TR 58-14, July 1958, 26pp. USAF Operational Applications Lab., Bedford, Mass.

12,073

Research on human factors problems in Semi-Automatic Ground Environment (SAGE) has been conducted by a number of nearly independent groups of human factors specialists. This report describes the missions of these groups, how they were established, what kinds of problems they worked on, and what their future plans are. The reports generated by these groups are listed in a combined bibliography and categorized reference lists bring together the reports relevant to various subject categories and SAGE functions.
R 199

12,074
Rogers, O.E., Webb, M.B. & Gallacher, T.J. EFFECT OF RESTRICTING INFORMATION IN THE VERBAL CONDITIONING SITUATION ON EXTINCTION. Bu Med Surg Res. Proj. MM 14-02-11, Subtask 11, Rep. 1, May 1958, 8pp. USN School of Aviation Medicine, Aviation Medical Center, Pensacola, Fla.

For 120 trials subjects pressed a key if they guessed a light would come on. No response indicated a guess to the contrary. 3 partial reinforcement ratios were used. In a full knowledge condition the light would appear or not appear on each trial. In the partial knowledge condition the subjects were told, "If you do not press the key, you do not find out if you are right or wrong." After this, 100 trials were given with no reinforcement. No differences were found between conditions during training. Significant differences were obtained among reinforcement ratios during both training and extinction. For the partial knowledge group extinction was considerably and significantly prolonged.
R 11

12,075
SALVENDY, J.H. SOME CONDITIONS GOVERNING THE USE OF THE CUE PRODUCING RESPONSE AS AN EXPLANATORY DEVICE. *Human Factors*, Vol. 1, No. 1, Jan. 1959, 10pp. *Applied Psychology Research Unit, Medical Research Council, Cambridge, England.*

Conflicting studies on the effect which teaching differential responses to cues has on the acquired distinctiveness of these cues produced the following two hypotheses: (a) that the active overt responses attached to stimuli will be used to furnish additional cues for later learning unless the responses are strongly attached (overlearned) to the stimuli; (b) when the overt responses are not strongly attached to the stimuli, the participants' responses made in the attempt to learn the overt responses furnish cues for later learning to the stimuli and hence are more important than the overt responses in determining future transfer. To test these hypotheses one group of 15 learned distinctive overt responses to a set of stimuli; a second group overlearned the same distinctive overt responses to the stimuli; a third group learned equivalent overt responses but distinctive perceptual responses to the stimuli; a fourth group learned equivalent overt responses and equivalent perceptual responses to the stimuli; and a fifth group learned no responses to the stimuli. Immediately after the above training all groups were required to learn a second set of responses to the same set of stimuli. All groups receiving preliminary training did better than the group receiving no training. Both hypotheses were confirmed.

12,076
FARMER, D. HUMAN FACTORS RESEARCH IN TRAFFIC ACCIDENTS IN ENGLAND. *Int. J. Road Safety & Traffic Prev.*, Autumn 1957, 2(1), 21-30. (*Applied Psychology Research Unit, Medical Research Council, Cambridge, England.*)

12,076
Research on human factors in highway usage in England is uniquely centralized within the Road Research Laboratory of the Department of Scientific and Industrial Research. The organization and types of research underway are briefly described. Two psycho-physical studies are more fully summarized: an experiment on the effects of small amounts of alcohol on driving and an investigation of "over-taking the car ahead".

12,077
SHEW, K.J. THE HUMAN FACTOR IN ROAD TRAFFIC. *COGNITIVE RESEARCH ON DRIVING SKILL. Int. J. Road Safety & Traffic Prev.*, Autumn 1957, 2(1), 21-30. (*Applied Psychology Research Unit, Medical Research Council, Cambridge, England.*)

12,077
This paper is concerned with variables in the driver which take either for good and safe driving on the one hand or accidents on the other. Two types of such variables - innate characteristics and temporary states such as fatigue - are discussed with reference to types of measurement that have been attempted. It is suggested that driving performance in its entirety as one complex skill needs to be studied before objective measurement can begin. Some pilot studies of a new technique for measurement are presented and discussed.

12,078
PAPROT, E.S. HUMAN FACTORS AND HUMAN-MADE MACHINES. *APPL. PSYCH. RES. J.*, July 1958, 12pp. *Applied Psychology Research Unit, Medical Research Council, Cambridge, England.*

12,078
To investigate the effect of an extreme level of warmth on performance of a difficult manual motor task, six subjects were exposed to a climate with a wet bulb temperature of 135 degrees Fahrenheit. Three exposures of 30 minutes each and spaced at 48-hour intervals were used. During the second and third exposures the subjects worked continuously to keep a pointer aligned with a target as it moved erratically from side to side. Error scores (integrated spatial errors of alignment and time) and number of movements of pointer were analyzed as functions of length of work in the hot environment.

12,079
LEONARD, J.A. THE EFFECTS OF "MACHINE" LAG ON A SERIAL CHOICE TASK WITH BALANCED AND UNBALANCED FREQUENCIES. *APPL. PSYCH. RES. J.*, March 1958, 11pp. *Applied Psychology Research Unit, Medical Research Council, Cambridge, England.*

12,079
To observe the difference in fast serial performance with input frequencies were balanced and when biased, and to observe the effects of imposing an enforced delay between completion of one response and the beginning of the next under both balanced and biased inputs, two groups of subjects performed a self-paced five-alternative task. The making of one response produced the stimulus for the next under all conditions of input frequencies and response lag. Response times and error percentages were analyzed and practical implications discussed.

12,080
HACKWORTH, J.F. PAIRED MEMORISING IN A CONTINUOUS TASK. *APPL. PSYCH. RES. J.*, Jun 1958, 9pp. *Applied Psychology Research Unit, Medical Research Council, Cambridge, England.*

An investigation was made to discover the number of stimuli that Ss could remember in a simple stimulus-response task. The stimulus was an alphabetical letter and the response a button labelled with the name of the letter. According to the instructions the response to a "lag" main stimulus had to be delayed until a definite number of later stimuli had appeared. Ss had to remember a continually changing group of letters. It was found that the nature of the task changed radically as the errors increased. Thus, it was of greater interest to determine the speed at which a pre-determined criterion of performance was reached than to determine the performance levels at various fixed speeds. It was found that the Ss required approx. 1 sec. per stimulus for each member of the group which they had to hold in memory. When the response lag 5 letters behind its stimulus so that 4 letters had to be remembered, the Ss required 4 sec. per stimulus to achieve the 80% performance level.

12,081
Poulton, E.C. PREVIOUS KNOWLEDGE AND MEMORY. British Psychological Journal, Nov. 1957, 46(4), 399-370.
(Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

This paper is concerned: a) with the relationship between previous knowledge and memory; b) with differences between recall and recognition; and c) with test for time of memory test while learning. It was found that a test was more likely to be certain that a false statement was false, than that a true statement was true. For both true and false statements, memory was best for statements about where truth the S was certain, and worse for statements about whose truth he had no idea. With memory for a particular word as a criterion, there was no difference between recall and recognition when the word was in a statement about whose truth the S was certain and correct, and memory was tested almost immediately. Recognition was found to be a less sensitive measure of previous knowledge than recall. Immediate memory was best when a test of memory was expected immediately, and worse when no test was expected. (MIA)

12,082
Coonan, T.J. SOME PROBLEMS IN THE DESIGN OF HUMAN-OPERATED TARGET DATA PROCESSING SYSTEMS. Final Report. Proj. NE 121 303, BuShips S 1836, NRL Rep. 5219, Sept. 1958, 7pp. USN Research Lab., Washington, D.C.

12,082
In target data processing systems utilizing manual detection and tracking, the design of operator tasks is especially critical. This report examines some tasks commonly assigned to operators in such systems with reference to human capabilities. Two aspects of detection and tracking task design are discussed: (1) type and number of tasks which can profitably be assigned to an operator and (2) some suggestions for facilitating performance of the basic tasks of detection, tracking, and monitoring. The discussion is particularly applicable to semi-automatic systems in which electronic data storage is provided.
G. R-4

12,083
Sweeney, J.S., Birmingham, N.P. & Garvey, W.D. A STUDY OF THE EFFECTS OF FILTERING ON THE PERFORMANCE OF A MANUAL COMPENSATORY TRACKING TASK. Proj. NR 401 000, NRL Rep. 5205, Sept. 1958, 6pp. USN Research Lab., Washington, D.C.

12,083
To investigate the effects of filtering on tracking performance, a low-pass filter was inserted ahead of the display or beyond the control in a closed-loop man-machine tracking system. An analog computer was used (1) with a human in the loop and (2) replacing the human operator with a high-gain amplifier and associated noise source. Errors were recorded for filter time constants of 0.10, 0.24, 0.45 and 0.74 seconds for condition (1) and 0.25, 0.50 and 1.0 seconds for condition (2). Data were compared for effect of filter position.
G. I. R-4

12,084
Central Institute for the Deaf. AUDITORY AND NON-AUDITORY EFFECTS OF HIGH-INTENSITY NOISE. Final Report. Contract NOME 1151(02), Proj. NR (146 092) & BuMed Engg Res. Proj. NR 15 01 99, Subtask 1, Rep. 7, June 1958, 224pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,084
To determine what, if any, cumulative effects were being produced on naval personnel by routine exposure to high-intensity noise, carrier flight deck personnel aboard two United States Navy carriers and a group of shore-based jet aircraft personnel were tested by pure-tone audiometry, by various psychological and psychomotor tests, and by psychiatric interviews. Sick-leave calls were further analyzed. The data were studied for indications of undesirable cumulative after-effects of noise exposure. Both general and specific recommendations are presented.
T. G. I. R-11

12,085
Havron, H.D. & Butler, L.F. EVALUATION OF TRAINING EFFECTIVENESS OF THE 2-PH-2 HELICOPTER FLIGHT TRAINER RESEARCH TOOL. Contract NOME 1915(00), NAVTRADVCN Proj. 20 05 16, Tech. Rep. 1915 00-1, PRA Rep. 56 17, April 1957, 141pp. Psychological Research Associates, Arlington, Va.

This evaluation was conducted to determine the effectiveness of Device 2-PH-2, Helicopter Flight Trainer Research Tool. The device consists of a unique type of visual display, a cockpit with activated instruments and controls, and a generalized flight system computer. It was originally constructed to determine the feasibility of utilizing an internal non-programmed point-source-of-light projection system to create the illusion of three dimensional space on a curved projection screen. The flight computer is designed to approximate in a general way the flight characteristics of the Bell UH-1A Helicopter. The evaluation examined the device's usefulness in the initial training stages, and the attendant problems when transferring to an operational helicopter. The findings indicated no particular advantage in this type of training and, in fact, some negative effects were noted. Some recommendations for analyzing these negative results are indicated.
R-16

12,085
Ammons, R.E., Farr, R.G., Bloch, Edith, Neumann, Eva, et al. LONG-TERM RETENTION OF PERCEPTUAL-MOTOR SKILLS. J. exp. Psychol., April 1958, 55(4), 318-328. (University of Louisville).

12,086
To measure the retention of perceptual-motor skills, 22 groups, ranging in size from 20 to 36 male college students, were trained to either a moderate or high level of proficiency on either a procedural task (sequential manipulation of a series of controls) or on a compensatory pursuit task (Airplane Control Test). They were then retrained after no-practice intervals up to two years in duration. Learning, retention, and re-learning were measured and analyzed and effect of proficiency level of original learning and length of no-practice interval were evaluated.
T. G. R-10

12,087
Colquhoun, W.P. VIGILANCE AND THE INSPECTION PROBLEM. *Nature*, Dec. 1957, 180, 1321-1332. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

12,087
The experimental findings of laboratory studies of vigilance tasks are summarized and their relevancy to the practical problems of examination and checking in the factory discussed. An analysis of such inspection tasks leads to the conclusion that more information is needed on the effects of various conditions on inspection efficiency. A program of research is then outlined. R 1

12,088
Broadbent, D.E. & Ladefoged, P. ON THE FUSION OF SOUNDS REACHING DIFFERENT SENSE ORGANS. *J. acoust. Soc. Amer.*, June 1957, 29(6), 708-710. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,088
The problem of perceptual fusion in hearing is considered and some aspects involved in the explanation of vowel perception by a place theory of hearing are explored. A speech synthesizer was programmed to produce a short sentence and the output recorded on a two-track tape recorder. In some cases the formants were on one track only, in others the first formant was on one track and the second on the other. In some cases the same generator was used for both formants; in others two identical ones were used. Each of the listeners' ears was stimulated by one track and the task was to judge how many voices were heard and from what position. The theoretical implications of the results are discussed. T. I. R 6

12,089
Ladefoged, P. & Broadbent, D.E. INFORMATION CONVEYED BY VOWELS. *J. acoust. Soc. Amer.*, Jan. 1957, 29(1), 98-104. (University of Edinburgh, Scotland).

12,089
To examine features of vowel quality which convey linguistic information enabling the listener to identify the words used, six versions of the sentence "Please say what this word is" were synthesized and varied in only one respect - frequency ranges for the first and second formants. Four test words of the form b - (vowel) - t were also synthesized. Sixty subjects were asked first to identify the words as heard in random order and then to identify them as they occurred immediately following the various versions of the sentence. The relationship between formant frequencies in sentence and word was analyzed. Some psychological implications were discussed. T. I. R 8

12,099
Bowen, Jane M. THE APPARENT DISTANCE OF OBJECTS PRESENTED STEREOSCOPICALLY. SOME EFFECTS OF VARYING CUES TO DEPTH. *APU 306/58*, April 1958, 11pp. *Applied Psychology Research Unit*, MRC, Cambridge, England.

12,099
To examine the importance of monocular cues in stereoscopic vision, pairs of stereoscopic slides (abstract shapes and photographs of scenery) were shown stereoscopically, pseudoscopically, and inverted pseudoscopically. The six subjects had to match the apparent distance of various objects in each scene with a "stereoscopic pointer". Errors of estimation were analyzed for each condition to study the manner in which the disruption of monocular cues affected performance. The technique used is discussed as providing a new tool in the study of depth perception. T. G. R 7

12,100
Baker, C.H. ATTENTION TO VISUAL DISPLAYS DURING A VIGILANCE TASK: II. MAINTAINING THE LEVEL OF VIGILANCE. *APU 295/58*, Feb. 1958, 10pp. *Applied Psychology Research Unit*, MRC, Cambridge, England.

12,100
To investigate the effect of regularity of signal appearance on vigilance level, 30 subjects participated in a series of tests. The subject faced a circular display of light on which a pip might appear at any moment and pressed a response button when it did appear. The temporal interval between successive appearances ranged from 36 to 196 seconds, the average period being two minutes. Various warning devices and searching aids were used with this regular timing. In the last experiment, irregular intervals were used. Percentage of pips missed was analyzed as a function of time. In addition, motor activity was continuously recorded from the subject's chair and the record related to performance. T. G. R 22

12,101
Baker, C.H. ATTENTION TO VISUAL DISPLAYS DURING A VIGILANCE TASK: I. BIASING ATTENTION. *APU 294/58*, Feb. 1958, 12pp. *Applied Psychology Research Unit*, Medical Research Council, Cambridge, England.

12,101
To determine (1) the nature of visual search behavior in radar-like situations, and (2) ways of biasing search behavior in an attempt to overcome "peripheral blindness", five experiments were performed in which subjects (16 in each) were asked to search a PPI (Plan Position Indicator) and report the appearance, at any location on the display of a pip (spot of light). The five displays were varied as follows: (1) blank (no sweep-line); (2) full sweep-line; (3) small dot on sweep-line at half-radius and a green light appearing randomly above display; (4) outer half of sweep-line only; and (5) box-sweep (two sweep-lines and three arc lines). Percentages of pips detected and response times were analyzed in terms of the objectives under study. T. G. R 9

12,102
Baker, P. EXTROVERSION-INTROVERSION AND IMPROVEMENT IN AN AUDITORY VIGILANCE TASK. *APU 311/57*, Aug. 1957, 8pp. *Applied Psychology Research Unit*, Medical Research Council, Cambridge, England.

12,102
To test the hypothesis that performance on a vigilance task can be improved by introduction of a secondary task that would markedly increase the total number of required responses, an auditory vigilance situation was chosen. Forty subjects were tested under two conditions: 1) they listened to an 80-minute recording of a sequence of digits in order to detect the occurrence of primary signals (three successive odd digits that are all different), and 2) they listened for primary signals as above and also had to detect secondary signals (the digit 6). Primary signals occurred ten times every 16 minutes and there were ten times as many secondary signals. Detection data were analyzed for the two situations and with reference to measures of introversion-extroversion for each subject. G. R 5

12,103
Carpenter, A. THE SYNTHESIS OF VOWEL SOUNDS. *A.P.U. 316/57*, Dec. 1957, 15pp. *Applied Psychology Research Unit*, Medical Research Council, Cambridge, England.

12,103
This report describes an apparatus designed as a flexible means of synthesizing complex sounds, by mixing together the component sine waves in known amplitude and phase. By means of the apparatus the effect of different kinds of larynx pulse and of different forms of modulation can be observed, and any desired profile of harmonics can be built up. Block diagrams and calibration graphs are presented for the various units that make up the apparatus. G. I. R 5

12,104
Kelley, T.L. DEVELOPMENT OF AN ACTIVITY PREFERENCE TEST. Contract AF 33(038) 13632, Proj. 7700, AFTRC TR 57-107, July 1957, 44pp. USAF Personnel Research Lab., Lackland AFB, Tex.

12,104
In this report, components of individual behavior are identified and measured through responses to a comprehensive questionnaire on activity preferences. This investigation follows up development and analysis of an Activity Preference Test with wartime Army samples by revising the test to make it suitable for the airman age range and for both men and women. The revised form was administered to seven groups of men and two groups of women. Component scores were analyzed for reliability and group differences. A chart form was developed for profiling individual and group component scores. Two alternate forms of the test were developed.
T. G. I. R 5

12,105
Kreider, M.E., Buskirk, E.R., & Bass, D.E. OXYGEN CONSUMPTION AND BODY TEMPERATURES DURING THE NIGHT. Proj. 7-83.01-005B, Tech. Rep. EP 95, July 1958, 10pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,105
To establish baseline data on physiological changes that occur during sleep, simultaneous measures of oxygen consumption, rectal temperature, and mean weighted skin temperature were made on nine young men (32 man-nights) sleeping at night in a "comfortable" ambient environment (25.5-27.8 degrees Centigrade). Some additional measurements were made on ten other subjects. Changes in the measures were analyzed as a function of time. Individual differences were studied. Values for body heat content and cumulative heat debt at the end of the seven-hour sleep period were calculated.
T. G. R 20

12,106
Hoehn, A.J., & Lumsdaine, A.A. DESIGN AND USE OF JOB AIDS FOR COMMUNICATING TECHNICAL INFORMATION. Proj. 7709, AFTRC TR 58-7, Jan. 1958, 34pp. USAF Maintenance Lab., Lowry AFB, Colo.

To reduce the amount of required technical training and increase the efficiency of job performance, improved techniques and principles in the design of job instructions were evaluated. Prototype materials and methods for the maintenance of flight control systems and their components were formulated and tested; several experiments on factors affecting the comprehension of printed verbal instructions were conducted; and exploratory research in audio presentation of instructions was accomplished. A number of conclusions were drawn: carefully designed job-aids can reduce training requirements; improve the utilization of lower-skilled airmen, and increase the reliability of performance; for maximum efficiency in the development of maintenance capabilities, procedures should be closely integrated with training materials; available principles for troubleshooting routines should be refined, in part with the aid of suitable mathematical models; better methods of job-tasks analysis are required for better design of job-aids (through use of learning concepts); an automatic sound-film viewer was demonstrated as technically feasible. (MEIAS)
R 31

12,108
Hollander, E.P. VARIABLES UNDERLYING SOCIOMETRIC STATUS: II. GROUP EXPECTANCIES AND LEADERSHIP STATUS. Contract NMR 1849(00), Navy Tech. Rep. 157, May 1957, 6pp. Psychological Labs., Carnegie Institute of Technology, Pittsburgh, Penn.

An attempt is made to integrate conceptions of norm, role, and status within a single framework. It is suggested that norms and roles are both based in behaviors which are expected by relevant others, i.e., members of a group to which one belongs. Status is seen to be related to role in the sense that the group generates a differentiated set of expectancies dependent upon status level; the role may be thought of in terms of these expectancies. Leadership is considered as a role evolved from high status which affords a great deal of latitude for deviation from common expectancies, but which imposes restrictions upon the individual for conformity to the differential expectancies associated with the role.
R 9

12,107
Larkins, J.T., & Jewell, D.S. ON-THE-JOB TRAINING AND PROFICIENCY OF K-SYSTEM MECHANICS. Proj. 7709, AFTRC TR 58-5, Jan. 1958, 20pp. USAF Maintenance Lab., Lowry AFB, Colo.

A final report on Task 37301, Principles of Effective OJT for Aircraft Maintenance. Research and development studies conducted in the maintenance personnel and training field are described, specifically in the areas of proficiency and performance evaluation of flight-line maintenance personnel for bombing-navigational systems and methods for the improvement of on-the-job training for these personnel. Tests, paper-and-pencil trainers, trainers, and job aids experimentally developed and evaluated under this task are briefly described. These include: K-System MAC-1 Trainer, MAC-2 Trainer, GTS Trainer, the Trainer-Tester, Multifunction-Information Trainer, and trouble Locator.
R 17

12,109
Lacey, J.J. & Lacey, Beatrice C. THE RELATIONSHIP OF
RESTING AUTONOMIC ACTIVITY TO MOTOR IMPULSIVITY.
CHAPTER V. *Brain and Human Behavior*, 1956, 36, 144-
209.

12,109
To explore the relationship of resting autonomic
activity to motor impulsivity, two experiments were per-
formed. In one, 28 adult women were subjects; heart
rates and plantar-plantar skin resistance were recorded
during 1) relaxation, 2) cyclic driving of autonomic re-
sponses by electric shock at fixed intervals, and 3) a
paper-and-pencil performance test self-paced and at a
speed causing failure. The second used the same record-
ing techniques on 34 male college students with the task
calling for a discrimination response to a series of
lights. The data were analyzed for frequency and level
of autonomic responses in relation to experimental con-
ditions. A neuro-physiological theory is developed in
some detail.
G. R. 49

12,110
Lehmann, G. & Kraut, H. ARBEITEN AUS DEM MAX-PLANCK-
INSTITUT FÜR ARBEITSPHYSIOLOGIE UND DEM MAX-PLANCK-
INSTITUT FÜR ERNÄHRUNGSPHYSIOLOGIE IN DORTMUND. June
1957, 29pp. *Max-Planck-Institut für Arbeitsphysiolo-
gie*, Dortmund, Germany.

12,110
This bibliography covers publications from the two
laboratories for the period from 1953 to 1957. Some
areas covered are: climate and work, muscles, industrial
psychology, vitamins, physiological chemistry, noise and
vibration, sensory physiology, and so forth.
R. 260

12,111
Licklider, J.C.R. STUDIES IN AURAL PRESENTATION OF
INFORMATION. Final Report. Contract AF 18(600)
1219, AFRC-TR 58-53, Oct. 1957, 44pp. *USAF Opera-
tional Applications Lab.*, Andrews AFB, Washington,
D.C. (Department of Economics and Social Science,
Massachusetts Institute of Technology).

12,111
This final report summarizes the results of re-
search aimed at furthering the understanding of some
fundamental characteristics of hearing that govern
auditory reception of radar information and the intel-
ligibility of speech communication. The discussion is
given under four main headings: (1) the stimulus basis
of the perception of pitch, (2) auditory signal detec-
tion, (3) identification of auditory signals, and (4)
effects of interference upon speech intelligibility.
A final section describes a device for demonstrating
the combined aural and visual display of certain types
of radar information.
R. 23

12,112
Parker, J.F., Price, H.E., McLaughlin, J.T., Shanahan,
W.P., & Older, H. AVIATION MEDICAL SAFETY TRAINING:
PROCEDURES, FINDINGS AND RECOMMENDATIONS. (Volume I
of Three Volumes). Contract N-61339 28, NAVTRADEVEN
Proj. 20 B-1, Tech. Rep. NAVTRADEVEN 1339 28 1, Aug.
1957, 41pp. *VSN Training Device Center*, Port Wash-
ington, N.Y. (Psychological Research Associates,
Arlington, Va.).

12,112
This report is the result of a comprehensive survey
of the role of the flight surgeon in aviation medical
safety activities. Various military and civilian facili-
ties were visited to gain information available relating
to the human factor aspects of aircraft accidents and to
determine current practices of flight surgeons with re-
spect to accident prevention procedures and accident in-
vestigations. Analysis of these materials together with
Navy directives relating to the duties of a Naval Flight
Surgeon led to recommendations for training, for the
substantive content of such training, and for training
aids and devices for accident prevention and flight
safety teaching.
R. 6

12,113
Strauss, P.S. & Morris, P.F. AN EVALUATION OF METAL
CONTAINER OPENING DEVICES FOR ARCTIC USE. Tech. Rep.
2539, Sept. 1956, 27pp. *USA Field Research and
Engineering Labs.*, Picatinny Arsenal, N.J.

12,113
Because arctic troops have encountered difficulty in
opening metal containers while wearing arctic mittens, sev-
en new methods for opening such containers (none requiring
fine manual and finger dexterity) were compared experimen-
tally. Standard metal containers with top and center
scored tear strips were used. Four subjects opened the
cans using each method several times at -65 degree F tem-
perature wearing arctic mittens and at room temperature
with and without mittens. Recommendations are made on the
basis of the results.
T. I.

12,114
Trittipoe, W.J. TEMPORARY THRESHOLD SHIFT AS A FUNC-
TION OF NOISE EXPOSURE LEVEL. *J. Acoust. Soc. Amer.*,
April 1958, 30(4), 250-253. (*USAF Operational Appli-
cations Lab.*, Bolling AFB, Washington, D.C.).

12,114
To investigate temporary threshold shifts (TTS)
as a function of sound level for equal exposure dura-
tions, TTS was measured continuously with a Bekesy-type
audiometer at 4000 and 6000 cycles per second for ten
minutes following a three-minute exposure to a thermal
noise. Five noise levels (from 108 to 128 decibels in
sound pressure level) were used. One ear of each of
nine listeners was tested twice on each condition. The
data were analyzed for the average trend and for individ-
ual patterns.
G. I. R. 5

12,115
Pollack, I. SPEECH INTELLIGIBILITY AT HIGH NOISE
LEVELS: EFFECT OF SHORT-TERM EXPOSURE. *J. Acoust.
Soc. Amer.*, April 1958, 30(4), 282-285. (*USAF Opera-
tional Applications Lab.*, Bolling AFB, Washington,
D.C.).

12,115
To examine the range of conditions over which post-
stimulatory effects of noise exposure upon speech intelli-
gibility (in noise) might be observed, successive word
intelligibility tests were executed at a constant signal-
to-noise ratio over a 13 minute period. The range of
noise levels covered 43 to 130 decibels. For tests of
cumulative effects eight lists were read at a single
noise level with no break between lists; four noise lev-
els (110, 115, 120 and 130 decibels) were used. For
post-stimulatory effects, noise levels increased or de-
creased during breaks between tests. Intelligibility
data from five listeners were analyzed for cumulative ef-
fects of a constant noise and post-stimulatory effects
of noise.
T. G. R. 5

12,116
Pollack, I. MESSAGE PROCEDURES FOR UNFAVORABLE COM-
MUNICATION CONDITIONS. *J. Acoust. Soc. Amer.*, March
1958, 30(3), 196-201. (*USAF Operational Applications
Lab.*, Bolling AFB, Washington, D.C.).

12,116
Several message procedures designed to improve
speech communications under extremely unfavorable noise
conditions were examined. One procedure based upon the
informational principle of successive selections was com-
pared with a second procedure using single repetition of
a single selection among a larger number of alternatives.
Under various speech-to-noise ratios the talker repeated
a sequence until the listeners signaled they were reason-
ably confident they had received the message or until
70 seconds had elapsed. A joint time-accuracy analysis
was made and relative efficiency established.
G. R. 16

12,117

Pollack, I. & Pickett, J.M. EFFECT OF NOISE AND FILTERING ON SPEECH INTELLIGIBILITY AT HIGH LEVELS. *J. acoust. Soc. Amer.*, Dec. 1957, 29(12), 1328-1329. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,117

This note resolves some apparent contradictions in experimental findings on the effects of high sound levels on the intelligibility of speech. The contradictions are: (1) in absence of noise, substantial losses are observed at high levels for frequency-limited speech but little loss for wide-band speech, and (2) in the presence of noise, substantial losses are observed at high levels for wide-band speech. It is shown that the effects of high sound levels on wide-band speech in noise roughly parallels the effects of high levels on filtered speech. The Articulation Index (AI) encompasses both findings if it is assumed that the effect of high sound levels is to produce an effective change in AI. C.

12,118

Pollack, I. SPEECH COMMUNICATIONS AT HIGH NOISE LEVELS: THE ROLES OF A NOISE-OPERATED AUTOMATIC-GAIN CONTROL SYSTEM AND HEARING PROTECTION. *J. acoust. Soc. Amer.*, Dec. 1957, 29(12), 1324-1327. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,118

This paper evaluated two aids for hearing conservation for personnel involved in military speech communications, a noise-operated automatic gain control (AGC) system and an insert ear protection. A noise AGC system was simulated and intelligibility tests carried out with binaural earphones. The ranges of conditions over which a listener might be exposed to fluctuating noise levels and still hear intelligible speech were tested with and without ear defenders (V-SIR) and wax-impregnated cotton plugs under earphones. The results are evaluated in terms of speech intelligibility. G. R. 4.

12,119

Pollack, I. & Decker, L.R. CONFIDENCE RATINGS, MESSAGE-RECEPTION, AND THE RECEIVER-OPERATING CHARACTERISTIC. *J. acoust. Soc. Amer.*, April 1958, 30(4), 286-292. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,119

To obtain independent information about a listener's criterion for message acceptance or rejection, a rating scale of confidence judgments was added to the standard articulation test procedure. Each of three listeners responded to the test words under three speech-to-noise ratios. After writing the word, they marked the six-category confidence-rating scale as to their judged accuracy of reception. Control tests were run without the rating scale judgments. The data were studied in terms of effect of rating-scale on accuracy, the form of the receiver operating characteristic, and effect of noise ratios on this relationship. G. R. 10

12,120

Groth, Hilde & Lyman, J. SENSORY PROBLEMS IN PSYCHO-MOTOR PERFORMANCE OF AMPUTEES. AN INVESTIGATION OF THE ADEQUACY OF REMAINING SENSORY CUES FOR PROSTHESIS PERFORMANCE ON TWO VISUO-MOTOR TASKS. Rep. 58 19, Special Tech. Rep. 26, Feb. 1958, 49pp. Department of Engineering, University of California at Los Angeles.

12,120

To isolate and identify those human factors considered to be of importance for the optimal functioning of the amputee-prosthesis system, two visual motor tasks were used: pursuit tracking and manipulation (placing cylinders in formboard at two levels of pace-performance and two levels of movement pattern). Twenty non-amputees and 15 unilateral amputees served as subjects. Performance data (target hits and time-on-target at various time intervals; mean prehension forces and time per transport) were analyzed in terms of adequacy of sensory information, increase of "central integration time" due to prosthesis. T. G. I. R. 10

12,121
Kelley, H.P. A STUDY OF PREFERENCES FOR TYPE OF NAVAL AIR ADVANCES TRAINING. DUMEDSBERG, Res. Proj. NK 16 01 11, Subtask 8, Rep. 1, Jan. 1958, 39pp. USN School of Aviation Medicine, Aviation Medical Center, Pensacola, Fla.

Preference and preference strength ratings for advanced flight training were obtained from several thousand naval aviation pilot trainees. Ratings were obtained at the beginning and end of pre-flight school. It was found that: a) The stability of preference for particular type training was not high. Roughly one-third of the students changed preference between pre-flight and their time of official choice; b) Men assigned against their preference to VPHS training performed more poorly than men assigned by their preference to such training. No other "cross assignments" showed such an effect; c) Men assigned to land-based training (VPHL and VPHS) against their preference attained at twice the rate of men assigned to land-based training (27 men in 1095 assignments). For this small group of men, attrition rates were not significantly high; d) In this sample the average FAA scores and basic flight grades were lower for men preferring and being assigned to land-based type training (VPHL and VPHS).

12,122

Dale, H.C.A. SUBJECTIVE PROBABILITY, GAMBLING AND INTELLIGENCE. *Nature*, Feb. 1958, 181, 363-364. (Applied Psychology Research Unit, Medical Research Council, Cambridge, England).

12,122

The experiment reported in this brief note examined the relationships among subjective ideas of probability, the individual's tendency to gamble and his intelligence. Each of forty subjects was given three problems requiring the location of hidden objects. The task could be approached systematically or randomly. The strategy adopted by the subject was related to his intelligence. Also examined was the relative intelligence of subjects with relation to their sophistication concerning the concept of subjective probability. Results are briefly noted and discussed in terms of the relation between intelligence and (1) method of approach to the problem and (2) ideas of subjective probability. R. 5

12,123

Davis, J.F., Stannett, R.G. & Oulter, R.E. AN AUDITORY TRACKING DEVICE DESIGNED FOR USE IN CONJUNCTION WITH CONTINUOUS EEG RECORDING. *Percept. Mot. Skills*, 1957, 2, 239-244. (Allan Memorial Institute of Psychiatry & McGill University).

12,123

An auditory tracking device is described which makes possible the continuous monitoring of performance and the continuous recording of the electro-encephalogram (EEG) simultaneously. It meets the conditions necessitated for a study of alpha in the EEG (eyes closed) and for satisfactory measurement of EEG (reclining position). The system is based on null-point tracking. The operation, processing and measurement of the error signal, and details of the separate circuit components are described. I. R. 4

12,124

Hall, J.F. Jr., Kearny, A.P., Polte, J.W. & Quilletts, S. EFFECT OF DRY AND WET CLOTHING ON BODY COOLING AT LOW AIR TEMPERATURES. Proj. 7164, Task 71830, WADC TR 57-769, May 1958, 26pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,124

To determine 1) the general feasibility of extending the "wet-suit principle" to emergency cold-water exposure of Air Force crews, 2) the comparative cooling effect of dry versus wet clothing, and 3) to define, in terms of body-heat-storage change and skin extremity cooling, the safe tolerance time for various air temperatures after exposure to cold water, five clothed subjects were immersed in cold water for brief periods, exposed in a life raft to air temperatures from plus 4.4 degrees to minus 28.9 degrees Centigrade. Skin, rectal, and extremity temperatures were measured. Predictive curves are given, which, applied with caution, permit estimation of human tolerance for subjects clothed in wet and dry garments while exposed to various low temperatures in a life raft. T. G. I. R-7

12,125

Baddelay, A. THE INFLUENCE OF AN IRRELEVANT CUE ON SEARCHING IN A STRUCTURED SYSTEM. APU 325/58, April 1958, 14pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,125

The present experiment studied the effect of an irrelevant cue on problem solving in a structured situation. Twenty-two subjects were presented with a series of problems analogous to that of locating a fault in electronic equipment. An irrelevant variable was introduced in the form of a right angle bend occurring at various points in a series of 19 stages. The problems were divided into two groups of two straight-line problems: 1) with bend occurring at an odd-numbered stage, and 2) with bend occurring at an even-numbered stage. Only the first stage checked by the subject was used as data. Results are discussed with relation to the effect of the irrelevant cue upon the orientation and general performance of the problem solver. T. G. I. R-7

12,126
Conrad, R. ACCURACY OF RECALL USING KEYSET AND TELEPHONE DIAL, AND THE EFFECT OF A PREFIX DIGIT. A.P.U. 322/58, Feb. 1958, 7pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

A test of immediate memory for 8-digit messages was given to 24 female telephone operators, using 4 different recall conditions. It was found that the presence of a redundant prefix significantly worsened recall. When the message was transcribed onto a 10-digit keyset, recall was not significantly better than when transcribed onto a telephone dial. But when a prefix digit was introduced, the dial proved to be an inferior method of transcription. It would seem that at about the level of difficulty when more than half the messages would be forgotten, recall would be improved by use of keyset rather than telephone dial. Recall errors were analyzed digit by digit. All errors could be classified into order errors and omissions. No evidence was found that certain digits would be systematically confused with certain others. R. 8

12,127

Bergquist, R.F. & Moore, C.D., Jr. REPORT, MEDICAL SECTION, OF A GREENLAND OPERATION, SUMMER 1957. Oct. 1958, 32pp. USA Medical Research Lab., Fort Knox, Ky.

12,127

To define qualitatively certain medical problems related to a Greenland military operation, the record of activities of a medical section (medical officers and five enlisted men) in support of the United States Army Engineer Arctic Task Force during the 1957 summer season is presented. The situation of the Task Force is described; the personnel, facilities, and equipment of the medical section are detailed; matters of safety, sanitation, and morale as noted by medical officers are recorded; and the medical care given is summarized. Recommendations are made. T. G. I.

12,128

Gogel, W.C. APPARENT DEPTH DUPLICATION WITH BINOCULAR DISPARITY CUES. AMRL Proj. 6-95 20 001, Rep. 354, Oct. 1958, 23pp. USA Medical Research Lab., Fort Knox, Ky.

12,128

Two experiments were conducted to apply a previously developed hypothesis to the problem of the perceptual duplication of a depth interval at different distances from the subject, using binocular disparity cues. Both frontal size judgments and depth duplication judgments were obtained in situations in which there were a variety of cues for the perceived distance of only one of the objects in each pair of stimuli. The results were compared with theoretical predictions. T. G. I. R-3

12,130

Michel, E.M. SURVIVAL SPACE REQUIREMENT FOR INDIVIDUAL AIRCRAFT ESCAPE CAPSULES. Proj. 6363, WADC TR 56-526, Feb. 1957, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,130

In capsular type aircraft clothing has become a part of necessary survival gear. This study was undertaken in order to establish a new space requirement for the stowage of gear. The absolute minimum amount of clothing and survival gear necessary for survival under extreme conditions was selected, measured, weighed, and a pack designed to carry the gear. Space requirements were then determined. Recommendations are included. T. I.

12,131

Mendelson, E.S. EFFECTS OF JET-ENGINE AFTERBURNER NOISE: OBJECTIVE MEASUREMENT OF THE AUDITORY REFLEX IN MAN. BUMED Proj. NM 0011062.05, Rep. 4, Rep. NAMC ACEL 327, TED NAM AE 6513.1, Feb. 1957, 2pp. USN Air Crew Equipment Lab., Air Materiel Center, Philadelphia, Penn.

12,131

An objective method for measuring involuntary reactions in human subjects exposed to loud sounds is described. In some subjects small but consistent muscular contractions may be demonstrated without resort to visual observations. The contractions have been elicited by stimulation of one ear with loud tones, while recording minute pressure changes from the external canal of the opposite ear. Some exploratory observations on this auditory reflex response are presented and the usefulness of the method discussed. T.

12,132
Teghtsoonian, R. & Shephard, A.H. REACTIVE AND CONDITIONED INHIBITION IN PERCEPTUAL-MOTOR PERFORMANCE. *Canada J. Psychol.*, 1957, 11(4), 201-211. (University of Toronto, Canada).

The following hypotheses were tested: a) the presentation of a tone at cessation of massed practice on a perceptual-motor task will lead to association of a tendency not to respond (a resting response) with the tone; b) this association will be stronger than if a delay is permitted between cessation of practice and presentation of the tone; c) it will be delayed by the active responding to the tone required in a measurement of reaction time to the tone. 4 groups of subjects were employed, whose reaction time to a tone was measured both before and after the differential treatment. 3 groups practiced for 7 1/2 minute periods separated by 60-second rest intervals on a modified 2-hand coordinator. For Group 1 the tone was presented for the first 15 seconds of each rest period. For Group 2 the tone was not used at all in relation to practice on the coordinator. For Group 3 the tone was presented throughout the last 15 seconds of each rest period. Group 4 was treated like Group 1, but did not perform at all on the coordinator. The hypotheses were tested by comparisons among the groups of differences in reaction time to the tone, measured before and after the differential treatment. All 3 hypotheses were supported by the data. It was concluded that the results provide indirect support for Hull's concepts of reactive and conditioned inhibition, but that the latter concept might be broadened to state that a resting response can become associated with any stimuli present at the cessation of massed practice.

R. 16

12,133
Fletcher, N.C. & Shephard, A.H. INTERPRETATION OF DATA AS A FUNCTION OF UNITS OF MEASUREMENT. *Canada J. Psychol.*, 1957, 11(1), 65-70. (University of Toronto, Canada).

12,133
This paper discusses the implications of various unit sizes when interpreting performance measured in terms of achievement over time. For illustrative purposes the data from a learning experiment are interpreted for various intervals of measurement. The implications of the resultant analysis are discussed in terms of the experimental design of studies and the necessity for properly defining the size of the measuring interval.

T. G. R. 1

12,134
Belanger, D. "GRADIENTS" MUSCULAIRES ET PROCESSUS MENTAUX SUPERIEURS. *Canada J. Psychol.*, 1957, 11(2), 113-122. (Institute of Psychology, University of Montreal, Canada).

12,134
Electromyographic techniques were used in two experiments to measure changes in muscular tension in the forearms of subjects engaged in perceptual-motor tasks of contrasted difficulty. In one experiment, 14 subjects were required to make rapid discriminations between circles of varying sizes and respond by pressing an appropriate button. The second experiment required the subject to press a button whenever he heard a clearly audible click. Muscle tension changes were compared for the two tasks and the results discussed in terms of the adequate stimulus for arousal of muscle-tension gradients. The use of such gradients in the study of higher mental processes is discussed.

T. G. R. 16

12,135
Mitchell, R.T. PROPOSED STUDY OF VISUAL FLICKER ON CATHODE RAY TUBES. Memo. 38 5603, March 1956, 6pp. Lincoln Lab., Massachusetts Institute of Technology.

12,135

This memorandum summarizes tentative plans for an investigation of visual flicker phenomena with special reference to the decay characteristics of various phosphors used in cathode ray tubes. The considerations that influenced the proposed plans are discussed and a list of phosphors to be studied is included.

I.

12,136
Hulbert, S.F., Burg, A., Knoll, H.A. & Matlewson, J.H. A PRELIMINARY STUDY OF DYNAMIC VISUAL ACUITY AND ITS EFFECTS IN MOTORISTS' VISION. Reprint 61, Jan. 1956, 5pp. Institute of Transportation and Traffic Engineering, University of California at Los Angeles.

12,136

The role of dynamic visual acuity (DVA) was explored in relation to reading highway destination signs while driving. First a procedure for measuring DVA was developed wherein a target image (checkerboard) was flashed on a semicircular screen by a projector mounted on a revolving turntable. DVA scores were obtained at 20, 60, 120, and 180 degrees/second angular velocity; four static acuity scores (Keystone Telebinocular, Ortho-rater, and two static exposures on DVA apparatus) were also obtained and analyzed for relationship to dynamic acuity. A comparison of DVA scores and ability to perform on a moving sign test (see 12,137) was then made. Plans for continuing research are discussed.

T. R. 13

12,137

Hulbert, S.F. & Burg, A. THE EFFECTS OF UNDERLINING ON THE READABILITY OF HIGHWAY DESTINATION SIGNS. Reprint 62, 1957, 14pp. Institute of Transportation and Traffic Engineering, University of California at Los Angeles.

12,137

To investigate the effects of underlining on the readability of highway destination signs, stimuli (destination signs) were prepared and photographed from a moving car. The stimuli conformed to standard highway signs and were varied with respect to underlining (short thick, long thick, long thin, and none), number and length of destination names, and arrow configurations. The accuracy with which the subjects (140) recognized a given destination when presented on the screen was analyzed in terms of the design factors named above. The relation of visual acuity to performance is discussed.

T. I. R. 6

12,138

Morris, A.D. & O'Rourke, G.G. EVALUATION OF AN/APQ-50 RADAR SET INDICATOR SHIELD. Final Report. Proj. TED PTR AV 33002, Rep. 1, ET313-201, Aug. 1957, 11pp. USN Air Test Center, Naval Air Station, Md.

12,138

The AN/APQ-50 Radar Set Indicator Shield was designed to make possible daylight radar viewing in the F4D-1 airplane. The development of the Indicator Viewer is described and its flight evaluation recorded. The implications of the need for this development are discussed in relation to new problems inherent in the design of future Navy fighter planes.

I. R. 3

12,139

Rohrer, R. THE INFLUENCE OF BOUNDARY SHARPNESS AND CONTRAST ON THE PERCEPTIBILITY OF DETAIL IN PHOTOGRAPHS WITH PARTICULAR REFERENCE TO X-RAY DIAGNOSIS. TIL/T 4778, July 1957, 8pp. Technical Information and Library Services, Ministry of Supply, London, England.

12,139

The perceptibility of detail in X-ray photographs is investigated in terms of how much information is basically provided by the film. A statistical evaluation of the probabilities that differences in film darkening can be attributed to true detail (as distinct from differences due to statistical variation) is made. The dependence of the objective perceptibility of detail on area, contrast, and boundary sharpness is analyzed.

R. 23

12,141
University of Michigan Engineering Research Institute.
REPORT OF THE WORKING GROUP ON INFRARED BACKGROUNDS.
PART II: CONCEPTS AND UNITS FOR THE PRESENTATION OF
INFRARED BACKGROUND INFORMATION. Contract NMM 1224
(12), 2309 3 S, Nov. 1956, 14pp. Engineering Re-
search Institute, University of Michigan.

12,141
This report describes the concepts and units recom-
mended for the description of infrared backgrounds. A
background is considered to be any distribution of radi-
ance that is capable of interfering with the detection
or identification of a target. The effect of intervening
atmosphere is included.

12,142
Landahl, H.D. ON THE INTERPRETATION OF THE EFFECT
OF AREA ON THE CRITICAL FLICKER FREQUENCY. Bull.
Math. Biophysics, 1957, 19, 157-162. (Committee
on Mathematical Biology, University of Chicago).

12,142
The effects of area and intensity on the critical
flicker frequency, threshold, and reaction time are con-
sidered in terms of neural net theory. An attempt is
made to develop a mechanism that can account for the
phenomena associated with the empirically observed laws
of Ricco, Granit, Talbot, and Ferry-Porter as well as
observations on reaction time and threshold. A simple
model gives results that are substantially in agreement
with observation with a few apparent discrepancies. Ex-
perimental procedures are suggested for determining
whether the discrepancies are apparent or real.
G. I. R 3

12,143
van den Brink, G. THE VISIBILITY OF DETAILS OF A
MOVING OBJECT. Rep. IZF 1958.2, 1958, 12pp. Institute
for Perception RVO-TNO, Soesterberg, The Netherlands.

12,143
To investigate the factors involved in perception
of a moving object, a test object consisting of two
luminous bands separated by a dark band of the same
dimensions and same brightness as the background was
observed as it moved along a circular track around the
fovea with different orientation of the bands and for
a wide range of velocities and exposure times. The
energy required for 60 per cent chance of perception of
the dark band was determined. The threshold data were
analyzed in terms of critical values for displacement
and discussed in terms of the physiological factors of
retinal summation.
G. I. R 12

12,144
Dardano, J.F. & Stephens, J.A. DISCRIMINABILITY OF
AOC SYMBOLS. OOD Proj. TBI 1000, Tech. Memo. 4 58,
May 1958, 27pp. USA Ordnance Human Engineering Lab.,
Aberdeen Proving Ground, Md.

12,144
The relative discriminability of four geometric
shapes (cross, cross-within-circle, circle, and half-
circle), considered for use as radar symbols, were ex-
amined at size levels ranging from 1/8 to 1/2 inch at
intervals of 1/16 inch. The shapes were electronically
generated by an apparatus designed for installation in
the Anti-aircraft Fire Control System M-33 PFI (plan
position indicator). The time taken by each of 36 sub-
jects to scan the display and determine the frequency
of the signal (only one type was used for each display)
was the index of discrimination. Some possible determi-
nants of symbol discriminability are discussed.
T. G. I. R 5

12,145
Siddall, G.J. THE ACCURACY OF RE-POSITIONING A POINT
ON A CIRCLE AND A HORIZONTAL STRAIGHT LINE. Rep. 62,
March 1957, 14pp. Clothing and Stores Experimental
Establishment, Ministry of Supply, London, England.

12,145
To compare the accuracy of re-positioning a point on
a broken circle and on a horizontal straight line, a spot
of light was exposed on the displays for five seconds.
After it had reappeared elsewhere in the display, the
subject was required to move it back to its previous
position as accurately as possible. Each of six subjects
made a total of 160 settings on each of the two displays.
Low illumination was used to eliminate extraneous visual
cues. Total mean errors were analyzed for differences
due to shape of display, improvement in performance and
errors at different settings were further studied. The
findings are related to A scan radar displays.
T. G. I. R 5

12,146
Stockbridge, H.C.W. & Chambers, J.B. SIGHTING WITH
AIDED AND UNAIDED VISION. Rep. 85, March 1958, 11pp.
Clothing and Stores Experimental Establishment, Ministry
of Supply, London, England.

12,146
To 1) estimate time required to change from open to
aided vision and vice versa and 2) compare the time re-
quired to use a binocular or monocular sight, using a
laboratory simulator, six subjects (Ss) carried out
three experiments using open vision and vision assisted
by monoculars and binoculars. In experiment one, S gazed
over binoculars until a light bulb was switched on, then
dropped his head and looked through the binoculars at a
Landolt C eight yards away and responded with location of
the break. In the second experiment eyes were removed
from binoculars when the light came on and S looked at
the Landolt C as before. The condition of the third ex-
periment was from open to monocular sight. Results of
the three experiments are compared.
T. I. R 2

12,147
USN Photographic Interpretation Center. TEST AND E-
VALUATION OF THE DIRECT VIEWING STEREO PLOTTER
(KERNSTEDT-MAHAN). Final Report. Proj. TED PIC PH
4740, PIC Rep. 212/57 U, July 1957, 11pp. USN
Photographic Interpretation Center, Naval Receiving
Station, Washington, D.C.

12,147
This report covers the testing and evaluation of the
Direct Viewing Stereoplotter for general accuracy and ap-
plicability to photographic interpretation. Engineering
and operational tests were made and the results discussed
briefly. Recommendations concerning the use of the ster-
eoplotter in field photogrammetric work are made.
I. R 2

12,148
USN Photographic Interpretation Center. EVALUATION
OF PHOTOGRAPHIC INTERPRETATION MEASURING SCALES.
Proj. TED PIC PH 4737, PIC Rep. 208/57 U, May 1957,
6pp. USN Photographic Interpretation Center, Naval
Receiving Station, Washington, D.C.

12,148
To develop, test, and evaluate several devices
for measuring distances on photographs, a series of
transparent scales were designed and distributed to
photographic interpreters in the Production Department
of the United States Naval Photographic Interpretation
Center for operational tests. Each scale was checked
for accuracy on the Mann Comparator. Appendices to
this report contain reproducible copies of each type
of scale accompanied by detailed descriptions and
operating instructions. Recommendations for further
evaluation by users are made.
I.

12,150

Kleiser, E.T. & Loftus, J.P. NUMERALS, NONSENSE FORMS, AND INTEGRATION. Proj. 7682, AFRC TR 57.2, Feb. 1958, 22pp. USAF Operational Applications Lab., Bolling AFB, Washington, D.C.

12,150

To determine whether well-learned symbols are perceived, discriminated, and remembered better than nonsense forms, a series of arabic numerals and a logically related class of nonsense forms were presented tachistoscopically to a group of ten subjects. The task was to reproduce the stimulus-patterns--in some tests the entire pattern, in others only the one out of four indicated by a poststimulus cue (either visual or auditory). Time between stimulus and cue was varied systematically. Performance, percentage of line segments correctly reported and amount of information transmitted, was analyzed and compared for effect of type of stimulus-pattern.

T. G. I. R 10

12,151

Guarino, L.S. & Sikora, S.J. REPORT ON COMPARISON OF HELICOPTER FLIGHT ATTITUDE INDICATORS. BU AER Proj. TED NAM AE 7362.3, Rep. NAES INSTR 62 53, Nov. 1953, 9pp. USN Aeronautical Instruments Lab., Naval Base Station, Penn.

12,151

To determine the comparative value of several helicopter indicators, flight tests were conducted under simulated instrument flight conditions. The indicators (a conventional gyro horizon type, a rotor attitude type, a rate type, and the Sperry helicopter flight attitude indicator) were installed in a helicopter and two experienced pilots performed flight tests designed to simulate several types of conditions encountered in helicopter flight. Recorded results were inspected and compared for 1) minimum amplitude of attitude displacement in each axis and 2) amount of effort required to maintain attitude (frequency and amplitude of cycles stick and pedal displacement).

T. I.

12,152

Parker, C.G. AUTOMATIC SEAT STYLE PARACHUTE PART NO. 5007025 15, TEST OF. Proj. 6068, WADC Tech. Note 56 507, August 1957, 12pp. USAF Aeronautical Accessories Lab., Wright-Patterson AFB, Ohio.

12,152

The automatic seat style parachute, developed for use in high altitude aircraft where seating space is extremely limited and provisions for back style parachutes have not been made, was evaluated. Function tests included aerial drop, bench tests, live jumps, and cold chamber tests. Recommendations are included.

T. I. R 3

12,153

Geer, R.L. OPERATIONAL REGIONS AND BIO-AERODYNAMIC LIMITATIONS OF FUTURE AIRCRAFT ESCAPE SYSTEMS. Proj. 7218, Tasks 71719 & 71750, WADC TR 57 390, Oct. 1957, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,153

The boundaries and conditions for practical flight within the atmosphere are delineated. The region where flight is practical is divided into areas of different escape requirements. Three figures are included to illustrate the various flight regions as a function of altitude and Mach number.

G. R 9

12,154

Miller, E.F. EVALUATION OF CERTAIN VISUAL AND RELATED TESTS. III. FORM FIELDS. Bu Med Surg Proj. NM 14 01 11, Subtask 6, Rep. 3, April 1958, 9pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,154

The Renshaw test of form field (peripheral visual acuity) was evaluated as a possible screening device to detect visual anomalies that might affect flying efficiency. The form fields of 110 naval aviation cadets were measured; 60 were retested after a two-week interval to determine reliability. Frequency distributions of the total horizontal (nasal plus temporal) form fields were studied and test-retest reliability calculated.

T. G. R 5

12,155

Miller, E.F. EVALUATION OF CERTAIN VISUAL AND RELATED TESTS. I. AUDITORY AND VISUAL DIGIT SPAN. Bu Med Surg Res. Proj. NM 14 01 11, Subtask 6, Rep. 1, March 1958, 13pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,155

Tests of auditory and visual digit span were evaluated as possible screening devices to detect visual anomalies that might affect flying efficiency. A sample group of 120 naval aviation cadets were given each test and 60 were retested to determine reliability. Frequency distributions were plotted and scores from the two tests correlated. The mean scores were compared to those recommended as minimal for visual efficiency.

T. G. R 9

12,156

Cheetham, D.C., Mathews, C.W. & Harper, J.A. A STUDY OF VISUAL INTERCEPTION ATTACKS ON A NONMANEUVERING AIRPLANE TARGET. NACA RM L53E01, July 1953, 97pp. Langley Aeronautical Lab., Langley Field, Va.

12,156

This is a study and evaluation of interception runs made by an experienced pilot flying a Grumman F9F-3 airplane against a nonmaneuvering airplane target. Included are the control procedures and tracking characteristics displayed by the interceptor; pilot, the effect of interceptor turning limitations, data pertaining to interceptor control operation, and evaluations applied to automatic control apparatus.

T. G. R 3

12,157

Graham, C.H. SENSATION AND PERCEPTION IN AN OBJECTIVE PSYCHOLOGY. Psychol. Rev., March 1958, 65(2), 65-76. (Columbia University).

12,157

Five topics that are of systematic importance in the treatment of sensation and perception are considered from the point of view of an objective or behavioristic psychology. (1) Types of stimulus-response relations are discussed as they relate to introspective or phenomenological descriptions, psychophysical discriminations, absolute judgments, and thresholds. (2) The terms "sensation" and "perception" are considered in terms of operationally specifiable concepts. (3) Problems of terminology are treated. (4) Some recurring problems of perception are described. (5) Perception is regarded in terms of general psychological theory.

G. R 16

12,158

Mueller, C.G. & Berger, E. VISION. Annual Rev. Psychol., 1956, 7, 365-390. (Columbia University).

12,158

This survey of literature in the field of vision covers primarily publications in the year 1954. The studies are organized and discussed under the following topics: 1) physiological mechanisms--optical and mechanical characteristics of peripheral systems, photochemical and chemical properties and electrical properties of the visual system, 2) psychophysical measurement--adaptation, intermittent stimulation, color theory, contrast and glare, movement, discrimination of depth and distance, discrimination of location and position, size and shape, and figural after-effects, and 3) perceptual functions and some past history and perceptual variables.

R 159

12,159

The Illuminating Engineering Society. Light and Lighting, Nov. 1949, XLII(11), 302-308.

12,159

This issue of Light and Lighting, a journal of seeing and illumination, contains articles on "Oxidized aluminum in the construction of light fittings" by V.S. Henley; "Natural and artificial lighting in a classroom," a description of a prototype classroom designed by C.G. Stillman; "Lighting a bookshop," a description of a relighting project; "Eye movement research," an account of recent work at the Imperial College and elsewhere by Mary P. Lord and W.D. Wright; "An integrating photometer for the measurement of light output of flashtubes" by D.L. Munden; and a series of short notes.

T. G. I.

12,160
Weston, M.C. ON AGE AND ILLUMINATION IN RELATION TO VISUAL PERFORMANCE. Trans. Illum. Engng. Soc., Lond. 1959, XIV(9), 281-297.

12,160
To study visual performance as related to age and illumination, a number of male subjects (age range: 19-47 years) were given tasks to perform which were visually comparable to various practical forms of "close work". Performance was recorded over a range of illuminations and contrasts. Two sets of data separated by a five-year interval were available for analysis which included comparisons of performance of five different aged groups and observations on the effect of an advance in age upon each group's performance. The results are discussed with reference to other findings in the literature and to the importance of providing more illumination for certain age groups.
G. R. 9

12,161
Kraft, C.L. & McGuire, J.C. SUITABILITY OF THE INSTALLATION OF THE ILLUMINATION SYSTEM FOR THE EXPERIMENTAL RAPCON CENTER, BLDG. 206, MPAFB. Contract AF 33(616) 3612, Proj. 7192, NADC TN 58 29, April 1958, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., Ohio State University & OSU Research Foundation).

12,161
This report presents the method, results, and conclusions of an evaluation of the suitability of the installation of an illumination system in the experimental Radar Approach Control (RapCon) Center. The installation was evaluated on the basis of previously drawn specifications for a Broad Band Blue lighting system which are appended to this report.
G. I. R. 4

12,162
Cornog, D.V., Rowland, G.E. & Courtney, D. PRELIMINARY FIELD EVALUATION OF A NAVAL AIRCRAFT RUNNING LIGHT CONFIGURATION. Final Report. NAMC Contract N156 34559, Proj. 1, Rep. 20, April 1958, 93pp. Courtney and Co., Philadelphia, Penn.

12,162
This report gives the details of a preliminary flight evaluation of a proposed aircraft running light configuration. The fundamental characteristics of the configuration are three "belts" of lights that are coded by flash direction and rate, color, and intensity to provide direction of motion, relative speed, altitude, relative altitude, and intentions. The system was installed on presently used aircraft and both ground and flight tests were made using 24 observers drawn from aviation-related jobs. Observation data were analyzed in terms of the basic information requirements—future research and development are discussed.
T. I. R. 5

12,163
Gogel, W.C. THE PERCEPTION OF SHAPE FROM BINOCULAR DISPARITY CUES. AMRL Proj. 6 95-20-001, Rep. 331, July 1958, 27pp. USA Medical Research Lab., Fort Knox, Ky.

12,163
To investigate an hypothesized change in the relation between the perceived and physical shape of objects as a function of object distance, shape judgments were determined, in two experiments, for an object having a frontal component and an adjustable depth component. Subjects (18) adjusted the depth component to appear equal to the frontal component at three distances of object from subject. The visual-alley situations differed for the two experiments in the number of cues other than binocular disparity supporting the depth component. The results are discussed in terms of the original hypothesis of depth perception.
T. I. R. 6

12,164
Arnold, W.O., Hoefle, R.R., Gambrell, L.M. & Klapsch, P. SYSTEMS ENGINEERING RELATING TO COMMUNICATIONS FACILITIES FOR THE COMMON SYSTEM OF AIR TRAFFIC CONTROL. TASK C: SYSTEMS ENGINEERING STUDY OF AN AIR TRAFFIC CONTROLLER'S DISPLAY UNIT. Final Report. Contract DA 36 039 sc 64567, Oct. 1955, 55pp. Air Navigation Development Board, CAA, Washington, D.C.

12,164
This final report of one portion of a systems engineering study aimed at planning for an improved Common System of air traffic control, presents studies relating to the controller's display unit. The proposed unit—the Cursor-Coordinated display—is described, the control concepts explained, the transition to an automatic system discussed, and its technical and operational feasibility considered. A recommended program for simulation studies of the system is presented.
I. R. 5

12,165
Toraldo di Francia, G. BASIC RESEARCH IN THE FIELD OF VISION. Contract AF 61(514) 634C (Supplemental Agreement 2), Tech. Status Rep. 7, Nov. 1955-Jan. 1956, 27pp. Istituto Nazionale di Ottica, Arcetri-Firenze, Italy.

12,165
This report presents the status of a research project concerned with basic aspects of vision. Three major topics are treated: (1) spatial gradients of illumination on the retina, (2) electroretinographic investigation of time gradients of illumination, and (3) influence of vibratory movements of a test object on vision.
G. I. R. 14

12,166
Siegel, A.I., Stirner, F.W., Baker, R.C., Brown, F.R., et al. CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT: VIII. THE APPLICATION OF RECENT RESEARCH TO AIRCREW STATION-SIGNALING INDICATOR SYSTEMS. Final Report. NAMATCN Contract N156 s-33252, TED NAM-EL 52064, Part 20, NAMC ACEL 377, June 1958, 14pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

12,166
This report discusses the results of recent experimental visual signal investigations. The application of the findings to military aeronautical usage is made in terms of making the "warning-cautionary" signals of maximal use to the pilot. Modifications of current usage are suggested with the objective of setting up a system possessing a minimum of ambiguity.
R. 11

12,167
Hannan, P.T. DETERMINATION OF REQUIRED CANDLEPOWER OF EXPENDABLE SEADROME LIGHTS. FINAL REPORT. Proj. TED. PIR AE 10026, ET311 39, Rep. 1, Feb. 1957, 5pp. USN Electronics Test Div., Naval Air Station, Md.

12,167
An investigation was conducted to determine the minimum candlepower lamp that can be used in future design of expendable, lightweight, channel marker buoys for indicating a night landing area for seaplanes. Three candlepower lamps (lowest commercially available) were placed in lightweight buoys and arranged to form a 1.0 one mile long. Landings and takeoffs were attempted with three, four, and six buoys during clear weather conditions. Some observations were made as to visibility of the lights under rain and haze and bright moonlight conditions.
I.

12,168
McNeynolds, Jeno. APTITUDE LEVELS IN THE ENLISTED HANPOWER POOL OF THE AIR FORCE. Part I. Proj. 7719, WADC TN 58-63(1), Sept. 1958, 30pp. USAF Personnel Lab., Lackland AFB, Tex.

Rapid development of weapon systems has increased the need for highly qualified airman in technical areas and for information concerning their availability. This is the first in a series of reports designed to provide estimates of the aptitude levels of enlisted personnel in the Air Force. From data collected in the May 1957 sample survey, distributions of aptitudes were obtained by career fields, by enlistment plans, by term of enlistment, by skill level, and by grade. Distributions are presented in terms of the total Air Force enlisted population so that estimates can be made not only of the numbers of airman of each aptitude level in any one group, but of the numbers in any other group who have aptitudes levels high enough to permit efficient retraining into shortage areas. For airman in their first term of enlistment, aptitude distributions were typically the normal bell shape with little difference in level between career fields. Airman in later enlistments were typically higher in aptitude, methods of screening for retraining and for promotion build up the quality of career personnel so that the majority of ACOS, and especially those in the highly technical career fields, have high aptitude qualifications and are capable of supporting modern technological advances.

12,169
Flyer, E.S. A FOLLOW-UP STUDY OF NAVAL ACADEMY GRADUATES WHO ENTERED THE AIR FORCE. Proj. 7719, WADC TN 58-64, June 1958, 26pp. USAF Personnel Lab., Lackland AFB, Tex.

Air Force Academy selection and proficiency records cannot be validated against measures of officer effectiveness for some years, but an estimate of the relationship of training grades to officer performance can be obtained from comparable records of Naval Academy graduates who have entered the Air Force. In this study, midshipman training grades were related to Air Force retainability and to officer effectiveness measures. The retention rate in the Air Force of Annapolis graduates, 5 to 8 years after graduation, is about 73 percent. Annapolis graduates who resigned their commissions had lower physical training grades than those officers remaining on active duty, but differed in no other training proficiency measures. Naval Academy grades predict officer effectiveness reasonably well, with Aptitude-for-Service ratings proving the best single predictor of Air Force C-1000 effectiveness. These results support the use of Aptitude-for-Service ratings and academic grades received at the Air Force Academy as intermediate criteria of officer effectiveness.

R 5

12,170
Allen, Patricia S. & Seal, E.V. AN ANNOTATED BIBLIOGRAPHY OF BULIMORPHIC PERTINENT TO THE DESIGN AND USE OF MACHINES BY HUMAN OPERATORS. Edm. Reichen. Sept. 1958, 26-44. (Institute of Applied Experimental Psychology, Tufts University).

12,170
This bibliography in the human factors field is based on the collection at Tufts University and represents military and governmental sources as well as university sources. Only those references are cited which have the primary objective of presenting a bibliography. Accompanying annotations are intended to convey the general content and range of the bibliography.

R 117

12,172
Crocker, H.E. INVESTIGATION INTO THE DECOMPRESSION TABLES. REPORT VII. SEA TRIALS OF PROPOSED NEW DIVING TABLES. RMP 57/605, UPS 142, DP 16, RMP 2/57, Feb. 1957, 3pp. Royal Navy Personnel Research Committee, London, England.

12,172
As part of a continuing investigation into methods of preventing decompression sickness in divers, new decompression tables were formulated which permitted a considerable saving in time spent in decompression over the old tables. This report describes stringent trials in the sea by suited divers of the schedules offering the greatest time in saving. In all of the dives, 53 in all, the divers performed some work such as cutting links of cables with hammer and chisel. Incidence of sickness and of minor symptoms were studied and discussed. Recommendations are included.

T. R 2

12,173
Glaser, M., Glaser, R. & Richlin, M. DEVELOPMENT OF A TEST BATTERY FOR STUDY OF AGE-RELATED CHANGES IN INTELLECTUAL AND PERCEPTUAL ABILITIES. Rep. 56-138, March 1958, 24pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (American Institute for Research, Pittsburgh, Penn.).

12,173
A battery of tests was constructed to measure age-related changes in behavior relevant to skilled performance of Air Force officers. The battery, consisting of 14 tests selected from suitable existing tests or newly constructed ones, was administered to 344 flying officers ranging in age from 21 to 50 years. Test data were analyzed by correlational methods for their relationship with age and flying experience. Some longitudinal data were studied for four of the tests in the battery which had been taken by some subjects ten years previously. Final selection of tests for inclusion in a battery for further study is made.

T. G. R. 37

12,174
Kendler, H.N. EXPERIMENTAL ANALYSIS OF PROBLEM SOLVING BEHAVIOR. Final Report. Contract N0001 187(00), Proj. NR.150-064, Feb. 1957, 7pp. New York University.

12,174
This is a final report on a research project investigating the psychological processes involved in problem solving behavior. Evidence about such basic processes as habit-shifting, habit-grouping, and habit-persistence has been collected and the implications of the findings discussed. A list of six technical reports issued by this project is appended.

R 17

12,175
Fitts, P.M. & Leonard, J.A. STIMULUS CORRELATES OF VISUAL PATTERN RECOGNITION - A PROBABILITY APPROACH. Final Report. Contract NMR 493(02), AF Proj. 482, Oct. 1957, 44pp. Aviation Psychology Lab., State State University Research Foundation.

12,175
This report summarizes a research program covering the study of stimulus (pattern) variables as related to perceptual behavior involved in classifying and identifying visual forms. The first section presents theory and methodology for the study of pattern perception--for specification of statistical properties of visual patterns and for measurement of behavior in perceptual tasks. Experimental findings on figure redundancy, figure complexity, figure orientation, type of figure and redundancy, visual noise, and perceptual learning are summarized. Implications for human engineering, methodology, and theory are discussed.
G. I. R 19

12,176
Brockett, J.E., Kozicki, F., Murphy, E.M., Macdonald, J.G., et al. THE ENERGY EXPENDITURE OF SOLDIERS IN A TRAINING COMPANY. Proj. 6 60 11 020, ARMC Subproj. 15-4, Sep. 22, 1957, 24pp. USA Medical Engineering Lab., Fitzsimons Army Hospital, Denver, Colo.

12,176
The energy expenditure and caloric intakes of eight soldiers were measured over a two-week period. Total daily work expenditures were determined by summing the products of the net energy costs of 56 activities by the time spent in each activity. Twenty-four hour basal metabolic rate (BMR) and specific dynamic action (SDA) values also were determined. These data are presented in a series of tables appended to the report.
T. G. R 20

12,177
Millen, L.P. & Rosenberg, W. VALIDATION OF POTENTIAL COMBAT PREDICTORS: 21. RESULTS FOR ARTILLERY. FR Proj. 8 6 80 12, Tech. Res. Note 77, DA Proj. 29560000, July 1957, 10pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

The purpose of this study was to furnish Interim Artillery Branch research information for use in selecting new Combat Arms Aptitude Areas based upon the validity of AGS tests, form 20 information, and a group of experimental predictors. Testing was accomplished in the 10th Infantry Division at the start of the training cycle for 166 enlisted men later assigned to Artillery Branch. 5th-week peer ratings of estimated combat potential were collected as additional predictors, and 16th-week ratings were collected as criteria. The most valid composites included both AGS tests and experimental predictors. Composites including and excluding the 5th-week predictor ratings were both superior in validity to that of the present Combat Arms Aptitude Areas. Validity coefficients for predictor ratings were substantially beyond those of any other single measure tried out, but it is not known to what extent these coefficients were influenced by rating bias factors.
R 3

12,178
Birnbaum, A.H., Rosenberg, W., White, R.K. VALIDATION OF POTENTIAL COMBAT PREDICTORS: 21. RESULTS FOR COMBAT ENGINEER. FR Proj. 8 6 80 12, Tech. Res. Note 79, DA Proj. 29560000, July 1957, 9pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

The purpose of this study was to furnish Interim Combat Engineer Branch research information for use in selecting new Combat Arms Aptitude Areas based upon the validity of AGS tests, form 20 information, and a group of experimental predictors. Testing was accomplished in the 10th Infantry Division at the start of the training cycle for 71 enlisted men later assigned to Combat Engineer Branch. 5th-week peer ratings of estimated combat potential were collected as additional predictors, and the 16th-week performance ratings were collected as criteria. The most valid composites included experimental predictors only. The composite including the 5th-week predictor ratings as well as the composite comprised of experimental predictor tests only were both superior in validity to that of the present Combat Arms Aptitude Areas. Validity coefficients for predictor ratings were substantially beyond those of any other single measure tried out, but it is not known to what extent these coefficients were influenced by rating bias factors.
R 3

12,179
Bylla, M.F., Ryberg, R.E., Readdy, A.F., & Schwartz, S. EVALUATION OF TRAIL RATIONS FOR OPERATION DEEP FREEZE. PART I. BACKGROUND INFORMATION. Proj. NTDC2024, Subproj. CR56 132(i), May 1957, 16pp. USN Supply Research & Development Facility, Bureau of Supplies & Accounts, Bayonne, N.J.

12,179
As part of an evaluational study of special trail or survival rations for use in cold climates, this report brings together information contained in correspondence concerning presently available trail rations. Those items considered to be of particular value have been condensed or quoted directly. Available reports on the trail rations used for Operation Deep Freeze I and II are included. A bibliography of literature references (not considered in this report) is attached.
R 160

12,180
Torrey, Jane W. EVALUATION OF COLOR VISION TESTS: ANNUAL SUMMARY REPORT OF PROGRESS. Contract NMR 996(03), Nov. 1957, 4pp. Dept. of Psychology, Connecticut College.

12,180
This annual summary reports three-phases of work: 1) A survey of color defect in women, 2) discrimination thresholds of color defectives, and 3) comparison of two different color discriminations in normals. Progress on all three is reviewed separately. Technical reports will be issued after the data are complete.
T. R 3

12,181
Kensington, K.M.L. A SUBJECTIVE STUDY OF STRING
VESTS UNDER HOT/DRY CONDITIONS. Rep. 74, Oct. 1956,
19pp. Clothing and Storage Experimental Establish-
ment, Ministry of Supply, London, England.

12,181
To establish whether, and in what way, the string
vest in standard or modified form makes any contribution
to the comfort of the wearer under hot-dry conditions,
24 subjects were required to wear each of three vests
(the standard string, a modified softer version known as
the Shemps, and the cotton singlet) for periods of three
or nine days on all occasions that a Dash Jacket was
worn. All men were engaged in active field duties. Cli-
matic conditions varied between 84 and 98 degrees Fahren-
heit and from 23 to 53 per cent relative humidity. A
questionnaire was issued covering obvious aspects of com-
fort and the analysis compared the three vests.
I. R. 6

12,182
Koutsoukos, A.M. & Nychal, R.E. FREQUENCY OF OCCUR-
RENCE OF WORDS. A STUDY OF ZIPF'S LAW, WITH APPLI-
CATION TO MECHANICAL TRANSLATION. 2144 147 T, June
1957, 15pp. Engineering Research Institute, Univer-
sity of Michigan.

12,182
This report is concerned with one aspect of an in-
vestigation of the possibility of translating language
by mechanical means—a consideration of a dictionary of
words. Existing laws concerning frequencies of words in
language (specifically Zipf's and Joses' laws) are exam-
ined by means of new formulas which permit comparison of
these laws with easily obtainable data. The empirical
approach to the problem is also considered.
G. R. 7

12,183
Caldwell, M.V., Coombs, C.H. & Thrall, R.M. EVALUATING
SURVEILLANCE SYSTEMS. Report of Project MICHIGAN. 2144
152 T, June 1957, 40pp. Engineering Research Institute,
University of Michigan.

12,183
The first phases of a long range project for
developing models for evaluating intelligence systems
in terms of measurable outputs is reported. For such
evaluations the number of correct identifications,
false alarms, displacements, and complete misses must
be measured in each of several categories (such as
infantry, artillery, armor, supply lines), sectors
(front line, rear, far rear) and situations (attack or
defense, good or poor mobility). Major results re-
ported on are: experimental techniques, an analytical
model, analysis techniques for evaluating parameters
of model, some preliminary evaluations, and formula-
tions of some concrete unsolved problems.

12,184
Hall, I.A. EFFECTS OF CONTROLLED ELEMENT ON THE HUMAN
PILOT. Contract AF 33(616) 2506, Proj. 7182, Task
71510, WADC TR 57 509, Aug. 1958, 204pp. USAF
 Aero Medical Lab., Wright-Patterson AFB, Ohio.
(Princeton University).

12,184
A simulator study of the human pilot performing a
two-dimensional tracking task, with random excitation,
was conducted. The effects on the pilot of various
longitudinal controlled element dynamics were investi-
gated. A technique for representing the pilot's re-
sponse mathematically is reviewed, and the describing
function and remnant term in the representation were
obtained for a wide range of controlled elements.
Pilot opinion of the controlled element's handling
qualities was obtained. Consistent physical explana-
tion for the remnant terms and of the changes in de-
scribing function are presented and found helpful in
understanding pilot opinion.
T. G. I. R. 14

12,185
Inzell, W., Jr. REPORT OF INDIRECT CALORIMETRY BY
NEW TECHNIQUES: A DESCRIPTION AND EVALUATION. Rep.
146, 9937 IV, Dec. 1954, 32pp. USA Medical Nutrition
Lab., Fitzsimons Army Hospital, Denver, Colo.

12,185
This paper describes and evaluates a number of
new techniques for indirect calorimetry: the Miller-
Frank portable respiratory gas meter, Foulke oxygen
analyzer, and Blair formulation of energy metabolism
calculations. The errors encountered with these
methods are described and evaluated and agreement of
results with the older techniques of indirect calori-
metry is discussed.
I. R. 8

12,186
Colla, J. & Brice, R. PHYSIOLOGICAL PRINCIPLES FOR
THE PROTECTION OF AIRMEN AT HIGH ALTITUDES - THE
FRENCH HIGH ALTITUDE SUIT. ATC 290676, FTS
10073/111, 1955, 9pp. USAF Air Technical Intelligence
Center, Wright-Patterson AFB, Ohio.

12,186
The problem of protecting the aircrew from low atmos-
pheric pressures is discussed in terms of various solu-
tions and the physiological principles applying in each
case. The following solutions are covered: pressurized
cabin, pressurized aircraft, and pressurized respiration
with such additions as an airtight helmet, pneumatic
vest, anti-G suit and various combinations of these.
The French high-altitude suit is described in some de-
tail and the performance attainable with the suit is
given.

12,187
Meier, W.M., O'Neill, J.J. & Adler, S. NUMBER-TELLING
METHODS. Contract AF-19(604) 1577, RF Proj. 664.
Tech. Rep. 48, AFRC TR 58-55, July 1958, 19pp. Ohio
State University Research Foundation.

12,187
To investigate number-telling (transmission of nu-
merical information) methods, a study was made of differ-
ent pronunciations of one-, two-, three-, and four-digit
numbers. Stimulus material was recorded by speakers re-
presenting the major American types of speech and the
principal language groups of the International Civil Avi-
ation Organization. Recordings were presented free-field
with an accompanying white noise mask to groups of gener-
al American listeners. Percentage intelligibility values
for the various pronunciations and for the various meth-
ods involving multiple digits were derived. Digit con-
fusions were obtained and effect of foreign speaker on
intelligibility was ascertained.
T. R. 12

12,188
Gulliksen, H. INTRODUCTORY BIBLIOGRAPHY ON MATHEMA-
TICS AND ITS USE IN PSYCHOLOGICAL THEORY. 8pp.
Educational Testing Service, Princeton, N.J.

12,188
This paper lists titles of selected articles and
books on mathematics and its use in psychological theory.
Some important references are dated as far back as 1927;
however, the majority are of recent publication. The
titles are classified under the headings of general in-
terest, mathematics for psychologists, paired comparison
and the law of comparative judgment, psychological scal-
ing-categories, ratios, graded dichotomies, multidimen-
sional scaling, latent structure and latent class anal-
ysis, test theory, and learning and other psychological
theories in mathematical form.
R. 81

12,189
Guedry, F.E., Cramer, R.L. & Koelle, W.P. EXPERIMENTS ON THE RATE OF DEVELOPMENT AND RATE OF RECOVERY OF APPARENT ADAPTATION EFFECTS IN THE VESTIBULAR SYSTEM. USAMRII Proj. 6 95, 20 001, App. 338, June 1958, 21pp. USA Medical Research Lab., Fort Knox, Ky.

12,189
To study the rate of development and of recovery of adaptation to angular acceleration two experiments were performed. (1) Conditioning stimuli (2.2 degrees square second acceleration) were varied in duration (three to 30 seconds) and standard test stimuli (five seconds acceleration or deceleration) presented five seconds after termination of primary subjective effects from conditioning stimuli; 18 subjects were used; rate of development of adaptation was thus determined. (2) The conditioning stimulus was presented for fifty seconds and test stimuli at various intervals after termination of primary subjective effect (ten to 60 seconds); 14 subjects; rate of recovery was thus determined.
T. G. R 25

12,190
Asher, J.W., Doty, L.A., Hanley, T.D. & Steer, M.D. AN INVESTIGATION OF MONAURAL AND BINAURAL AUDITORY DISCRIMINATION IN NOISE. Contract M6ori-104, NAVTRADEVEN Proj. 20 F 8, NAVTRADEVEN Tech. Rep. 104 2 49, Feb. 1957, 8pp. Purdue University.

12,190
To compare the relative effectiveness of listening to words in noise under monaural and binaural listening conditions, 18 subjects transcribed lists of words heard with a background noise (95 decibels). Three listening conditions were tested: right ear, left ear, and both ears. The data (number of words heard and recorded correctly by each subject for each condition) were analyzed by a repeated measurement analysis of variance for differences due to conditions, lists, and subjects. Implications for communications personnel are discussed.
T. I. R 6

12,191
Rogers, O.R. & Cook, R.F. ENVIRONMENTAL ASPECTS OF SONIC FATIGUE. Proj. 1370, WADC Tech. Note 57-68, Feb. 1957, 14pp. USAF Aircraft Lab., Wright-Patterson AFB, Ohio.

12,191
To determine methods of testing equipment and aircraft structures in high intensity noise, available propeller and jet noise data were examined and consolidated in a useable form. Requirements for noise test equipment and methods for testing were defined.
G.

12,192
Green, D.M. & Birdsall, T.G. THE EFFECT OF VOCABULARY SIZE ON ARTICULATION SCORE. Contract AF 19(604) 2277, AFRC TR 57 58, EDG Tech. Rep. 81, Jan. 1958, 15pp. Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

12,192
A statistical decision model is applied to the recognition of voice signals in noise in an attempt to account for data obtained in previous studies of the effect of size of vocabulary on articulation scores. Certain strong simplifying assumptions are made to make the mathematics of the model manageable. A discussion is included of the physical parameters involved. An appendix presents various approximations to the problem involved in predicting the percent correct recognition for the conditions considered by the model.
T. G. R 4

12,193
Gelber, Beatrice. ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL. MUSCULAR TENSION IN THE LEARNING AND UNLEARNING OF A SIMPLE CHOICE RESPONSE. Rep. 55-134, Jan. 1957, 23pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,193
To examine changes in muscular action potential recordings (EMG) during the learning and unlearning process, 30 subjects were conditioned to press a key when a tone sounded. Reinforcement was a tone of another frequency. Three groups of subjects were used; each received varying numbers of acquisition trials with 80 percent reinforcement and 15 extinction trials with no reinforcement. Muscle action potentials were recorded from the arm, left leg, and forehead and analyzed in relation to response frequency (key-presses).
T. G. R 23

12,194
Woser, H.M., Oyer, H.J. & Wolfe, Susan M. THE RELATIONSHIP OF PHONETIC STRUCTURE TO THE INTELLIGIBILITY OF WORDS SIMULTANEOUSLY RECORDED AT EAR AND LIPS. Contract AF 19(604) 1577, Tech. Rep. 47, AFRC TR 58 54, RF Proj. 664, April 1958, 23pp. Ohio State University Research Foundation.

12,194
To analyze the intelligibility of words relative to the origins (ears and lips) and to interpret these analyses with special attention to word structure, data from a previous study were utilized. The data consisted of 72,000 listener responses to a list of 50 monosyllabic words, recorded from the lips or ear of six speakers (General American dialect), and played back under varying levels of noise. The analysis compared intelligibility data from the two origins for 1) substitutions and omissions through different noise levels, 2) effect of number of sounds per word, 3) vowel and diphthong sounds in word, and 4) patterns of confusion.
T. G. R 15

12,195
O'Connell, M.H. HEARING ACUITY OF AIR FORCE RECRUITS. Rep. 58 70, April 1958, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,195
The hearing testing facility for all Air Force recruits beginning training at Lackland Air Force Base is described, including the demonstrable sound-treated test booths, Rudmose automatic audiometers, and general testing schedules and procedures. A simplified scoring method based on 5,170 audiograms is discussed along with all grading procedures. Hearing levels are expressed by (1) age groups for the frequencies tested, and (2) classification of hearing acuity by classes A, B, C, including bivariate distribution of classes by right, left, and worse ears.
T. G. R 3

12,196
Mollenkopf, M.G. A STUDY OF SCORES OTHER THAN NUMBER RIGHT. Contract NONR 694(06), Proj. Des. NR 151 113, Jan. 1957, 23pp. Educational Testing Service, Princeton, N.J.

12,196
To ascertain the properties of several scores, including their consistency, their interrelationships, and their validity for predicting academic grades, test scores of 649 students on three speeded tests in each of three content areas (verbal, arithmetic reasoning, and spatial) were analyzed. Seven scores were studied: errors, attempts, omits, variability of errors, variability of rights, ratio of rights to attempts, and ratio of wrongs to attempts. Intercorrelations were computed for all scores in each area and judged in terms of criterion of academic grades in five course areas.
T. R 5

12,197
Schellinger, R.T. TOTAL HEAD SOUND PROTECTOR. Final Report. Contract AF 33(600) 23895, Exhibit WCRDS 57, May 1956, 28pp. L.E. O'Neill & Associates, Dayton, Ohio.

12,197

The fabrication and design of protective devices against sound are described briefly. Through conferences with the project engineer, various ideas arose and were applied to the devices as fabricated. After testing, recommendation and instructions were issued for fabrication of the next type. Existing commercial ear cup type protectors contributed to the items fabricated. Types of devices include: (1) total head enclosure, (2) helmet, and (3) individual ear covering cups with adjustable headband.

12,198

Miller, H.R., Grundfest, H., Alper, J.M., Margolin, S.G., et al. THE SKIN TEMPERATURE OF THE FACE OF SUBJECTS EXPOSED TO 40° WHILE OPERATING MICROPHONE T-45. Engng. Mem. 15CR, April 1944, 15pp. USA Climatic Research Unit, Fort Monmouth, N.J.

12,198

To ascertain whether the wearing of Microphone T-45 at low temperatures for an extended period of time carries any danger of producing frostbite or other harmful effects, clean shaven subjects were dressed in Arctic costumes and exposed to -40 degree temperature and a turbulent wind velocity of about five meters per second for periods from 50 to 125 minutes. The conditions tested included application of microphone to uncovered face and to face protected by wool mask and no microphone. Temperatures were continuously recorded at different positions on the microphone and on the skin. Observations of ice formation and skin injury were made. Recommendations for operating use are included.

I. I.

12,199

Bamford, H.E., Jr. THE USE OF TRAINING AIDS IN CONCEPTUAL TRAINING. Contract AF 18(600) 1203, July 1955, 56pp. American Institute for Research, Pittsburgh, Penn.

12,199

This report represents an attempt to isolate and identify various classes of training aids and various classes of relationships, a knowledge of which might support job performance, and to formulate hypotheses and working principles as to what form of training aid will be the most effective training medium for a given training aid. Seventeen species of training aid are distinguished, and for each there are considered the relationships which it can teach, its psychological value, its use in training, its advantages, and its disadvantages. Conceptual training is then considered as a process of communication which may vary with respect to its medium, form, content, and redundancy.

I. 7

12,200

Wolfe, D. RESEARCH AND DEVELOPMENT IN HUMAN RESOURCES. Publ. L57 31, Sept. 1956, 20pp. Industrial College of the Armed Forces, Washington, D.C. (American Association for the Advancement of Science, Washington, D.C.).

12,200

This is a transcript of a talk, and of the general discussion which followed, on changing attitudes and present trends in research and development in human resources. The factors underlying the changes and the fields of selection, training, and design of equipment for human use are discussed.

12,201

Ness, J.L. THE APPROXIMATION OF THE RESPONSE OF THE HUMAN TORSO TO LARGE RAPIDLY APPLIED UPWARD ACCELERATIONS BY THAT OF AN ELASTIC ROD AND COMPARISON WITH EJECTION SEAT DATA. Rep. ES 26472, Nov. 1956, 51pp. Douglas Aircraft Co., Inc., El Segundo, Calif.

12,201

It has been noticed that when the human body is subjected to very rapidly applied accelerations, the accelerations at points of the body can be considerably larger than the maximum value of applied acceleration. This paper considers the case in which acceleration is applied along the line of the spine from seat to head as in ejection from aircraft and attempts to approximate the motion of the human torso by that of an idealized, one-dimensional, visco-elastic structure. The simple case of a homogeneous elastic rod is discussed in detail and its predictions compared with ejection seat data. Extensions to more complicated visco-elastic structures are discussed.

G. I. R 8

12,202

Mangurian, G.N. THE AIRCRAFT STRUCTURAL FACTOR OF SAFETY. Rep. 154, Nov. 1957, 24pp. Advisory Group for Aeronautical Research & Development, North Atlantic Treaty Organization, Paris, France.

12,202

This paper presents the case for a review of the value given to the present Aircraft Structural Factor of Safety as defined for United States military and commercial aircraft and International Standards and Recommended Practices, I. C. A. O. In light of advancements in structural knowledge, certain design aspects are discussed wherein the presently required factor of safety might be considered for reduction should not be considered at present.

12,202

Miller, J.D. TEMPORARY THRESHOLD SHIFT AND MASKING FOR NOISE OF UNIFORM SPECTRUM LEVEL. J. acoust. Soc. Amer., June 1958, 30(6), 517-522. (Indiana University).

12,203

To test the hypothesis that differences in the effective noise level from one critical band to the next can account for the typical audiogram showing a temporary threshold shift resulting from an exposure to noise of uniform spectrum levels, eight listeners were exposed to each of four levels of white noise (95, 100, 105, and 110 decibels) for 12 minutes. A reference audiogram, as well as pre- and post-exposure audiograms, were obtained and the recovery of the threshold traced for three and one-fourth minutes after cessation of noise at each of seven test tone frequencies (from 0.5 to 8.0 kilocycle/s). Temporary threshold shifts were analyzed with respect to the hypothesis.

I. G. R 8

12,204

Decker, L. & Pollack, I. CONFIDENCE RATINGS AND MESSAGE RECEPTION FOR FILTERED SPEECH. J. acoust. Soc. Amer., May 1958, 30(5), 432-434. (Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,204

To test the extension of the statistical decision model, which has achieved success in describing the detection of signals in noise, to message reception of filtered speech, three listeners were tested. A speech signal, subjected to low-pass filtering was presented for 1) identification of word from a closed message set, and 2) assignment of a rating reflecting a judgment of the accuracy with which it was received. The relation between correct confirmations and false alarms (the Receiver Operating Characteristic) was determined and compared with that obtained with noise interference.

G. R 5

12,205

Pollack, I. LOUDNESS OF PERIODICALLY INTERRUPTED WHITE NOISE. *J. Acoust. Soc. Amer.*, March 1958, 30(3), 181-185. (Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,205

To investigate the possibility of providing a computational procedure for loudnesses of intermittent noises, the burst level of a periodically, abruptly interrupted, white noise, necessary to match a continuous white noise in loudness, was determined by each of seven to ten listeners. The variables were burst duration, burst level, duration of interval and noise level between successive bursts. Equal-loudness contours were derived for the various conditions. A procedure for calculating the required burst level, with knowledge only of time-intensity characteristics of the interrupted noise, is presented.

G.

12,206

Stevens, S.S. MEASUREMENT AND MAN. *Science*, Feb. 1958, 127(3295), 383-389. (Psycho-Acoustic Lab., Harvard University).

12,206

This paper treats the problem of measurement as applied to the capacities, attitudes, sensations, or any of the many aspects of man that cannot be directly measured. The relation between measurement and mathematics is discussed and the nature of a scale is defined with a classification of scales of measurement. Measurement in psychophysics is treated with particular emphasis on the measurement of sensation. Today's resolution of the conflicting laws (logarithmic and power) in this area is treated and some insights derived therefrom are discussed.

T. G. R 19

12,207

Miller, J.D. TEMPORARY HEARING LOSS AT 4000 C.P.S. AS A FUNCTION OF A THREE-MINUTE EXPOSURE TO A NOISE OF UNIFORM SPECTRUM LEVEL. *The Laryngoscope*, March 1958, LXVIII(3), 660-671. (Indiana University).

12,207

To investigate some aspects of form of the function relating temporary hearing loss to the intensity of the exposure stimulus, six subjects were tested in eight different sessions. After determination of the absolute threshold at 4000 cycles per second, the listener was exposed to three minutes of noise (eight noise levels ranging from 85 - 120 decibels) and the recovery of the threshold was traced for thirteen and three-fourths minutes at thirty-second intervals. Temporary hearing loss (difference between pre- and post-exposure thresholds) was analyzed as a function of noise intensity and time after exposure. Individual differences in susceptibility were examined.

T. G. R 4

12,208

Davis, R.C. RESPONSE PATTERNS. *Trans. N.Y. Acad. Sci.*, June 1957, (Ser. II) 19(8), 731-739. (Indiana University).

12,208

This paper deals with the question of whether a detailed description of responses and their antecedents can throw any light on an animal's reaction. Through modern instrumentation many hidden components of response can be recorded. Various theories regarding the number and variety of excitation patterns are discussed and the kind of approach needed to resolve the question is indicated. Results from experiments conducted to study somatic patterns related to specific stimuli are summarized and discussed.

T. R 12

12,209

Miller, G.A. & Newman, E.B. TESTS OF A STATISTICAL EXPLANATION OF THE RANK-FREQUENCY RELATION FOR WORDS IN WRITTEN ENGLISH. *Amer. J. Psychol.*, March 1958, LXXI, 209-218. (Harvard University).

12,209

The form of the rank-frequency relation of words in written English and the various theories accounting for the relation are discussed. In order to test a statistical explanation, materials drawn from three widely divergent sources were studied. Frequency counts of individual words were made for each sample and then for all three combined. Various rank-frequency relations (frequency of a word as a function of its rank with respect to decreasing frequency, average frequency as a function of rank with respect to increasing word length, and for strings of letters between successive occurrences of the letter "e") are presented and discussed.

G. R 3

12,210

Stevens, J.C. & Tuving, E. ESTIMATIONS OF LOUDNESS BY A GROUP OF UNTRAINED OBSERVERS. *Amer. J. Psychol.*, Dec. 1957, LXX, 600-605. (Harvard University).

12,210

To compare loudness estimations made by a group of untrained listeners with those made by sophisticated subjects serving alone, 70 inexperienced subjects estimated the loudnesses of a series of white noises (from 65 to 105 decibels) presented through a loudspeaker in a classroom. In the first experiment, no standard was designated, and each subject used a scale of his own choosing; in the second, a numerical value was assigned to a standard noise which preceded the presentation of each variable. The results were analyzed for effects of the two methods and compared to other data in the literature.

T. G. R 2

12,211

Hanley, T.D. & Steer, M.D. INTELLIGIBILITY OF VOICE COMMUNICATION: (A REVIEW OF PAST AND PROJECTED RESEARCH, TRAINING DEVICES AND METHODS). Contract No. orl 104, NAVTRADEVEN Proj. 20 F 8, Task Order II, NAVTRADEVEN-TR 104 2 51, June 1957, 117pp. USN Training Device Center, Port Washington, N.Y. (Voice Communication Lab., Purdue University).

12,211

This is a summary report of speech intelligibility research. Critical aspects of communication are reviewed with attention focused on each link of the transmission chain: talker, message, mode of communication, and listener. Message clarity and understandability provides the frame of reference for the examination of such variables as the talker and his characteristics, the communications environment, instrumentation, training, and training devices. Current research trends and research objectives of the Purdue Voice Communication Laboratory are discussed.

T. G. R 79

12,213 Roff, M. PRESERVICE PERSONALITY PROBLEMS AND SUBSEQUENT ADJUSTMENTS TO MILITARY SERVICE. THE PREDICTION OF PSYCHONEUROTIC REACTIONS. Rep. 57 136, Nov. 1957, 11pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Institute of Child Welfare, University of Minnesota, Minneapolis, Minn.).

A longitudinal follow-up study is being made of patients of public school child guidance clinics and a nonpatient control group through subsequent military service. The present report compares 2 groups of former patients of the child guidance clinics: one group (55 men) who were diagnosed as neurotic while in service; the other group of 55 represent individuals who attained a grade of sergeant or higher with no adverse indications in their military records. Childhood tendencies to antagonize others to an unusual degree were shown to distinguish the potential neurotic with a high degree of accuracy.

R 5

12,212 Zeldner, J., Harper, Bertha P., & Karcher, K. RECONSTITUTION OF THE APTITUDE AREAS. Proj. DA 2956 0000, Pgs Prof. 8 & 250 11, Pgs Tech. Res. Rep. 1095, Nov. 1956, 34pp. USA Personnel Research Branch, Adjutant-General's Office, Washington, D.C.

Simultaneously with the introduction in 1949 of the original Aptitude Area composites of Army Classification Battery test scores, series of studies were initiated to provide additional information on the effectiveness of various composites of ACG tests in classifying men for training and job assignment. Sufficient information has now been accumulated to warrant review of the original Aptitude Area system. The result of the study described in this report was reconstitution of Aptitude Areas. In selecting the new composites, data were used from 42 studies on the validity of ACG composites for predicting success in Army School courses and in Army jobs. Selection was based on considerations of high differential validity. Instead of the original 11 Aptitude Areas, the 7 new Aptitude Areas are 2-test composites involving repeated use of the same tests. The 7 new Aptitude Areas are 2-test composites of the ACG tests and involve the same ACG tests less frequently. The new areas are less intercorrelated. Identify the highest aptitude of a greater percentage of men, and are better able to differentiate levels of aptitude in each man.

R 15

12,214 SantaMaria, L.J., Tiller, P.R. & Lieber, L.M. A PHYSIOLOGICAL COMPARISON OF VENTILATED AND NON-VENTILATED ANTI-EXPOSURE SUITS UNDER SIMULATED COCKPIT CONDITIONS. Bu Med Proj. NM 15 01 13 4, TED NAM AE 52114, Rep. NAC ACCEL 353, Nov. 1957, 9pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

12,214 To investigate the physiological effects of two types of anti-exposure suits, a series of tests involving two subjects were conducted. All tests were run at 18,000 feet simulated altitude for two hours with the subject in a sitting-resting state. The suits, vapor permeable (Vaportex) and impermeable (neoprene), were worn in a non-ventilated condition; the impermeable suit was also worn in a ventilated state. Ambient temperatures of 60, 80, and 100 degrees Fahrenheit were employed. Values for skin and rectal temperatures, total weight loss, and evaporative weight loss were analyzed for differences due to type of suit.

T. G. R 4.

12,215 Stirner, F.W., Siegel, A.I. & Baker, R.C. CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT: V. AN EXPERIMENTAL COMPARISON OF VISUAL, AUDITORY, AND VISUAL-AUDITORY "MASTER" SIGNALS. Contract N156S 33252, NAMC ACCEL 357, TED NAM EL 52004, Part 17, Dec. 1957, 25pp. USN Air Crew Equipment Lab., Air Material Center, Philadelphia, Penn.

12,215 The relative merits of three "master" signal variables (auditory, visual, combination of both) were investigated and evaluated in relation to no "master" signal. Ten subjects performed a simulated flight task (multiple compensatory tracking) while listening to a prose passage heard, through earphones, against a jet noise. A secondary task was to respond to peripheral light signals by pressing an appropriate button. These lights were presented alone, with a visual, auditory, or visual and auditory "master" warning device. Response times and misses were compared for the four conditions. The implications for aircraft purposes are discussed.

T. I. R 14

12,216 Debons, A. & Chiles, W.D. THE EFFECTS OF COLD ON PSYCHOPHYSICAL WEIGHT JUDGMENTS: A METHODOLOGICAL STUDY. Proj. 7193, WADC TN 57 305, Sept. 1957, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,216 A methodological experiment was carried out to study problems involved in obtaining psychophysical weight-judgment functions at lowered ambient temperatures. Two subjects compared seven variable stimuli, ranging in weight by five gram increments from 185 to 215 grams, with a standard stimulus of 200 grams by the method of constant stimulus differences. Judgments were made at ambient temperatures of 700 and -25 degrees Fahrenheit. The limens, obtained by a least-squares solution, were analyzed as functions of exposure to cold and learning. Implications for methodology are discussed.

T. G. R 4

12,217 Slingland, C.E. THE FITTING OF OUTER CLOTHING OVER THE MC-3 AND MC-4 PARTIAL PRESSURE SUITS. Proj. 6325, Task 63751, WADC TN 57 306, Dec. 1957, 7pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,217 Tests were conducted to determine the upgrading of outer clothing sizes necessary to allow adequate room for inflation of the partial pressure suit. Two men were selected for each of the 12 sizes of partial pressure suits, each man was: 1) measured for flight clothing over a standard Air Force fatigue coveralls; 2) fitted for a partial pressure suit; 3) outfitted with a ventilating garment; then 4) standard tailors measurements were made following suit inflation to ten pounds square inch. The outer clothing to fit these dimensions were tried on the subject to assure the best fit and comparisons made with sizes normally worn. Recommendations are included.

T.

12,218
Berah, P.J., Pottermen, J.M. & Schoenfeld, V.H. A COMPARISON OF INTERNAL VS. EXTERNAL REINFORCEMENT IN MOTOR AVOIDANCE SITUATIONS. Rep. 57-27, April 1957, 7pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Columbia University, New York, N.Y.)

Avoidance training following the establishment of a conditioned heart rate depression resulted in more complete elimination of the conditioned response when an interoceptive cue (light) was used to help the subject distinguish between the occurrence of the avoidance response and ineffective responses than when no cue was used. There was some evidence that increased avoidance training resulted in the exercise of an increased discriminative control over heart rate by the interoceptive cue, while, conversely, such cues as were available to the control group (presumably proprioceptive) lost some of their effect upon the conditioned response.
R 9

12,219
USMC Development Center. HELMET, TANK, MC-X2, TEST OF. MDC Proj. ET 1193, Nov. 1957, 31pp. USMC Development Center, Marine Corps Schools, Va.

12,219
The MC-X2 Tank Helmet was tested to determine its suitability for Marine Corps use in connection with tracked vehicles. Tests were carried out determining the physical characteristics, ballistics quality, durability, and operational suitability. For the latter two tests, helmets were worn by 20 tank crewmen, for an average of 98.7 operational hours. In addition to periodic examination of the item, each crewman was questioned as to comfort and fit, operation of the communications equipment, adaptability for use with sighting and fire control equipment, and with other items of equipment. The findings are summarized and recommendations are presented.
T. I. R 1

12,220
USA Infantry Board. SERVICE TEST OF RATION, INDIVIDUAL, COMBAT, MEAL TYPE. Proj. DA 7 84 06 034, Proj. NR 2742, Oct. 1957, 13pp. USA Infantry Board, Fort Benning, Ga.

12,220
Tests were made to determine the suitability of the Ration, Individual, Combat Meal Type for Army use in temperate zones. The tests included determinations of the physical characteristics of the ration, its portability, suitability for aerial delivery, effects of extreme temperatures, ease of preparation, palatability, and the extent to which it meets military requirements. Test results are summarized and a table of deficiencies and modifications is presented along with recommendations.
T. I. R 4

12,221
Stalder, J.J. A STUDY OF AUTOMATIC SIGNAL SELECTION FOR AIRBORNE DIRECTION FINDERS. Final Rep., Contract DA 36 039 SC 72806, Oct. 1957, 83pp. College of Engineering, New York University.

12,221
This is a summary report of an investigation into the feasibility of developing an accurate automatic direction finder for use by the pilot of a small, low-flying, fixed or rotary wing plane. Phase one was a human factor's investigation to determine the psychophysical actions employed in taking aural-null type direction findings in the presence of noise interference. Phase two was an engineering investigation leading to development and preliminary evaluation of an automatic direction finder that would exhibit the advantages of an aural-null operation in the presence of interference. The results of the evaluation are discussed and recommendations for further development are made.
G. I. R 56

12,222
Fischl, H.A., Datta, Lois E. & Courtney, D. DEVELOPMENT OF A SHIPBOARD SUPERVISORY TRAINING PROGRAM FOR PETTY OFFICERS. Contract N00R 2212 (00), Proj. J. Tech. Rep. 17, Nov. 1957, 28pp. Courtney & Co., Philadelphia, Penn.

For this project, the requirements for shipboard supervisory training programs were first determined through field research aimed at identifying the specific content material and scheduling needs and through a bibliographic search of already existing instructor training techniques. A proposed program is then presented and each of its dimensions discussed: administrative requirements and limitations, course contents, and course medium. Two exhibits are included: a syllabus and instructor's manual. (NITAS)
R 37

12,223
Cogan, E.A., Willmorth, N.E. & Findlay, D.C. A SURVEY OF MAP SKILLS REQUIREMENTS. Contract DA 44 109 qm 650, Proj. DA 095 30 000, Tech. Rep. 43, Sept. 1957, 44pp. Human Resources Research Office, The George Washington University, Washington, D.C. (USA Armor Human Research Unit, Fort Knox, Ky.)

The purpose of this study was to determine the degree to which each of 53 map skills and map skill applications is required for infantry, armor, and reconnaissance combat personnel in each of 7 levels of responsibility ranging from squad members (tank crewmen in armor and reconnaissance units) to battalion commanders. The summary derived as to the relative importance of the 53 skills may be used as a guide in developing or revising training programs pertaining to map skills, and as a means for assessing the degree to which tactical doctrine and actual map using practice correspond.

12,224
Willenlin, L.P. & Karcher, K., Jr. DEVELOPMENT OF COMBAT APTITUDE AREAS. PRB Tech. Res. Rep. 1110, DA Proj. 29560000, Jan. 1958, 34pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

12,224
To refine the stimulus presentation and scoring technique of radar aiming-point identification group tests, a motion picture of a radar-scope display during a practice bomb run was animated with crosshairs. These crosshairs constituted test items and the subject's task was to place a pencil dot on the crosshair printed on answer sheets which corresponded to correct position of aiming-point on the film. Test score was the sum of circular error scores for each item. Two forms of the test were administered to 90 rated flying officers, an item analysis was performed, and estimates of reliability computed. Grades and ratings of the subjects were studied in relation to test scores as intermediate validity criteria.
T. G. I. R 9

12,225
Tupas, E.C. & Christal, R.C. STABILITY OF PERSONALITY TRAIT-RATING FACTORS OBTAINED UNDER DIVERSE CONDITIONS. Proj. 7719, WADC TN 58 61, May 1958, 16pp. USAF Personnel Lab., Lackland AFB, Tex.

Peer ratings by officer candidates on specific personality traits have been shown to be predictive of later officer performance. The present study investigated personality trait ratings to determine their factorial structure and the extent to which the factors remained constant in spite of differences in samples, raters, lengths of acquaintanceship, and rating situation. 6 intercorrelation matrices were factored and the resulting factors rotated to orthogonal simple structure. Six clearly defined personality factors were found in each analysis which remained relatively invariant through all analyses. The factors were identified as Surgency, Agreeableness, Dependability, Emotional Stability, and Culture. It was concluded that the factor structure of personality trait ratings is sufficiently invariant that such trait ratings may be regarded as adequate criteria for the study of personality differences and for test development purposes.

R 6

12,228
Moser, H.H., Dreher, J.J., & Wolfe, Susan H. CONTRASTION OF STANDARD SEQUENCE TO AN AIR DEFENSE TASK. Contract AF 19(604) 1577, Tech. Rep. 39, AFRC TN 56 73, AF Proj. 664, Jan. 1957, 19pp. Ohio State University Research Foundation, Columbus, Ohio.

Typical Air Defense surveillance messages were read with elements in standard order and in random order to 2 groups of listeners. Each group practiced logging data in one particular type of sequence for 7 hour-long training periods; at which time the standard and random orders were interchanged to assess the performance of listeners on an unfamiliar type of presentation. A final proficiency test consisting of extremely rapid telling of messages in regular order was administered to both groups to evaluate the 2 types of training. When using standard vocabulary and one type of message, the message items may be presented in different sequences to trained groups without seriously affecting reception. Initial results produced better intelligibility scores for the standard-ordered material. However, training appeared to negate this original advantage. Groups trained in standard and random sequence, respectively, showed no significant difference when the presentation method was interchanged. Groups trained in standard and random sequence, respectively, showed no significant difference when subjected to speed tests of standard-ordered messages.

R 3

12,226
Olsen, R.A. CRITICAL ANALYSIS OF ACCURACY OF SYNTHETIC MOTION TIME VALUES AS DEVELOPED BY MOTION PICTURE ANALYSIS. Jan. 1957, 12pp. Pennsylvania State University, Philadelphia, Penn.

12,226
To explore the accuracy of the motion picture camera as a means for determining synthetic motion time values, an operation was studied by means of the electronic touch detector simultaneously with the motion picture camera (1000 feet per minute). The tape as produced by the touch detector was then compared to the time values as recorded on the film. Differences in end points were average for each movement element. The pattern of differences obtained by the two methods is discussed.

T.

12,227
Mullinax, P.F., Jr. & Beischer, D.E. OXYGEN TOXICITY IN AVIATION MEDICINE. A REVIEW. Bu Med Surg Res. Proj. NM 12 01 11, Subtask 11, Rep. 2, Feb. 1958, 13pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,227
Toxic effects of oxygen that may be of importance in aviation medicine are reviewed. Of primary concern were studies of inhalation of oxygen at pressures not exceeding one atmosphere by man. Successively considered are: (1) mechanisms of toxicity, (2) symptoms and signs of toxicity in man, and (3) safe limits of exposure to oxygen.

T. G. R-26

12,230
Ronchi, Lucia & Bittini, Marcella. ON THE INFLUENCE OF THE SHAPE OF EQUAL ENERGY LIGHT PULSES ON THE CRITICAL FLICKER FREQUENCY. Contract AF 61 (514) 634C, BOARD TN 57, Rep. 10, 1957, 11pp. Istituto Nazionale di Ottica, Arcetri, Firenze, Italy.

12,230
To investigate the critical flicker frequency as a function of the shape of the light pulses, two experienced subjects made judgments with the right eye. Fan-tooth and rectangular pulses (in white, red, green, and blue-violet), at a light-dark ratio equal to one, were presented at central and peripheral (seven to 15 degrees nasal) retinal locations for several durations from 16 to 30 milliseconds. The critical luminances (L) were analyzed and discussed in relation to results from other research studies, in particular, to those obtained taking as response index the b-wave of the electroretinogram elicited by a single flash.

T. G. R-13

12,234
Page, H.E. NATIONAL INSTITUTE FOR EDUCATIONAL RESEARCH, DENMARK. ONRL TR 3759, April 1959, 3pp. USN Office of Naval Research, Branch Office, London, England.

12,234
Denmarks Paedagogiske Institut of Copenhagen was established in 1954. This paper sets forth the duties of the Institut, the make-up of the management staff, and the type of research program undertaken. Several investigations, either completed or in progress, are discussed to indicate the scope of the research program.

12,235

Bowen, J.H. & Chernikoff, R. THE EFFECTS OF MAGNIFICATION AND AVERAGE COURSE VELOCITY ON COMPENSATORY TRACKING. Proj. NR 401 000, NRL Rep. 5186, Aug. 1958, 6pp. USN Research Lab., Washington, D.C.

12,235

This experiment investigated the relationship between magnification, average course velocity, and system error in a compensatory position-control tracking system. Course inputs, each consisting of single sine waves (two, eight, and thirty cycles per minute) with appropriate frequency-amplitude combinations, were used to generate three values of average velocity, constant velocity of 10, 30, and 90 units for linear magnifications of 1X and 10X. Six subjects were tested over 15 cycles (two one-minute trials on each possible combination). Integrated error scores were analyzed for effect of the variables.

12,236

Harker, G.S. WHITEOUT - A BIBLIOGRAPHICAL SURVEY. Proj. 6 95 20 001, Rep. 343, July 1958, 11pp. USA Medical Research Lab., Fort Knox, Ky.

12,236

The polar phenomenon of whiteout (loss of depth perception under certain meteorological conditions) is described through the medium of quotations from persons who have experienced it. The meteorological conditions said to produce whiteout are noted and the mechanism of their operation discussed in terms of research findings available in the literature. Topics considered are: diffuse illumination, meteorological range, illumination levels, retinal illumination, empty-field myopia, entoptic phenomena, perception of the vertical, directional orientation, and distance estimation.

R 51

12,237

Sidersky, R.C. & Newton, J.M. SHIP CONTROL: III. DEPTH SEEKING AND DEPTH KEEPING WITH A ONE-SURFACE CONTACT ANALOG DISPLAY. EB Tech. Rep. 411-HF 16, P58 133, Aug. 1958, 14pp. Electric Boat Div., General Dynamics Corp., Groton, Conn.

12,237

To measure the dynamic performance to be expected in controlling a high-speed submarine using a Contact Analog (a two-dimensional projection of a three-dimensional space model) with one model surface, seven operators effected two types of maneuvers in a simulated submarine situation using only information from the Contact Analog. One maneuver was changing depth up or down 200 feet, the other was holding a constant depth while counteracting a forcing function. Graphic records of control-stick motion, pitch angle, and depth were analyzed to determine efficiency of performance.

T. G. I. R 5

12,238

White, W.J. EXPERIMENTAL STUDIES OF THE EFFECTS OF ACCELERATIVE STRESS ON VISUAL PERFORMANCE. Doctor's Dissertation. 1958, 74pp. Ohio State University.

12,238

Two different aspects of visual behavior were examined during exposure to accelerative stress: absolute thresholds of foveal (cone) and peripheral (rod) vision and the ability to read instrument dials. The threshold measurements were made on one seasoned observer at accelerative levels from one to four units (G) with and without protection from an anti-G suit. Six subjects, wearing an anti-G suit, read dials at five luminance levels and four acceleration levels (one to four G). The data from both were analyzed in detail for the effect of acceleration on visual performance. An extensive review of previous studies in this area is included.

T. G. I. R 65

12,239

Rends, O.G., Chondlee, Joern & Sampson, P.B. HUMAN FACTORS IN HELICOPTER INSTRUMENTATION: AN EVALUATION OF TWO NAVIGATION DISPLAYS. Contract AF 33(600) 34034, Subcontract 484 76004, Interim Rep. 2, Aug. 1958, 26pp. Laboratory for Electronics, Inc., Boston, Mass. (Institute for Applied Experimental Psychology, Tufts University).

12,239

As part of an investigation on the design of an optimal integrated instrument display for an all weather helicopter, this report compares the efficiency of a Rho-Theta and a Course Indicator display as navigation aids. The actions of these two instruments were reproduced photographically during simulated flights of 15 minutes duration. The subjects, 12 inexperienced and six experienced pilots or navigators, were shown their point of departure and destination on a map and, after watching displays for a portion of the flight, asked to mark their location on the map. Differences between true and estimated locations were analyzed for differences due to instruments, type of course, and experience.

T. G. R 3

12,240

Falkowski, S.J. & Hastings, A.D. Jr. WINDCHILL IN THE NORTHERN HEMISPHERE. Proj. 7 83 01 005A, Tech. Rep. EP 82, Feb. 1958, 9pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,240

This report is a study of mean windchill (cooling power of wind and temperature combinations on shaded, dry human skin) distribution in the northern hemisphere for the coldest month of the year. A map is included. The windchill index, its formula and aids for computation (tables and nomogram), are presented. The usefulness of the index in assessing relative human comfort as well as its limitations with respect to evaporative and radiation influences are discussed.

T. G. I. R 11

12,241
Alt, E.F. & Gordon, L.V. A FLEET VALIDATION OF SELECTION TESTS FOR UNDERWATER DEMOLITION TEAM TRAINING. BuNavPers Tech. Bull. 57 6, Jul 1957, 5pp. USN Personnel Research Field Activity, San Diego, Calif.

In a previous study, a battery of predictor tests was administered to 140 students entering Underwater Demolition Team (UDT) training. Of the entering group, 64 were graduated into fleet teams. Approximately 15 months after graduation of the last of this group, the present follow up was performed to determine the relationship between the predictor battery and fleet success. Basic Test Battery (BTB) scores were significantly correlated with fleet success, while swimming and physical fitness measures were not. 2 personality traits, Objectivity and Masculinity, had significant validities against this fleet criterion. Swimming test scores correlated significantly with rankings of swimming ability in the fleet. Swimming ability and physical fitness are important as predictors of UDT training success, but not of fleet success. Cognitive measures, (BTB), while unproductive of UDT training success, predict fleet success. Therefore, both types of measures should be used for screening in the initial UDT training program.

R 2

12,242

Underwood, B.J. STUDIES OF DISTRIBUTED PRACTICE: XV. VERBAL CONCEPT LEARNING AS A FUNCTION OF INTRA-LIST INTERFERENCE. *J. exp. Psychol.*, July 1957, 54(1), 33-40. (Northwestern University, Evanston, Ill.).

This study investigated concept learning as a function of degree of intralist interference and intertrial interval. Verbal concept materials were employed in which intralist interference was varied in terms of number of common characteristics shared by the objects symbolized by their respective word stimuli when those stimuli were instances of different concepts. 3 lists were constructed varying in degree of such overlap among concept stimuli. Massed practice consisted of 4 sec. between trials, distributed practice involved 30 sec. between trials. 6 groups of Ss, 51 in each group, were used. The 6 groups represent the 6 conditions, namely, 3 degrees of intralist similarity with a massed and distributed group for each degree. The Ss were given a constant number of learning trials with retention being measured after 24 hrs. The major results were: a) The greater the overlap (intralist interference) the slower the learning up to a point. Beyond this point with the present materials no further change occurred. b) Confirming previous concept formation studies, and studies using rote-learned paired associates, no differences in learning occurred as a consequence of massed vs. distributed practice. c) The forgetting over 24 hrs. was greater for lists with high intralist similarity than for the list with low intralist similarity, but was small in all lists.

R-11

12,243

Whittingham, D.G.V. THE DEVELOPMENT OF BOOTS FOR FLYING PERSONNEL. *FPRC* 817, Feb. 1953, 5pp. *RAE Institute of Aviation Medicine, Farnborough, Hants, England.*

12,243

The development of the Royal Air Force boot for flying personnel is described. The boot requirements were that it be suitable for in-flight and inter-flight wear in a wide range of climatic conditions, particularly those of ground survival. The various steps in development were: 1) breakdown of specific requirements and preliminary trials of several boots, 2) study of increase in foot volume during marching, 3) thermal insulation provided by two pairs of socks, 4) design of new boots, 5) sizing and 6) final evaluation.

R-4

12,246

Held, R. & Gottlieb, M. TECHNIQUE FOR STUDYING ADAPTATION TO DISARRANGED HAND-EYE COORDINATION. *Percept. Mot. Skills*, 1958, 8, 83-86. (Brandeis University).

12,246

A technique for measuring errors in hand-eye coordination induced by a displaced retinal image is described which precludes error recognition by the subject. The procedure separates conditions of measurement of localization from conditions of exposure and yields numerical measures of shifts in localization after short exposure periods. The technique is felt to be useful for exploring the exposure conditions responsible for adaptation to disarranged hand-eye coordination.

I. R-3

12,244

Church, S.A. REFINEMENT AND VALIDATION OF AN AIMING-POINT IDENTIFICATION MOTION-PICTURE GROUP TEST. *Proj. 7711, Devel. Rep. AFPRC TN 57 142, Dec. 1957, 16pp. USAF Operator Lab., Randolph AFB, Tex.*

A technique for obtaining group measures of radar aiming-point determination ability developed earlier by this laboratory was refined, and validity data on the newly developed test was obtained. A motion picture of the radarscope display during a bomb run served as the testing device. This filmed bomb run was animated with crosshairs which constituted items of the test. 90 rated officers undergoing upgrading training in the aircraft observer school at Hather Air Force Base served as subjects for this study. A scoring system was empirically derived which quite adequately described and discriminated the subjects' responses. This system provided scores which can be broken down into range error, azimuth error, or circular error. An analysis of the types and kinds of errors made was carried out. An item analysis was performed. The reliability of the test was determined. Equivalent form reliability proved to be .76, and the reliability of the complete test, consisting of 38 items, (19 in each of 2 equivalent forms) was .90. Portions of the test's variance were identified in terms of intermediate validity criteria consisting of grades and ratings by observer instructors. The test is of potential value as a predictor of circular errors made on check-flight missions, and as a predictor of instructor ratings of radarscope interpretation skills. It provides a useful criterion measure for research studies of radarscope interpretation skills.

R-9

12,245

Held, R. & Hein, A.V. ADAPTATION OF DISARRANGED HAND-EYE COORDINATION CONTINGENT UPON RE-AFFERENT STIMULATION. *Percept. Mot. Skills*, 1958, 8, 87-90. (Brandeis University).

12,247

Miller, E.F. EFFECT OF BREATHING 100 PER CENT OXYGEN AT ATMOSPHERIC PRESSURE UPON THE VISUAL FIELD AND VISUAL ACUITY. *Bu Med Surg Res. Proj. NM 12-01.11, Subtask 11, Rep. 11, March 1958, 14pp. USN School of Aviation Medicine, Naval Air Station, Fla.*

12,245

To test the importance of sensory stimulation that is dependent upon self-produced movement (re-afference) in the reduction of errors in hand-eye coordination induced by prisms placed in front of the eyes, comparisons were made of shifts in localization following exposures with and without re-afferent visual stimulation of the moving hand. The subjects were required to mark a target location while viewing the target through a prism (hands could not be seen thus visual detection of error was obviated) both before and after exposure conditions: scanning motionless hand, passive movement of hand by experimenter, and self-produced movement. Shifts in localization were analyzed for effects of exposure conditions.

T. G. R-4

12,247

The effect of hyperoxia upon vision was investigated under conditions approaching those experienced in actual flight. The visual field and visual acuity, both central and peripheral, of six subjects were tested under two conditions: breathing 100 percent oxygen and breathing air. Each subject was tested prior to starting and immediately after each of four hours breathing oxygen or air. Threshold data were analyzed for effect of oxygen and time of exposure.

R-4

12,248
Schrader, W.F. TRANSITION FROM VISUAL TO INSTRUMENT
FLYING. FINAL PROJECT REPORT. Prof. Moody 56 25, RCS:
1 CIAF-83, Aug. 1956, 3pp. USAF 350th Combat Crew
Training Group (Intercenter), Moody AFB, Ga.

12,248
To determine the best method for transition from visual
to flight conditions, seven flights were flown under
simulated instrument conditions whereby the instructor pilot
put the aircraft in an unusual attitude and at some
time during the maneuver directed the student to recover.
The approximate time lag for transition was determined
and, from observations of performance, some procedures
useful for transitioning are given.

12,249
Olson, H.C., Goss, A.E. & Volers, W.D. RECOGNITION
OF VEHICLES BY OBSERVERS LOOKING INTO A 5° BEAM.
Contract DA-44 109 OM 650, Proj. D. 5-30 000,
Tech. Rep. 49, July 1958, 48pp. Human Resources
Research Office, The George Washington University.

12,249
Information useful for night combat tactics was
gathered on how soon average observers facing a search-
light recognized tank-size vehicles approaching from
the light. Variables included observer distance and
position, and vehicle path and type. Similar recog-
nition data were collected under conditions of darkness.
During half the trials a loud, continuous noise behind
each observer was used to mask the sound of the approach-
ing vehicle. Recognition ranges (in yards) were ana-
lyzed for all conditions and the implications of the
results for armor tactics discussed.
T. G. I. R 3

12,250
USA Office of Ordnance Research. PROCEEDINGS OF THE
FIRST CONFERENCE ON THE DESIGN OF EXPERIMENTS IN
ARMY RESEARCH: DEVELOPMENT AND TESTING. Oct. 1955.
Rep. OORR 57 1, June 1957, 278pp. USA Office of
Ordnance Research, Ordnance Corps, N.C.

12,250
This volume presents the proceedings of a three-day
conference on the design of experiments in Army Research.
The first session consists of invited papers by well-
known authorities on the general philosophy and general
principles of the design of experiments; the second con-
sists of technical papers contributed by research workers
from various Army research, development and testing fa-
cilities; and the third session concerns presentations
and discussions of partially solved and unsolved problems
that had arisen in these establishments. There are 28
papers in the volume and a record of discussion.
T. G. I. R 80

12,251
Charlpper, B.A. SHIP CONTROL: VII. JUDGMENT OF
PITCH WITH VISUAL AND NON-VISUAL CUES. Contract
NONR-2512, EB Tech. Rep. 411 HF 14, P58 109, July
1958, 13pp. Electric Boat Div., General Dynamics
Corp., Groton, Conn.

12,251
To investigate man's ability to judge pitch
angles by various sensory cues, 30 subjects were
tested on a tilt-table submarine simulator. Each
subject reported two judgments at each of 20 angles
spaced in four degree intervals over a range of plus
to minus 40 degrees. In one condition only the
vestibular-kinesthetic cues provided by body tilt
were available; in a second condition visual cues
from a contact analog display were added. Mean
judgments and average error scores were compared
for the two conditions and with those from a pre-
vious experiment which used visual cues only.
T. G. I. R 3

12,252
Graham, C.H. & Hsia, Y. THE DISCRIMINATIONS OF A
NORMAL AND A COLOR-BLIND EYE IN THE SAME PERSON.
Proc. Amer. Phil. Soc., April 1958, 102(2), 168-173.
(Columbia University).

12,252
This paper presents color vision data for a subject
whose color-mixture and hue discrimination functions
show the right eye to be normal and the left eye, di-
chromatic. Sensitivity curves for each eye were obtained
to determine whether there was a loss in the dichromatic
eye. Binocular color matching experiments were made to
establish what colors were seen by this unilaterally
color-blind subject. These results are considered in
terms of theories of color vision. (See also 12,253,
12,254).
G. R 15

12,253
Graham, C.H. & Hsia, Y. THE SPECTRAL LUMINOSITY
CURVES FOR A DICHROMATIC EYE AND A NORMAL EYE IN
THE SAME PERSON. Proc. Nat. Acad. Sci., Jan. 1958,
44(1), 46-49. (Columbia University).

12,253
Luminosity curves were determined for the two eyes
of a unilaterally color-blind person. The subject's
right eye was normal and the left eye dichromatic -
most directly classified as deuteranopic. (See also
12,252, 12,254).
G. R 18

12,254
Graham, C.H. & Hsia, Y. LUMINOSITY LOSSES IN DICHRO-
MATS. The Optician, 1957, 134, 315-318. (Columbia
University).

12,254
Additional data on the luminosity functions of
color blindness are given here for one subject who
was color-blind (dichromatic) in one eye and normal
in the other. (See also 12, 253 and 12,252).
Luminosity curves, flicker curves, and brightness
matches are reported for this subject and discussed
in relation to theories of color vision.
G. R 13

12,255
Beukelman, T. PRELIMINARY SURVEY OF FACTORS CONTROL-
LING THE DEFINITION OF TRACKING TELESCOPE IMAGES.
OMB Rep. 12, July 1948, 15pp. USA Ballistic Re-
search Labs., Aberdeen Proving Ground, Md.

12,255
To determine the causes for poor definition
observed in photographs of missiles in flight taken
with tracking telescopes, each of the following
factors were investigated: seeing, focus, and vibra-
tions that might cause image motion during exposure.
These factors are treated in detail and proposals for
solution to the problem are advanced
T. G. I

12,256
Alderson Research Labs., Inc. ANTHROPOMORPHIC TEST
DUMMY MARK II. 1952, 16pp. Alderson Research Labs.,
Inc., New York, N.Y.

12,256
This report describes an anthropomorphic test
dummy (Mark II) that is considered to be a close
approximation to the human body. The uses of such a
life-size dummy in research on seating and harnessing
arrangements to minimize crash effects, in general
safety design, and other areas in which the subject is
an expendable item are discussed. The specifications
and characteristics are presented through discussion,
illustrations, and tables.
T. I.

12,257

Ewert, E.S. A SURVEY OF POTENTIAL MORALE, MOTIVATION, AND RETENTION PROBLEMS AT BALLISTIC MISSILE SITES. Proj. 7719, WADC TR 58-66, Oct. 1958, 36pp. USAF Personnel Lab., Lackland AFB, Tex.

Potential morale, motivation, and retention problems among personnel at ballistic missile complexes are reviewed, together with pertinent research findings in the military and industrial literature. Although morale and motivation problems do not appear particularly unique, there are important considerations of emphasis. Therefore, problem areas and proposed solutions are viewed in the broad context of analogous conditions in other military and industrial situations. This provides a framework for more effective evaluation of personnel actions. It is a major thesis of this report that in the area of improved management and leadership practices lies the greatest potential for enhancing morale and motivation to get things done effectively at ICBM complexes.

R 89

12,258

Corp., Frances M. RELATIONSHIPS BETWEEN AIRMAN INTERESTS AND CAREER SATISFACTION. Contract AF 41(657) 60, Proj. 7719, WADC TR 58-90, March 1958, 23pp. USAF Personnel Lab., Lackland AFB, Tex. (Trinity University, San Antonio, Tex.).

This study is an attempt to validate a 264-item interest inventory for inclusion in the basic airman battery to improve prediction of general competence in the Air Force situation and in particular Air Force jobs. Assuming that satisfaction is related to effectiveness in a work situation, it was taken as the criterion for this study. Responses of 842 airmen were validated against their answers to Sample Survey questions selected as indexes of satisfaction with the general Air Force situation and with particular Air Force duty. Predictive validity was not demonstrated for existing keys with general Air Force personnel or selected job specialty groups; item analysis did not result in new scales.

R 17

12,259

Taylor, C.W., Smith, W.R., Ghiselin, B., Sheets, B.V., et al. IDENTIFICATION OF COMMUNICATION ABILITIES IN MILITARY SITUATIONS. Contract AF 18(600) 1211, Proj. 7719, WADC TR 58-92, June 1958, 57pp. USAF Personnel Lab., Lackland AFB, Tex. (University of Utah, Salt Lake City, Utah).

This research was designed to define the dimensions of communication abilities, to provide techniques for measuring performance in communication in military situations, and to determine test predictors of the communication abilities thus defined and measured. A list of communication requirements was abstracted from descriptions of airman jobs. Tests were assembled assumed to be predictive of these abilities. From their administration in 2 large test batteries to samples of airmen the data were analyzed for selection of predictors to include with criterion variables in a validation battery. 18 situation tests were constructed from which were derived 27 criteria of communication effectiveness in military situations. Significant relationships between predictors and criteria demonstrated the practicability of assembling either a general set of predictors or groups of specific predictors. There is evidence that communication abilities are more complex than categorization by communication channel (speaking, writing, reading, listening) implies; integrating abilities are predictive of effectiveness in all channels. The report supplies extensive data useful for the further development of selection and classification procedures for Air Force personnel primarily concerned with communication tasks.

R 31

12,260

Marks, D.A. & Gronow, D.G.C. A COMPARISON OF THE APPRECIATION OF AIRCRAFT ATTITUDES GIVEN BY FOUR TYPES OF NON-TOPPLING ATTITUDE INDICATOR. FPRC 833, May 1953, 14pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

12,260

To discover the most suitable presentation of aircraft attitude, four non-toppling attitude indicators were compared: the standard artificial horizon, two single dial forms with horizons, and one two-dial form without an horizon. The stimuli were presented tachistoscopically and the subject was required to interpret the information presented. Groups of 24 pilots, 24 cadet pilots and 24 non-pilots were tested and seven types of scores were investigated. A subsidiary experiment was run using motor rather than verbal responses. Recommendations are included.

T. G. I.

12,261

Duncan, C.H. THE INFLUENCE OF FIELD OF VIEW ON MEASUREMENTS OF ATMOSPHERIC TRANSMISSION. Proj. NR 544-000 & Proj. NR 544 001, NRL Rep. 4917, April 1957, 20pp. USN Research Lab., Washington, D.C.

12,261

To provide atmospheric transmission data for varying sizes of fields of view in the regions of lower transmissions, measurements were made of the ratio of diffuse transmission to collimated transmission for fields of view as large as 50 degrees in diameter. This work was done over a 1.51-mile path with collimated transmission values ranging from 0.75 to 0.01. The obtained data is compared with theoretical values computed from an equation derived from earlier observations in relatively clear atmospheres.

T. G. I. R 1

12,262

Lanier, L.H. & Tresselt, Margaret E. A FACTORIAL ANALYSIS OF DEPTH PERCEPTION TESTS. Contract WSW 2496, no date, 42pp. Psychological Research Center, New York University.

12,262

To investigate the inter-relationships among the aspects of visual discrimination involved in depth perception, a battery of 28 visual tests covering variables of binocular and monocular depth, visual acuity, phorias, and color was administered in a test and retest series to 228 subjects. The data were studied by factorial analysis and significant factors identified and discussed. Further analysis was made with reference to (1) the form of distribution of scores for different tests, (2) test-retest reliability, and (3) practice effects. Courses for future investigation are suggested.

T. R 19

12,263
Willingham, W.A. A NOTE ON THE RELATION OF AGE TO ATTRITION. Bu Med Surg Proj. No 16 of 11.
Subtask 1, Rep. 15, April 1958, 6pp. U.S. School of Aviation Medicine, Naval Air Station, P.O.

It has been noted in previous years that in the Naval Air Training Program older students are more likely to fail. It was the purpose of this study to analyze the relationship between age and different types of failure in order to clarify in what respects age is related to success. The data indicated that age is negatively related to success primarily due to the fact that older men are more likely to withdraw voluntarily. The data showed relatively small relationships between age and other types of failure.
R. 6

12,265
Malfreck, J.N. & Taylor, J.H. (Eds.). FORM DISCRIMINATION AS RELATED TO MILITARY PROBLEMS. Proceedings of a Symposium, April 4-5, 1957. Pub. 561, 1957, 263pp. National Academy of Sciences-National Research Council, Washington, D.C.

12,265
This report presents the proceedings of a symposium on form discrimination as recorded on tape and later transcribed and edited for publication. Session I deals with the significance of form discrimination in military applications, visual psychophysics, and psychology. Session II provides up-to-date information about some representative technical and procedural aspects of research in this area. Session III presents experimental results relating form to the elementary visual detection process. The final session was a summary discussion by the fifty or more participants. There are 35 papers presented in full.
T. G. 1. R 83

12,266
Moser, H.M., Kirkconnell, T.W. & Wolfe, Susan M. AN INTERIM REPORT ON INTERNATIONAL LANGUAGE FOR AVIATION. Contract AF 19(604) 1577, AFRC IN 57 63, RF Proj. 664, Tech. Rep. 46, April 1958, 16pp. Ohio State University Research Foundation.

12,266
This report analyzes the United Kingdom proposals for constructing, testing, and introducing an International Language for Aviation (ILA). An alternate proposal that is based on laboratory experimentation in this country is proposed as a more logical base for standardization of present and future ILA. The morphology and syntax of the proposed language are presented.
T. R 5

12,267
Lichten, A.M. PSYCHOLOGICAL STUDIES OF THE CONTENT AND METHODS OF PRESENTING CHARTS AND MAPS FOR RADAR OBSERVERS AND NAVIGATORS. Contract AF 19(604) 1209, Proj. 7738, AFFRC IN 58 3, Jan. 1958, 22pp. Naval Ordnance Lab., Randolph AFB, Tex.

12,267
The pilot studies and experiments summarized in this report were undertaken (1) to provide additional knowledge of types of information derived from radar scope displays, (2) to develop an objective test of navigational performance, and (3) to study the influence of certain chart variables on performance. Two techniques for measuring performance were developed: a group form of the "plotter" technique of aiming-point identification and a new "city recognition test" that is also a group method based on use of slides and projectors. The effect of two chart variables—map scales and amount of information—on performance were studied.
R. 4

12,268
Davis, R.C., Landerside, A. & Miller, J.D. THE PATTERNS OF SCATTERED RESPONSE DURING A REVERSIVE MOTOR TASK AND ITS MODIFICATION BY VISUAL STIMULI. J. Comp. Physiol. Psychol., Feb. 1957, 30(1), 53-60. (Indiana University).

12,268
To explore the effects of a simple repetitive motor task on the skeletal and autonomic state of the individual and the effect of additional stimuli imposed during this response, measurements of muscle potentials and various other responses such as skin resistance, pulse rate, breathing, and blood volume were made on 14 subjects. The test routine included rest, sound of metronome, tapping on key at a given rate, tapping during exposure of lantern slides and tapping at maximum rates. The data were analyzed for common response patterns and for departures therefrom.
T. G. 2:13

12,269
van Kesteren, T. (Chairman). PROCEEDINGS OF THE SEVENTH AGARD GENERAL ASSEMBLY. 25-26 Nov. 1957. Nov. 1957, 102pp. Advisory Group for Aeronautical Research & Development, North Atlantic Treaty Organization, Paris, France.

12,269
The proceedings of NATO's Advisory Group for Aeronautical Research and Development Assembly are presented in this document. The papers indicate the interest and concern of the men charged with national defense and outline their awareness of the important role of the scientist in that effort. A round table discussion, "Towards Higher Altitude" dealt with these topics: physics of the stratosphere and ionosphere, aerodynamics of low density media, propulsion at high altitudes, human parameters of space flight and high altitude flight testing. Summary reports from panels are presented: aeromedical, combustion and propulsion, flight testing, structures and materials, wind tunnel and model testing, and documentation.
G. 1.

12,270
Baker, P.T. AMERICAN NEGRO-WHITE DIFFERENCES IN HEAT TOLERANCE. Proj. 7 of 01 0058, Tech. Rep. EP 75, June 1958, 19pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,270
The physiological responses of American white and negro soldiers were studied under hot-wet and hot-dry conditions. Under hot-wet conditions 40 pairs of men matched for body fat, weight, and stature were walked around a course at three and one-half miles per hour for one hour. Under hot-dry conditions eight pairs of men, matched as before, were studied under eight different conditions which included combinations of clothing, sun, shade, walking and sitting. The data were studied for differences in ability to withstand heat stress between the two types of subjects which might be genetic in origin.
T. R 25

12,271

Boher, P.T. A THEORETICAL MODEL FOR DESERT HEAT TOLERANCE. Proj. 7 83 01 0038, Tech. Rep. EP 96, July 1958, 28pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,271

This report points out the great individual variance in the desert heat tolerance of man as shown by experimental and actuarial data. The same data also show that a significant percentage of this variance is correlated to morphological characteristics. From these relationships a "model" for tolerance of desert heat was constructed. A survey of world populations indicated a trend for desert populations to conform more closely to the "model" than other populations. The military applications of the model are discussed.

T. I. R 37

12,272

Baldwin Piano Co. COMPUTED VS. MEASURED WORD ARTICULATION: SIMULATED PILOT-TO-CONTROL TOWER COMMUNICATION. Final Engineering Report. Contract AF 33(616) 3325, Task 2, Rep. AFAC 21, March 1957, 84pp. Baldwin Piano Co., Cincinnati, Ohio.

12,272

To determine whether less than the full frequency range could be successfully used in radio communication between pilot and control tower, calculated estimates were made of word articulation for communication systems containing military and commercial microphones, headset, amplifiers, and loudspeakers of types now used in control towers in ten ambient noise environments typical for present aircraft. Experimental articulation values were obtained in a limited number of these and compared with calculated values. The frequency ranges required for 80 percent word articulation were determined.

T. G. I. R 10

12,273

Barnardo, R.B., Mager, M. & Bass, D.E. MEASUREMENT OF THE RATES OF EXCRETION OF SWEAT SOLUTES UNDER PHYSIOLOGICAL CONDITIONS. Proj. 7 83 01 0038, Tech. Rep. EP 78, Dec. 1957, 9pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,273

An apparatus is described which permits the study of rates of secretion of sweat solutes under physiological conditions from an arm, and which permits regulation of skin temperature independent of ambient conditions. With the apparatus all sweat water can be collected separately from the associated solutes. Comparative data on rate of excretion of sodium, potassium, chloride, "apparent" creatinine, and urea for the arm enclosed in the apparatus and for the unenclosed arm are presented. The usefulness of the apparatus is discussed.

T. I. R 7

12,274

Borjer, F.H. THE ROLE OF THE WORK ENVIRONMENT IN THE CONCEPT OF HUMAN ENGINEERING. International Congress on Occupational Health, 1957, III, 110-112. (Instituut voor Praeventieve Geneeskunde, Leiden, The Netherlands).

12,274

The relation of the field of human engineering to that of occupational health is pointed out. The idea that more attention needs to be given to equipment design, work place layout and physical environment if physical and mental health are to be promoted is illustrated by the common example of the crane cabin. A diagram of interrelationships in human engineering is presented.

T. I.

12,275

Brown, Mary B. EVALUATION OF QUALITY AND STABILITY OF TEN MENUS OF PRECOOKED FROZEN MEALS FROM THREE AIR FORCE PROCUREMENTS. Proj. 7156, QMCI Rep. 40 57, Interim Rep. 1, Dec. 1957, 16pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.

12,275

Ten menus of precooked frozen meals from three Air Force procurements were evaluated for quality initially and at intervals during 12 months storage at zero degrees Fahrenheit. Quality ratings on a nine-point scale were made by a panel of eight to 12 food technologists for three menu items from each of eight menu combinations and two casseroles. One meal was shared by two testers at a single serving. A special questionnaire was also used to evaluate the items. Recommendations as to procurement, packaging, and storage time are made.

12,276

Brown, M.K. STRESS SUMMATION IN FLIGHT: III. EFFECT OF BREATHING PURE OXYGEN AT ATMOSPHERIC PRESSURE ON TOLERANCE TO ACCELERATION. EPIC 1043, April 1958, 8pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

12,276

To investigate possible interaction between positive acceleration (g) and breathing of pure oxygen leading to a lowering of the threshold of consciousness, changes in blackout threshold of six experienced centrifuge subjects breathing ten and 100 percent oxygen at atmospheric pressure were determined. The method involved the use of dark adaptation. Respiratory and pulse rates were also measured. Thresholds were determined after five, ten, fifteen and twenty minutes on pure oxygen and compared to two values determined at ten and fifteen minutes while breathing air.

T. G. I. R 26

12,277

Chapanis, A. REPORT OF RESEARCH UNDER CONTRACT WITH OFFICE OF NAVAL RESEARCH. Prog. Rep. 40, May 1957, 14pp. Psychological Lab., The Johns Hopkins University.

12,277

This report gives details of the progress on a research project concerning human factors in the design of systems for the display, control, and transmission of information. The personnel involved, visits and special activities, research reports published since the last report period, and reports ready for publication are listed. Summaries of the recent reports and of new research are given. Also included is a bibliography of research reports published in 1955-1956.

R 9

12,278

Cohen, S.I. & Silverman, A.J. MEASUREMENT OF PILOT MENTAL EFFORT. AGARD Rep. 148, May 1957, 23pp. Advisory Group for Aeronautical Research & Development, North Atlantic Treaty Organization, Paris, France.

12,278

This paper discusses the factors that affect a pilot's ability to respond to situations demanding effort and methods of measuring his total psychophysiological response: the electroencephalogram (EEG), skin resistance, and projective tests heavily loaded with aggressive content and symbols. Quantitative results obtained by these methods in relation to tolerance for accelerative forces on the human centrifuge are presented. Lines of future research are suggested.

T. G. I.

12,279

Gaume, J.G. DESIGN OF AN ALGAL CULTURE CHAMBER ADAPTABLE TO SPACE SHIP CABIN. Rep. 58 61, May 1958, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,279

This report describes the design of a new type of algal culture chamber that could be readily modified, as required, in the establishment of an algal exchange system in a completely closed ecology such as a space ship cabin. The new design is capable of utilizing a much smaller amount of power to illuminate a much larger volume of algal suspension than earlier designs. A diagram is presented showing parts of model photo-synthetic gas exchanges.

1. R. 3

12,280

Gaydos, H.F. THE EFFECT ON COMPLEX MANUAL PERFORMANCE OF COOLING THE BODY WHILE MAINTAINING THE HANDS AT NORMAL TEMPERATURES. Proj. 7 83 01 005, Tech. Rep. EP 84, April 1958, 7pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,280

To determine whether the impairment of performance of complex manual tasks in the cold can be prevented by maintaining the hands at normal temperature even though the rest of the body becomes cool, 12 subjects were tested on two tasks (knot tying and block stringing) under two conditions. In one the body and hands were cooled simultaneously to 45 degrees Fahrenheit; in the other the body was cooled to the same degree as before while the hands were kept warm (80 degrees Fahrenheit). Tests were administered at intervals as body and/or hand temperatures dropped. Performance scores were analyzed for differences due to experimental variables.

T. G. R. 8

12,281

Gerlach, Muriel W. INTERVAL MEASUREMENT OF SUBJECTIVE MAGNITUDES WITH SUBLIMINAL DIFFERENCES. Contract NMR 225(17), Proj. NR 171 034, Tech. Rep. 7, April 1957, 184pp. Applied Mathematics & Statistics Lab., Stanford University.

12,281

This paper presents the view that subjective (psychological, sensory) measurement is possible if certain conditions are met and is concerned with specifying these formal conditions. Adequate criteria for interval measurement of subjective magnitude are specified, that is, axioms on experimentally realizable notions are laid down and proofs offered of their adequacy to guarantee interval measurement. Account is taken of special conditions for sensory measurement such as indifference (psychological indistinguishability), subliminal differences, limited extent of sensation.

R 29

12,282

Hannigan, J.F. INTERIM REPORT ON CAMOUFLAGE OF ARMY AIRCRAFT. Proj. 8 31 02 110, Tech. Rep. 1508-TR, Jan. 1958, 100pp. USA Engineer Research & Development Lab., Fort Belvoir, Va.

12,282

This report covers camouflage tests for army aircraft in temperate terrain. The L-20, H-21, and H-34 army aircraft were used. Four paint schemes were tested against terrain backgrounds: 1) interim pattern (dark green, forest green, and sand), 2) solid color (lustreless olive drab), 3) field pattern (olive drab and black), and 4) standard. Gray, white, and aluminum undercolors and the standard were compared against sky backgrounds. Four viewing situations were used: air to ground, ground to ground, air to air (above), and ground to air. Photographs using various types of films were taken. Some additional measures for concealing aircraft on the ground were tested.

T. I. R. 5

12,283

Tampietro, P.F., Buskirk, E.R. & Bass, D.E. EFFECTS OF FOOD, CLIMATE, AND EXERCISE ON RECTAL TEMPERATURE DURING THE DAY. Proj. 7 83 01 005B, Tech. Rep. EP 76, Dec. 1957, 5pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,283

To determine the effect of climate, food intake, and activity level on the diurnal pattern of rectal temperature from eight o'clock in the morning to eight o'clock at night, a series of experiments was performed. All subjects were healthy young soldiers. Data were collected from men 1) living in two climates (subarctic and temperate) performing a daily march of ten miles with regular meals; 2) with and without the daily march; and 3) with different combinations of food and exercise. In all phases rectal temperatures were measured at four periods during the day and analyzed for changes attributable to experimental variables.

T. G. R. 11

12,284

Konecki, E.B. DECOMPRESSION EVENTS IN BIOSATELLITES. ARS 638 58, 8-12 June 1958, 56pp. Human Factors Group, Douglas Aircraft Co., Inc., Tulsa, Okla.

12,284

This report deals with very slow to extremely rapid decompressions, both accidental and intentional, in a variety of sealed, pressurized, environmental biosatellites. Physical aspects of the decompression process are reviewed and a nomogram presented to give the relationships between cabin volume, orifice opening, and time of decompression through various pressure altitudes. Causes of various kinds of decompressions are outlined with detailed attention given to meteoric hazards. Biological aspects are next considered: hypoxia, dysbarism (decompression sickness), and physical injury. Finally safety measures that should be taken are discussed.

T. G. I. R. 55

12,285

Konecki, E.B. HUMAN FACTORS AND SPACE CABIN DEVELOPMENT. ARS 533 57, Aug. 1957, 27pp. Human Factors Group, Douglas Aircraft Co., Inc., Tulsa, Okla.

12,285

The first prerequisite to manned space flight is a hermetically sealed environment terrestrial equivalent cabin. Human factors requirements for the design and reliability testing of such a space cabin are briefly outlined and human factor problems discussed. Primary attention is given in this discussion to the oxygen and dioxide systems with original experimental data on the production of oxygen from the photolysis of carbon dioxide presented. Dynamic testing of the space cabin under simulated space conditions on the ground is considered a mandatory requirement prior to first test flight.

T. G. I. R. 36

12,286

Konecki, E.B. HUMAN FACTORS IN SPACE FLIGHT. ARS/Space Engng., June 1958, 12(6), 34-48. (Human Factors Group, Douglas Aircraft Co., Inc., Tulsa, Okla.).

12,286

This paper lists possible human factor problem areas in space flight under three headings: physiological, human engineering, and psychological-social. Space cabin requirements for the human operator are also listed with discussion of the following: cabin environment, decompression, cosmic radiation, and weightlessness.

T. G. I. R. 13

12,287

Lacey, J.I. & Lacey, Beatrice C. VERIFICATION AND EXTENSION OF THE PRINCIPLE OF AUTONOMIC RESPONSE STEREOTYPY. *Amer. J. Psychol.*, March 1958, **LXXI**, 50-73. (Fels Research Institute, Antioch College).

12,287

This is the fifth of a series of studies of somatic changes during effortful mental activity and noxious stimulation. An hypothesis, derived from earlier studies, states that the entire pattern of autonomic responses is reproducible over different stressor episodes. This study is a replication of an earlier study using a different sample consisting of adult women (42 in number) rather than young college men. They were subjected to four stressors in sequence (anticipation of noxious stimulation, and cold-pressor, mental arithmetic, and word-fluency tests) while some physiological measures (blood pressure, pulse, skin resistance, and heart-rate) were measured. The data were analyzed for patterns of response and their specificity.

T. G. R 29

12,288

Miller, E.F. EVALUATION OF CERTAIN VISUAL AND RELATED TESTS: II. PHORIA. *Bu. Med. Surg. Res. Proj.* NM 14-01 11, Subtask 6, Rep. 2, April 1958, 20pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,288

To determine the distribution of phoria, especially at near point, among pilot personnel and to evaluate several tests of this function, a sample of 110 naval aviation cadets were tested. Phorias were measured at a near (40 centimeters) and/or far (six meters) distance by the von Graefe method, red Muddox rod (near only), Keystone D89 series, and monocular projections (Renshaw). Sixty subjects were retested. Frequency distributions and variability among subjects were studied. Results from the four tests were compared and test-retest reliabilities computed.

T. G. R 13

12,289

Shilling, C.W. (Chairman) MINUTES AND PROCEEDINGS OF THE FIFTEENTH MEETING OF THE ARMY-NAVY-MRC VISION COMMITTEE. 12-13 Feb. 1946, Oct. 1957, 178pp. National Academy of Sciences, Washington, D.C.

12,289

In addition to the regular business of this organization, this report gives in full 12 papers describing research in several areas of vision: visual acuity tests; visual acuity in mesopic brightness range; visibility program; optical aids such as binoculars, and night vision. Appended are 21 abstracts of current vision literature.

T. G. R 21

12,290

Melani, J.F. COCKPIT, INSTRUMENT, AND ANTI-COLLISION LIGHTING FOR ARMY AIRCRAFT (INSTALLATION AND EVALUATION OF COCKPIT AND INSTRUMENT LIGHTING FOR THE L-19 AIRCRAFT). *Proj. DA 9 39 01 000*, House Task 12.23, First Interim Rep., April 1957, 41pp. USA Transportation Research & Engineering Command, Fort Eustis, Va.

12,290

To develop improved cockpit and instrument lighting systems for the L-19 aircraft, a variety of systems in use on various types of aircraft were investigated. Mock-up and installation tests were made of different types of "gang-light" and individual light systems for instrument lighting. Lights for illuminating individual items in the cockpit as well as general cockpit lighting were also tested. Evaluation was in terms of factors that would affect pilot efficiency. Recommendations are included.

T. I. R 3

12,291

Calvert, E.S. & Sparke, J.M. THE EFFECT ON WEATHER MINIMA OF APPROACH SPEED, COCKPIT CUT-OFF ANGLE AND TYPE OF APPROACH COUPLER FOR A GIVEN LANDING SUCCESS RATE AND LEVEL OF SAFETY. *RAE Tech. Note EL 130*, Jan. 1957, 14pp. Royal Aircraft Establishment, Farnborough, Hants, England.

12,291

This note attempts to make a realistic assessment of the performance of various approach couplers using the results of some tests made during 1955-56, both full scale and on a landing simulation. The influence of cockpit cut-off angle, approach speed, ground lighting pattern, and runway width on the weather minima which can be defeated by a coupler of given accuracy is discussed. The implications of the findings on cockpit and Ground Control Approach (GCA) procedures are pointed out, and some suggestions are made for improving safety.

T. G. R 7

12,292

Siegel, A.I., Fox, B.H. & Stirner, F.W. CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT: II. AN INVESTIGATION INTO THE EFFECTS OF VARYING SIGNAL LIGHT SHAPES ON THE ATTENTION ARRESTING VALUE OF CAUTION AND WARNING LIGHT INDICATORS. *Contract N 1565 33252*, TED MAN EL 52004, Part 12, NANC ACEL 330, Feb. 1957, 21pp. USN Air Crew Equipment Lab., NANC, Philadelphia, Penn. (Applied Psychological Services, Villanova, Penn.).

12,292

To investigate the feasibility of shape coding for warning and caution light indicators, 20 subjects were required to perform a compensatory tracking task and also to turn off a signal light when it appeared on the panel before him. Four light indicator shapes (square, circle, triangle, and rectangle), four locations, two levels of surround brightness, and steady or blinking presentation were used with both maximal and minimal contrast conditions. The mean response times (from time signal appeared to response made to turn it off) were analyzed for effects of the variables. The results are discussed in relation to practical use in aircraft panels.

T. I. R 4

12,293

Willingham, W.M. A NOTE ON PEER NOMINATIONS AS A PREDICTOR OF SUCCESS IN NAVAL FLIGHT TRAINING. *Bu. Med. Surg. Proj. NM 16 01 11*, Subtask 1, Rep. 14, May 1958, 5pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

Previous research has indicated that peer nominations can be of value in predicting success in the Naval Air Training Command. The present study was initiated to determine the validity of a number of different types of peer nominations and to evaluate the effectiveness of summing several ratings. 2 peer nominations were found to predict success equally well. One of these, leadership, is currently included in the grading system of the U.S. Naval School Pre-flight. The data indicate that additional peer nominations would not improve prediction of success in the training program.

R 2

12,294
Telhurst, G.C. VOCAL PITCH CHANGES: EFFECTS ON INTELLIGIBILITY TEST SCORES. OSU Contract N60MR 22525, ONR Proj. NR 145 993 & Bu Med Surg Res. Proj. NM 18 02 99, Subtask 1, Rep. 76, April 1958, 13pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,294
To explore the generally accepted belief that heightened intelligibility is given to words by a rising inflection, two recordings of multiple-choice tests were made by three speakers. In one recording a single talker spoke a test phrase, inflecting one of the three stimulus words upward in pitch, and in another each of the three test words was spoken by a different speaker. Each recording was heard by 116 to 120 listeners in quiet classroom (62 decibels). Listener data were analyzed for intelligibility advantages due to inflection and the position of the inflected word in the phrase.
T. G. R 18

12,295
Miles, S. OXYGEN SYNCOPE. RSP 57/880, UPS 161, Jan. 1957, 7pp. Royal Naval Personnel Research Committee, Medical Research Council, London, England. (Royal Naval Physiological Lab., Alverstoke, Hants, England).

12,295
To investigate the theory that breathing oxygen will lower the threshold for the occurrence of syncope (loss of consciousness due to an acute decrease of cerebral blood flow) irrespective of its immediate cause, 36 young adults were tested breathing air or oxygen (five minutes), hyperventilation (one minute), changing from prone to upright positions, and blowing into pressure tube attached to mercury manometer for as long as possible. Breath holding time, amount of pressure maintained, and incidence of syncope or symptoms were analyzed. The results are discussed in relation to cases of "Shallow Water Blackout" in divers and episodic unconsciousness in pilots. Recommendations to limit its occurrence are given.
T. R 10

12,296
Miller, J.W. & Goodson, J.E. A NOTE CONCERNING "MOTION SICKNESS" IN THE 2-FH-2 HOVER TRAINER. Bu Med Surg Proj. NM 17 01 11, Subtask 3, Rep. 1, Feb. 1958, 19pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,296
To investigate possible factors that contribute to "motion sickness" in the 2-FH-2 helicopter simulator, a review was made of the development of the equipment and two previous evaluations. Individuals, both instructors and students, who had performed on the simulator were interviewed. Finally the equipment was thoroughly studied in an effort to pinpoint trouble areas. The problem of "motion sickness" lies in a combination of several modes of distortion: static and dynamic distortions of projected scenery, errors in perceived directional changes of motion, and errors in perceived angular rate of motion. Suggestions are made for remedying these distortions.
T. R 3

12,297
Summy, W.H., Chambliss, D. & Pollack, I. INFORMATION TRANSMISSION WITH ELEMENTARY AUDITORY DISPLAYS. J. Acoust. Soc. Amer., May 1958, 30(5), 425-429. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,297
This study examines the feasibility of employing tonal signals for low rates of information transmission with naive observers. The procedure employed successive selections of tones, each from among two, three, or five alternatives, in order to transmit a target vocabulary of 25 letters. Four stimulus variables were studied: tonal frequency, sound level, location, and duration. The subjects were tested individually on their ability to identify the coded signals against a quiet and a noise background. Estimates of transmitted information were based on the average error scores.
G. I. R 4

12,298
Luce, R.D. A THEORY OF INDIVIDUAL CHOICE BEHAVIOR. May 1957, 51pp. Dept. of Mathematical Statistics and Sociology, & Bureau of Applied Social Research, Columbia University.

12,298
This paper presents a mathematical description of individual choice behavior based on the presupposition that such behavior is probabilistic, not algebraic. A single axiom is developed relating the various probabilities of choices from different finite sets of alternatives. The question of the existence of a comparatively unique numerical scale that reflects choice behavior is investigated and the results applied to some problems in psychophysics and psychometrics, stochastic learning theory, choice reaction time, information theory and utility theory of economics. Other problems needing study are suggested.
R 19

12,299
Harris, Katherine S., Hoffman, H.S., Liberman, A.M., Delattre, P.C., et al. EFFECT OF THIRD-FORMANT TRANSITIONS ON THE PERCEPTION OF THE VOICED STOP CONSONANTS. J. Acoust. Soc. Amer., Feb. 1958, 30(2), 122-126. (Haskins Labs., New York, N.Y.).

12,299
To investigate the role of third-formant transitions in the perception of the voiced stop consonants /b,d,g/, spectrographic patterns of a variety of third-formant transitions paired with each of a number of second-formant transitions in initial positions before two vowels were converted into sound. The listeners (101) were asked to identify each stimulus as one of the three consonants being tested. Response distributions to each stimulus were analyzed and discussed.
G. I. R 8

12,300
de Percin, F.P. & Falkowski, S.J. HANDBOOK OF THE QUARTERMASTER RESEARCH & ENGINEERING CENTER: ENVIRONMENT AND CLIMATIC TEST FACILITIES. Proj. 7. 83 01 005A, Tech. Rep. EP 62, Sept. 1957, 66pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,300
This report provides information on the environment and environmental research facilities of the Quartermaster Research and Engineering Center, Natick, Massachusetts, and its surrounding area. To aid in the planning, timing, and evaluation of scientific studies and tests conducted at the Center, a description is given of climate with its changing seasons, the ground and vegetation characteristics of outdoor testing areas, the Climatic Research Laboratory, and other climatic test facilities. Where possible information is presented graphically.
T. G. I. R 38

12,301
Camp, R.T., Jr. THE PERCEPTION OF MULTIPLE-CHOICE INTELLIGIBILITY ITEMS IN THE PRESENCE OF SIMULATED PROPELLER-TYPE AIRCRAFT NOISE. Contract N60MR 22525, Proj. NR 145 993, & Bu Med Surg Res. Proj. NM 18 02 99 Subtask 1, Rep. 73, July 1958, 51pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,301
To investigate the responses to multiple-choice intelligibility tests under a wide range of noise levels, the per cent word intelligibility of four such tests was obtained from 573 listeners in the presence of 47 decibels (3b) sound pressure level (SPL) of room noise and four levels (88, 108, 118, and 124 db SPL) of simulated propeller type aircraft noise. A wide range of signal-to-noise ratios was tested at each noise level. An exponential curve was fitted to the data from each noise condition. The fitted curves were consolidated into one family showing mean word intelligibility as a function of speech level with ambient noise as a parameter.
T. G. I. R 8

12,302
Papinsky, Pauline M., Papinsky, H.B., Robin, S.S. & Minor, F.J. MOTIVATIONAL FACTORS IN INDIVIDUAL AND GROUP PRODUCTIVITY: V. THE EFFECTS OF INDUCED ORIENTATION AND TYPE OF TASK UPON GROUP PERFORMANCE AND GROUP MEMBER MORALE. Contract ONR N60R1 17, T.O. III, Proj. NR 171 123, 1957, 126pp. Ohio State University Research Foundation.

12,302
This experiment is fifth in a series designed to investigate motivational factors in individual and group productivity. The question investigated is whether differences occur in group productivity, as measured by task performance, when the initial value-orientation of the group and task itself are varied. Two value-orientations (how the group functions and accomplishment of task) were induced in separate sets of eight four-man groups. Each group then performed two tasks (Treaty Problem and 30 Questions Quiz). Group productivity was measured by objectively scored task performance and analyzed in terms of differences due to orientation and to task.
R 28

12,303
Rubin, L.S. MANUAL DEXTERITY OF THE GLOVED AND BARE HAND AS A FUNCTION OF AMBIENT TEMPERATURE AND DURATION OF EXPOSURE (U). Proj. 4 08 02 019 01, ONR Rep. 2107, March 1957, 31pp. USA Chemical Warfare Lab., Army Chemical Center, Md.

12,303
To determine the effect of various protective gloves, temperature conditions and durations of exposure on manual dexterity, the standard M3 (nylon/neoprene) glove and the E20 impermeable protective glove were worn in combination with a cotton liner under temperature conditions ranging from 25 to 100 degrees Fahrenheit and for periods of 40, 80, and 120 minutes. Several dexterity tasks were performed (washer nut and bolt, and screwdriver tests and manipulation of contents of chemical kit) by 72 subjects at each temperature with gloved and ungloved hands and the performance data analyzed for differences due to experimental variables. Anthropometric measurements and subjective judgments of comfort were further studied.
T. G. I. R 9

12,304
Webb, W.B., Berkshire, J.R. & Goodman, I.J. PRE-SOLO FLIGHT GRADES AND CARRIER LANDING ACCIDENTS OCCURRING IN TRAINING. Special Rep. 57 21, July 1957, 4pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,304
This report examines the relationship between pre-solo grades and in-training carrier landing accidents. The pre-solo and field carrier landing practice grades of 62 students involved in pilot-error aircraft accidents during their carrier landing phase of training were compared with those of a non-accident control group. Results are presented in terms of the comparison between the proportion of the accident group falling below given grade levels and the non-accident group. A discussion of "accident-proneness" as a meaningful concept in airplane accidents is presented and recommendations made for its discovery and control.
T. R 3

12,305
Willingham, W.W. CONFIDENCE AND CORRECTNESS IN COMPARATIVE JUDGMENT. Bu Med Surg Res. Proj. NM 14 02 11, Subtask 12, Rep. 3, July 1958, 4pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,305
This experiment examines the relationship between confidence in a judgment and correctness of the judgment. One hundred and eight subjects were required to make a series of two-choice judgments involving the population size of some twelve countries paired against each other. Each subject estimated the accuracy of his response. Results are discussed in terms of the correlation between correctness of a judgment and confidence in the judgment even when items which are answered consistently incorrectly are included.
G. R 2

12,306
DuBois, P.M. & Manning, W.H. METHODS OF RESEARCH IN TECHNICAL TRAINING. A REPORT OF A CONFERENCE HELD AT THE NAVAL AIR STATION, MEMPHIS, TENNESSEE, OCTOBER 11 AND 12, 1956. Contract N60R 816(02), Tech. Rep. 3, May 1957, 114pp. Department of Psychology, Washington University.

12,306
This report is based upon a transcript of the Conference. The problems of design and methodology in technical training research were examined and directions for future investigations conducted under the contract between Washington University and the Office of Naval Research were indicated. Emphasis was placed upon statistical procedures that could be used in place of the traditional experimental controls, such as techniques of multivariate correlational analysis and the analysis of variance and covariance. Six papers and the following discussions are reported. An annotated bibliography of gains studies is appended.
T. G. R 73

12,307
Alluisi, E.A. & Muller, P.F., Jr. VERBAL AND MOTOR RESPONSES TO SEVEN SYMBOLIC VISUAL CODES: A STUDY IN S-R COMPATIBILITY. J. Gen. Psychol., March 1958, 25(3), 247-254. (Lab. of Aviation Psychology, Ohio State University).

12,307
To measure information-handling performance of subjects responding to conventional Arabic numerals and six other symbolic visual codes (straight line Arabic numerals, three sets of symbols based on visual inclination of a line, a set of colors, and a set of ellipses of differing axis ratios), ten subjects were tested. Both motor (key pressing) and verbal response conditions with self- and forced-paced rates of information presentation, with the latter being varied from two to six bits per second in unit steps, were used. The response data were analyzed for effect of code, type of response, type of presentation and their interactions.
T. G. I. R 14

12,308
Appley, R.H. (see Appley, R.H. & Moeller, G. MOTIVATION AND PSYCHOLOGICAL STRESS: FINAL PROJECT REPORT. Contract N60R 996(02), Proj. NR 172 228, Sept. 1958, 17pp. Dept. of Psychology, Connecticut College.

12,308
This is a summary of work on a research project undertaken to study the concept of psychological stress within a unified theoretical framework. Psychological stress was defined as a condition produced by a conflict in motives. Following this concept a measure of motivational tendencies, The Behavior Interpretation Inventory (BII) was developed and standardized. An extensive indexed bibliography on psychological stress and related concepts was prepared and some preliminary experimentation on stress was accomplished. Some suggestions are offered of ways in which continued research can be implemented.
T. R 52

12,309
Ashe, W.F., Wright, C.C., Anderegg, Jeanne W., Carlisle, H.N., et al. HISTORICAL SURVEY OF INHABITABLE ARTIFICIAL ATMOSPHERES. Contract AF 33(616) 5103, Proj. 7(776350), WADC TR 58 154, Sept. 1958, 154pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University Research Foundation).

12,309
Unclassified world literature on production and control of artificial atmospheres for living organisms was surveyed and pertinent articles abstracted and literature in the fields of human biology and medicine, microbiology, botany, and zoology was covered. The abstracts are grouped as follows: carbon dioxide (removal systems and at high partial pressure), electromagnetic (also cosmic) radiation, "G" forces, temperature and regulation, noise, oxygen (generation of, at high and low partial pressures, instrumentation), odor, pressure (low, explosive decomposition), sealed cabins or containers, toxic substances, water and moisture control, and miscellaneous.
R 400 (approx.)

12,310
Banford, M.E., Hanes, L.F., Ritchie, M.L. & Wilson, S.E. THE OPERATION OF MANNED SPACECRAFT. Contract AF 33(616) 3167, Proj. 6190, WADC TR 58 225, June 1958, 112pp. USAF Flight Control Lab., Wright-Patterson AFB, Ohio.

12,316
In an effort to expose the essential interconnect-
edness of the contributions of many technological spe-
cialties to the control of manned spacecraft, a survey
is made of problems involved. Three categories of prob-
lems are distinguished. (1) The elements of space travel -
vehicle, propulsion system, and energy source - are
examined in relation to requirements for escape, deep-
space operations, and descent. (2) The environmental
needs of protection from hazards of space and ecological
interactions required for survival are discussed. (3)
Allocating the control function between crew and resid-
ual system is held to be the central design problem.
T. R 200

12,311
Benzinger, T.M., Huebner, R.G., Minard, D. & Kitz-
inger, Charlotte. HUMAN CALORIMETRY BY MEANS OF
THE GRADIENT PRINCIPLE. Res. Rep. NM 01 03 00.02.01,
15, Oct. 1957, 547-600. USN Medical Research Insti-
tute, Bethesda, Md.

12,311
This report describes the purpose, principles, and
main construction features of a human calorimeter in
which the gradient principle has been used for measuring
accurately, rapidly, and continuously the total rate as
well as the fractions of heat loss from a heat source or
a human subject accommodated inside a closed system.
Preliminary experiments on rates of heat transfer during
exercise, application of drugs, change of posture, exces-
sive cooling or heating of the body, and others are pre-
sented to show the potentialities of the new method.
G. I. R 22

12,312
Borgatta, E.F., Cottrell, L.S., Jr. & Mann, J.H.
THE SPECTRUM OF INDIVIDUAL INTERACTION CHARACTERISTICS:
AN INTER-DIMENSIONAL ANALYSIS. Psychol. Rep., 1958,
4, 279-319. (Russell Sage Foundation).

12,312
To study the performance of individuals as members of
small groups, 47 graduate students participated in five
groups in roles (leader, observer, recorder) which rotated
among the members. Rankings of peers were made for 16
personality trait names, 24 behavioral descriptive cate-
gories, and other related variables. The groups' behav-
ior was classified by the experimenter during two periods
of direct observation on Bales' category system. Inter-
correlations were calculated and factor-analyzed. The
factors extracted are discussed at length and the concept
of a spectrum of behavioral characteristics is introduced
in explanation. Interaction scores, social perception
measures, and self-reported data are fully analyzed.
T. G. R 5

12,313
Buoy, D.L. F-86 EJECTION SEAT SLED TESTS. CONDUCTED
AT THE WADC SUPERSONIC MILITARY AERONAUTICAL RESEARCH
TRACK (SMART). Contract AF 33(616) 3261, Proj. 1362,
WADC TR 57 637, Oct. 1957, 32pp. USAF Aircraft Lab.,
Wright-Patterson AFB, Ohio. (Coleman Engineering
Co., Inc., Los Angeles, Calif.).

12,313
In order to determine the structural limitations of
F-86-A and F-86-E upward ejection seats where ejected at
equivalent air speeds of 400 to 650 knots, a series of 11
tests utilizing rocket propelled vehicles was performed.
Data were obtained by electronic and photographic instru-
mentation and are presented in this report in both tabu-
lar and graphic form.
T. G. I.

12,314
Cain, S.M. & Greenwald, C.M. A COMPARISON BETWEEN
THE BREAKING POINT OF TWO BREATH HOLDS SEPARATED BY
A SINGLE INSPIRATION (U). Proj. 4'08 02 019 01,
CMLR 2139, July 1957, 12pp. USA Chemical Warfare
Lab., Army Chemical Center, Md.

12,314
To investigate some of the factors regulating
man's ability to hold his breath, alveolar gas
tensions were measured during six trials for each
of three men at normal resting level, at the end
of the breaking point of a first breath hold, at
the end of a single gasp, and at the breaking point
of a second breath hold. The volume of inspirations
preceding each breath hold and the breath-holding
times were also measured. The data for the two
breath hold breaking points were compared and ana-
lyzed for chemical factors affecting them.
T. I. R 9

12,315
Chapanis, A. (Dir.) A REPORT OF RESEARCH UNDER
CONTRACT WITH OFFICE OF NAVAL RESEARCH. Contract N5-
ORI 166, Task Order 1, Proj. NR 145 089, Prog. Rep.
42, May 1958, 15pp. Psychological Lab., The Johns
Hopkins University.

12,315
This report gives details of progress on a re-
search project concerning human factors in the de-
sign of systems for the display, control, and trans-
mission of information. Personnel involved, visits
and special activities, research reports published
since last report, and reports ready for publication
are listed. Summaries of recent reports, of current
and of new research are given. A bibliography of
research reports published in 1956 - 1957 is also
included.
R 14

12,316
Chapanis, A. (Dir.) A REPORT OF RESEARCH UNDER
CONTRACT WITH OFFICE OF NAVAL RESEARCH. Contract N5-
ORI 166, Task Order 1, Proj. NR 145 089, Prog. Rep.
43, Nov. 1958, 16pp. Psychological Lab., The Johns
Hopkins University.

12,316
This report gives details of progress on a re-
search project concerning human factors in the de-
sign of systems for the display, control, and trans-
mission of information. Personnel involved, visits
and special activities, research reports published
since last report period, and reports ready for pub-
lication are listed. Summaries of recent reports,
of current and new research are given. Also in-
cluded is a bibliography of research reports pub-
lished in 1956 - 1957.
R 9

12,317
Colman, K.W., Lucier, O. & Courtney, D. HUMAN FACTORS
RECOMMENDATIONS FOR FLIGHT PROGRESS STRIPS. Contract
MONR 2346(00), Memo Rep. 1, Oct. 1957, 18pp. Courtney
and Co., Philadelphia, Penn.

12,317
This report presents recommendations for
changes in printed flight progress strips based on
a human factors study of this segment of the system
for displaying air traffic control information.
The study included observation, informal inter-
view, and intensive review of the state-of-the-
art in this area of human factors. Major sources
of difficulty in using the printed strip are pre-
sented with accompanying recommendations for
modifying the strip. A recommended flight strip
layout is presented. The human capabilities con-
cerned in these problems are discussed at some
length and the limitations of the study of an
isolated segment of a system are noted.

12,318

Diamantides, N.D. & Cacioppo, A.J. HUMAN RESPONSE DYNAMICS: GEDA COMPUTER APPLICATION. GER 8033, Jan. 1957, 56pp. Goodman Aircraft Corp., Akron, Ohio.

12,318

An aircraft-pilot computer system is described that can simulate some of the communication and control functions of a human airplane pilot. The system permits study of the dynamic characteristics of human operators while they perform a simple task, in this case control of an aircraft subjected to randomly spaced pitch disturbance. The approach used to construct an analog computer circuit that would simulate the nonlinearities of the human response system is detailed. Aerodynamics simulation and mock-up kinematics are described. Some system test results are presented.
T. G. I. R 20

12,319

Slivinske, A.J., Levine, M., Robertson, J.G. & Ugelow, A. BIBLIOGRAPHY OF ARTICLES RELEVANT TO VIBRATORY COMMUNICATION. Contract NMR 656(17), Proj. TACCOM (8625), July 1958, 9pp. Pennsylvania State University.

12,319

This bibliography contains an alphabetical (by author) listing of articles relevant to vibratory communication. The time period covered is 1900-1957.
R 140

12,320

Simons, Allison K. & Schmitz, M.A. THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VIBRATION ON HUMAN PERFORMANCE. Contract DA 49 007 MD 797, Prog. Rep. 1, Jan. 1958, 35pp. Boistrum Research Labs., Milwaukee, Wisc.

12,320

To determine the effect of whole body vibration of the type produced by work vehicles, two groups of five subjects were exposed to two vibration conditions and a control condition: 2.5 cycles per second, amplitude one-half inch; 3.5 cycles per second, amplitude one-half inch no vibration. Measures of performance--tapping rate, hand reaction time, hand tremor, body sway, mental addition, depth perception, visual acuity, tracking, foot pressure constancy, and foot reaction time--were taken before, at intervals during, and after each condition. The data were analyzed for effects of vibration over time.
T. G. I. R 18

12,321

Schock, G.J.D. SENSORY REACTIONS RELATED TO WEIGHTLESSNESS AND THEIR IMPLICATIONS TO SPACE FLIGHT. Proj. 7851, AFMDC TR 58 6, April 1958, 10pp. USAF Aeronautical Field Lab., Holloman AFB, N. M.

12,321

The implications of a sensory-starved environment are reviewed and compared to conditions that will prevail in actual space flight. Recommendations for training for future space flight are presented.
R 10

12,322

Sargent, F., II & Johnson, R.E. THE PHYSIOLOGICAL BASIS FOR VARIOUS CONSTITUENTS IN SURVIVAL RATIONS. PART IV: AN INTEGRATIVE STUDY OF THE ALL-PURPOSE SURVIVAL RATION FOR TEMPERATE, COLD, AND HOT WEATHER. Contract AF 18(600) 80, Proj. 7156, WADC TR 53 484, Dec. 1957, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois).

12,322

This report summarizes the results and conclusions of five years' intensive investigation on the problem of survival rations for the healthy young castaway in any environment from cold to hot. Three separate studies simulating survival were required: temperate conditions, moderate work; winter cold, moderate and light work; and summer heat, light and hard work. A total of 8698 subject-days yielded results of statistical reliability. The quantitative characteristics of an all-purpose survival regimen were established by physiological, biochemical, nutritional, and clinical observations on the relative effects of water intake, total calorie intake, osmotic intake, ketosis, and ratio of protein, carbohydrate, and fat for 20 different experimental regimens.
T. G. R 30

12,323

Fisher, F.R. (Ed.) PROTECTION AND FUNCTIONING OF THE HANDS IN COLD CLIMATES. 23-24 April 1956. 1957, 179pp. National Academy of Sciences-National Research Council, Washington, D.C.

12,323

This report presents both papers given and discussion of the papers at a conference on protection and functioning of the hands in cold climates. The 13 papers covered physiological factors of the hand, psychological and anthropological factors, operational requirements, and new approaches to the problem.
T. G. I. R 96

12,324

Mozell, M.M. & White, D.C. BEHAVIORAL EFFECTS OF WHOLE BODY VIBRATION. Bu Med Surg Proj. NM 18 01 12-4, Rep. 1, WADC MA 5802, Jan. 1958, 17pp. USN Aviation Medical Acceleration Lab., WADC, Johnsville, Penn.

12,324

A study was made of the effect of whole body vibration on ability of human subjects to read digits of an aircraft mileage indicator and their ability to do a tracking task that simulated the control of an aircraft. Vertical sinusoidal vibration (frequencies from zero to 50 cycles per second, double amplitudes, 0.05, 0.1, and 0.16 inches) were used. Twelve subjects were tested. Error data were analyzed as a function of frequency and amplitude. The practice of measuring vibration in acceleration units (g) is discussed.
T. G. R 6

12,325

Miller, N.D. STUDY OF VISUAL STEREOSCOPIC ACUITY. Sixth Interim Technical Report. Contract DA 44 009 ENG 2882, Proj. 8 35 03.118, Dec. 1957, 15pp. Institute of Optics, University of Rochester.

12,325

This study is concerned with determining the optimum conditions for viewing for stereogrammetric map compilation. During the period reported here 30 observers made over 28,000 measurements on six artificial targets. The whole group of observers repeated the comparison of near and far vision previously reported. These data were subjected to an analysis of variance and the results compared with those from the former group. Fifteen observers have completed all tests but no definite conclusions will be drawn until all observations are completed.
T.

12,326

Harris, Katherine S. CUES FOR THE DISCRIMINATION OF AMERICAN ENGLISH FRICATIVES IN SPOKEN SYLLABLES. Language and Speech, Jan.-March 1958, 1(1), 1-7. (Haskins Labs., N.Y.).

12,326

To assess the relative importance of the friction and vocalic cues for the identification of the fricatives of American English in spoken syllables, the noise from one spoken fricative-vowel syllable was combined with the voiced portion of another. The procedure used tape recordings of four unvoiced (and their voiced counterparts) fricative-vowel syllables which were then spliced to produce the test stimuli presented to 22 listeners for identification. Distribution patterns for the responses to each test stimuli were analyzed and discussed in terms of the cues that determined perception.
G. I. R 7

12,327
Hendler, E. & Hardy, J.D. TEMPERATURE SENSATIONS ACCOMPANYING CHANGES IN SKIN TEMPERATURE. Proj. No. 17. OI 13 2, Rep. NADC-ACEL 350, Aug. 1957, 21pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn.

12,327
To investigate temperature sensation in such a way that true skin temperature was accurately measured throughout the experimental period, a radiometric apparatus was used. The central forehead area was exposed to controlled levels of far infrared radiant heating and subjects were asked to respond at stated intervals describing the temperature sensation they experienced. These reports were analyzed in relation to rate of change in skin temperature and the conditions necessary for establishing thresholds for temperature sensations are discussed.
T. G. I. R 21

12,328
Hoffman, C.S. EVALUATION OF RUNWAY IDENTIFICATION AND RUNWAY CIRCLING GUIDANCE LIGHTS. Proj. 6061 60423, WADC Tech. Note 57-262, Sept. 1957, 29pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

12,328
To evaluate runway identification and runway circling lights as part of the visual night landing aid system for aircraft pilots, both light systems were installed and field tested with a variety of types of aircraft. Usefulness of the systems, singly or combined, to inbound pilots, to pilots while in the traffic pattern, and to pilots maneuvering aircraft on the ground were determined from pilot answers on questionnaires completed after a given flight was completed. Recommendations are included.
T. I. R 2

12,329
Holton, H.F. HELICOPTER PERSONNEL RETRIEVER. Contract AF 33(600) 28744, Proj. 6067, WADC TN 57-190, July 1957, 66pp. USAF Aeronautical Accessories Lab., Wright-Patterson AFB, Ohio.

12,329
This report summarizes briefly the development of equipment for the recovery of wounded, semi-conscious, or exhausted survivors from the water by means of existing types of rescue helicopters. Acceptance tests were conducted for this equipment (XMA-1 Personnel Retriever), a Sproule Net (British) and the Rescunet with two helicopters, each equipped with a rescue hoist controlled by one man (pilot or crewman). Both static and water retrieval tests were made. The results were evaluated in terms of contract requirements and comparisons among the retriever systems were drawn. Recommendations are included.
T. I.

12,330
Kidd, J.S. & Kinkade, R.G. AIR TRAFFIC CONTROL SYSTEM EFFECTIVENESS AS A FUNCTION OF THE DIVISION OF RESPONSIBILITY BETWEEN PILOTS AND GROUND CONTROLLERS. A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33(616) 3612, Proj. 7192, WADC Tech. Rep. 58-113, June 1958, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Lab. of Aviation Psych., Ohio State University & Ohio State University Research Foundation).

12,330
To evaluate the inclusion of air-borne navigational aids in a radar approach system, a comparison was made between systems in which all changes in flight path were initiated by the controller, changes in speed and altitude were initiated by pilots, and changes in heading, speed, and altitude were initiated by pilots. Heterogeneity of aircraft types was studied by including one-, two-, and four-type problems. Nine controllers participated in all conditions. The equipment used an electronic air traffic control simulator. Measures of system performance, such as control time, were studied for effects of the two variables.
T. I. R 11

12,331
Howarth, C.I. & Treisman, M. THE EFFECT OF WARNING INTERVAL ON THRESHOLDS. EPAC 1034, June 1958, 9pp. Flying Personnel Research Committee, Air Ministry, London, England. (Institute of Experimental Psychology, Oxford, England).

12,331
To investigate the relationship between the length of a warning period and threshold level, a series of experiments were performed using different warning signals and threshold stimuli. Warning intervals varied from one to nine seconds and threshold determinations were made by the method of limits for electric phosphene using a light flash, a bell and both together as warning signals; for auditory intensity difference threshold with neon light as warning signal. The data were analyzed for effect of warning interval and a model developed relating threshold level to accuracy of anticipation of the end of the warning interval.
T. G. R 10

12,332
Howland, D. AN INVESTIGATION OF THE PERFORMANCE OF THE HUMAN MONITOR. Contract AF 33(616) 3612, Proj. 7192, WADC Tech. Note 57-431, July 1958, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Lab. of Aviation Psych., Ohio State University).

12,332
To study various aspects of the behavior of the human being acting as monitor, two groups of 12 subjects each were required to monitor for a continuous four-hour period four voltmeters. Meter readings were randomly assigned from a normal distribution with a mean of 12 volts and standard deviation of two volts. Subjects were instructed to report shifts in the mean of each voltmeter reading; only one group kept a written log of readings. The data (number of correct reports, number of false reports and time to report a shift) were analyzed for consistency and the two groups were compared. The results are discussed in relation to theoretical models of monitoring behavior. T. G. I. R 10

12,333
Humpton, J. INVESTIGATION OF HELICOPTER AIRSPEED INDICATOR SYSTEM. Final Report. BUAE Proj. TED ADC AE 7226.4, Rep. NADC AI 5751, Aug. 1957, 9pp. USN Aeronautical Instruments Lab., Naval Air Development Center, Penn.

12,333
This report summarizes work on a project established to provide for the development of a means of measuring the low airspeeds required in all-weather helicopter instrumentation for certain types of operations. Particular emphasis was placed on indicated speeds of ten knots or less. A sensitive air-speed indicator with an expanded scale (zero to 150 knots) was developed and tested. Various methods were tested for reducing system perturbations in the range below ten knots in an effort to eliminate undesirable pointer fluctuations. The results are discussed and recommendations made.
T. G. I.

12,334
Hunsicker, P.A. A STUDY OF MUSCLE FORCES AND FATIGUE. Contract AF 33(616) 3461, Proj. 7214, WADC Tech. Rep. 57-586, Dec. 1957, 47pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Michigan).

12,334
The first part of this research on human arm strength deals with strength which can be exerted with the arms and hands in various positions. Thirty subjects, selected to span the physical characteristics of flying personnel, were seated in a simulated pilot-seat and six movements tested. The data are presented in percentile tables and graphic form. The second part presents data on 25 representative subjects on the amount of strength possible in wrist pronation and wrist supination. The final testing was for strength decrement over a 42-hour period in which subjects were tested hourly. Several recommendations are offered for design of pilot controls.
T. G. I. R 15

12,335
 Tampietro, P.F., Bass, D.E., Fackirk, E.H. & Vaughan, J.A. HEAT EXCHANGES OF MEN IN THE COLD: EFFECT OF HUMIDITY, TEMPERATURE, AND WINDSPEED. Proj. 7-83-01-0055, Tech. Rep. EP 59, Sept. 1952, 11pp. USA Quartermaster Research & Engineering Center, Natick, Mass.

12,335
 To determine the extent to which high humidity and windspeed alter the rate of body cooling during exposure to temperatures within the cold-dry range, six healthy young men were exposed nude during two hour exposure periods to various combinations of wind (ten and less than one mile per hour), temperature (50 and 60 degrees Fahrenheit), and relative humidity (30 and 90 per cent). Skin and rectal temperatures, oxygen consumption, and subjective responses were recorded and analyzed for relative effects of humidity and windspeed.
 T. G. R. 8

12,336
 Indik, B.P., Brockett, J.E. & Issac, G.J. REPORT OF METHODS OF CLUSTER ANALYSIS AND FACTOR ANALYSIS IN SELECTING A BATTERY OF PHYSICAL FITNESS TESTS. Proj. 6 60 11 020, Rep. 216, Nov. 1957, 20pp. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Colo.

12,336
 The methods of cluster analysis and factor analysis used for selection of the smallest feasible battery of tests are discussed and illustrated in application to a physical fitness test battery. Test scores achieved by 61 airmen on a group of 26 physical fitness tests are analyzed using both methods. Advantages and limitations of the methods are pointed out.

12,337
 Kydd, G.H. & Stoll, Alice M. G. TOLERANCE IN PRIMATES. I. UNCONSCIOUSNESS END POINT. Bu Med Surg Proj. NM 11 01 12-9, Rep. 1, WADC 44 5717, Dec. 1957, 16pp. USN Aviation Medical Acceleration Lab., Naval Air Development Center, Penn.

12,337
 In this study unanaesthetized monkeys were observed by means of both a movie and television camera during centrifuge runs of from 2.8 to 15.6 positive G (accelerative force) for periods up to three minutes. An end point was found which served to separate the initial period of activity from that which occurred later during the run. The curve resulting from the plot of end points with respect to maximum G was compared with the human tolerance curve with respect to unconsciousness. The results are discussed in terms of a beginning in the systematic correlation of animal and human experimentation.
 G. I. R. 7

12,338
 Lloyd, L.F. FIELD EVALUATION OF IRON AGE COMPANY BOOTS FOR USE BY NAVAL AVIATORS. Final Report. Proj. TED PTR AE 5207, ST 34 185, Aug. 1957, 9pp. USN Air Test Center, Naval Air Station, Md.

12,338
 To evaluate the Iron Age Company flight boot to determine acceptability for use by Naval aviators and aircrew personnel, comparative tests were conducted with the standard N-1 field shoe. Fifty-two pilots fitted themselves with the boots from the available sizes, wore them during flight, and completed questionnaires as to fitting and sizing, comfort during normal wear and while walking on smooth and rough surfaces, boot weight, ease of donning and doffing, compatibility with stirrups and rudder pedals, protection during bailouts, and hygienic aspects. Recommended changes in design are included.
 I. R. 1

12,339
 Nantlone, P. AIR CONDITIONING NOISE SURVEY REGARDING USS FORRESTAL (CVA 59) SPECIAL TRIALS. Final Report. Lab. Proj. 5281-19, Sept. 1957, 12pp. USN Material Lab., New York Naval Shipyard, N.Y.

12,339
 This is a final report dealing with the air conditioning noise survey of the USS FORRESTAL. Noise level measurements were made in compartments throughout the ship where habitability and good speech intelligibility are important. These data have been previously reported. In addition, the effectiveness of noise reduction measures (duct wrapping to reduce duct vibration, plenums with recirculation openings, intake boxes for vane-axial fans) was investigated. Data on noise transmitted through plenums and intake boxes are presented in this report.
 T. I. R. 6

12,340
 Miles, S. THE PROBLEM OF HYPERVENTILATION IN DIVERS. R.M.P. 57/889, U.P.S. 165, April 1957, 11pp. Royal Naval Physiological Lab., Alverstoke, Hants, England.

12,340
 To investigate the effect of wearing a mouthpiece and nose clip on respiratory patterns, 32 experienced divers and eight nondivers were tested on a standard breathing program. Measurements were made of the normal respiratory pattern, of breathing with the mouthpiece and nose clip, and again of free breathing. The data included volume of air expired per minute, respiratory rate per minute, and tidal volume. Changes in respiratory patterns were analyzed and the results from the two groups were compared. The importance of the findings in relation to underwater accidents is discussed and the need for a psychological study of the problem is emphasized.
 T. I. R. 8

12,341
 Hale, F.C., Westland, R.A. & Taylor, C.L. THE INFLUENCE OF BAROMETRIC PRESSURE AND VAPOR PRESSURE ON INSENSIBLE WEIGHT LOSS IN NUDE RESTING MAN. Contract AF 33(616) 3338, Proj. 7155, WADC TR 57 9, Jan. 1957, 28pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Engineering, University of California).

12,341
 To determine the dependency of human insensible weight loss on barometric and water vapor pressure, two nude subjects were exposed to barometric pressures of 760, 506, and 253 millimeters of mercury (mm Hg) in combination with water vapor pressures of 6, 16, and 26 mm Hg. Chamber temperature was kept constant at 28 degrees Centigrade and air movement at low levels. Subjects were free from sweating under these conditions. Total weight loss was measured directly and analyzed as functions of both pressures. Skin insensible weight loss was calculated and analyzed in a similar manner.
 T. G. I. R. 39

12,342
 West, F.J. & Newton, J.M. A GUIDE TO UNDERWAY EQUIPMENT EVALUATIONS. Contract NONR 2324(00), 411 HF 18, P58 040, 52pp. Electric Boat Div., General Dynamics Corp., Groton, Conn.

12,342
 This guide, primarily for operating personnel of submarines, gives the information needed to base evaluations of equipment and procedures on a firm scientific foundation. The underlying premise is that operating personnel can carry out the final phase of new equipment and tactics under operational conditions better than laboratory personnel. Certain details of experimentation to naval problems are described and certain common errors pointed out. Statistical measurement is described in enough detail so that it may become a useful tool. A detailed example of an equipment evaluation is presented.
 T. R. 7

12,343

Morse, P.F. & Goldsmith, C.T. INVESTIGATION OF THE MAXIMUM ALLOWABLE TORQUE FOR ROTARY SELECTOR KNOBS. Proj. SA 12-15 023; Ordnance Proj. TM2 8106; Tech. Rep. 2551, Nov. 1958, 20pp. USA Feltman Research and Engineering Labs., Picatinny Arsenal, N.J.

12,343

To determine the maximum torque an operator can efficiently handle with a rotary selector type knob, ten male subjects were required to make settings on a display with various sized knobs (ranging from 1-1/8 to 2.5 inches long) mounted on a rotary selector switch. Each size knob was used at four torques ranging from 60 to 120 inch-pounds. The time to make a setting and errors were recorded and analyzed for differences attributable to subjects, knobs, and torques. The findings are discussed in relation to the optimum torque for selector knobs when used on missiles so that settings will not be altered by in-flight vibrations.
T. G. I. R 3

12,344

Maltraver, P.L., Leeboek, H.J. & Bouman, M.A. SOME MEASUREMENTS ABOUT THE FUSION FREQUENCY OF COLORS. Optica Acta, 1958, 5, 4, 4pp. & Acta Electronica, 1957-1958, 2(142). (Instituut voor Zintuigfysiologie R.V.D.-T.M.O., Soesterberg, the Netherlands).

12,344

To investigate the relation between fusion frequency and color discrimination ability, the fusion frequency of alternating white and mixtures of white and spectral lights were determined. Both white and mixtures were of same subjective brightness; the white was illuminant A and the eleven spectral lights ranged from 650 to 480 millimicrons; retinal brightness some 1000 troilands; visual field two degrees in diameter and with dark surround. Observations were made by two subjects. The fusion frequency data were analyzed as a function of saturation and wavelength.
G. I. R 5

12,345

Vos, J.J. TWENTY FIVE YEARS STILES-CRAWFORD EFFECT. Rep. IZF 1958/6, Sept. 1958, 21pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

12,345

A review is given of 25 years of investigation of the Stiles-Crawford effect (luminous efficiency of rays of light entering the human eye decreases as the eccentricity of the point of entry increases). The following topics are used: quantitative description and example in photometry, variation with brightness and wavelength, anatomical explanation, wave optical refinements, the effect in rod vision, in color vision and in stray light experiments. Suggestions for further investigations are offered.
G. I. R 51

12,346

Veghte, J.H. THE MA-2 VENTILATING SUIT AS A PROTECTIVE GARMENT IN COLD. Proj. 7155, WADC TR 57 564; Sept. 1957, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,346

To evaluate the possibility of utilizing the MA-2 ventilating garment, developed by the Aero-Medical Laboratory, in heating aircrew members in cold environments, a series of exploratory experiments was undertaken at ambient temperatures of -30 and -40 degrees Centigrade. The temperature of the ventilating air was varied from 50 to 60 degrees Centigrade; air volumes varied from 290 to 430 liters per minute. Two metabolic levels were simulated: a sitting, resting subject (aircrew member); and a standing, working subject (maintenance personnel). Body storage rates over a period of three hours were used to evaluate maintenance of thermal balance.
T. G. I. R 8

12,347

Veghte, J.H. & Webb, P. CLOTHING AND TOLERANCE TO HEAT. Proj. 7155, WADC TR 57 759, Dec. 1957, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,347

To determine the effect of clothing on human tolerance to hot environments (90 to 160 degrees Fahrenheit), a series of experiments was conducted. Seven subjects were exposed to heat in five different clothing assemblies that were representative of permeable and impermeable, lightweight and heavily insulated Air Force clothing. The effect of the exposures was measured in terms of physiological strain and the various types of clothing assessed by this index. The extent to which impermeable, as compared with permeable, clothing reduces human tolerance to heat regardless of insulation value is discussed.
T. G. R 10

12,348

van den Brink, G. THE VISIBILITY OF DETAILS OF A MOVING OBJECT. Optica Acta, 1958, 5, 5pp. & Acta Electronica, 1957-1958, 2(1-2). (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

12,348

To investigate some factors determining the perception of detail of a moving object, a series of experiments was conducted with an object consisting of two luminous bands separated by a dark one. The task was to distinguish the dark band as velocity, exposure time, and brightness were varied. The threshold data were analyzed and interpreted in terms of predictions based on theoretical background on the summing properties of the retina. Critical values for vt (velocity times exposure time) are shown graphically for different duration times.
G. I. R 3

12,349

Andrew, D.K., Miller, T.W. & Lansill, C.P. HUMAN ENGINEERING FIELD SURVEY OF 280 MM GUN AND TRANSPORTERS. Proj. OOD RD T81-1000, Tech. Memo 4 57, April 1957, 86pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

12,349

This is a study of problems of man-machine relationships on the 280 millimeter gun and transporter M249 and M250. The collection of data proceeded through four phases: 1) familiarization with equipment by observer; 2) observation and discussion with battery personnel to elicit problems; 3) preparation of questionnaires; 4) formal interviewing of user personnel (74 drivers, chiefs of sections, gunners, mechanics, and cannoners). The results--presented in two main sections, one covering transporters and one covering the gun--are derived from number of responses on each question. Deficiencies and recommendations for correction are given. A ranking of most frequently checked problems is presented.
T. I.

12,350

Atkinson, R.C. & Suppes, P. AN ANALYSIS OF A TWO-PERSON INTERACTION SITUATION IN TERMS OF A MARKOV PROCESS. Contract NONR 225(17), Proj. NR 171 034, Tech. Rep. 9, May 1957, 20pp. Applied Mathematics & Statistics Lab., Stanford University.

12,350

This study represents an attempt to describe quantitatively human behavior in a non-zero-sum, two-game situation. The analysis is in terms of a Markov model for learning. Subjects were run in pairs for 210 trials (a single play). On a trial each player made a choice between one of two alternative responses, thereupon the correct choice was announced. Game characteristics were explained and subjects instructed to maximize correct responses. Analysis of results made these comparisons: between theory and data; 1) mean asymptotic response probabilities, 2) one- and two-stage transition probabilities, and 3) variances associated with asymptotic response probabilities.
T. G. R 11

12,351
Baird, H.P. AN ANALYSIS OF STIMULUS VARIABLES INFLUENCING THE PROPRIOCEPTIVE CONTROL OF MOVEMENTS. *Psychol. Rev.*, 1957, 64(5), 324-328. (Ohio Wesleyan University).

12,351
This article describes an indirect approach to the problem of specifying the relations between stimulus and response characteristics in the area of proprioceptive control of movements. The forces required to move a control, and thus also the control forces acting upon the limb, can be specified as a function of four physical properties of the control (mass, viscosity, elasticity, and degree of coulomb friction) all of which can be varied by the experimenter. Some general hypotheses are developed about the effect of these parameters and data are reported which test the hypotheses.
R:16

12,352
Barri, N.L. A FIELD EVALUATION OF A SYSTEM FOR PREDICTING VISUAL RANGE. BU AER Proj. 71704-56, Res. Rep. NM 18-01-00-02-01, 12, Nov. 1957, 843-872. *USN Medical Research Institute*, Bethesda, Md.

12,352
This paper reports the results of a field evaluation of a system for predicting visual range which involves a prediction equation containing three essential parameters: attenuation coefficient, B, inherent contrast, C₀, and the contrast threshold of the human eye, C_r. Observers viewed balloon targets (of varying reflectivities) against the horizon sky and indicated the pattern of the targets as seen at varying distances. Measurements of sky brightness, target brightness, attenuation coefficient and actual distance of observers from target were made simultaneously. Contrast thresholds were obtained for each observer on outdoor targets. Visual ranges as predicted by the equation were compared with obtained values.
T. G. I. R:11

12,353
Brennan, J., Dylla, M.F., Tofte, T.E., Parentini, E.J., et al. OPERATIONAL EVALUATION OF THE IF-7 RATION FOR BATTLE STATION FEEDING. Proj. NT 002024, Subproj. CR 53 80(4), Jan. 1957, 12pp. *USN Supply Research & Development Facility*, Bureau of Supplies & Accounts, Bayonne, N.J.

12,353
To determine the acceptability and suitability of the IF-7 food packet as a battle station feeding ration, an evaluation was conducted aboard the USS WISCONSIN during an underway training period. The food packets were served to the crew at battle stations during three separate meal periods. Information was gained by means of a questionnaire and limited oral interrogation of officers and some crew members. Data on acceptability of the ration as a food item, adequacy of quantity, comparisons with past rations, ease of disposal of waste materials and other related problems were analyzed.
T. I.

12,354
Bittini, Marcella, Nicolletti, I., & Ronchi, Lucia. BASIC RESEARCH IN THE FIELD OF VISION. Contract AF 61(514) 634-C, EOARD, TN-57-W-12, Oct. 1957, 24pp. *Istituto Nazionale di Ottica*, Arcetri, Firenze, Italy.

12,354
The first part of this report contains a review of the bibliography (23 references) concerning the factors that may influence the human electroretinogram (ERG). The second part presents a statistical analysis of a number of records (2000) obtained over a period of three years. Responses (scotopic wave) to two stimuli of same energy but different shapes (saw-tooth and rectangular) were analyzed. The fine structure of the ERG is further analyzed, in particular, a fine wavelet that sometimes appears just at the beginning of the wave. Application of the findings to visual theory is made.
T. G. I. R:26

12,355
Bond, G.W., Gale, K.S., & Haake, J.W. STUDIES AND INVESTIGATIONS OF AIR-TRAFFIC CONTROL SYSTEMS. AND PROJECT AND/ARMY 14-3. Contract DA 36 039 SC 72104, Third Quarterly Prog. Rep., Oct. 1957, 33pp. *Aeronaut Research Foundation of Illinois Institute of Technology*.

12,355
This report describes progress made in the period from July 10 to October 9, 1957, in formulating, evaluating, and applying techniques of systems analysis to air traffic control systems. An enroute area approximately 120 miles wide which includes New York City and Washington had been previously selected for study. Using anticipated traffic figures for 1965 both manual graphical and computer simulation of control procedures were carried out. Summary and conclusions, program for the next quarter, and key technical personnel are included.
T. G. R 2

12,356
Brackmann, J.F. ELECTROMYOGRAPHIC FACTORS IN AIRCRAFT CONTROL: THE ROLE OF MUSCLE POTENTIALS IN TRANSFER OF TRAINING. Rep. 55-132, Jan. 1957, 15pp. *USAF School of Aviation Medicine*, Randolph AFB, Tex. (*Indiana University*).

12,356
To investigate the role of muscle tension in transfer of training, a simple reaction time experiment was designed. Subjects were required to move a lever left or right in response to one of two lights. Different groups practiced for different lengths of time (20, 40, 60, 120 trials) and then for 20 trials on the same task but with the significance of the stimuli reversed. Both reaction time and muscle action potentials were recorded and the data analyzed for effects of variable length of practice and muscle tension on transfer of training. The results are discussed in relation to theoretical formulations on the basis of transfer.
T. G. R:20

12,357
Browne, M.K. STRESS SUMMATION IN FLIGHT: V. THE EFFECT OF INSULIN HYPOLYCAEMIA ON TOLERANCE TO ACCELERATION. FPRC 1044, May 1958, 9pp. *Flying Personnel Research Committee*, Air Ministry, London, England. (*RAF Institute of Aviation Medicine*, Farnborough, Hants, England).

12,357
To study the influence of insulin hypoglycaemia on tolerance to acceleration, six subjects were tested on the human centrifuge. The end point was central light loss with the dark-adapted eye. Two runs were carried out to establish a baseline threshold for each subject and a sample of capillary blood was collected for estimation of blood sugar. Twenty minutes following administration of insulin the procedure was repeated and finally after glucose dosage, the testing procedure was again repeated. Urine samples and pulse rates were obtained. Changes in threshold and blood sugar before and during insulin hypoglycaemia were analyzed. Implications for dietary requirements of pilots are pointed out.
T. G. R:21

12,358
Cherry, G. ON HUMAN COMMUNICATION: A REVIEW, A SURVEY, AND A CRITICISM. 1957, 333pp. *Technology Press of Massachusetts Institute of Technology & John Wiley & Sons, Inc.* N.Y. *Chapman & Hall Ltd.* London. (*Imperial College, University of London*, England).

12,358
This book contains a series of essays that review recent trends in the study of human communication. The common related concepts and ideas concerning communication in such diverse sciences as linguistics, phonetics, communication theory, semantics, and psychology are examined in such a way as to show the historical development and growth of the subject. The chapter headings are: communication and organization; evaluation of communication science; signs, language, and communication; analysis of signals, especially speech; statistical theory of communication; logic of communication; and cognition and recognition.
G. I. R:367

12.300

12-3000

12-360

12.341

12.361

12.362

12.362

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233

22-3864

2234

12.365

234

12.344

13.22.

111 - 112 -

12,327
Gordon, L.C. **STIMULI RESPONSE OF MAN.** In the Temp. Proj. 20 20 22.1, Rep. 14, DEC 28 1944, Sept. 1945, 14p. **Wright-Patterson Medical Laboratories, Dayton, Ohio.**

12,328
To substantiate the question of whether optical stimulation for pain (increase with size of area stimulated) exists, three different methods of stimulation were used: thermal stimulation, cold immersion, and needle scratch. Five subjects were tested by each method. Pain thresholds for thermal stimulation were obtained for skin areas varying from 2.5 to 15.0 square centimeters, for one and two hands immersed in water at temperatures of 0.5, 2.2, 4.5 degrees centigrade, and for length of scratch required to produce a first and second report of pain as a needle moved at rate of 2.5 millimeters per second, at angle of 45 degrees, and with a five-gm weight over the skin. Many data were analyzed for differences in threshold due to size of area stimulated.
T. L. R 48

12,329
Hall, A.A., Spill, R.L., Jr. & Williams, R.D. **STUDIES OF HUMAN BODY AREA FOR AIR CLOTHING DESIGN.** FINAL REPORT OF STUDY IN AIR 204. Feb. 1947, 17p. **Wright-Patterson Medical, Dayton, Ohio.**

12,330
To evaluate the Army Garmentation, Service Corps, and modified Service Corps combat suits in terms of 1) feasibility of lightweight body cover for crew protection in Army aircraft and 2) type most suitable for use, tests were conducted. Flights of various lengths of this were performed by personnel wearing the various types of cover with normal flight clothing and equipment, including parachute and over-water gear. Tests were also made. Observations were made on feasibility and practicability of the body cover with installed equipment, to parachute, general comfort, and degree of protection provided. Recommendations are included.
T. L. R 1

12,331
Hall, F.C. & Sappanfield, L.C., Jr. **THE INFLUENCE OF CHAMBER HUMIDITY ON THERMAL AIR FLOW ON THROAT AND CERVICAL MEMBRANES OF HUMAN SUBJECTS.** Contract AF-33(616) 3021, Proj. 7400, DEC 28 1944, Oct. 1947, 6p. **Wright-Patterson Medical Lab., Wright-Patterson AFB, Ohio. (School of Medicine, Ohio State Univ.)**

12,332
To demonstrate how resistance to breathing, experimentally produced, affects tidal volume, respiratory capacity in normal subjects, nine healthy young men were tested. Their normal vital capacities were determined. Subsequently, four different resistances (expressed as 0.10, 0.20, 0.30, and 0.40 millimeters of water per centimeter of air per second) were interposed between mouthpiece and vitalometer; the volume of air that could be expelled into the vitalometer was then determined. The data were analyzed for effect of the resistances imposed. A few determinations were made during moderate exercise to study this effect. It is suggested that this test can be used to determine the degree of breathing obstruction in pulmonary efficiency tests.
T. G. R 5

12,333
Hepburn, C.O. **HUMAN STEERING DISPLAY STUDIES AT BUSHES AIRCRAFT COMPANY, 1932 TO 1935.** Contract AF 33(600) 32038, RA 17 S, Jan. 1938, 4pp. **Systems Development Lab., Bushes Aircraft Co., Culver City, Calif.**

12,370
This report contains three studies on the effects of radar attack display variables upon pilot steering performance. 1) Four experimental displays were compared with the standard E-series display in an interceptor attack simulator by groups of 12 pilots inexperienced in flying radar-directed attacks. The standard was a moving horizon and error dot display; the others used variations of the moving element to represent the airplane. 2) Ten test pilots were tested in the simulator for effects upon performance of transferring from the standard display to the moving airplane display and then back to the standard. 3) Six experienced pilots performed the same series as above in regular flight tests.
T. G. J. R 2

12,371
Cohen, E. **THE RESPONSE OF HUMAN SUBJECTS TO VIBRATION STIMULATION.** Contract AF 33(600) 32038, RA 17 S, Jan. 1938, 4pp. **Systems Development Lab., Bushes Aircraft Co., Culver City, Calif.**

12,372
The research reported is primarily concerned with a phenomenon that has been called "white-out" effect (temporary cessation of vision during prolonged exposure to a uniform visual field). The variables studied were: (1) intensity of illumination, (2) duration of stimulation, (3) frequency and amplitude of vibration, (4) individual differences in susceptibility, and (5) inter-subject differences. In addition, progress is reported on the construction of new apparatus for the study of pattern vision in an otherwise uniform visual field.
T. G. R 4

12,373
Robson, A. **VISUAL ACUITY AND LIGHT ADAPTATION.** Proj. 7400, Task 4011, DEC 28 1944, Oct. 1947, 14p. **Wright-Patterson Medical, Dayton, Ohio.**

12,374
The time course of visual acuity as a function of light adaptation was determined for adapting retinal illuminances ranging from -0.25 to -4.0 log trolands. Measurements of visual acuity were obtained at periodic intervals between eight seconds (approximately) to 20 minutes following initial exposure to light. Six observers were employed. The results are discussed in terms of their consistency with the data of other experiments on light adaptation. The facts of light adaptation are interpreted in terms of lighting photochemical and neural factors.
T. G. R 20

12,375
Finkbeiner, Eustice. **STUDIES IN THE EFFECTS OF LONG RANGE AIRCRAFT (MILITARY TYPE).** Proj. 7400, DEC 28 1944, May 1947, 14p. **Wright-Patterson Medical Lab., Wright-Patterson AFB, Ohio.**

12,376
A preliminary nutrition study designed to investigate feeding requirements for long range high performance aircraft is described. A group of five men participated in the study. All food was stored in an experimental crew compartment galley. Meals simulating those which would be served in flight were served with between meal snacks available. The adequacy and acceptability of the feeding program were evaluated. In addition, the functional utility of the galley was studied. Suggestions for design improvements are included.
T. I. R 3

12,377
Foley, P.J. **LEGIBILITY OF MOVING DIGITS AS A FUNCTION OF THEIR SEPARATION AND POSITION OF MOVEMENT.** Proj. 76, Rep. 76-4, FCC Proj. E77 94 20 21, MR 147, Aug. 1957, 3pp. **Defence Research Board, Toronto, Ontario, Canada.**

12,378
To investigate the maximum speed of moving digits at which correct identification is possible, five subjects were tested. The digits were presented on a screen by means of a projector modified so that the stimuli could move in four directions: left to right, right to left, up, or down. Three separation distances were used (.75, 1.5 and 3.0 inches subtending visual angles of 6.4, 12.8, and 25.6 degrees). A series of digits was presented and speed was increased until the subject no longer gave correct responses. Legibility thresholds of 100 per cent (in degrees per second) were analyzed for effects of direction, separation, and subjects.
T. G.

12,375
Giles, J. **HEAD MOUNTING EXPERIMENTS OF AIR-
CRAFT COCKPIT VISUAL DISPLAYS. PART II. SIZE AND
SHARP OF VISIONS AND LIGHTS FOR DISPLAYS. I. THE
COCKPIT DISPLAYS WITH SINGLE AND MULTIPLE SHARPEN
AND CHISEL LINE PERS. THE WAR DEPT, Rep. HRC-
ADM 32, Oct. 1957, 24pp. HEADLINE CO. BOSTON
Lab., HRC, Philadelphia, Penn.**

12,376
To determine if either straight or curved lines are
subsequently more perceptible, three experiments are re-
ported. The four stimuli (a single straight line, a
single curved line, two straight lines joining at an
angle of 180 degrees, and three perpendicular straight
lines) were presented in an electronic tachistoscope at
increasing time intervals and at a constant low level of
brightness until the subject correctly identified the
figure. Each form was shown under four orientations
(horizontal, vertical, 45 degrees left and right). The
data (duration of exposure) were subjected to an analy-
sis of variance and a content analysis. Implications
of the results for design of letters and manuals for
aircraft displays are discussed.
T. G. I. R 20

12,377
Jenkins, H.L. **HEAD MOUNTING AND ITS RELATION TO
READING SETTINGS ON A LINEAR SCALE. Contract AF 33
(604) 2000, Proj. 7762, HRC TR 57 200, May 1957,
24pp. HRC Army Medical Lab., Wright-Patterson AFB,
Ohio. (Lafayette University).**

12,378
This study was concerned with the least time of a
task that can be made on a tachistoscopic basis
without visual guidance. Various conditions of head di-
rection (0.125 to 2.0 inches), inertia (normal, one or
two cheeks added), and friction (normal, moderate, heavy)
were investigated. Also the influence of head shape,
position, orientation, use of gloves and on mean least
time and on the time to make settings on a linear scale
were measured. Group means (from 15 to 20 subjects for
each of nine experiments) are presented together with
differences and indications of their significance. The
results are discussed in terms of the factors that influ-
ence them and related to performance in linear scale set-
tings.
T. G. I. R 5

12,379
Johnson, E.P. **FLUCTUATIONS IN NIGHT VISION ACTIVITY,
FIRST PROGRESS REPORT. Contract DA 49 007 MD 871,
Jan. 1958, 8pp. Research & Development Div., Office
of The Surgeon General, Washington, D.C. (Colby
College).**

12,379
To examine the character and extent of fluctuations
in night vision acuity, fifty subjects are being given
instruction in the use of the eyes at night and practice
in viewing visual targets at scotopic levels of illumina-
tion. Following training, each subject is to be given
one or more two-hour periods of testing during which the
level of visual performance is continuously measured.
The task requires manual adjustive movements in response
to visually perceived target movements. Target distance
is automatically adjusted to a level at which the subject
is able to remain "on target" 50 per cent of the time.
Target distance is the measure of visual acuity. No data
are given in this progress report.
T. G. I. R 1

12,378
Johnson, F.M. **AN EVALUATION OF EXPOSURE TO HIGH IN-
TENSITY NOISE BY EQUIVALENT TIME EXPOSURE METHOD.
1957. 17pp. University of North Carolina.**

12,378
This paper considers the problem of expressing noise
hazard by a single exposure value and reference is made
to the convenience and use of Maximum Allowable Con-
centrations (thresholds of exposure to toxic materials)
and to time limits and concentration values of exposure
to radioactive substances. The present tentative stand-
ards of measurement for noise exposure are reviewed.
The Equivalent Energy concept is presented and a method
for expressing noise exposure by a term Equivalent Time
Exposure is developed. A series of charts illustrates
the means of applying this concept to high and low ex-
posures with varied exposure time and to protected and
unprotected ears.
T. G.

12,379
Jucker, F. **THE THRESHOLD CRITERION A "WINDING LINE"
BETWEEN OF HUMAN. Contract AF 49(602) 01, AFOSR TR
57 200, Jan 1957, 24pp. HRC Headquarters of Advanced
Studies, Washington, D.C.**

12,379
The importance of including systems in mechanized in-
formation retrieval and the desirability of criteria crite-
ria for such systems are discussed. The history of in-
formation control is traced and analyzed from the earliest
systems to the latest developments, and the major
problem of such systems is identified. A generalized
theory of including is presented and set forth in careful
detail.
T.

12,380
Kahn, H. & Shaw, I. **TECHNIQUES OF SYSTEM ANALYSIS.
IN 1957 I, Dec. 1957, Revised June 1957, 144pp. RAND
Corporation, Santa Monica, Calif.**

12,380
This is a preliminary draft of the first section of
a projected book, **MILITARY PLANNING IN AN UNSTABLE
WORLD**. This section is concerned with techniques of
systems analysis and the major objective of the authors
is to make readers better and more critical consumers
of systems analyses. The various portions illustrate
the techniques and give secondary attention to funda-
mental principles. The chapter headings are: designing
the offense, probabilistic considerations, designing the
defense, the two-sided war, evaluation and criticism.
T. G. I. R 4

12,381
Kahn, H. & Shaw, I. **TEN COMMON PITFALLS. AN 1957,
July 1957, 24pp. RAND Corporation, Santa Monica,
Calif.**

12,381
This is a preliminary draft of one chapter of a
projected book on systems analysis to be called
MILITARY PLANNING IN AN UNSTABLE WORLD. This chapter
is concerned with identifying and discussing some com-
mon methodological mistakes of the operations and sys-
tems analyst and is placed in a larger section on
"Philosophical and Methodological Comments." The ten
common pitfalls are called: modelism, statistical un-
certainty, real uncertainty, over-concentration, phasing,
over-inhibition, fanaticism, hermitism, and hush.
T. G. I. R 4

12,382
Lybrand, H.A., Havron, H.D., Gartner, H.B., Scarr, H.A.
et al. **SIMULATION OF EXTRA-COCKPIT VISUAL CUES IN
CONTACT FLIGHT TRANSITION TRAINERS. Contract AF 41
(657) 69, Proj. 7716, AFFTC TR 58 11, Appendix 1,
Feb. 1958, 164pp. HRC Operator Lab., Randolph AFB,
Tex.**

12,382
This bibliography was compiled during a literature
search on the role of visual cues in contact flight and
for information relating to certain characteristics of
visual attachments to flight simulators. Both military
literature produced over the past ten years and non-mil-
itary literature for the years 1954-1956 were searched.
The first three sections list publications, examined but
not abstracted (171); the final section presents abstracts
for those studies reviewed in detail (137). Each list
is arranged alphabetically by author.
R. 308

12,383
Lybrand, H.A., Havron, H.D., Gartner, H.B., Scarr, H.A.
et al. **SIMULATION OF EXTRA-COCKPIT VISUAL CUES IN
CONTACT FLIGHT TRANSITION TRAINERS. Contract AF 41
(657) 69, Proj. 7716, AFFTC TR 58 11, Feb. 1958,
116pp. HRC Operator Lab., Randolph AFB, Tex.**

12,383
To provide information needed to make recommenda-
tions regarding the visual cues that should be presented
in prototype visual attachments to flight simulators, a
survey and analysis of research evidence on the visual
cues utilized by pilots in performing specified flight
tasks was accomplished. Supplementary information was
obtained by an analysis of operational tasks involved,
interviews with pilots, consultations with experts, and
inspection of existing equipment. Recommendations are
made concerning (1) "flying" capability of simulator,
(2) flight conditions to be simulated, (3) natural and
man-made objects to be simulated, (4) fidelity-of-sim-
ulation parameters, and (5) information displays and
controls for instructor.
T. I. R 37

12,384

Wills, A.M. ON THE HUMAN AUDIBLE RANGE. J. Acoust. Soc. Amer., April 1935, 25(4), 237-244. (Psych.-Acoustic Lab., Harvard University).

12,385

The difference limit for the amplitude of a source of pure tones was measured as a function of the frequency of the tone and the direction of the source. Tone pairs between 230 and 10,000 cycles per second were sounded in the horizontal plane around the head of a subject seated in an anechoic chamber. The smallest angular separation that could be detected between the sources of the successive tone pairs (the minimum audible angle) was determined for each of these subjects. These threshold angles were analyzed in terms of the corresponding threshold changes in the phase, time, and intensity of the tone at the ears of the subject.

G. I. R 21

12,386

Reaney, C.M. SCIENTIFIC ASPECTS OF MILITARY MANAGEMENT. RAND School of Advanced Management, 1937, 7pp. (Defense Research Medical Lab., Edmonton, Ontario, Canada).

12,387

The general assumption upon which this discussion rests is that management of any kind is a decision-making process, specifying operational objectives and governing its enterprises in ways to realize them. Its factors, human and mechanical, which are functionally interdependent, although structurally inseparable at any point, are discussed in relation to effective military management. The scientific techniques that have proven to be useful subjects of management in recognizing the two factors are discussed with illustrations from Air Force management. The particular difficulties of military management, in both peacetime and wartime, are indicated with some suggestions for their solution.

G. I.

12,388

McCloskey, J.F. & Lindstrom, Florence H. (Eds.) OPERATIONS RESEARCH FOR MANAGEMENT. 1954, 489pp. Johns Hopkins Press, Baltimore, Md.

12,389

This book provides a comprehensive introduction to operations research and is addressed primarily to management. The volume is divided into three main parts. Part One provides a general background by setting forth the scope and history of operations research and discusses the relation between management and the scientist. Part Two deals with methodology—statistics, queueing theory, information theory, symbolic logic, computing machines, linear programming, and game theory. Part Three contains case histories demonstrating the wide variety of ways in which operations research is being used. Included are studies from commercial operations, printing industry, heavy industry, agriculture, and others.

T. G. I. R 360

12,390

McCloskey, J.F. & Coppinger, J.M. (Eds.) OPERATIONS RESEARCH FOR MANAGEMENT. CASE HISTORIES, METHODS, INFORMATION HANDLING. VOL. II. 1956, 366pp. Johns Hopkins Press, Baltimore, Md.

12,391

This is the second volume on operations research addressed primarily to management (see 12,389). Part One includes papers on actual problems handled by organized groups and includes studies on automobile traffic problems, subway fares, cargo handling, inventory control, mining, and military problems. Part Two adds information on methods—queueing theory with a special bibliography, operational gaming, Monte Carlo models, and the like. The last part is devoted to information handling in organized groups.

T. G. I. R 150

12,392

MacLennan, R.E.L. & Goetsch, Hans S.T. APPARENT INTENSITY OF COLORED LIGHTS. J. Opt. Soc. Amer., April 1937, 27(4), 192-193.

12,393

To investigate whether the apparent intensity of colored light signals can be computed from a knowledge of its spectral radiant intensity (J lumens), experiments were made of pairs of point sources, one of which was always white and the other colored. The white signal was held constant and the colored varied through five known intensities with the observer judging which signal appeared brighter. The observers made judgments for 17 different colors and several others on only two or three. All observers had normal color vision. The ratio of the observed apparent intensity of the colored signal to the calculated intensity was derived from the data.

T. I.

12,394

Quastler, H. ed. INFORMATION THEORY IN PSYCHOLOGY. PERCEIVING AND REMEMBERING. 1955, 48pp. Englewood Cliffs, Ill.

12,395

This book is concerned with the problem of how to use information theory in psychology. It is an outgrowth of a conference on this subject and so each represents an author who contributed papers to the various sections. Part One is a summary and concluding review of the opinions of the conference participants. Part Two, Information processing, contains articles on foundations of information management, coding distributions of information functions and structural changes. Part Three deals with information theory and psychology—basic considerations, units, categories and classifications, probability and redundancy, channels and channel capacity. The last part considers utilization of information.

T. G. I. R 120

12,396

Woolf, R.H., Craik, C.H. & Davis, R.L. (Eds.) INFORMATION PROCESSING. 1956, 382pp. John Wiley & Sons, New York & London & P. 1957. London, England.

12,397

This book presents the proceedings of an eight-week seminar on The Design of Experiments in Decision Processes. In addition, some papers were revised to include empirical research and theory construction stimulated by the seminar. The 19 papers range in character from pure mathematics to experiments in group dynamics, but all are directed at the application of mathematics to behavioral sciences in general and at decision processes in particular. Following the introduction and a consideration of mathematical models and measurement theory are papers on 1) individual and social choice, 2) learning theory, 3) theory and applications of utility, and 4) experimental studies.

T. G. I. R 120

12,398

Research, K.A. RELATIONS BETWEEN AUDITORY PSYCHOLOGICAL AND AUDITORY ELECTROPHYSIOLOGY. Transactions of the New York Academy of Sciences. Ser. II, May 1957, 12(7), 628-637.

12,399

In this paper two sets of data are examined for possible relations between them one set describes ways in which organisms discriminate auditory stimuli; the other describes the anatomical and physiological characteristics of those parts of the nervous system which seem to be involved with acoustic stimuli. Major conceptual trends that have influenced research workers are listed and discussed. Advances in instrumentation and technique over the past few decades are noted.

R 20

12,382
Rosen, P.M. QUANTAL, HUMANITIES AND ENGINEERING. THE
ANALYSIS OF OPERATIONAL SYSTEMS WITH VARIABLE NOISE
AND NOISE. 1958, 20pp. John Wiley & Sons, Inc.
N.Y.

12,383
This is an introductory book on queuing or waiting
line theory. It presents concepts, defines terms, and
illustrates some of the analytic techniques of queuing.
Chapter headings include: representation in terms of pro-
babilities, probabilistic descriptions of arrivals and
service times, single and multiple exponential channels,
infinite queues, priorities, and problems of inventory
control and maintenance. A glossary, definitions and
properties of functions tabulated, and tables are included
in the appendices.
L. G. R 27

12,384
Rosen, P.M. & Kishall, G.S. HUMANITIES OF OPERATIONS
RESEARCH. 1958, 195p. Indianapolis Dept. of Human-
ities Institute of Technology & John Wiley & Sons,
N.Y.

12,385
This book traces the development of the science,
operations research, and describes its methods and tools.
The following features are outstanding: 1) careful defini-
tion of the science, 2) statement of the boundaries of
science, 3) explanation of the tools to be used, 4)
presentation of successful applications to military
problems and 5) detailed discussion of the setup of an
operations research group.
L. G. L. R 25

12,386
Peterson, G.A. & Brown, L.R. HUMAN ENGINEERING - A NEW
CONCEPT. Psychological Bull., Dec. 1957, 272-276.
(Psychological Research Association, Inc., San Jose,
Calif. & USA Armed Forces Humanities Lab., Picatinny
Arsenal, N.J.)

12,387
This article provides occupational information on the
field of human engineering for those engaged in person-
nel, guidance, and counseling activities. Basic infor-
mation is given on job duties, requirements, related job
titles, recommended academic preparation for employment,
salary levels, the current status, and possible future
needs for human engineers.
L. R 12

12,388
Peterson, G.A. & Sanborn, J.L. HUMAN ENGINEERING:
AN OUTSTANDING TERM. J. Psychol., Dec. 1957,
12(12), 731-732. (USA Picatinny Arsenal, N.J.)

12,389
The term "human engineering" to designate an occupa-
tional area is criticized as infringing on the profes-
sional rights of engineers and as a non-meaningful de-
scriptive title. It is suggested that "human factors
engineering" is a more meaningful title and a proposed
nomenclature is presented listing various job titles,
typical activities, and related areas or job titles.
T.

12,389
Peterson, G.A. HUMANITIES OF OPERATIONS ANALY-
SIS. J. Psychol., Dec. 1957, 2(4),
4pp. (USA Picatinny Arsenal, N.J.)

12,390
This paper considers a potential source of error in
operations analysis particularly germane to the study of
variables involving the human factor. Analytic solutions
based upon what seems to be common sense or theoretic ap-
proach which are not subjected to some check of the
validity of such assumptions in the tradition of the sci-
entific method. A report of the validity of just such a
simplified solution of a human factor component in a
military weapons analysis is described. The implications
of the study for methods of operations analysis are dis-
cussed.
G.

12,391
Peterson, G.A. & Sanborn, J.L. HUMANITIES IN HUMAN EN-
GINEERING AND RESEARCH. Indianapolis Dept. of Human-
ities Institute of Technology, May 1958,
2pp. (Psychological Research Association, Inc., West
Coast Facility, San Jose, Calif. & Engineering Research
Section, Picatinny Arsenal, N.J.)

12,392
This defines the field of human factors engineering
and discusses the factors that have created this new oc-
cupational field. The relations existing between the de-
sign engineer and the various specialities in the field -
human factors engineer, human factors research special-
ist, and human factors consultant - are discussed. An
illustrative example of the work is given.
R 10

12,393
Pickett, J.R. LIMITS OF HUMAN SPEECH COMMUNICATIONS
IN NOISE. J. Acoust. Soc. Am., April 1958, 30(4),
770-781. (USAF Operational Applications Lab., Balling
AFB, Washington, D.C.)

12,394
To establish a quantitative estimate of the effect-
iveness of "person-to-person" speech in noise and a mea-
sure of the noise levels in which such communication be-
comes impossible, tests of sentence intelligibility were
performed in low frequency and white noise at noise lev-
els ranging from 85 to 115 decibels. The speaker and
listener were separated by distances of eight or 16 feet.
No data (percent intelligibility scores at two dis-
tances, vocal effort used on each sentence in decibels,
subject noise level in decibels) were analyzed for rela-
tionships existing among them. Limits of communication
by shouting over noise were estimated.
G. R. 8

12,395
Pollack, I. & Pickett, J.R. MASKING OF SPEECH BY
NOISE AT HIGH SOUND LEVELS. J. Acoust. Soc. Am.,
Feb. 1958, 30(2), 127-130. (USAF Operational Ap-
plications Lab., Balling AFB, Washington, D.C.)

12,396
To examine the deterioration of word intelligibility
at high sound levels, a series of tests were performed
over a wide range of speech and noise spectra (85 to 130
decibels). Monosyllabic words were presented to trained
listeners who checked each received word against a cor-
rect check-list. For each test all variables were held
constant except the over-all level of the signals. Con-
ditions varied were: signal-to-noise ratio, presentation
(binaural, monaural, checkbone, no background noise, low-
frequency cutoffs of speech channel and peak clipping).
Control tests were run to check on equipment distortion.
L. G. R 15

12,400

Pallick, I., Becker, L.2. & Sakuma, R. **RELIABILITY OF SELECTED MESSAGE-SETS.** *J. Acoust. Soc. Amer.*, July 1958, 32(7), p. 643. (USF Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,401

To demonstrate the relative effects on speech intelligibility of word-frequency and phonemic confusion patterns, four message-sets were selected from three word-frequency classes in accordance with known rules of phonemic confusion. The four sets were chosen to yield 1) positive word-frequency effect, 2) a negative effect, 3) lowest scores of intermediate word-frequency, and 4) uniform word-frequency effects. Each set was recorded by one talker and played back over emphasis to a crew of five experienced listeners at three speech-to-noise ratios. The per cent of words correctly identified was compared for the four message sets.
T. G. R 7

12,402

Randson, R.P. & Connelley, C.F. **RELATIONSHIP OF OXYGEN DEBT TO OXYGEN LAC.** *Proc.*, 6 40 11 620, Rep. 217, Dec. 1957, App. USA Medical Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

12,403

To determine if recovery values after steady state activation that require less than 1.5 liters per minute and therefore can be considered as not producing lactic acid in the blood are significantly different from the lag values for the same activity, five determinations of the oxygen uptake during a pre-exercise post-absorptive period, during exercise on a horizontal motor-driven treadmill, and during recovery thereafter were made on a healthy young man. Comparison of oxygen intake lag at the beginning of exercise to the oxygen debt after exercise was made. Implications of the findings for assessing energy cost of work are discussed.
T. I. R 9

12,404

Stevens, S.S. **SOME SIMILARITIES BETWEEN HEARING AND SEEING.** *LARYNGOSCOPE*, March 1958, 68(3), 308-327. (Psycho-Acoustic Lab., Harvard University).

12,405

This paper discusses problems relating to the manner in which the eye and ear respond to the intensity of light and sound. Similarities between the two sense organs are presented on the following areas: electrical effects, sensitivity, dynamic range of intensities to which the organs react, measurement of sensation, recruitment phenomena.
G. R 12

12,406

Stevens, S.S. **PROBLEMS AND METHODS OF PSYCHOPHYSICS.** *Psychol. Bull.*, July 1958, 54(4), 177-196. (Harvard University).

12,407

This review of psychophysics classifies the methods in terms of the problems to be solved. Three psychophysical parameters are distinguished; namely, the task undertaken by the observer (classification, order, intervals, ratios, magnitudes), the manner in which the stimuli are presented (fixed or adjustable), and the statistical measure used to describe the data (measure of location and of variability or confusion). Some of the principal problems, along with some typical methods used in their solution, are considered. The final section treats problems of estimation of objective value.
R 42

12,408

Stevens, J.C. **STIMULUS SPACES AND THE JUDGMENT OF LOUDNESS.** *J. Acoust. Soc. Amer.*, Sept. 1958, 32(3), 246-258. (Harvard University).

12,409

To determine whether the form of the loudness scale, as determined by magnitude estimation, is independent of stimulus spacing, two experiments were undertaken. 1) The magnitude estimations of stimuli spaced uniformly in decibels was compared with those of stimuli spaced uniformly in loudness (sones). The same spacings were used to generate category scales and the two types were compared. 2) The stimuli were spaced four ways at equal decibel intervals or bunched together toward the high, middle, or low end of the range. Loudness estimations were made for each spacing. The over-all form and slope of the function were studied for effects of spacing.
G. R 6

12,410

Spilth, M. & Trittsch, H.J. **PERMANENT AND DURATION OF NOISE INDUCED AND TEMPORARY THRESHOLD SHIFTS.** *J. Acoust. Soc. Amer.*, Aug. 1958, 32(8), 750-752. (USF Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,411

To investigate the validity of an hypothesis that the relative importance of duration to intensity of an exposure to thermal noise in producing temporary threshold shifts (TTS) is two to one, both ears of six subjects were tested separately. Thermal noise exposures ranged from 120 decibels of sound pressure level for one minute to 94 decibels for 60 minutes. In the series each doubling of duration was associated with a four-fold decrease in sound level. TTS was measured at 2000, 4000, 6000, and 8000 cycles per second throughout a ten-minute period following exposure. Recovery curves were constructed and analyzed in terms of the hypothesis.
T. G. R 6

12,412

Spilth, M. & Trittsch, H.J. **TEMPORARY THRESHOLD ELEVATION PRODUCED BY CONTINUOUS AND "IMPULSIVE" NOISES.** *J. Acoust. Soc. Amer.*, June 1958, 32(6), 323-327. (USF Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,413

Three experiments compared the amounts of temporary threshold elevation resulting when a given total amount of noise energy was presented to the ear in the form of repeated, short, intense bursts and in the form of continuous noise. Several patterns of noise bursts and continuous noise were tested for durations of two and twenty minutes, for frequencies at 3000, 4000, 6000, and 8000 cycles per second, and noise levels averaging approximately 100 to 117 decibels. The implications of the results for hearing conservation programs are discussed.
G. R 5

12,414

Severy, D.M. **PHOTOGRAPHIC DISSEMINATION FOR COLLISION INJURY RESEARCH.** *J. Soc. Motion Picture & Television Engineers*, Feb. 1958, 62(2), 69-77.

12,415

This report describes photographic instrumentation that was developed for study of full-scale automobile impact experiments. By this means the two impacts that are part of every collision can be accurately and fully recorded: the contact between the automobiles and the contact between the occupants and the interior of the automobiles. Operation procedures, photographic instrumentation, and photographic versus electrical instrumentation are discussed.
T. I. R 2

12,400
Savarn, J.S. (Ed.). **RESEARCH REPORT NO. 11.**
NOV 16-1956. 13, 1956. Contract AF 33(616) 130,
Proj. 12 142 201 & National Science Foundation Grant
G 2000, Nov 1956, 13pp. Psycho-Acoustic
Lab., Harvard University.

12,401
This status report presents summaries of six studies
that have been completed during the period covered (May
to November), and six other research studies in progress.
A list of reports published by this laboratory since
1954-1956 is appended.
R 70

12,402
Tulvin, H. & Hollnagel, L.A. **THE RELATION OF THE SIZE OF
THE CUES TO THE WORK ACCOMPLISHED BY A STORAGE
AND RETRIEVAL SYSTEM.** Contract AF 33(616) 130, AFOSR
TR 57 402, Aug. 1957, 11pp. **THE RESEARCH OF
ADVANCED STUDIES, Washington, D.C.**

12,403
This document defines the concept of work accom-
plished by search of a storage and retrieval system, then
discusses its bearing on the design of storage and re-
trieval devices with special reference to the Rapid Se-
lector and the Mosaic System.
R 2

12,404
Turr, D.G. & Turner, S.R. **RESEARCH REPORT (1) THE
EFFECTS OF SOUND AND POSITIONAL PERFORMANCES ON RE-
SPONSE.** In Proj. 3 99 12 023 & SC Proj. 1230, SE
26 U S 2, Serial 70, May 1956, 11pp. Institute for
Cooperative Research, University of Pennsylvania.

12,405
To investigate the effect of meaningfulness of a sym-
bol and its position in a display upon responses, the
symbols chosen (A, B, C, and lambda, delta, omega) were
presented to 27 and 25 subjects, respectively, in a man-
ner analogous to the way symbols are presented in a com-
munication system. The two sets of data were analyzed
for evidence of tendencies to choose one symbol over the
others and for positional preferences. The problems in-
volved in presentation of information within communi-
cation systems are discussed at length.
T. I.

12,411
Zaklowski, J. **EAR PROTECTION.** LEXINGTON, March
1956, 11111(3), 496-497. (Psycho-Acoustic Lab.,
Harvard University).

12,412
This paper presents a general discussion of present
knowledge on the problem of personal ear protection,
discusses the basic requirements of ear protectors
(sound attenuation to safe level, comfort, non-toxic,
and so on), and main trends in recent design. Four
classes of ear protectors are: certified ear plugs,
semi-inserts, earmuffs, and helmet.
G. R 1

12,413
Zaklowski, J., Hulse, F., Feldman, A.S. & Rubin, R.
**ON THE EFFECT OF PRACTICE AND MOTIVATION ON THE
THRESHOLD OF AUDIBILITY.** J. Acoust. Soc. Amer.,
April 1956, 28(4), 234-242. (Psycho-Acoustic Lab.,
Harvard University).

12,414
To investigate the effect of practice and motivation
on the absolute auditory threshold, five groups of ori-
ginally naive subjects were tested by various experi-
mental techniques. Thresholds of audibility were mea-
sured during the course of four to eight sessions, each
session consisting of five test periods six minutes long.
Variables were test tone (100 and 1000 cycles per sec-
ond), method (tracking and forced choice), motivation
(monetary reward and informational feedback). Threshold
changes with practice were analyzed and the implications
of the findings for audibility threshold measurement
practices are discussed.
G. R 3

12,415
White, C.S. **CONRAD MEDICAL CORPUSCULE'S REPORT.**
BIOLOGICAL TOLERANCE TO ACCELERATIVE FORCES. Abstract
1. June 1954, 7pp. **Lewisian Foundation for Medical
Education and Research, Alhambra, N.Y.**

12,416
This report on biological tolerance to accelerative
forces (G) presents summaries of four experiments with
appropriate presentation of quantitative data. The pa-
pers deal with 1) the relative G-time relationships be-
tween the several possible means by which accelerative
forces are applied to the human being, 2) experience
with ejection seat controls when exposed to positive G
simultaneously with pitch and roll, 3) man's ability to
move when exposed to radial G forces, and 4) long time
exposure to accelerative forces.
T. G. I. R 4

12,417
Sally, P. **BIBLIOGRAPHY OF THE LITERATURE ON AIR TRAF-
FIC CONTROL, 1952-1957.** Contract AF 19(604) 1399,
Tech. Rep. 5, AFMTC TR 57 776, Sept. 1957, 21pp.
Enka Mathematical Laboratories, Inc., Carlisle, Mass.

12,418
This report contains titles of papers published in
more than 40 periodicals from January 1952 to August
1957. All pertain to one or more aspects of Air Traffic
Control (ATC) and are grouped into seven categories:
Collision avoidance (hardware and mathematical formula-
tions), communications (ground to air, particularly in
terminal area, and ground to ground), descriptive or
general expositions, remote control (navigational aids,
long range navigational systems, dead reckoning, inertial
and Doppler techniques), landing control (instru-
ment aids, statistical data), theoretical, and weather
considerations affecting ATC.
R 300

12,419
Smith, C.P. **SPEECH DATA REDUCTION. VOICE COMMUNI-
CATIONS BY MEANS OF BINARY SIGNALS AT RATES UNDER 1000
BITS PER SECOND.** AFMTC TR 57 111, May 1957, 107pp.
USAF Communications Lab., AFMTC, Bedford, Mass.

12,420
This paper is concerned with a new method of instru-
mentation that may be the means of communicating voice
signals in binary messages at digital rates under 1000
bits per second. Some considerations pertinent to the
speech analyzer (Vocoder) and synthesizer design are
considered. Techniques for data reduction are presented
and a semi-automatic data-collecting is described which
will provide statistics of the voice spectrum quickly
and efficiently.
T. G. I.

12,416

Allen, R.L. (Proj. Officer). ANALYSIS OF SURVIVAL EQUIPMENT. SECOND ANNUAL SUPPLEMENT. 20 SEP 54 EIT, AFIC P44. 6 1954, July 1957, 4pp. HRL Air Mater. Center, Randolph AFB, Ala.

12,416

To supplement an earlier study of the effectiveness of individual items of sea and land survival equipment used in the Air Force survival kits, data from all available accident and rescue reports for the period January 1955 to December 1956 were reviewed. Approximately 300 incidents in which one or more Air Force personnel were placed in a survival situation were selected for detailed analysis as to (1) use made of the various items in the kit, (2) performance of function by item if used, (3) effect of climatic conditions on use, (4) changes indicated, and (5) usefulness of item in escape or evasion. Several complete survival stories are given.

R 2

12,417

Baker, R.C. & Stegal, A.L. DEVELOPMENT AND TEST OF HYDRAULIC SEAT CUSHIONS; AN OPERATIONAL EVALUATION OF IMPROVED PROTOTYPE SEAT CUSHION ASSEMBLIES. Contract AF 33(616) 3343, AFIC ACN 334, TND RM 33 333.1, Oct. 1957, 24pp. HRL Air Mater. Center, Randolph AFB, Ala.

12,417

Three Trilak covered prototype seat cushion assemblies were evaluated through in-flight test in order to determine the potential of the seats for reducing certain seat discomforts on long flights. Trilak is a three-dimensional plastic fabric. Two seats incorporated an air-cushioning principle plus seat and back pad selections; the third seat was air-cushioned but static and used the standard back pad. Ratings of seat comfort after prolonged flight and preference rankings of the prototype assemblies and the current standard assembly were made by six pilots and five crewmen. Interview data were collected. The data were analyzed for differences due to seat design. Recommendations are included.

T. I. R 4

12,418

Reese, H. & Patten, R.H. SELECTED BIBLIOGRAPHY: FATIGUE, STRESS, SLEEPY COMMA AND BEHAVIOR. Contract AF 33(616) 3343, Proj. 6335, WDC IN 37 123, April 1957, 63pp. HRL Air Mater. Center, Randolph AFB, Ala.

12,418

This bibliography surveys the field of stress and fatigue, and the accompanying behavior and body changes. Since this compilation was made for a study of the stressful effects of five days of confinement and isolation upon crew members performing in-flight duties, the following areas were not covered extensively: physical fatigue, high noise and vibration levels, temperature and pressure effects, and sleep deprivation. A ten-year period, 1946-1956, is covered by the references, which are arranged alphabetically. A topical index is included with classification under a wide range of headings.

R 683

12,419

Bond, G.W., Gale, K.S. & Hake, J.W. STUDIES AND INVESTIGATIONS OF AIR TRAFFIC CONTROL SYSTEMS. APRIL 9, 1957 TO JULY 9, 1957. SECOND QUARTERLY PROGRESS REPORT. Contract DA 039 SC 73104, 3025 Proj. ANDR/ARW 14.3, July 1957, 4pp. Armour Research Foundation, Illinois Institute of Technology.

12,419

This report details progress during the second quarter on a research project concerned with developing and applying techniques of systems analysis to the problems of a Common System of Air Navigation and Traffic Control. Accomplishments in these areas are discussed: 1) preparation of traffic samples of expected 1965 traffic in the New York-Washington area; 2) graphical simulations and the resulting hypotheses concerning relevant problems, 3) programming for computer analysis, and 4) studies of area control.

T. G. I.

12,420

Reese, C.H. & Reese, E.V. (Proj. Engineers). A STUDY OF AN AIRCRAFT CARGO-HANDLING SYSTEM. Contract AF 33(616) 3343, Proj. 6335, WDC IN 37 143, May 1957, 73pp. HRL Air Mater. Center, Randolph AFB, Ala. (Long Beach Div., Douglas Aircraft Co., Inc., Long Beach, Calif.)

12,420

This study covers the development of a cargo-handling system for five low-floor, non-landing aircraft (C-119, C-123, C-130, C-132, and C-133). Analysis of the present loading system was made to determine whether more economic methods might be used. Investigations into an optimum-sized pallet and pallet-conveyance methods were conducted. A design is recommended for a system of loading and unloading the aircraft. An economic analysis of the improved system was made in terms of man-hour requirements and aircraft utilization. Proposed design drawings for the system showing installation in the aircraft are included.

T. G. I. R 15

12,421

Campbell, R.T., Hunt, R.A. & Lewis, Max A. THE EFFECTS OF ASSIMILATION AND CONTRAST IN JUDGMENTS OF CLINICAL MATERIALS. ANN. J. PSYCHOL., Sept. 1957, 70(3), 347-355. (Northwestern University).

12,421

To investigate the effects of contrast in judgments of clinical materials, schizophrenic responses to items in a vocabulary test were presented to 60 judges for rating, on a nine-point scale, the degree of disturbance manifested in each response. The items were arranged in three parts: 1) those from the high end of the scale, 2) those from the low end, and 3) a range from high to low. All parts were rated by each judge, but in varying order. These responses seemed to all three parts were studied for judgment differences due to the contrast in which they appeared. Trends for both assimilation and contrast were noted and discussed.

T. G. R 13

12,422

Carpenter, V.J. & Miller, R.D. STUDY OF VISUAL STEREOSCOPIC ACUITY. JUNE 15, 1956 THROUGH FEBRUARY 15, 1958. FINAL TECHNICAL REPORT. Contract DA 44 009 ENG 2082, Proj. 6 35 08 118, March 1958, 32pp. Institute of Optics, University of Rochester.

12,422

This study was concerned with determining the optimum conditions of viewing for stereo-photogrammetric map compilation. During a series of six experiments 30 observers made 72,000 settings of a floating mark on representative targets (six miniature tents photographed against a model of hilly terrain) with multiplex and stereo-photogram equipment. This report presents the analysis of 47,000 settings made by 30 trained observers using seventeen different viewing conditions (near and far vision, interpupillary distance, illumination intensity, color, and balance, color separation, transparency, and resolving power). An index of accuracy was derived from the setting data and used for evaluating the viewing conditions.

T. G. I.

12,423

Cheng, S.S.L., Harris, B., Hauptstein, A., Morgan, K., et al. SUPPLEMENTARY NOTES ON EVALUATION AND OPTIMIZATION OF DIGITAL COMMUNICATION SYSTEMS. PART II. FIRST SCIENTIFIC REPORT JANUARY 15, 1957 TO APRIL 15, 1957. Contract AF 19(604) 1964, AFIC IN 57 355, April 15, 1957, 8pp. College of Engineering, New York University.

12,423

Game theory techniques are applied to certain aspects of the communication problem in an effort to show how the decision maker can be benefited in his choice of a communication system. Coded decision feedback is analyzed using Slepian's group representation. A type of information feedback is discussed in which the parity checks are calculated by the receiver and returned to the transmitter for action. The method of linear programming is applied to various problems in communications. The effect of noise in the feedback channel of a binary symmetric decision feedback system and the use of cumulative decision feedback are discussed.

T. G. I. R 8

12,424
Olsen, S.I., Silvestri, A.J., Zidman, G.D., Johnson, G.E. SKIN RESISTANCE CHANGES DURING ACCELERATION. Proj. 7225, Task 71713, WADC TR 56 397, April 1958, 10pp. Wright-Patterson AFB, Ohio.

12,424
To investigate basal skin resistance changes (gradual drifts or changes) during acceleration stress, a series of experiments were performed on the human centrifuge. Basal resistance changes were measured 1) during acceleration with and without G-suit protection, 2) with rapid and gradual acceleration, and 3) with progressively increased rapid acceleration. The role of blood volume changes and compensatory sympathetic vasoconstrictive activity, the primary determinant of decreases in skin resistance during acceleration was investigated with hemisympathetized dogs. The use of basal resistance changes as a rapid indicator of changes in the psychophysiological state during acceleration is discussed. G. R. 6

12,425
Davis, M., Eldridge, D.H. & Weber, J.L. CNRA FOURTH ANNUAL REPORT OF THE ARMED FORCES-NATIONAL RESEARCH COUNCIL COMMITTEE ON HEARING AND BIO-AcouSTICS. Contract W33-011-01, NR 140 039, Tech. Rep. 10, June 1956 to May 1957, 47pp. Armed Forces-National Research Council Committee on Hearing and Bio-AcouSTICS, Central Institute for the Deaf, St. Louis, Mo.

12,425
This report contains the by-laws of the Armed Forces-National Research Council Committee on Hearing and Bio-AcouSTICS (CNRA), a statement of purposes and methods of operation, membership list, and calendar of meetings. The program of the fourth annual meeting, on the problems and recent progress in hearing and bio-acoustics, is included in this report. There is also a summary of working group activities and a cumulative list of reports and papers prepared and distributed by CNRA. R 16

12,426
Elkins, H.W. REPORT OF TEST OF PROJECT NR 2746 (ARCTIC) SERVICE TEST OF BOOT, COMBAT, RUBBER, INSULATED, COLD-WET (BLACK BOOT), T35-15. DA Proj. NR 7 79 10 001, RDS Tech. Obj. PO 8, June 1958, 18pp. USA Arctic Test Board, Fort Greely, Alaska.

12,426
To determine the suitability of the boot (combat, rubber, insulated, cold-wet, T35-15) for Army use, 65 test items were compared with the standard boot in tests of sizing and fitting, protection against cold injury under active and inactive conditions, comfort, ease of donning and doffing, wearing qualities, and military specifications for cold-wet footwear. Deficiencies in the test boot are listed with suggested modifications. T. I. R 1

12,427
Etheridge, H.A. EXPERIMENTAL AIR-TRAFFIC CONTROL COMMUNICATION SYSTEM. JANUARY 1 1956 THROUGH DECEMBER 31, 1957. FINAL REPORT. Contract DA 36 039 SC 64567, Task D, Part 3, Dec. 1957, 38pp. Bell Telephone Lab., Inc., Murray Hill, N.J.

12,427
This is a final report on activities related to a study of Air-Traffic Control Communications and covers specifically an experimental air traffic communication system—a partial automatization of air traffic control based on space-time prediction. The system was successively arranged for evaluating the feasibility and operational requirements of the following items: flight plan and position report messages on printed slips, printed flight progress messages, the 81D1 teletypewriter switching system, the Position Reporting Device, and display elements. Upon the basis of the evaluation a projected automatic system is discussed. T. G. I.

12,428
Fisher, S. & Rabinstein, I. EFFECTS OF MODERATE SLEEP DEPRIVATION ON SOCIAL INFLUENCE IN THE AUTOKINETIC SITUATION. Proj. 6 60 10 017, Stress, Subtask 2, WATR 63 57, May 1957, 6pp. USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.

12,428
Changes in autokinetic judgment in a social influence situation were studied as a function of sleep deprivation. The judgments required an estimate of apparent movement of a bright point observed continuously in the dark; social influence was manipulated by using a second observer who had previously been instructed to give his estimates higher than those of the subject. Three groups of subjects (five to seven) were used as follows: (1) sleep-deprived (48 to 54 hours) with influence, (2) sleep-deprived without influence, and (3) normal sleep with influence. Base-line judgments were established for all groups. Differences among the group were analyzed. T. G. R 3

12,429
Fleishman, E.A. & Friedman, R.P. SOME STANDARDIZED TESTS OF AUDITORY-PERCEPTUAL ABILITIES. Proj. 7706, Task 29002, AFPMR TR 57 132, Nov. 1957, 37pp. USA Quartermaster Lab., Randolph AFB, Tex.

12,429
This report describes a number of auditory-perceptual tests developed primarily for testing skill components in radioteletype proficiency. Complete instructions and scoring keys are presented for the Copying Behind, Dot Perception, Code Distraction, and Hidden Tunes tests; available distribution, reliability, validity, and inter-correlational data are summarized. Briefer descriptions are presented for tests of rhythm, pitch, time, intensity, tone discrimination, and tonal memory, as well as for the Army Radio Code and Signal Corps Aptitude tests. These tests may be of use in selecting personnel for jobs in which auditory perception is critical. T. R 7

12,430
Slegel, A.I. & Taber, E.M. STUDY TO ASSESS THE EFFECTIVENESS AND UTILIZATION OF FULL PRESSURE SUITS: AN OPERATIONAL EVALUATION OF THE MARK II FULL PRESSURE SUIT ASSEMBLY. Part 1. Contract N156 34553, WAC ACPL 373, TED MAN AE 5177, May 1958, 65pp. USA Air Crew Equipment Lab., Naval Air Material Center, Penn.

12,430
This report presents a human factors review of the Mark II full pressure suit. Motion picture, still picture, interview, questionnaire, and direct observational techniques were used to gather information. Six pilot subjects served in all three phases: (1) ground phase in which suit was donned and simulated flight procedures; (2) flight phase; and (3) interview. Analysis of the data led to specific recommendations to pressure suit assembly designers and fabricators, to persons responsible for pressure suit indoctrination, to service and related laboratories, and to airframe manufacturers. T. I.

12,431
Stevens, S.S. (Dir.) PERIODIC STATUS REPORT XXXI. NOVEMBER 16, 1957 - MAY 15, 1958. Contract W33-011-01, NR 142 201 & National Science Foundation Grant G 2668, P-479, May 1958, 9pp. Psycho-Acoustic Lab., Harvard University.

12,431
This is a progress report of activities during the period November 1957 through May 1958. Brief summaries are given for six recently finished studies and for nine studies in progress. A list of recent reports is included. R 64

12,432

Strong, E.M. & Fry, G.A., (Chairmen). PROCEEDINGS 2nd RESEARCH SYMPOSIUM MARCH 3-4, 1958, DEARBORN, MICH. March 1958, 183pp. Illumination Engineering Research Institute, New York, N.Y.

12,432

These proceedings from a research symposium on lighting research put to work contains six papers: 1) Development and use of a generalized method for specification of interior illumination levels on the basis of performance data; 2) Visibility measurements on several schoolroom visual tasks under different lighting conditions; 3) An example from Toronto schools; 4) A discomfort glare evaluator; 5) Measuring disability glare with a portable meter; and 6) Some effects of quantity of illuminance on accommodation and vergence of the eyes.

T. G. I. R 43

12,433

USAF School of Aviation Medicine. SUBJECT INDEX OF SCHOOL OF AVIATION MEDICINE PUBLICATIONS. JANUARY 1942 - MAY 1958. May 1958, 84pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,433

This index contains the research reports published by the School of Aviation Medicine from January 1942 through May 1958. Supplements are published annually. The subject headings have been arranged by major field of interest with appropriate subheadings and cross references. The major fields include accidents, air evacuation, aviation medicine, dentistry, internal medicine, microbiology, neuropsychiatry, ophthalmology, otolaryngology, pathology, personnel, pharmacology and biochemistry, physiology, psychology, radiobiology, space medicine, statistics (medical), preventive medicine, surgery and anesthesiology, and veterinary sciences.

R 1500 (approximately)

12,434

USA Library. THESES AND DISSERTATIONS IN THE HOLDINGS OF THE ARMY LIBRARY. Special Bibliography No. 14. July 1957, 56pp. USA Library, Adjutant General's Office, Washington, D.C.

12,434

This bibliography is a compilation of theses and dissertations in The Army Library and derives from military personnel in training at civilian educational institutions. A few have been received from other sources. The titles are arranged functionally by title in an alphabetical order within major and subordinate subject classes. The major classes include military arts and sciences, social sciences, physical sciences, earth sciences, psychology and psychological testing, and humanities.

R 350

12,435

USN Training Device Center. ANNOTATED BIBLIOGRAPHY OF VOICE COMMUNICATIONS RESEARCH COMPLETED UNDER CONTRACT N6CR1 104, TASK ORDER II. Contract N6CR1, NAVTRADEVEN TR 104 2 32, June 1958, 34pp. USN Training Device Center, Port Washington, N.Y.

12,435

This report presents an annotated bibliography of reports issued during the life of a research contract (1947 to 1957) devoted to the study of problems in voice communications. The abstracts are divided into four major categories: 1) human factors in intelligibility, 2) characteristics of the message, 3) voice communication training of talkers, and 4) voice communication equipment. The abstracts give the purpose of the experiment, method of investigation, and the main results and conclusions. An author index is included.

R 51

12,436

Maag, C.M. & Trumbull, R. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. SUPPLEMENT NUMBER 4: JULY 1957 - JULY 1958. July 1958, 14pp. USN Psychological Sciences Division, Office of Naval Research, Washington, D.C.

12,436

This supplementary bibliography is organized around five categories that correspond to those in the main bibliography: sensory mechanisms, perception and orientation, neural basis of behavior, response mechanisms, and physiological and psychological effects of high intensity noise. Titles of specific research tasks and technical reports that have been issued during the period covered are listed under the five headings. Names of investigator and his institution are given in each instance.

R 144

12,437

Macbeth, M.H. (Dir.). HUMAN PERFORMANCE REPORTS - LIST 4. SUMMER 1958. 1958, 32pp. Applied Psychology Research Unit, Medical Research Council, Cambridge, England.

12,437

This report presents brief summaries of the studies that were made by members of the Applied Psychology Research Unit from the summer of 1957 to summer of 1958. The papers are grouped under the following major headings: seeing, hearing, thinking, remembering, moving, and surroundings.

R 27

12,438

Gelsler, M.A. FIRST TOOLING-UP EXERCISE FOR LOGISTICS SYSTEMS LABORATORY (OCTOBER - NOVEMBER 1956). RM 1924, July 1957, 35pp. Rand Corporation, Santa Monica, Calif.

12,438

This report describes the first exercise conducted as part of an extensive program in the study and testing of improvements in the logistics system through an examination in a simulated environment constructed in a laboratory. The origin, objectives, and nature of the Simulation Laboratory are discussed. The exercise described here was conducted on a limited scale in order to gain knowledge about laboratory techniques and other problems in logistics simulation and to aid in the design of major experimentation.

G. I.

12,439

Goodnow, Jacqueline J. & Rubinstein, I. EFFECT OF SLEEP LOSS ON PROBLEM-SOLVING BEHAVIOR. Proj. 6 60 10 017, Subtask 2, WRAIR 40 57, March 1957, 13pp. USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.

12,439

To demonstrate how changes in problem-solving behavior can be quantified, an experiment on the effects of sleep deprivation upon relationships between the choice made on any one trial of a two-choice task and the outcome of one or more previous trials was conducted. Techniques of sequential analysis were applied to the data. The task was to press one of two keys in a slot machine in order to release a chip. Subjects were told that there was a pattern to the order of correct keys which they were to discover. The order of correctness in fact was determined by a 50:50 random schedule. A control period of testing on five consecutive days was followed by sleep deprivation of 72 hours with testing once each day during this period.

T. R 12

12,440

Narcum, E.R. & Blackwell, H.R. VISUAL ACUITY FOR CIRCULAR AREA LINE GRATINGS PRESENTED AT VARIOUS INCLINATIONS IN THE VISUAL FIELD. Proj. MICHIGAN, Rep. 2144-318-1, Sept. 1958, 10pp. Vision Research Labs., University of Michigan.

12,440

This paper reports measurements of visual acuity in the frontal plane of the visual field, utilizing a grating consisting of black and white bars at four inclinations within a circular area. Measurements were made both with a sharp-edged circular aperture limiting the grating visible to the observers and with a photographic transparency which produced a graduated rather than a sharp edge for the target pattern. For each observation made by the six subjects, the inclination of the lines in the grating was set at either 0, 45, 90, or 135 degrees to the horizontal. A comparison of results obtained with the two masks was the main experimental task. T. G. I. R 10

12,441

Henry, J.P., Eckstrand, G.A., Hessberg, R.R., Simons, D.G., et al. HUMAN FACTORS RESEARCH AND DEVELOPMENT PROGRAM FOR A MANNED SATELLITE. ARDC TR 57 160, Oct. 1957, 4pp. USAF Air Research and Development Command Headquarters, Baltimore, Md.

12,441

This report presents a brief summary of the "state-of-the-art" in human factors research and development in providing a functioning man in space flight. An estimate that man can now be sent out into space for two hours is based upon present knowledge of such factors as habitable atmosphere; accelerations; weightlessness; thermal effects; water, nutrition, and waste disposal; radiation; escape; isolation and confinement; presentation and processing of information; work place layout; crew skills; selection and training; and motivation. In the above factors, areas of the unknown are indicated and estimates of time needed to achieve significant progress are made.

12,442

Hirsch, J.A. ACCOMMODATIVE FATIGUE IN THE AGING RADAR OBSERVER. Proj. 7157, WADC TR 58 24, Task 71808, April 1958, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,442

To study ocular (accommodative) fatigue in aging radar observers, ten subjects ranging in age from 32 to 49 years were tested on a simulated radar observation problem. The subject, at a viewing distance equivalent to the absolute near point, scanned forty successive targets (five concentric circles within which eight letters were randomly placed) and identified the letters in a prescribed manner; period of work was one hour. Fatigue was measured by loss of accuracy of performance, subjective symptoms (discomfort, headache, etc.). The results are considered in relation to presbyopia, ocular fatigue, and aids for alleviation of the condition. I. R 34

12,443

Jameson, M.E., Byrd, W.H., Jr. & Williams, R.R. REPORT OF TEST PROJECT NR AVN 1857 EVALUATION OF FLARES FOR BATTLEFIELD ILLUMINATION. Proj. NR AVN 1857, May 1958, 17pp. USA Aviation Board, Fort Rucker, Ala.

12,443

To evaluate three flares (M-24, Mod O, M-138, M-139) against the current United States Army Standard M-6 flare for use in battlefield illumination and to determine the best method of dispensing the flares from currently used aircraft, each type of flare was studied and dropped from L-19, L-20, and LL-1A airplanes under simulated tactical conditions. Light-intensity measurements, use of tracking transits, and subjective opinions of aerial and ground observers were analyzed in terms of illumination provided for ground operations. Recommendations are included as to most satisfactory flare and method of dropping flares. T. I. R 4

12,444

Jeffries, M.T., Jr., Kelly, R.B., Cunningham, S.M., & Saul, E.V. AN EXPERIMENTAL EVALUATION OF THREE APERTURE AND THREE OPEN SIGHTS UNDER VARIOUS LEVELS OF ILLUMINATION. Contract DA 19 020 504 ORD 4264, Proj. Rep. 1, Nov. 1957, 46pp. Institute for Applied Experimental Psychology, Tufts University.

12,444

To investigate the effects of three aperture and three open sight designs upon the accuracy and precision of marksmanship in the field, the sights were tested over a broad range of natural illumination levels. The aperture systems were varied with respect to two different aperture diameters and two front post widths; the open sight systems were designed to facilitate aiming by the use of principles of geometrical configuration and visual acuity. Data were obtained and analyzed from six male subjects who, acting as their own controls, fired with each of the systems under all levels of illumination. Implications of the findings for future research and design of military rifle sights are discussed. T. G. I. R 20

12,445

Kendler, H.H. & Karasik, A.D. CONCEPT FORMATION AS A FUNCTION OF COMPETITION BETWEEN RESPONSE PRODUCED CUES. Contract NKNR 285(30), Proj. NR 150.064, Tech. Rep. 1, Nov. 1957, 15pp. Dept. of Psychology, New York University, New York, N.Y.

12,445

A mediational stimulus-response formulation was applied to verbal concept formation behavior to test the hypothesis that concept formation depends on implicit response differentiation between relevant and irrelevant words. The material consisted of concrete nouns divided into sense-impression categories. The subjects were required to select four words from a group of eight to form a concept. The four relevant words were always of middle-dominance value. The irrelevant words were varied from high-dominant related to low dominant related, to high-dominant unrelated words. Correct responses on first trial and errors were analyzed for effects of the three conditions. T. R 10

12,446

Kidd, J.S. & Kraft, C.L. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL, MAY 1958 THROUGH JULY 1958. Contract AF 33(616) 3612, Proj. 7192, R.F. Proj. 690, Rep. 9, Aug. 1958, 14pp. Ohio State University Research Foundation.

12,446

This is the ninth quarterly progress report on a research project on human engineering aspects of air traffic control. The status of the following types of activities is given: operational studies of existing air traffic control systems; systems research on simulated air traffic control operations; technical studies and supporting research, theoretical formulations, design and development of research equipment, liaison activities, and personnel. A list of reports submitted by this project is attached. R 32

12,447

Kidd, J.S. & Kraft, C.L. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL, AUGUST 1958 THROUGH OCTOBER 1958. Contract AF 33(616) 3612, Proj. 7192, R.F. Proj. 690, Rep. 10, Nov. 1958, 13pp. Ohio State University Research Foundation.

12,447

This is the tenth quarterly progress report on a research project on human engineering aspects of air traffic control. The status of the following activities is described: operational studies of existing air traffic control systems; systems research on simulated air traffic control operations; technical studies and supporting research, theoretical formulations, design and development of research equipment, liaison activities, and personnel. A list of reports submitted under this project is included. R 35

12,448

Kincaid, M.M., Kristofferson, A.E. & Blackwell, H.R. A NEURAL FORMATION OF THE EFFECTS OF TARGET SIZE AND SHAPE UPON VISUAL DETECTION. Contract DA 36 039 SC 52654, Proj. WICHICAN, Rep 2144, 280 p, July 1958, 19pp. Engineering Research Institute, Vision Research Lab., University of Michigan.

12,449

A quantitative general formulation of the effects of target size and shape on visual detection is presented in connection with counter-surveillance. The chief assumptions are that neural impulses originating in retinal receptors converge upon neurons in a central area, and that excitation of the most excited neuron in that area determines the response. It is shown that the hypothesis leads to testable relationships between thresholds for circular targets and for targets of other shapes. Evidence is presented that diffuse neural connections are relatively more important at low background levels and an interpretation is suggested.

G. H. B.

12,449

Lewis, S.T. & Stapp, J.P. EXPERIMENTS CONDUCTED ON A SWING DEVICE FOR DETERMINING HUMAN TOLERANCE TO LAP-BELT-TYPE DECELERATIONS. Proj. 7850, AFMDC/TN 27 1, Dec 1957, 21pp. USAF Missile Development Center, Holloman AFB, N.M.

12,449

This note describes a device, the swing-test, for use in obtaining human parameters to experimental application of crash-type mechanical forces while restrained with only a lap belt. The swing consists of an aircraft seat, suspended by cables forming a swing-pendulum, which can be raised or dropped through a measured vertical component and arrested by a vertical cable. Rate of onset, magnitude, and duration of deceleration have been recorded for 21 anthropometric dummy tests and 19 human tests in this device.

T. I. R. 3

12,450

Marschak, T. CENTRALIZATION AND DECENTRALIZATION IN ECONOMIC ORGANIZATIONS. Contract N60R 25133, (NR 047 004), Tech. Rep. 42, April 1957, 257pp. Dept. of Economics, Stanford University.

12,450

This paper aims to clarify the problem of an organization that must choose between a centralized scheme for coordinating the decisions of its members and a decentralized one, or more generally between many schemes of varying degrees of centralization. Various chapters deal with: 1) descriptions and definitions of the organization and various decision systems; 2) criteria for choice among decision systems; 3) a symbolic treatment; 4) applications of the criteria to several types of organization; and 5) general conclusions about the evaluation of decision systems in general and the ranking of certain types as to the criteria given here.

R. 29

12,451

Milch, L.J., Frank, H.D. & Renzi, A.A. THE EFFECTIVENESS OF DRUGS AGAINST MOTION SICKNESS. PERPHENAZINE AND SYSTRAL. Rep. 59 20, Dec. 1958, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,451

To test the effectiveness of the drugs perphenazine and systral against motion sickness, groups of unselected basic airmen were tested aboard a multi-engine aircraft. The subjects were equally divided into drug and placebo groups. The four-hour flight involved simulated turbulence. The endpoint was vomiting. Subsequent to the flight all subjects completed a questionnaire on side effects. Data from 223 subjects were analyzed for differences between drugs and placebo. Also, dogs were swing-tested after the administration of chlorpromazine and perphenazine to test the reliability of extending results of apomorphine inhibition to the relationship of the chemoreceptive zone to motion sickness.

T. R. 10

12,452

Neibaur, J. & Andrus, F.S. SHIPBOARD EVALUATION OF FLIGHT DECK CLOTHING OPERATION. SMALL. Proj. KT301-052.04. R.C.D. Rep. 18, Airside Rep. 1950 2, Jan. 1953, 11pp. USA Clothing and Textile Office, Bureau of Supplies & Accounts, Brooklyn, N.Y.

12,452

This report deals with evaluation of experimental flight deck clothing for carrier operations in cold weather. Three types of experimental winter identification clothing (sleeveless and sized to wear over foul and cold weather clothing, vest-type, panel-type and commercial-type athletic shirt) were evaluated on a comparative basis for fit and comfort, difficulty in donning and doffing, difficulties in performing duties, and possibilities of wearing personnel. The adequacy and acceptability of other clothing (gloves, shoes, summer wear) are also discussed.

T. R. 2

12,453

O'Connell, M.M. AUDITORY ACUITY MEASURED BY AUTOMATIC AND MANUAL AUDIOMETRY. Rep. 58-13, Nov. 1957, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,453

Auditory thresholds were established for 24 subjects on the Rudense model AR-3 audiometer, on the SAM model 56-2 automatic audiometer, and on the standard Naico H-1 audiometer. The test results are compared by percent agreement and probability of such difference occurring by chance. The result of one retest per subject is also given. Additional test-retest data obtained at the 1953 Wisconsin State Fair, using the SAM model 56-2, are presented.

T. R. 11

12,454

Pepinsky, H.B., Pepinsky, Pauline N., Minor, F.J. & Robin, S.S. MOTIVATIONAL FACTORS IN INDIVIDUAL AND GROUP PRODUCTIVITY. VI. TEAM PRODUCTIVITY AS RELATED TO THE CONFIRMATION OR CONTRADICTION BY MANAGEMENT OF ITS COMMITMENTS TO AN APPOINTED LEADER. Contract N60R 17, T.O. III (NR 171 123), 1957, 89pp. Personnel Research Board, Ohio State University Research Foundation.

12,454

To test the hypothesis that the productivity of a work team will actually be lower when management is viewed as contradicting than when it is viewed as confirming its production commitments to an appointed team leader, an experiment was conducted in a simulated small industrial plant in which a team of four subjects worked together on a toy manufacturing problem. Their task was to buy parts for, assemble, and sell different kinds of toys. One member of the team, the department head, conducted all transactions with the vice-president, buyer, and seller. In one condition all purchase orders were approved, in another half were disapproved and toy output and sales were compared for 20 different teams.

T. R. 28

12,455

Pinneo, L.R. THE INFLUENCE OF PRE-EXPOSURE LUMINANCE AND DURATION UPON SHORT-COURSE DARK ADAPTATION. Proj. 7186, RADG TR 50 24, Task 4511, Feb. 1958, 12pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

12,455

To determine the effect upon human vision of momentary exposures of intensities of light higher than adaptation level, the course of dark adaptation (as measured by contrast sensitivity) was determined for the first 32 seconds following pre-exposure. Two pre-exposure luminances of 1.0 and 10.0 foot-lamberts and three pre-exposure durations of 1, 10, and 100 seconds were used. Contrast thresholds were also determined for each condition of pre-exposure during the last second prior to its termination. The results are compared with those in the literature and the implications for optimum luminances for night visual tasks are discussed.

G. I. R. 10

12,455
Rand Corporation. LIST OF UNCLASSIFIED REFERENCES.
UNCLASSIFIED PUBLICATIONS, INCLUDING RELATED REPORTS
FROM OTHER SOURCES. RR 920 3, June 1957, 39pp.
Rand Corporation, Santa Monica, Calif.

12,456
The publications listed in this document include six
books, 17 translations and approximately 400 each of re-
ports and papers. The time period covered is from 1945
through April 1957.
R 500

12,457
Sankar, V.B. HUMAN THERMAL RESPONSE, March 1958 to
July 1958. Progress Report. Contract AF 33(616)
3458, Rep. 50 25, July 1958, 14pp. Department of
Engineering, University of California at Los Angeles.

12,458
This report indicates progress in various areas of a
study in human thermal tolerance: skin diffusion study;
biomedical analog computer; ventilating garment (M-3),
and constant temperature room. Some suggestions relating
to the biomedical analog computer are discussed in a sup-
plement to the report.

12,459
Sachal, E., Hall, I.A.M., McRae, D.T. & Weir, D.H.
HUMAN PILOT RESPONSE RESPONSE IN FLIGHT AND SIMULATOR.
Flight Control Lab. Contract AF 33(616) 3088, Proj.
1350 13504 & Aero Medical Lab. Contract AF 33(616)
2388, Proj. 7202 72388, WADC TR 57 330, Aug. 1958,
39pp. WADC Flight Control Lab. & WADC Aero Medical
Lab., Wright-Patterson AFB, Ohio.

12,460
This report presents the results of an effort to de-
termine the difference in pilot tracking behavior result-
ing from differences between flight and ground simulator
control environments. The investigation was centered on
an experiment designed to simulate the quasi-linear de-
scribing functions and linear correlations of eight pi-
lots when engaged in lateral and longitudinal tracking
tasks with random appearing forcing functions. A Kari-
son aircraft was used both in flight and ground simulation
tests. The data are presented in the form of pilot de-
scribing functions and linear correlations. Simple ana-
lytical describing functions are developed and differ-
ences between flight and simulator behavior are discussed.
T. G. I. R 8

12,461
Huest, A. INVESTIGATION OF THE CO-ORDINATION OF
ORTHOGONAL TO-AND-FRO MOVEMENTS OF THE EXTREMITIES
OF NORMAL SUBJECTS. TIL/T 4579, Aug. 1957, 33pp.
Technical Information and Library Services, Ministry
of Supply, London, England. (University of Freiburg).

12,462
To investigate the regular peculiarities of coordi-
nated-rhythmical voluntary movements, the voluntary to
and fro movements of 15 subjects, including seven pairs
of twins, were recorded. The tests were made uniformly
with each limb and part limb moving simultaneously and
separately at various rates. The data were analyzed in
terms of natural or basic frequencies, maximum frequen-
cies, lateral differences, amplitudes, and coordination
similarities. The importance of these results in motor
coordination is discussed.
G. I. R 20

12,463
Sinalko, H.W. & Buckley, E.P. HUMAN FACTORS IN THE
DESIGN OF SYSTEMS. Final Report. NRL Rep. 4996,
Aug. 1957, 49pp. NSA Research Lab., Washington, D.C.

12,464
This report was written for the designer of systems
incorporating men as operators, maintainers, or monitors
of machines. The following list represents the material
covered: 1) the human component and the process of de-
signing systems, 2) a summary of the characteristics of
the human component with implications for design engi-
neering, 3) the effects of human characteristics upon en-
gineering tests and systems evaluations, 4) an annotated
reading list, and 5) a checklist of human factors co-
siderations in system design and evaluation.
G. R 92

12,465
Comité d'Action Scientifique de Défense Nationale.
BULLETIN BIBLIOGRAPHIQUE RECHERCHES DES SCIENCES
HUMANES. Rep. 28, Feb. 1958, 59pp. Section Scien-
tifique et Technique, Paris, France.

12,466
This report presents an annotated bibliography of
selected studies of human behavior of interest to the
French armed services. Both French and English language
journals are used as sources. The time period is pri-
marily 1957. The studies are arranged in three sections:
national defense, the techniques and methods of psychol-
ogy, and general scientific information. A subject and
an author index are included.
R 100

12,467
Pittman, R.M., Marriott, F.H.C. & O'Shaughnessy, E.F.
INDIVIDUAL DIFFERENCES IN HEAR-VISION EFFICIENCY.
Martins, H.L. & McDonald, F.E. WITH A SECTION ON
"THE FREQUENCY OF SEEING AT LOW ILLUMINATION".
Rep. 294, Feb. 1957, 83pp. Medical Research Council,
London, England.

12,468
To assess the part played by sensory acuity in per-
ception, a series of specialized tests were administered
at low illuminations to dark-adapted subjects. Instance
levels required to resolve black Landolt rings of differ-
ent sizes were obtained and correlated with absolute
thresholds measured by the flicker-and-flash method. A
"filter factor" theory was proposed and further experi-
ments were carried out to test it. Perceptual efficiency
was measured by a score given for a complicated picture
viewed at low illumination and compared to the flash
thresholds. The data were examined from point-of-view of
the quantum theory. A method of carrying out simple
tests of visual efficiency at low illuminations is pre-
sented.
T. G. I. R 57

12,469
Anderson, Nancy S. & Fitts, P.M. AMOUNT OF INFORMATION
GAINED DURING BRIEF EXPOSURES OF NUMERALS AND SYMBOLS.
J. Exp. Psychol., Oct. 1958, 56(4), 362-369.

12,470
The problem of how much can be perceived during a
brief exposure of a group of subjects was re-examined
from the viewpoint of the relation of amount of infor-
mation transmitted to informational coding and amount of in-
formation displayed. Groups of homogeneous colors, nu-
merals, or combined color-numeric symbols were exposed
for 0.1 seconds; information content varied from 9.51 to
25.36 bits per message (symbol group). The subjects (24)
wrote down estimates of all the symbols in each message
during ten test sessions (36 test messages) with the mes-
sages presented in order of increasing difficulty. Re-
sults were analyzed in terms of information transmitted
at various complexity levels.
T. G. R 13

12,471
Hartman, B. & Fitts, P.M. THE DEVELOPMENT OF TECHNI-
QUES AND PROCEDURES FOR THE STUDY OF ALERTNESS IN
AVIATION PERSONNEL. Nov. 1950, 38pp. The Ohio State
University Research Foundation.

12,472
This report covers two phases of work on the prob-
lem of alertness. The first, a review of literature on
the nature and causes of alertness changes, leads to the
formulation of several hypotheses regarding underlying
factors that lead to loss of alertness. The second
phase is an initial evaluation of the suitability of ob-
servational techniques to the problem of quantifying
alertness changes. The results of this study are dis-
cussed in relation to research necessary to validate
this method.
T. R 18

12,459

Brown, R.B., Gorton, W.A., Smith, P.E. & Bradford, R.A. A RESEARCH STUDY OF THE EFFECTIVE TRAINING OF THE INFANTRY RIFLE SQUAD. FINAL REPORT. Subcontract NUMBER 000 007 (50 45 2 50 17), PMA Rep. 34 10, Aug. 1954, 61pp. Psychological Research Association, Washington, D.C.

12,460

To develop training methods and procedures for increasing the effectiveness of infantry rifle squads. Four different methods (control, group participation, combat fundamentals, and team training) were developed. A 40-man group of eight squads was trained by each method and given performance tests to evaluate their comparative effectiveness. Evaluation of the results along with opinion of all involved led to the formation of a final training program that was used to train 40 squads. Instructors with no experience in the project trained half the squads. Performance tests were again used for evaluating the program. Lesson plans for rifle squad unit training are presented.

T. G. I. R 6

12,466

Murch, R.S. FORMULAS FOR MEASURING AND ESTIMATING HUMAN RESPONSE PERFORMANCE IN MECHANIZED SYSTEMS. RJ 130, Oct. 1953, 6pp. HRL Research Lab., San Jose, Calif.

12,465

This paper discusses the development of a formula for estimating the rates at which human operators, using glass input devices, are able to enter data accurately into a man-machine system. The estimates include error correction but are based on tests during which the operator does not actually stop to correct errors. The underlying assumptions are discussed for two specific input systems and the formulas developed are simplified for certain cases and approximations.

R 2

12,467

Rees, J.L. STUDIES ON THE ACCELERATION OF A BODY FROM REST. PART I. THE APPROXIMATE CONSISTENCY OF VELOCITIES PRODUCED BY TIME-DEPENDENT ACCELERATIONS HAVING EQUAL MAXIMUMS AND OPERATING OVER EQUAL DISTANCES. Rep. ES 26463, Nov. 1954, 22pp. Douglas Aircraft Company, Inc., El Segundo, Calif.

12,467

This paper is a theoretical investigation of the effect of the shape of the acceleration-versus-time curve on final velocity. The range of final velocities that can be given a point mass (or rigid body) by accelerations having a prescribed maximum and operating over a certain fixed distance are investigated for two special classes of accelerations: linear ramp and power of the elapsed time. Actual velocities obtained in ejection seat tests are compared with those predicted from the analytic study. The findings are discussed in relation to the design of ejection seats.

12,468

Human Resources Research Institute. INDEX TO HUMAN 1953 PUBLICATIONS. Res. Memo. 9, Jan. 1954, 37pp. HRI Human Resources Research Institute, Maxwell AFB, Ala.

12,468

This index is designed to facilitate reference to substantive reports that outline Human Resources Research Institute (HRI) research findings and activities. A list of all 1953 publications is given. Annotations of each document follow the basic list. Indexes to the publications are included by author, division or origin, and subject. The types of publications include research reviews, technical research reports, research memoranda, research digests, and research studies.

R 50

12,469

Brown, G.A., Jr. PHYSICAL STANDARDS & SELECTION. SUB-REPORT. AIR FORCE HUMAN RESEARCH PROGRAM. 19-50 Feb. 1957, 230 pp. HRL School of Aviation Medicine, Randolph AFB, Tex.

12,469

This is a report of papers presented at a symposium on physical standards and selection in the Air Force. Aside from certain purely medical considerations, such as the significance of vision impairment in pilot selection, there are papers on visual, physiological, neurological, and psychiatric standards, standards for acceleration and high-altitude indoctrination, and also papers on job requirements and the relation of selection to the man-machine complex.

T. G. I. R 200

12,470

Technical Information Bureau. BIBLIOGRAPHY OF INFORMATION ON HUMAN-ENGINEERING AND RELATED SUBJECTS. RESEARCH NO. 2. Subj. Classification 19, Serv. Library Ref. 2 20, Sept. 1953, 124pp. Technical Information Bureau for Chief Scientist, Ministry of Supply, London, England.

12,470

This annotated bibliography, a second addendum to that issued on correspondence in November, 1953, includes unclassified reports added to the Serv. Library since the issue of Addendum Number One, November, 1953. The articles are indexed according to subject area into the major parts: 1) automatic control-general theory, analysis and design of control systems and associated instruments, components and sub-units of control systems, applications, tests and performance; 2) manual teaching-manual control and tracking. An author index is provided.

R 247

12,471

Treadler, P.C. FINAL REPORT OF RESEARCH CARRIED OUT BY THE UNIVERSITY OF MICHIGAN BUREAU FOR CHEMICAL CORPS REOLOGICAL LABORATORIES, CAMP DETROIT, MI. Contract DA 18 054 ON 1307, April 1955, 26pp. Lehigh Institute, University of Notre Dame.

12,471

This report describes the development and design of four protective garments suitable for germicidal bath decontamination together with accessory equipment. One garment to be decontaminated by a germicidal shower and completely sealed has been developed and used over a period of one year. Two garments which can be decontaminated by germicidal sprays and are easier to use have been developed. The limitations for a garment with a self-contained air supply and with ice used as a coolant have been determined.

I.

12,472

Thompson, P.O. THE EFFECT OF TEMPORARY HEARING LOSS ON THE MASKED THRESHOLD. MEL Rep. 786, June 1957, 12pp. HRL Electronics Lab., San Diego, Calif.

12,472

To determine the effect of temporary hearing loss due to intense sound upon detection of tonal signals in a noise background, data were obtained from three subjects (monaural listening) using a 400-200 cycle per second band of up to 100 decibels sound pressure level of noise. The masked stimulus was a 4000 cycle tone (interrupted three times a second) which also served to measure auditory fatigue. A test run consisted of pre-exposure tracking of the absolute threshold, 16 minutes of noise exposure interspersed with thresholds for gauging masking and fatigue, and post-exposure thresholds (recovery). Implications of the results for sonar operation are discussed.

T. G. R 13

12,473
Peters, G.J. HUMAN CHOOSING SWITCHES. *Psychological Research Association, Inc., Santa Monica, Calif.*

12,474
This design sheet presents tips to the design engineer as to the selection of selector-switch levers for easy reading and positioning. Illustrations accompany the suggestions.
1.

12,475
Folley, J.B., Jr., & Altman, J.M. HUMAN FACTORS IN MAINTENANCE TASKS IN FACTORS AFFECTING THE MAINTENANCE OF ELECTRONIC EQUIPMENT. *Tech. Rep. NAFM-100-20 05 23 4, Sept. 1958, 18pp. Naval Aviation Research Center, Fort Washington, N.Y.*

12,476
This report delineates many of the general features and cautions necessary for effective maintenance of electronic equipment and was prepared for inclusion as Chapter 12 in the "Joint Services Manual Engineering Guide to Equipment Design." The various parts deal with factors in planning for maintainability; a design schedule for maintainability; design of equipment units, of covers and enclosures; selecting and applying wiring, cables, and connectors; recommendations for maintenance access; for test points and test equipment; for maintenance controls and displays; installation of equipment; design of bench set-ups and tools; maintenance procedures and instructions; glossary and index.
T. I. R 11

12,477
Crisie, C.S. INDICATING (READ-OUT) TUBE HUMAN ENGINEERING APPLICATIONS FOR INFORMATION DISPLAYS. *QED, Research Branch, Proj. TM 1000, Tech. Memo 938, Aug. 1958, 3pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.*

12,478
This paper points out some of the advantages that might be gained by the incorporation of indicating (read-out) tubes in Ordnance weapon systems. The increased complexity of modern equipment, together with associated human factors problems, are felt to justify new emphasis on the use of such tubes. Various specific applications, such as circuit check-out, information displays are discussed.
1.

12,476
Vandenberg, J.D. & Goldsmith, C.T. HUMAN FACTORS ENGINEERING. I-VI. April - July 1958, 31pp. *Machine Design. (Purdue University & USA Human Engineering Unit, Picatinny Arsenal, N.J.).*

12,476
A series of articles is presented organized to provide a human-factors understanding for the designer of equipment who must contend with human capabilities and limitations. The first article defines the area of human-factors activity and shows how these areas fit into the overall design picture. More specific topics are dealt with in the five other articles: design for seeing, design for hearing, design of controls, fitting man and machine, and data and design.
T. G. I. R 55

12,477
Klein, S.J. THE RELATIONSHIP OF MUSCLE ACTION POTENTIALS TO ENDURANCE OF WORK IN TASK ORIENTED SUBJECTS. *Rep. NMC 401-302, No. 17-01 121, Dec. 1958, 14pp. Naval Air Development Lab., Naval Air Materiel Center, Pens.*

12,477
This is one of a series of studies concerned with the development of stress criteria and their effects on and relationship to performance. In the present experiment stress, measured by muscle tension, was induced by 1) varying the rate of lift in an isometric task, and 2) varying the rate of temperature of a thermal stimulus applied to the working hand. Muscle action potentials were recorded and studied in relation to work output on the isometric task. The effects of the stimuli used to induce the various levels of electrical activity were studied in relation to performance.
T. G. R 1

12,478
Nelson, P.B. PERSONAL INFLUENCE AS A FACTOR IN CONTRACT DECISIONS. *Rep. Proj. NMC 401 21, Subtask 1; Rep. 17, Sept. 1958, 8pp. Naval School of Aviation Medicine, Naval Air Station, Fla.*

12,478
To evaluate the relationship between different forms of personal influence and contract decisions made in the pre-flight stage of naval air training, 126 aviation officer cadets (four classes) were studied. At some period between the third and sixth week of training each cadet estimated what his contract decision (length of stay in service) would be and on the fifteenth week final decisions were made. A questionnaire was given asking for the three best friends in the class, whom they would go to for an informed opinion, and what they thought of the class spirit. Friendship patterns and opinion leaders were studied in relation to actual contract decisions.
1.

12,479
Pettitt, Julia A., Cohen, S.I., Silverman, A.J. & Zidovus, G. MULTIPLE PSYCHOPHYSIOLOGIC MEASURES DURING GRADUAL ONSET ACCELERATION. *Proj. 015, Task 71713, NMC TM 57 234, Feb. 1958, 20pp. USA Army Medical Lab., Wright-Patterson AFB, Ohio.*

12,479
To investigate psychophysiological factors associated with the response of subjects to gradual onset of acceleration (G), 15 subjects were tested. Prior to the experiment blood was drawn for blood sugar determination, then the subject was exposed to four "stress" periods during which time skin resistance, blood pressure, tracking performance, and pulse were measured. The periods were 1) tracking for 90 seconds with centrifuge at rest, 2) 2G, 3) 4G, and 4) blackout level or 7G. Prior to each G exposure there was a one-minute control period. Subjective symptoms and post-run performance estimates were obtained after each run. The relation between level of central nervous system arousal and vascular changes to blackout and performance decrement were analyzed.
T. G. I. R 8

12,480
Schultz, B. THE FACILITATION OF WORK THROUGH THE ADAPTATION OF THE MACHINE TO THE HUMAN BEING. *Contract NCMR 1268(01), Aug. 1954, 61pp. San Diego State College Foundation, San Diego, Calif.*

12,480
This volume is concerned with the adaptation of the machine to the worker. Consideration in designing for human work at the machine should be given to 1) understanding of the mechanical relations of the body, 2) adaptation to physiological processes, and 3) observation of psychological happenings. The various chapters give information on 1) the mechanics of body movement, 2) individual physiological data on static and dynamic work, speed of movement, strength, and so forth, 3) the place of work, 4) the relationship between big movements and controls of the machine, and 5) the position of the worker at the machine. A summary of basic principles is given.

12,480
Shimony, A. THEORY OF INFORMATION IN THE DISCRETE COMMUNICATION SYSTEM. SC Proj. NR 10250, DA Proj. No. 145 08 001, Tech. Memo. 1956, Sept. 1955, 61pp. Naval Signal Lab., Fort Monmouth, N.J.

12,481
This report is a revised version of the lectures on the discrete communication system given in a course of Information Theory. It represents an organization of the most useful aspects of the treatment of this subject by several authors. Various chapters are devoted to 1) a precise definition for quantity of information transmitted through a discrete information system; 2) a survey of parts of probability theory; 3) an analysis of the noiseless communication system; and 4) an analysis of the noisy communication system.
R 8

12,482
Saunders, H.E. VARIATION OF VISIBILITY IN FOG AT EXETER AIRPORT, AND THE TIME OF FOG DISPERSAL. No. 971, SC 117 204, April 1956, 9pp. Metereological Research Committee, London, England.

12,482
An account is given of the variation in visibility at Exeter Airport (England) during periods of fog. Some features presented and discussed are the rapidity with which visibility falls to lower values within the fog range once fog has formed, the effectiveness of cloud cover as a fog-clearing agency, and the intervals between times of clearance of a fog during the morning and times of sunrise.
T. G. I. R 1

12,483
Oncken, W., Jr. ORGANIZATION AND PEOPLE. Publ. 157 22, Sept. 1956, 20pp. Industrial College of the Armed Forces, Washington, D.C.

12,483
This is an informal discussion of chains of command and chains of understanding, corresponding to the terms "organization" and "people" in the title. The thesis is that the chain of understanding is the most important and has to be maintained through a common mode of communication or language. Further that this language must be based upon common personal values--a job that is significant and important, that maintains the integrity of the individual, that offers a feeling of belonging, and that provides security or the ability to plan ahead with confidence.

12,484
Yustein, S.E. REPORT OF EVALUATION OF COLOR DURABILITY OF COLORED SAFETY HELMETS. FINAL REPORT. Lab. Proj. 4526 36, NSM 181 013, March 1957, 5pp. NSM Material Lab., New York Naval Shipyard, Brooklyn, N.Y.

12,484
To determine the durability of colors in colored safety helmets (color molded integrally into the shell), 80 test samples were issued to four groups of workers (electrical, electronics, riggers, laborers) in a Naval shipyard. The helmets were inspected after periods of six months and one year of service. A number of samples were cleaned using soap and water, naphtha, or hand sanding followed by cleaning and polishing. The results as to general condition, color durability, condition of painted brim, and cleaning quality are reported.
T.

12,485
Williams, C.C. & Clodding, J.A. THE EFFECTS OF COLD ON HUMAN PERFORMANCE. I. REACTION TIME. II. VISUAL COORDINATION. III. THE VISUAL FIELD. NRC Rep. C 7123, March 1942, 14pp. National Research Council of Canada, Ottawa, Canada. (Hunting and Sport Department of National Research).

12,485
To investigate the effects of cold in relation to a reaction time, visual coordination, and vision, a series of separate experiments were performed. 1) Subjects wearing flying clothing were tested with respect to simple or multiple reaction time at zero and -65 degrees Fahrenheit. Time in the cold varied from one to one and one-half hours (hands in warming box). 2) Subjects were exposed to zero degree temperature for four hours while performing a two-handed coordination task. 3) The visual field was charted in the cold (-60 degrees) at intervals during a two-hour period and also at room temperature. Test results at room temperature were compared with those in the cold.
T. G.

12,486
Seelien, J.M. "SOME OBSERVATIONS ON THE USEFULNESS OF THE INDEX OF WIND AND RAIN IN COMPUTING THE THERMAL BALANCE IN INDUSTRIAL WORK". Acta Physiol. Pharmacol. Scand., Dec. 1956, 7(2), 169-174. (Netherlands Institute for Preventive Medicine, Leiden, Netherlands).

12,486
This note discusses the usefulness of some simplified methods that have been developed to compute thermal balance in industrial work. Measurements were made by the longer but more precise method and also by the simplified method on a group of workers in a brick factory who were exposed to high temperatures. The results were compared and recommendations made regarding the use of the simplification of computing procedures.
T. R 3

12,487
Peters, G.A. THE HUMAN FACTOR IN AUTOMOBILE ACCIDENTS. Int. Rev. Med., Sept. 1956, 171(9), 558-642. (University of Southern California).

12,487
This paper discusses the possibility of reduction in the highway accident rate from the systems concept and team approach. Three vital areas are named and discussed: the vehicle, the human operator, and the highway environment. The role of standards and government regulation is considered.
T. R 1

12,488
Fattu, N.A. A CATALOG OF TROUBLE SHOOTING TESTS. (SURVEY OF TESTS DEVELOPED TO DECEMBER 1956). Contract NMR 908(07), Proj. Des. NR 151 167, Res. Rep. 1, Dec. 1956, 130pp. Institute of Educational Research, Indiana University.

12,488
This catalog contains examples of various kinds of trouble shooting tests (Unclassified or Restricted only) that could be located in various bibliographic and Department of Defense publications. An attempt was made to be representative rather than exhaustive when selecting tests for the catalog. Tests are reported in the following groups: 1) on-the-job measures, 2) performance tests, 3) simulator tests, 4) Automatic Recording of Checks (ARC) tests, and 5) paper-pencil and oral interview tests.
T. I. R 148

12,489
Irvine, R.F. & Smith, J.D. MAINTENANCE REQUIREMENTS FOR ELECTRONIC PERSONNEL. I. RECOMMENDED METHOD OF THE QUALIFICATIONS FOR ADVANCEMENT IN RATING FOR ELECTRONIC TECHNICIANS. Study 12-489-6.1, 1948-49, 7th and 8th Rep. 75, May 1950, 74pp. USA Personnel Research Unit, Field Activity of Bureau of Naval Personnel, San Diego, Calif.

12,490
To investigate qualifications for advancement in rating of Navy electronics technicians (qual) and to develop a method for subsequent use in reviewing them, tasks relating to electronics maintenance were studied. Questionnaires containing 125 such tasks were constructed and distributed to 1) 21 technically qualified experts who indicated whether or not the task was essential and, if so, the lowest pay grade that should be held responsible and 2) every electronics technician aboard a sample of 64 ships who indicated which tasks they performed as part of their present assignment. The methods for deriving "qual" from these data are set forth in detail together with a recommended revision obtained by this procedure.
T. I. R 4

12,491
Moran, E.B. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. V. HENRY PATTERNS ALONG 12 MERIDIANS. Proj. MCHENR, Rep. 2144 102 I, Nov. 1950, 20pp. Vision Research Lab., University of Michigan.

12,492
As part of a series of investigations of visual recognition along various meridians of the visual field, observers were required to reproduce linear binary patterns presented tachistoscopically at inclinations of 15 degree steps from horizontal about the visual field. Forty target patterns, each composed of four blackened and four open circles, were used, with four elements appearing on either side of fixation. Luminance was approximately 6.8 foot-lamberts and exposure duration was 0.075 second. The function described by the plot of mean error per meridian and per half-meridian was determined with the data for twelve target meridians and seventeen observers.
T. G. I. R 6

12,492
Moloni, J.F. COCKPIT, INSTRUMENT, AND ANTI-COLLISION LIGHTING FOR ARMY AIRCRAFT (INSTALLATION AND EVALUATION OF COCKPIT AND INSTRUMENT LIGHTING FOR THE L-23 AIRCRAFT). FINAL REPORT. Proj. 9 38 01 000, House Task 12-23, Nov. 1957, 27pp. USAJ Cooperation Research and Engineering Command, Fort Eustis, Va.

12,492
To investigate and evaluate instrument and cockpit lighting for L-23 aircraft, the systems currently in use (combination of fluorescent and red floodlighting) were reviewed in terms of previous findings on the F19 aircraft lighting. Prismatic individual red instrument lights with a cockpit utility light were installed in a test aircraft and subjected to a series of static night tests, night flights, and demonstrations. Recommendations for an improved lighting system are based upon analyses of these data.
G. I. R 4

12,493
Miller, E.F., II. EVALUATION OF CERTAIN VISUAL AND RELATED TESTS V. RETINAL RIVALRY. BMedSurg, Proj. NM 14 01 11, Subtask 6, Rep. 5, Aug. 1950, 8pp. USM School of Aviation Medicine, Naval Air Station, Fla.

12,493
To evaluate the test of retinal rivalry rate as a possible additional visual screening device for visual anomalies that may influence flying efficiency, 112 naval aviation cadets were tested and 12 retested to determine test-retest reliability. A pair of Renshaw oblique line split stereogram targets were used to measure alternation rate. The test was repeated with instructions to attempt to alternate target lines as rapidly as possible. The analysis included frequency distributions of both types of data and comparison with normal curves. Testing significance of ability to change rate at will, and checking on test reliability.
T. G. R 10

12,494
Miller, R.B., Grandstaff, H., Alpert, J.H., Barr, I.H., et al. SIMILARITIES OBSERVATIONS ON DIGITAL AND ANALOG TEMPERATURES IN 12 HOURS BEFORE TO COLD. Rep. 29 01, Aug. 1954, 8pp. USA Climatic Research Unit, Fort Monmouth, N.J.

12,494
To investigate the relationship of the temperature of digits and muscles of limbs exposed to cold, young male military subjects were used. They were tested at room temperature (20-23 degrees centigrade) with upper extremities, bared to just above elbows, placed in ice-jacketed boxes (minus four to ten degrees centigrade). In some experiments wool gloves were worn. Temperatures were recorded from the fingers, forearm, and calves. The temperature reactions were studied for changes occurring in digits, muscles, and for correlation between the two during the course of three to four hours of cold exposure.
T. G. R 2

12,495
Miller, R.B. COMMON JOB COMPONENTS AND TRANSFER OF NON-SPECIFIC SKILLS IN ELECTRONIC LINE MAINTENANCE PART II SOME THEORY AND IMPLICATIONS FOR IMPROVING OF TRAINING OF NON-SPECIFIC SKILLS IN L-23 MAINTENANCE JOBS. Contract AF 18(600) 600, Proj. 7709, Jan. 1955, 34pp. American Institute for Research, Pittsburgh, Penn.

12,495
The work described in this report is an outgrowth of previous study of common job requirements for line maintenance of several types of electronic equipment. It was found in these studies that, on the basis of specific external job similarities, not a great deal of transfer of training could be expected from one system to the other. The present study develops a number of hypotheses predicting the kinds of transfer of training to be expected on non-specific job similarities (for example, concepts of "signal flow," methods of trouble shooting, certain overall work methods such as layout of tools), and the psychological grounds on which this transfer can be expected.
R 8

12,496
Miller, R.B. & Van Cott, N.P. THE DETERMINATION OF KNOWLEDGE CONTENT FOR COMPLEX MAN-MACHINE JOBS. Contract AF 18(600) 1205, Proj. 7714, Dec. 1955, American Institute for Research, Pittsburgh, Penn.

12,496
This report is intended to provide a practical technique for the determination and optimal use of conceptual content in training and job operations. The technique permits the training analyst to induce from concrete job data the essential skills and knowledge which will support his performance and to eliminate irrelevant ones. Four successive steps are delineated: 1) methods for identifying job data, 2) method for deriving operative (or useful) content from particular behaviors, tasks, or job segments, 3) criteria for translating operative content into symbols (verbal descriptions, maps, diagrams) most appropriate for learning and recall, and 4) methods for organizing conceptual supports into training presentations.
I. R 11

12,497
Morrison, D. SCIENTIFIC METHODS FOR USE IN THE INVESTIGATION OF FLIGHT CREW REQUIREMENTS. Proj. RP 1 F, Nov. 1948, 113pp. Flight Safety Foundation, Woods Hole, Mass.

12,497
This report brings together certain methods and techniques, primarily those of medical research and experimental psychology, with which crew proficiency may be investigated. They are examined with particular reference to their potential usefulness in the evaluation of flight crew requirements in large transport aircraft. The section on psychology includes seven papers: polling techniques, motion photography, time sampling, motion and time study, systems research, flight-check, and fatigue. A final section presents some related methods of flight test engineering principles, laboratory equipment, and use of punched-card equipment for data analysis.
T. G. I. R 58

12,498

Gould, M.J. & Hoffmann-Weyden, A.E. MID. 11. RADAR ERROR PRESENTATION FOR RANGE SAFETY ESTIMATES. AFMTC TR 56.77, Quality Control TR 24, Nov. 1956, 15pp. Naval Missile Test Center, Patrick AFB, Fla.

12,496

This report describes a graphical method of displaying radar error on missile tracking which will assist the Range Safety Officer to discriminate between missile off-target deviations and probable tracking errors (radar noise). The method developed displays radar error by means of guide lines drawn along the nominal trajectory prior to missile flight. Problems that arise during the early part of trajectory are discussed. Samples of actual missile trajectories are shown with the radar error guide lines drawn for comparison.

G. I. R 2

12,499

Glaizer, M., Glaser, E. & Klaus, D.J. THE TEAM PERFORMANCE RECORD: AN AID FOR TEAM ANALYSIS AND TEAM TRAINING. Contract 17008-37008, NR 154 079, Dec. 1956, 32pp. American Institute for Research, Pittsburgh, Penn.

12,499

To develop a procedure for the evaluation and training of Navy teams, observations of several hundred Navy teams were analyzed to determine the specific behavior critical in producing effective team performance. Thirteen general categories of behavior were used to construct team performance records on which observations can be recorded. Three forms were developed: a general one for Navy teams, one for Gunnery, and one for Combat Information Center teams. The construction and use of the records are discussed and a program for improvement of team functioning is considered.

I.

12,500

Gogel, M.C. THE EFFECT OF CONVERGENCE AND ANGULAR SIZE UPON THE COMPUTED VALUE OF A HYPOTHETICAL OBSERVER CONSTANT IN BINOCULAR VISION. USAMRL Proj. 6-95, 20 001, Rep. 372, Dec. 1958, 28pp. USA Medical Research Lab., Fort Knox, Ky.

12,500

The amount of binocular disparity required to duplicate a frontal extent in apparent depth was investigated. In two experiments the angular size of the frontal extent was constant but the convergence distance was varied. The final experiment reversed these conditions. The binocular disparity data were analyzed as a function of the angular size of frontal extent and its convergence distance. Equations for calculating an observer constant from this type of judgment were developed. The consequence of this approach was considered for the perception of the size of a depth interval and the shape of a three-dimensional object.

T. G. I. R 14

12,501

Fromer, R. & Morowitz, M.W. FLIGHT INFORMATION DISPLAYS FOR INSTRUCTIONAL CONSOLES. CHAPTER I OF THE HANDBOOK OF INSTRUCTOR STATION DESIGN. Contract N61339 74, Tech. Rep. NAVTRADEVEN 20 OS 31 1, Sept. 1958, 83pp. USN Training Devices Center, Fort Washington, N.Y. (Educational Research Corp.).

12,501

To determine the best mode of presenting cockpit information to the flight simulator instructor, two general methods of study were used. The first method included an examination of all relevant literature on instruments currently used, or of similar design to those currently used, in Navy Flight Simulator Instructor Stations. The second method used consultations with informed personnel. The results are given in two parts: (1) A comparative study of 28 instruments with data on general purpose, operating principle, major and secondary functions, type of information presented, and proposed presentation. (2) Analysis of current modes of presentation in five general information categories and recommendations for proposed presentations.

I. R 57

12,502

Foley, P.J., Jackson, K.R. & Ekins, D.O. A METHOD OF RECORDING AND MEASURING LIMITS OF VISIBILITY FROM COCKPITS OF CIVIL AIRCRAFT. Aviation Research Lab., 4 University of Toronto).

12,502

This note describes a technique for measuring and recording limits of visibility from aircraft cockpits which can be speedily and reliably used by relatively untrained personnel. The method uses a photographic technique to make the recording of a grid overlay to facilitate angular measurements.

I.

12,503

Fritz, E.L. REALISTIC MATHEMATICAL ASPECTS OF AIR TRAFFIC CONTROL. Contract CICA 505, Working Paper 7, Proj. 2384 1, June 1955, 21pp. Laboratories for Research and Development, The Franklin Institute, Philadelphia, Penn.

12,503

This paper summarizes some of the mathematical analogs and models that best describe air traffic control problems. These are the tools with which intensive analysis can be made. The mathematical concepts, coupled with basic descriptions of the operating system, provide the fundamentals necessary for optimum system design. The use of actual data has been kept to a minimum. The general divisions of the system are: 1) departures, 2) the enroute area, and 3) terminal arrival areas. Some general conclusions and recommendations are given.

I. G.

12,504
Grill, R. & Snyder, F.V. PRELIMINARY STUDY OF AIR-CREW TOLERANCE TO LOW-FREQUENCY VERTICAL VIBRATION. Contract AF 34 (601) 2975, Document D3 1189, Model B 47, July 1957, 32pp. Boeing Airplane Company, Wichita, Kan.

5 aircrews were subjected to vertical harmonic motions of frequencies ranging from 3 to 30 cps with input accelerations ranging to a maximum of over 2.5g. The subjective judgments of the effect of the vibrations on the aircrews were reported by them in terms of 5-point scale. The results of the subjective judgment tests indicate that aircrews are able to tolerate unexpectedly high levels of vibratory acceleration for relatively short periods at the frequencies explored. Transmissibility of vibration from supporting structure adjoining the seat to just under the body of the seated airman varied with frequency. Generally, the higher frequencies were transmitted with a greater loss in amplitude of vibration, (or g's) than were the lower frequencies. The same aircrews performed a tracking task while being subjected to vibration of various amplitudes and frequencies. The magnitude and duration of error in tracking was electrically integrated to produce a comparable score for each vibration condition. It was tentatively found that there were statistically significant decrements in performance under vibration conditions which were judged to be nearly "intolerable." In addition, there were some notable individual differences in response to the various vibration conditions.

12,505

Hartman, L.A., Matner, J.P. & Telf, A. FINAL ENGINEERING REPORT ON RADAR NAVIGATION AIDS IN COMMON AIR-TRAFFIC CONTROL SYSTEMS. Contract AF 33(602) 1444, RADC TR 57-132, Rep. 1/20 1, May 1957, 48pp. Airborne Instruments Lab., Inc., Minnola, N.Y.

12,505

To investigate existing and proposed navigation systems to determine their potential usefulness in the common system of air-traffic control (ATC), a study was made in three phases. 1) Specific navigation systems were studied and the more important are reported here in the appendices. 2) ATC systems were analyzed to determine the critical requirements that would be placed upon common system navigation aids. 3) The more important navigation aids were analyzed on the basis of coverage, accuracy, siting, capacity, spectrum requirements, compatibility and transmission problems with ATC, and weight. Recommendations are included.

T. G. I. R 2

12,506

Rowarth, C.I. & Treisman, M. THE VALIDITY OF MOTOKAWA'S TECHNIQUE FOR INVESTIGATING RETINAL FUNCTION. PPMC 1035, June 1956, 2pp. Flying Personnel Research Committee, London, England. (Institute of Experimental Psychology, Oxford, England).

12,506

This paper describes a series of experiments in which the validity of Motokawa's technique for investigating retinal functions is tested. Motokawa's technique is based on the curve of the change of threshold for electrical stimulation of the eye after various types of light stimulation. Using both naive and trained observers, approaching the threshold from both directions, by equal step changes in stimulus intensity, and by using varied intervals between the warning light flash (of various colors) and the electrical stimulus (from one to nine seconds), phosphene thresholds were obtained and compared with those from Motokawa's studies. Studies from other laboratories are reported.

T. R 13

12,508

Anderson, Nancy S. & Leonard, J.A. THE RECOGNITION, NAMING, AND RECONSTRUCTION OF VISUAL FIGURES AS A FUNCTION OF CONTOUR REDUNDANCY. J. exp. Psychol., Sept. 1956, 26(3), 262-270. (Ohio State University).

12,508

This study extends the previously reported finding that one form of redundant metric figure (any one contour restricted to one appearance) was more difficult to identify among a sample of similar figures than were random (nonredundant) metric figures. Two experiments were conducted: 1) two intermediate levels of redundancy (restricting total figure area and restricting the relation of adjacent details) were compared with the earlier more extreme forms; and 2) the perceptual task was varied (classification of a series of figures, paired-associate learning of figure names, and complete reconstruction of figures). The data were analyzed to answer the question of why some particular forms are detrimental to identification performance.

T. I. R 12

12,509

Banks, J.E., Dick, J.L. & William, J.M. A STUDY OF THE EFFECTIVENESS OF GLOVES FOR THE REDUCTION OF THE CONTACT RADIATION HAZARD ASSOCIATED WITH CONTAMINATED AIRCRAFT. Proj. 7801, Task 7801, AFSC TR 57 26, USAF Special Weapons Center, Kirtland AFB, N.M.

12,509

To determine the effectiveness of gloves in reducing the contact radiation hazard to personnel who work on aircraft that have become radioactively contaminated, a number of different types of gloves and glove materials were subjected to test. A representative swatch of the glove was interposed between the source of radiation and dental X-ray film to determine radiation dose. Measurements were made on inside and outside of gloves worn by personnel working on contaminated aircraft and for whole body exposure. The data were analyzed and the gloves rated in order of effectiveness of protection.

T. I. R 2

12,510

Blagione, J.R., McElvey, R.K. & Reusted, J.F. A RADAR MAPPING DISPLAY SIMULATION AND PERFORMANCE RECORDING DEVICE. Proj. 7184, Task 7184, RADC TR 58 210, Sept. 1958, 14pp. AFSC Air Medical Lab., Wright-Patterson AFB, Ohio.

12,510

The apparatus described in this report simulates the essential display features of a fixed antenna radar mapping system. It is designed to record operator speed and accuracy in identifying various targets on strip-map display materials. Features of general interest include flexibility of application to a variety of problems involving similar materials, convenience and reliability of operation under extended use, and a high yield of data pertinent to performance. A number of structural and operating innovations have been incorporated and are described in detail.

T. R 1

12,512

Accani, F.J. LETTER REPORT ON PRELIMINARY HUMAN FACTORS EVALUATION OF F-84F AIRPLANE. 9pp. Air Research and Development Command, Baltimore, Md.

12,512

This is a preliminary report of a human factors evaluation of the F-84F airplane (a single place, swept-back fighter designed for flight in the sub-sonic and sonic speed ranges at high altitudes). The findings were assembled by physical inspection of the aircraft and include comments and suggestions on such design features as normal entrance and exit, mobility and room within the aircraft, seating, outside vision, controls, instruments, lighting, and equipment.

12,513

Debons, A. & Fried, C. EFFECTS OF RATE AND PROLONGED VIEWING OF RADAR SIGNAL FLICKER. Proj. 4506, RADC TR 58 69, May 1958, 9pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

12,513

Some radar scopes present lights that flicker at varying rates. To determine whether prolonged viewing would affect observer performance, lights flickering at different rates (zero, four, eight or twelve cycles per second) were presented on a simulated radar scope for periods up to two hours. Twelve subjects were asked to report continuously the number of non-flickering lights (one to four) appearing at random intervals for one flicker rate; three subjects were tested at all four rates. Time to respond correctly to changes in number of non-flickering lights were analyzed for effects of flicker rate and length of observation. Subjective responses as to comfort and alertness to task were elicited.

T. G. I. R 3

12,514

Barker, W.S. & Gorham, W.A. A RESEARCH STUDY OF THE ACCEPTANCE OF QUARTERMASTER CLOTHING AND EQUIPMENT. Contract DA 44 109 QM 1725, PRA Rep. 57 3, April 1955, 206pp. Psychological Research Associates, Washington, D.C.

12,514

To provide information for the design of acceptance surveys for Quartermaster clothing and equipment, data were sought relevant to those dimensions most frequently employed in judging items of clothing and equipment. Data were also collected on personal characteristics of users that might affect choice. Five different climatic regions were sampled for influence of a climate variable. A self-administering questionnaire on three families of equipment and five of clothing were administered to 4,269 men. The main product of the study consists of a series of Chi Square Tables for each item of clothing and equipment.

T. I.

12,515

Barthelet, A.K. THE GRADIENTS AND EEG AMPLITUDE DURING MOTIVATED LISTENING. *Canad. J. Psychol.*, 1956, 10(3), 156-164. (Allan Memorial Institute of Psychiatry, Montreal, Canada).

12,515

The relation between electroencephalographic (EEG) gradients and electroencephalographic (EEG) amplitude in subjects listening to a story was explored. Records were taken on 20 subjects during three repetitions of a ten-minute story. In order to increase motivation to listen, the subjects were told that they would be questioned on the story. They also rated their interest during each of the three presentations. Gradient slope was measured as the EEG change during the period from 30 seconds after the story started to its end. The relation of gradient slope to EEG amplitude (arousal) and to reported interest was analyzed.

G. I. R 14

12,516

Byrnes, V.A. (Chm.). MINUTES AND PROCEEDINGS OF THE THIRTY-FIRST MEETING OF THE ARMED FORCES-MHC VISION COMMITTEE. Nov. 20, 21 & 22, 1955. 34pp. Armed Forces-MHC Vision Committee, Wright-Patterson AFB, Ohio.

12,516

These proceedings contain the texts of 35 reports in the field of vision together with the discussion of these reports by the participants. In addition to a list of the participants there are abstracts of 43 articles that had been published in the year preceding this meeting. T. G. I. R 220 (approx.)

12,517

ASTIA Reference Center. A BIBLIOGRAPHY OF BIBLIOGRAPHIES. A REPORT BIBLIOGRAPHY Supplement I to ARC 1721, Nov. 1957, 33pp. ASTIA Reference Center, Library of Congress, Washington, D.C.

12,517

This is a selective bibliography of bibliographies in the catalogs of the ASTIA Reference Center Library of Congress and the Document Service Center, Dayton, Ohio. It is divided into 33 Divisions as listed in the ASTIA Distribution Guide. Within each Division the references are arranged alphabetically by the parent issuing agency. In general the types of material included are patent lists, translation lists of any kind, and material on the Arctic in general. R 360 (approx.)

12,518

Bond, G.W., Gale, K.A. & Haake, J.W. STUDIES AND INVESTIGATIONS OF AIR TRAFFIC CONTROL SYSTEMS AND PROJECT NO. AND/ARMY 14.3. FIRST-QUARTERLY PROGRESS REPORT. PERIOD COVERED: JANUARY 9, 1957 TO APRIL 9, 1957. Contract DA 039 SC 73104, ARF Proj. E079, April 1957, 22pp. Armour Research Foundation of Illinois Institute of Technology.

12,518

This report describes progress made during a three-month period in formulating and applying techniques of system analysis to air traffic control systems. A geographic area encompassing Washington, D.C. and New York City has been selected for study and a particular air navigation and traffic-control system has been described. The immediate problem is that of determining, by means of simulation, how well the system can meet the expected 1965 traffic demand. Using a 200-minute sample of expected peak traffic demand (based on published information) several paper-and-pencil simulation runs have been made. A program is being prepared for computer simulation. I.

12,519

Chinn, H.J. THE EFFECT OF SMOKING AT SIMULATED ALTITUDES ON CARBOXYHEMOGLOBIN FORMATION. Proj. 221, Rep. 1, Feb. 1944, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,519

To determine whether smoking at altitude decreases the oxygen carrying capacity of blood beyond that at ground level, 48 subjects who were regular smokers were tested at ground level and at simulated altitudes of 12,000 and 15,000 feet (all subjects were not included in all three tests). The subjects were asked to smoke four cigarettes within 30 minutes. Finger blood was collected before and after the test and the carbon monoxide content was determined. The carboxyhemoglobin concentration of blood was compared for the various conditions. I.

12,520

Bondurant, S., Clarke, M.P., Blanchard, W.G., Miller, H., et al. HUMAN TOLERANCE TO SOME OF THE ACCELERATIONS ANTICIPATED IN SPACE FLIGHT. Proj. 7216, Task 71712, WADC TR 56-156, April 1956, 5pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,520

Human tolerance limits to the major linear components of acceleration patterns anticipated during exit and re-entry in space flight have been reviewed. These limits were determined for various body positions using g levels which were varied between two and 12, for the following conditions: positive & negative g, rocket-like acceleration and water immersion. G. I. R 10

12,521

Blackwell, H.R. (Group Leader). OPTICS AND VISION. PERIOD AUGUST 1, 1956 TO JANUARY 31, 1957. Rep. 2144 184 P, Nov. 1957, 25pp. The University of Michigan Engineering Research Institute.

12,521

This report describes the progress of the optics and vision portion of a research project on combat surveillance for the period from August 1956 through January 1957. The study, development, and tests of illumination, optical, electro-optical and physiological aids to visual surveillance are described. Tests of improved visual and photographic surveillance procedures and battle-area illumination techniques are discussed. Studies leading to the construction of visibility-forecasting charts are also described. Three basic aspects of visual surveillance are common to all the studied target and background characteristics, optical properties of the atmosphere, and operating characteristics of the eye. I. R 3

12,522

Thomas, C.J. & Deemer, W.L., Jr. OPERATIONS ANALYSIS WORKING PAPER NO. 66, THE ROLE OF OPERATIONAL GAMING IN OPERATIONS RESEARCH. AFDDA U 1837, Oct. 1956. 27pp. USAF Assistant for Operations Analysis, Operations Headquarters, Washington, D.C.

12,522

This paper examines the role of operational gaming as a technique in research. The importance of a firm foundation in clarifying what operational gaming can do is stressed. Definitions of operational gaming, simulation and Monte Carlo are given and a brief sketch is included of the theory of the games of strategy. An illustrative example shows two different approaches to the simple game situation. Gaming and non-gaming techniques in practice are compared. Conclusions as to the proper use of this technique are offered. T. R 15

12,523

General Dynamics Corporation. **PSYCHOLOGICAL SERVICES AVAILABLE IN THE RESEARCH & DEVELOPMENT DEPARTMENT ELECTRIC BOAT DIVISION.** March 1958, 14pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn.

12,523

This brochure describes the psychological services available in the Research and Development Department of the Electric Boat Division of the General Dynamics Corporation of Connecticut. The staff is described as well as previous research accomplished and areas of interest and laboratory facilities available.

I. R. 12

12,524

Dennis, J.P., Siddall, G.J. & Colbourne, P.J. **NOISE LEVELS RECORDED IN 'ANTAR' AND SOME OBSERVATIONS ON THEIR POSSIBLE EFFECTS.** Rep. 64, Oct. 1956, 19pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

12,524

To investigate noise levels on both diesel and petrol models of the Army's F.V. 4430 34-ton tank towing vehicle (Antar) and to give an account of their possible effect on the operator, noise level measurements were made under various driving conditions. An octave band analyser was used to find the region of highest intensities for the recorded noise levels. Comparisons of these data were made with those reported from other investigations and discussed in relation to the following: damage to hearing both permanent and temporary, effects on communication, health and safety, work efficiency, and subjective effects. Recommendations are included.

I. G. R. 24

12,525

Dogan, J.M., Desguin, P.E., Jones, J.S., Hank, S.A., et al. **AUDIO-VISUAL PRESENTATION OF INTELLIGENCE DATA.** RADC TR 57 146A, 1957, 190pp. **Battelle Memorial Institute, USAF Rome Air Development Center, Griffiss AFB, N.Y.**

12,525

This manual describes the essentials of the graphic methods and equipment useful in presenting intelligence data to small audiences. The manual can be used to aid in the selection and use of effective methods and equipment and also as an operating and training guide. Major sections of the manual are: 1) principles of briefing, 2) preparation of pictures and charts, 3) use of still projection in presentation, and 4) techniques and use of motion pictures, stereoscopic presentation, projection of microcopy, and closed circuit television.

T. G. I.

12,527

Baker, L.E. (Chm.). **THIRD ANNUAL ARMY HUMAN FACTORS ENGINEERING CONFERENCE.** Oct. 2, 3 & 4, 1957, 115pp. **Quartermaster Research & Engineering Command, Natick, Mass.**

12,527

This report is the record of a conference on human factors engineering. Two addresses are given in full. "Man: The Ultimate Weapon", James Edson and "Human Factors in Systems Engineering", Alphonse Chapanis. One section is devoted to presentations by the Army of new organizations and tactics - their influence on material objectives. Another section comprises papers presented by the technical services which deal with human factors research. Reports of working groups are summarized.

I. R. 152

12,528

Siegel, A.I. & Stirner, F.W. **CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT. VII. THE EFFECTS OF COLOR CONTRAST, BRIGHTNESS CONTRAST AND MODE OF LEGEND PRESENTATION ON THE ATTENTION INTRUDING VALUE OF PERIPHERALLY POSITIONED LIGHT INDICATORS.** Contract N1565 33252, NANC ACEL 369, TED NAM EL 52004 Part 19, Feb. 1958, 22pp. **Applied Psychological Services, Wayne, Penn.**

12,528

To investigate the effects of color contrast, brightness contrast, and mode of legend presentation on the attention intruding value of cautionary and warning light signal indicators, fifteen subjects were tested. They were instructed to consider their primary task to be that of keeping three pointers "on target" and secondarily to extinguish any signal light that appeared by pushing the appropriate button. Specific comparisons of performance (response time to signal and number of light signals missed) were made for 1) red and yellow light indicators in a red surround illumination, 2) two levels of surround illumination, and 3) positive and negative modes of legend presentation (legend opaque-background illuminated and the reverse condition).

T. G. I. R. 6

12,529

Barker, P.A. **INVESTIGATION OF TECHNIQUES FOR DISPLAYING INFORMATION IN AN AIR TRAFFIC CONTROL CENTER.** FINAL REPORT. Contract AF 19(604) 2034, AFMCC TR 58 113, May 1958, 133pp. **Electronics Research Directorate, Air Force Cambridge Research Center, Bedford, Mass. (Stavid Engineering, Inc., Plainfield, N.J.).**

12,529

The important features of a variety of dynamic display equipments and techniques pertaining to air traffic control centers are described, broken down into 1) cathode-ray tube techniques, 2) optical techniques, and 3) special techniques. The equipments are analyzed from the standpoint of one or more of the following possible applications: 1) large, bright Plan Position Indicator-type displays, 2) color coded displays, 3) displays imparting altitude information, 4) tabular displays, and 5) miscellaneous. Significant advantages and disadvantages are discussed and those equipments that most nearly meet needs of air traffic control uses are indicated. Topics for human engineering study are suggested.

T. G. I. R. 50

12,530

Baker, L.E., Siegel, A.I. & Stirner, F.W. **CAUTION AND WARNING LIGHT INDICATORS FOR NAVAL AIRCRAFT. VI. AN EXPERIMENTAL COMPARISON OF VISUAL AND AUDITORY "MASTER" SIGNALS UNDER TWO LEVELS OF TASK COMPLEXITY.** Contract N1565 33252, NANC ACEL 366, TED NAM EL 52004 Part 18, Jan. 1958, 24pp. **USN Air Crew Equipment Lab., Naval Air Material Center, Penn. (Applied Psychological Services, Villanova, Penn.).**

12,530

To compare experimentally the attention intruding value of four master cautionary signals (one-tone and two-tone auditory and two visual signals of varying brightness) six subjects performed a simulated flight task. Through instructions they were set to perceive the multiple tracking task and simultaneous attendance to verbal passages as their major tasks and reaction to the cautionary and warning signals as collateral tasks. Time to respond to peripheral light signal indicators and number of signals missed constituted the basis for comparisons. Suggestions for further investigation into task complexity are made.

T. R. 10

12,531

Gairn, S.M., Colby, Helen J., Crawford, Mary B. & Younger, Deborah E. **FITTING AND DONNING TESTS ON GAS MASKS AND RELATED DEVICES, FINAL REPORT ON PART I OF CONTRACT NO. DA 18-108-CML-2829.** July 1952, 19pp. **Forsyth Dental Infirmary for Children, Boston, Mass.**

12,531

This is a final summary report upon fitting and related tests on Gas Masks. It includes a resume of fitting tests on E51 and E52 masks and summarizes suggested design changes recommended. In addition, data on donning tests, harness tests, and tests on the infant protector are included. Information on the segments of population tested is given.

G. I.

12,532
Rosenbaum, D.A. EXPLOSIVE DECOMPRESSION STUDIES WITH ANIMALS WEARING FULL BLADDER SUIT AND HELMET. Proj. 7160, Task 71814, NADC TR 57 685, Nov. 1957, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,532
This is a preliminary attempt to assess any permanent pulmonary damage resulting from explosive decompression to animals wearing a full bladder type suit and helmet while connected to an automatic oxygen regulator. Studies were made of 17 dogs following explosive decompression (30 milliseconds) through ten and fourteen pounds per square inch (psi). Animals were run in pairs for most of the runs; one was nebulized following the run and autopsied; the other was allowed to live and followed clinically. Case histories, including pathology and physical examination records, of the experimental animals are given. Possible reasons for the findings are discussed.
G. I. R 14

12,533
Kalogeris, J.G. REPORT NO. 9999 PILOT EMERGENCY ESCAPE UPPER TORSO HARNESS SUPPORT DEVELOPMENT TEST OF MODEL F-106A. Test 9999 56 399, Rep. 9999, Aug. 1956, 22pp. Engineering Test Labs., Convair, San Diego, Calif.

12,533
This report describes the development and testing of an Upper Torso Harness that would enable a pilot to sustain ejection seat acceleration forces in excess of 20 G's. Using a Drop Track apparatus, initial seat drop tests were made, using a fully anthropomorphic test dummy to determine the various loads the torso is subjected to under varying G forces. Based upon these results the Torso Harness was developed to relieve the spinal compression load and tested with the dummy. Some human drops were conducted at accelerations up to 11 G's. Various combinations of flight clothes and the Harness were tested.
G. I.

12,534
Laro, J. & Brown, F.R. INSTRUMENT LIGHTING- INVESTIGATIONS OF ULTRA-VIOLET REFLECTIONS. PART 2. MEASUREMENTS OF ULTRA-VIOLET ENERGY IN AIRCRAFT COCKPITS EQUIPPED WITH FLUORESCENT INSTRUMENT LIGHTING. Rep. TED NAM 31334 Part 2, Feb. 1950, 30pp. USN Aeronautical Medical Equipment Lab., Naval Air Materiel Center, Penn.

12,534
The ultra-violet energy in ten naval aircraft, equipped with ultra-violet instrument floodlighting fixtures, was measured at the pilot's eye position. One commercial aircraft equipped with a cold cathode ultra-violet installation was also studied. In addition to measurements of radiant flux density, the related brightnesses of the fluorescent instrument markings on the panels were determined. The data were analyzed and studied with reference to possible ways of reducing the amount of energy reaching the pilot's eye. The measuring assembly, an Ultra-Violet Radiometer, is described.
T. I.

12,535
Central Experimental and Proving Establishment. MODIFIED MARITIME SEAT-PACK - EVALUATION FOR USE IN THE SABRE, T-33, AND CF-100 AIRCRAFT. Rep. 1152, Jan. 1956, 6pp. Central Experimental and Proving Establishment, Air Materiel Command, Ottawa, Canada.

12,535
The modified maritime seat pack container was evaluated to determine its suitability for use in the Sabre, CF-100, and T-33 aircraft. The project pilot used the test pack on routine flights in each of the aircraft and a group of pilots of varying sizes were used to test knee clearance during ejection. Comfort, sizing, and interference with control stick are discussed. Recommendations are included.
T. R 1

12,536
Loveless, R.E. SIGNAL DETECTION WITH SIMULTANEOUS VISUAL AND AUDITORY PRESENTATION. FPRC 1027, Dec. 1957, 8pp. Flying Personnel Research Committee, London, England. (University of Durham).

12,536
To investigate the possibility of increasing rates of signal detections by use of an additional sensory channel, a comparison was made of the rate of detection of noise masked signals with audio, visual, and audio-visual presentation (earphones, cathode-ray oscilloscope or both). Each of six subjects was given 15 half-hour sessions; each session used only one form of presentation and one signal-to-noise ratio (from -15 to -27 decibels). The task in each case was to indicate the presence of the signal following a ready signal. The proportions of correct detections were analyzed for effect of the three modes of presentation. The strategy used by the various subjects in the bimensory situation is discussed.
T. G. I. R 25

12,537
McKenzie, R.E. THE EFFECT OF BINAURAL BEATS ON PERFORMANCE. Ph.D. dissertation, 1957, 40pp. University of Michigan.

12,537
To determine the effects of binaural interaction, produced by binaural beat stimulation, upon certain performance measures, forty subjects were tested on the MacQuarrie Test for Mechanical Ability and three subtests from Thurstone Primary Mental Abilities Test. Three matched groups were tested as follows: 1) three times without noise; 2) once without noise, with a pure tone of 250 cycles through both earphones, and with a frequency difference of eight cycles between tones presented to the two ears; and 3) as before except on last test in which a beating tone was used. Differences in performance data were analyzed for effects of types of stimulation. Theoretical explanations of the findings are offered.
T. G. R 12

12,538
Miles, S. RESISTANCE TO BREATHING ITS APPLICATION TO BREATHING APPARATUS. R.N.P. 56/871 U.P.S. 158 R.N.P.L. 5/56, June 1956, 3pp. Royal Naval Physiological Lab., Medical Research Council, Alverstoke, Hants, England.

12,538
This paper reviews the findings of a number of research studies upon total respiratory resistance and the physiological effects when increased. Acceptable limits of resistance at pressures of one atmosphere and at pressures above one atmosphere are given. These limits are applied to specific design suggestions for breathing apparatus.
R 6

12,539
Millet, R.J. A SELECTED READING LIST ON RADIOLOGICAL PROTECTION AND LABORATORY DESIGN. AERE-1/M 43, April 1957, 4pp. Atomic Energy Research Establishment, Harwell, England.

12,539
This list contains 31 items on radiological protection, and 17 concerning laboratory design.
R 48

12,540
Shilling, C.W. (Chm.) MINUTES AND PROCEEDINGS OF THE EIGHTEENTH MEETING OF THE ARMY-NAVY-NRC VISION COMMITTEE. Jan. 14 - 15, 1957 103pp. Army-Navy-NRC Vision Committee, Wright-Patterson AFB, Ohio.

12,540
These minutes and proceedings include texts of 20 papers presented. They represent a survey of current and contemplated research studies into visual problems. In addition, eight abstracts of recently published visual research are given along with two reports of interrogations of two German scientists concerning their work during World War II.
T. G. I. R 8

12,540

Posner, J.F., Jr., Price, H.F., McLaughlin, J.T., Shneider, H.P., et al. **AVIATION MEDICAL SURVEY BOARD. COGNITIVE CHANGES/STIMULI FOR TRAINING HUMAN FLIGHT SURVIVORS.** Sub. Rep. **WRIGHT-PATTERSON AIR FORCE BASE, OHIO.** 11pp. **Wright-Patterson Medical Center, Fort Wright, Ohio.** **Psychological Research Associates, Arlington, Va.**

12,541

The role of the flight surgeon in aviation safety is defined broadly as concerned with problems of the aviator's survival in the hostile environment encountered in aviation. The source content for training flight surgeons is set forth under three major areas of responsibility: 1) accident investigation procedures, 2) accident prevention programs, 3) physiological factors, 4) psychological factors, and 5) physical factors. With respect to each area, key directives are also cited which define the activities of the flight surgeon.

I. G. I. R 35

12,542

Rand Corporation. **AN ANNOTATED BIBLIOGRAPHY OF RAND SPACE FLIGHT PUBLICATIONS.** APR 1954, RM 2413, Feb. 1954, 13pp. **Rand Corporation, Santa Monica, Calif.**

12,543

This annotated bibliography lists all the RAND Corporation Research Memoranda, Reports, and Translations related to space flight that are currently available to industrial contractors and commercial organizations with the required need-to-know. The reports that are deposited with the Armed Services Technical Information Agency (ASTIA) have the ASTIA number below the RAND number.

R 82

12,543

Schub, R., Jaffe, H.S. & Vanderplas, J.H. **SHOPE COORDINATING OF AIRCRAFT INSTRUMENT ZONE MARKINGS.** Proj. 7186, WADC-TR 57 260, March 1953, 11pp. **Wright-Patterson Medical Lab., Wright-Patterson AFB, Ohio.**

12,543

To determine whether aircraft instrument zone markings could be profitably shape-coded rather than color-coded, seven shapes, chosen from a preliminary survey, were selected for further investigation. Simulated instrument dials were shown, with and without numbers; 70 college students and 70 rated Air Force officers were asked to indicate by a forced-choice matching technique their preference for association of each of the shapes with each of seven stated aircraft functional categories. The frequencies with which each marking was associated with each category were analyzed to determine significant trends. Recommendations for further study are made.

I. I. R 2

12,544

Spencer, J. **A COMPARISON OF AN AUDITORY WARNING SYSTEM WITH A CONTROLLED VISUAL WARNING SYSTEM FOR USE IN AIRCRAFT.** FPRC 818, March 1953, 8pp. **Elving Personnel Research Committee, London, England.** (**RAF Institute of Aviation Medicine**).

12,544

To compare two methods for presenting warning information in aircraft, both were installed in an aircraft and tested during a cross-country flight. The two methods were: 1) auditory system of three different warning signals fed into telephone circuit of aircraft intercom set, and 2) visual centralized panel layout (three labeled windows) and attention-getting flashing lights (red flashing for warning with steady red glow behind one window). Ten pilots were tested on their ability to respond to warnings from both systems by flipping the appropriate toggle switch while piloting the plane. Performance data (time to respond to signal) were analyzed for differences due to display.

12,545

The University of Rochester. **STUDY OF VISUAL SUPPLEMENTARY ACTIVITY, FIFTH BOMBING TECHNIQUE GROUP FOR PERIOD FROM JUNE 15, 1957 THROUGH SEPTEMBER 15, 1957.** Contract DA 46 000 DMC 2002, Proj. 8 30 00 100, Sept. 1957, 17pp. **The Institute of Optics, The University of Rochester.**

12,545

This is the fifth interim report on a study of stereoscopic acuity. The purpose of the over-all study is to determine the optimum conditions of viewing for stereoscopic map compilation. The data reported in the fourth report are subjected to statistical analysis. Steps remaining in the over-all test plans are reviewed and a refined test plan presented.

I.

12,547

Vilypontaga, T.L. **AVIATION INSTRUMENTS AND AUTOMATIC FLIGHT.** AIC 21190, F IS 0025/V, TI 732, 1954, 212pp. **Wright-Patterson Medical Center, Wright-Patterson AFB, Ohio.**

12,547

This is a textbook intended for students in instrument-building courses. It sets forth the basic principles of operation of aviation instruments and autopilots, briefly describes the elements of design, and discusses the questions of the error of the instruments and the methods for eliminating such errors. It gives an idea of the instruments that control the operation of the aircraft engine as well as that of piloting and navigation instruments and automatic equipment.

I. F 13

12,548

White, C.S. **THE BIOLOGICAL EFFECTS OF NOISE (SOUND).** Convair Aeronautical Consultant's Report, April 1954, 20pp. **Lamson Foundation for Medical Education and Research, Albuquerque, N.M.**

12,548

This is a summary of the current status of data relevant to the biological effects of noise prepared to give Convair engineers and administrative personnel a fair grasp of existing and future significant problems in the field. A bibliography and supporting documents are presented with a summary of key papers. Working space noise levels specified in the **Handbook of Instructions for Aircraft Designers** is reviewed in light of noise fields of existing and future aircraft. Auditory and extra auditory effects of noise and various protective devices are discussed. Data on hearing thresholds, tolerance levels, changes in threshold due to noise, age and hearing, and allowable levels for various work areas were tabulated. Attention is directed to future problems.

T. R 16

12,549

White, C.S. **TEMPERATURE AND HUMIDITY.** Convair Aeronautical Consultant's Report, April 1954, 29pp. **Lamson Foundation for Medical Education and Research, Albuquerque, N.M.**

12,549

This report calls attention to appropriate publications dealing with human tolerance during acute and chronic exposure to variations of temperature and points out certain deficiencies in the experimental data much needed by engineers designing tomorrow's high speed aircraft. Thermal problems relevant to ram heating following emergency escape and 6 thermal emergencies associated with equipment failure are discussed. Other topics treated are long-term exposure to hot and cold temperatures (comfort zones, tolerances, effect on performance) and the air-conditioning system on the B-47 aircraft. Recommendations are included.

G. R 17

12,550
McClure, T.F. & Leary, F.J. TRANQUILIZING DRUGS AND STRESS TOLERANCE. Forj. 7142, WADC TR 56 64, Task 7142, Oct. 1954, 4pp. NSA Climatic Research Unit, Wright-Patterson AFB, Ohio.

12,551
Stress tolerance studies were performed on a group of ten healthy male subjects, ranging in age from 18 to 27, both in their normal state and while on therapeutic doses of the tranquilizers, pentobarbital hydrochloride (Sporine) or amphetamine (Miltan, Equanil). Responses to the tests (Valsalva Overhead, Continuous Positive Pressure Breathing, 30 millimeters Hg Pressure, 100 per cent oxygen at 23,000 feet in altitude chamber; Tilt Table, Harvard Step test; Combined Stress Test) were graded on a one-to-five basis and studied for differences due to the drugs and the degree of stress. Psychological factors were also discussed. The findings are considered in relation to the practice of giving tranquilizers to flying personnel.
T. R 19

12,552
Miller, E.Z. A SUMMARY OF SOME AIRCRAFT ACCIDENT TRENDS. SPECIAL REPORT. Special Rep. 56 33, Dec. 1954, 3pp. NSA School of Aviation Medicine, Naval Air Station, Fla.

12,553
This report summarizes certain trends noted in United States Navy Aircraft Accident Statistics for the fiscal years 1953 and 1954. Special interest was focused upon a comparison between operational and reserve accidents, and also upon the comparative rates of accidents attributed to pilot error and to material failure for various models of aircraft (a classification used in the annual accident statistical reports, such as "AJ" or "FS-2/3/4").
T. R 1

12,554
Miller, M.R., Grundfest, H., Alper, J.M., Margolin, S.G. et al. A MUFF FOR USE WITH CHEMICAL HEATING PADS IN EXTREME COLD. Engr. Memo. 17 CR, May 1944, 14pp. NSA Climatic Research Unit, Fort Monmouth, N.J.

12,555
This report describes a muff designed to prolong the activity of chemical heating pads in extreme weather. The muff is incorporated in the design of the parka worn as the outer garment of the arctic assembly; the back wall was formed by the portion of the parka covering chest and abdomen to allow a space partially warmed by body heat. Experiments on military personnel and an electrically heated dummy torso in the -40 degree room are described. Temperatures of the surfaces of the heating pad are reported over periods of seven hours in the cold. Recommendations for further evaluation are made.
T. G. I.

12,556
Miller, M.R. THE ORGANIZATION AND FUNCTIONS OF THE CLIMATIC (PHYSIOLOGICAL) RESEARCH UNIT. Engr. Memo. 1 CR, Aug. 1943, 5pp. NSA Climatic Research Unit, Fort Monmouth, N.J.

12,557
The organization and functions of the Climatic Research Unit are set forth in this memorandum. The purpose of the Unit is to provide data on physiological reactions of humans exposed to extreme temperatures while operating Signal Corps equipment. The functions are discussed more specifically in terms of modern warfare and Signal Corps needs. The various groups within the Unit--climatic physiology, sensory and coordinative physiology, chemical physiology and service sub-groups--are discussed.

12,558
Miller, M.R. CHANGES OF COLD SENSITIVITY OF THE HANDS AND FEET BY MEANS OF AIR HEATED BY THE CHEST. Engr. Memo. 7 CR, Sept. 1943, 5pp. NSA Climatic Research Unit, Fort Monmouth, N.J.

12,559
To determine whether cold digits of the hands and feet can be warmed by the delivery to them of a stream of air heated by the chest, an apparatus was developed consisting of 1) specially designed hand-operated centrifugal airblower fitted to 2) a coil of tubing arranged around the chest and 3) extensions of this tubing to hands and feet. The subject, usually dressed, was seated in a -40 degree Centigrade chamber in a turbulent wind velocity. After 30 minutes pumping was started by the subject and continued for one hour; the subject remained in the cold for another 25 minutes. Digit and rectal temperatures were recorded and studied for effectiveness of the method used.
T. G.

12,560
Miller, M.R. SHIVERING OBSERVED IN COOLED SUBJECTS FOLLOWING THE ABRUPT TERMINATION OF THE INSULATION OF CO₂ ENRICHED MIXTURES. Engr. Memo 22 CR, Nov. 1944, 14pp. NSA Climatic Research Unit, Fort Monmouth, N.J.

12,561
This report describes a series of studies investigating the phenomenon of shivering associated with the abrupt cessation of breathing carbon dioxide (CO₂) enriched mixtures. The experiments were conducted with subjects at temperatures of 20 to 23, -10 to 2, and -40 degrees Centigrade. Groups of subjects were changed several times over the nine-month investigation period. After preliminary cooling (hands and feet only at room temperature conditions) various CO₂ enriched mixtures were administered. The effect of abrupt return to room air breathing upon shivering was observed. Similar experiments were conducted upon subjects rendered acidotic by ingestion of ammonium chloride or alkalotic by sodium bicarbonate.
T. G.

12,562
Murray, G.H. & Gabbard, J.M. COMPARISON AND INTERACTION AMONG SENSORY INPUT CHANNELS. Contract NORD 7386, March 1956, 41pp. Applied Physics Lab., Johns Hopkins University.

12,563
This report is a preliminary draft of Chapter IV of the Joint Services Human Engineering Guide to Equipment Design. The human capabilities in the various sensory systems are outlined as well as some of the deficiencies. Ways in which more efficient use can be made of man in complex environments are indicated. The major topics are: 1) a comparison of the major sensory systems; 2) visual and auditory displays; 3) multiple sensory inputs and 4) choice of sensory input to man.
T. G. R 35

12,564
Nishi, Y. A NEW TENTATIVE THEORY OF VISUAL SPACE PERCEPTION (II). Isokoku Psychol. Folia, 1956, XVII(1), 1-20. (Institute of Psychology, Iwate University, Morioka, Japan).

12,565
The first part of this paper discusses the phenomenal facts concerning visual perception of space. The concept of "depth limit" is discussed as a primary factor. A new theory of size constancy is introduced to explain the phenomenon of space perception. Data from experimental studies are presented and discussed in relation to this theory.
T. G. I. R 25

12,566
Rand Corporation. A SELECTED LIST OF UNCLASSIFIED PUBLICATIONS OF THE SOCIAL SCIENCE DIVISION, 1948-1956. RM 1403 2, Dec. 1956, 12pp. Rand Corporation, Santa Monica, Calif.

12,567
This document contains a list of unclassified reports, research memorandums, and papers that have been issued by the Social Science Division of The RAND Corporation from its inception to the present (1956). The publications are grouped according to the above types and listed chronologically. A list of deposit libraries is given.
R 118

12,560

Glaeser, M. & Glaeser, M. A STUDY OF NON-INTELLECTUAL CORRELATES OF TROUBLE-SHOOTING ABILITY: RIGIDITY MEASURES. Contract AF 41(657) 98, Proj. 7719, Task 17011, WADC TR 58 488, Oct. 1958, 30pp. USAF Personnel Lab., Lackland AFB, Tex. (American Institute for Research, Pittsburgh, Penn.).

12,560

To determine the relationship between measures of problem-solving rigidity and performance on both novel and routine trouble-shooting tasks concerned with electronics equipments, 251 electronics trainees were tested on the rigidity tests and of these 152 were tested on the criterion measure. A battery of 13 rigidity tests was constructed in terms of four categories: ability to change performance and perceptual sets, preference for highly structured stimuli, simple stimuli, and general attitudes. Three routine and three novel trouble-shooting problems formed the criterion. Relationship between rigidity and the two types of tasks were analyzed. Rigidity test scores were further analyzed to determine whether they would improve prediction of the Electronics Aptitude Index. T. R 27

12,561

Sells, S.B. HUMAN FLIGHT BEHAVIOR IN GROUPS. Ev. 6 58, July 1958, 21pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,561

This paper presents a survey of research on group behavior oriented to problems of aircrew efficiency. A common semantic problem involving the distinction between the terms descriptive of behavior and of group functioning was clarified. The frame of reference used for organizing the review was explained. The following topics were then considered: measurement of group performance—the problems of criteria; research on staffing problems—technical competence, crew assembly; research on utilization problems—structural, group dynamics, and man-machine systems approaches.

R 41

12,562

Simons, J.C. & Richardson, W.H. AIRBORNE EQUIPMENT FOR RECORDING AIRCRAFT FLIGHT PATHS. Proj. 7189, WADC TR 58 37, June 1958, 32pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,562

The Aero Medical Human Factors Airborne Laboratory, C-131 B 53-7823, has been equipped to record continuously pitch, bank, heading, altitude, airspeed and other flight path parameters. This report reviews the capability and reliability of the recording systems and establishes general operating and calibrating procedures for the equipment. A general description of the systems research capability including methods of scoring, data reduction, and experimental controls is given.

T. I. R 5

12,564

Stockbridge, H.C.W. THE EFFECT OF THE ANTICIPATORY STARTLE PATTERN ON AIMING A RIFLE. Rep. 40, Feb. 1956, 16pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

12,564

To investigate the effect of the anticipatory startle pattern on aiming a rifle, photographic records were taken of nine men firing eight live rounds, eight blank rounds, and eight times with an empty firing chamber. The technique involved three observers who fired 21 shots at seven targets and their mean errors from target center calculated. Also photographic records of 21 rifle aims were made to obtain standard deviations. These data were used in the analysis of subjects data in regard to differences in elevation and traverse errors between live, blank and no rounds.

T. I. R 13

12,565

Gittelman, D.M. & Nedge, J., Jr. EXPANDIBLE AND SHRINKABLE SOCKETS. Tech. Rep. 5661 (Ref. T.2. 5630), Oct. 1956, 14pp. USA Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D.C.

12,565

To investigate the problems involved in the preparation of a double-wall, below-elbow laminated arm prosthesis, the methods in use were analyzed in terms of time requirements for fabrication and for flexibility in design and material to accommodate stump changes in dimension. An attempt to standardize dimensions of the prosthesis based on an anthropometric survey of arm dimensions was made and a search conducted to find a resin formulation that will permit linear expansion up to 25 per cent at approximately 100 degrees Centigrade with zero recovery to initial size and shape at temperatures of 55 degrees Centigrade. Investigation on both aspects is continuing.

T. R 2

12,566

Sherwin, C.W., Kovaly, J.J., Melrose, J. & Prothe, W.C. AN EXPERIMENTAL STUDY OF THE AUDITORY DETECTION IN NOISE OF SIGNALS OF RANDOMLY VARYING FREQUENCY. Contract DA 36 039 SC 56695, D/A Subtask 3 99 06 111, Rep. R 72, July 1955, 21pp. Control Systems Lab., University of Illinois.

12,566

This investigation related to certain aspects of listening errors in an experimental signal detection situation roughly comparable to one that might be proposed as a test of signal detection apparatus. It was concerned with detection in noise of signals which occur randomly in time and are either of the same frequency (800 cycles per second) or are of varied frequencies (ranging from 300 to 1,200 cycles per second). Detection data from four listeners were analyzed and compared for the two conditions. The results are related to the behavior of a model of the auditory system consisting of a bank of contiguous narrow filters, each as wide as a critical band, and each followed by a low pass filter.

T. G. I. R 4

12,567

Standize, L.S., Popham, W.J. & Fattu, N.A. A REVIEW OF TROUBLE SHOOTING RESEARCH. Contract N6AR 908(07), Proj. Des. MR 151 167, Res. Rep. 3, Dec. 1956, 126pp. Institute of Educational Research, Indiana University.

12,567

This report presents an annotated bibliography of publications concerned with electronic trouble shooting. Tabular summaries of authors, type of report, tests used, and the variables of electronic trouble shooting performance and personnel are presented in the form of indices to the bibliographic references. The reports include discussions concerning proficiency assessment techniques, training equipment or materials, analyses of job activities, evaluation of maintenance personnel, experimentation, and bibliographies.

R 109

12,568

Borgatts, E.F. & Bales, R.F. SOCIOMETRIC STATUS PATTERNS AND CHARACTERISTICS OF INTERACTION. J. soc. Psychol., 1956, 43, 289-297. AFPRC TN 56 101. (Russell Sage Foundation & Harvard University).

12,568

To explore the relationship of some sociometric measures of status in three-man groups to overt behavior in group interaction, 125 male Air Force personnel were composed from each subsample of nine persons in such a way that each subject participated with each other subject in four sessions and with two different persons each time. Ratings of leadership, by coparticipants and by self, a popularity score received from coparticipants and a self-rating of social acceptability were obtained. Subjects were then assigned to interaction groups (planning role-playing session) where they were observed. The data were studied for relations between the status categories and interaction rate.

T. R 7

12,569

Baker, P. VIGILANCE DECREMENT: A CRITICAL REVIEW OF THE LITERATURE AND AN EXPERIMENTAL PROGRAM. Contract AF 33(616) 25726, Task 8, Mon. Rep. 8 1, May 1952, 21pp. University of Illinois.

12,569

This paper presents a critical review of the literature related to the problem of vigilance (sustained attention). An outline for an experimental program to investigate some of the variables that influence vigilance is presented.

G. R 10

12,570

Breadmont, D.E. RECENT AMERICAN HEARING RESEARCH OF SERVICE INTEREST. Oct. 1956, 5pp. Applied Psychology Research Unit, NRC, Cambridge, England.

12,570

This paper brings up-to-date an earlier review of multi-channel listening experiments. Other acoustic work observed by the author on a trip to the United States in June and July 1956 is also summarized. The major divisions of the paper are: multi-channel listening, effects of noise on efficiency, noise protection and measurement, band width compression systems for speech, and miscellaneous.

R 27

12,571

Chiles, W.D. EFFECTS OF HIGH TEMPERATURES ON PERFORMANCE OF A COMPLEX MENTAL TASK. Proj. 7193, Task 71615, WADC TR 58 323, July 1958, 5pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,571

Ten subjects were tested on a complex mental task during one-hour exposures to different dry bulb/wet bulb temperature conditions (85/75, 90/80, 110/90, and 120/105 degrees Fahrenheit). Performance data were analyzed as a function of temperature. The results are discussed in relation to those reported in the experimental literature.

T. I. R 4

12,572

Chambers, L.S. INDEX TO AIR FORCE PERSONNEL AND TRAINING RESEARCH CENTER 1956 TECHNICAL DOCUMENTARY REPORTS. Res. Rep. AFTRC TR 56 140, Dec. 1956, 25pp. USAF Personnel and Training Research Center Headquarters, Lackland AFB, Tex.

12,572

Technical documentary reports released in 1956 by the Air Force Personnel and Training Research Center are identified here by publication serial numbers. Both Technical Notes and Technical Reports are listed. These are cross-reference listings by author, laboratory, and project number. A list of depository libraries is included.

R 143

12,573

Godard, R.R. MINE LIGHTING DEVELOPMENTS. Mining and Geology, Oct. 1958, V(65), 2pp. (United States Steel Corp., New York 6, N.Y.).

12,573

An installation of fluorescent lighting fixtures in a continuous section of a coal mine is described. The various problems encountered during installation and the solutions achieved are discussed. The question of whether the advantages of a full-scale lighting system justifies the cost is considered.

I.

12,574

Conover, D.M. & Kraft, C.L. THE USE OF COLOR IN CODING DISPLAYS. Contract AF 33(616) 3612, Proj. 7192, WADC TR 58 471, Oct. 1958, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & OSU Research Foundation).

12,574

The objectives of this study were to (1) determine the maximum number of absolutely identifiable hues, (2) construct an "equally discriminable" scale of hues, and (3) to validate the scale on an independent population sample. Surface colors from the Munsell 51-hue series of colored papers provided the stimulus material. The experimental group consisted of ten color normal subjects, the validating group - 21 color normal subjects. The results were analyzed to find the number of hues that could be used for practical color coding under various conditions. Advantages and disadvantages of color coding are discussed; current engineering practice is reviewed. A color plate and specifications for various code categories are given.

T. I. R 46

12,575

Corso, J.F. SURVEY OF HEARING IN A LOW INDUSTRIAL NOISE-LEVEL POPULATION. Contract AF 33(616) 2626, Proj. 7210, WADC TR 58 442, Task 71700, Oct. 1958, 102pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Pennsylvania State University).

12,575

This report summarizes a series of studies performed in conducting a survey of the hearing characteristics of a population exposed to minimal levels of industrial noise. Each study reported contains a section on purpose, procedures, tests and instructions, results and conclusions. The basic topics relate to threshold of hearing for pure tones measured by different techniques, threshold of hearing for speech, and the discrimination loss of speech. Results are given as normal threshold values in order to provide a basis from which hearing loss due to noise exposure may be evaluated. Recommendations are made relative to the present standards for normal hearing.

T. G. I. R 58

12,576

Crook, M.N., Alexander, Edith A., Anderson, Edythe M.S., Coules, J. et al. AGE AND FORM PERCEPTION. Rep. 57 124, June 1958, 56pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,576

The effect of age on form recognition was experimentally investigated with "Gotteschaldt" forms, incomplete "Street" forms, familiar forms, and irregular forms, under various combinations of exposure time and viewing conditions (varied luminances, contrasts, inversions, and noise overlay). The population sample consisted of 176 males with normal vision, good health, and average educational level above the mean of the general population, distributed in age from the middle teens to the late fifties. The ability of the individual to discriminate, recognize, and identify two-dimensional forms was analyzed as a function of age for the various conditions which ranged from optimum to very unfavorable viewing.

T. G. I. R 5

12,577

Kahn, H. & Mann, J. TECHNIQUES OF SYSTEMS ANALYSIS. RM 1829, Dec. 1956, 154pp. Rand Corporation, Santa Monica, Calif.

12,577

This is a preliminary draft of the first portion of a projected book on military planning in an uncertain world and the contribution that systems analysis and operations research can make in this planning. This section is really a verbatim account of a combined lecture and workshop course given to selected Air Force audiences. The various chapters are: defining the problem, designing the offense, probabilistic considerations, designing the defense, the two-sided war, and a summary.

T. G. I.

12,576

Kruskal, B.M. STUDY OF WAR-GAME MATHEMATICAL MODELS. FINAL REPORT. Contract AF 18(600) 1243, Supplement 4(96 388), Expired 670 795, WADC TR 96 5, June 1956, 15pp. Engineering Research Institute, University of Michigan.

12,578

This is a final report on a study of war-game mathematical models suitable for use in training Senior Air Force officers. The study included 1) analysis of both simplified mathematical models and complex, realistically detailed models of war games, 2) a two-day conference attended by some 40 military and civilian experts, and 3) frequent consultation with the Weapons Courses staff, Air Command and Staff College, who have recognized a concrete need for a mechanized facility. Recommendations are presented for the introduction of high-speed computing processes coupled with adequate, readable display equipment. A research and development program is outlined.
R 12

12,579

Burns, H.L. & Stockman, R.E. DESIGN AND DEVELOPMENT OF A PRESSURE AND CYCLE CONTROL FOR DYNAMIC SEAT CUSHIONS. Contract AF 33(600) 31721, Proj. 7222, Task 71747, WADC TR 58 616, Dec. 1958, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Alar Products, Inc., Cleveland, Ohio).

12,579

This report describes the design and development of a control mechanism for a dynamic seat cushion for aircraft use. Requirements to be met included light weight, small size, reliable performance over wide ranges of environmental conditions and long periods of continuous use (up to 60 hours). The cushion consists of an inflatable bladder sandwiched between two layers of foam rubber. In action the cushion alternates between inflation and deflation; the regulating, valving and timing mechanism necessary to accomplish this is described in detail, pictured and diagrammed. The control system was subjected to vibration, temperature, and acceleration tests and modified accordingly.
R 12

12,580

Brown, W.S., Jr. PHYSIOLOGICAL HAZARD OF NON-IONIZING RADIATION. SDR 1072, Aug. 1952, 28pp. Lockheed Aircraft Service, Burbank, Calif.

12,580

This report is an analysis of the character and intensities of microwave radiation with regard to possible physiological hazards. Both findings from experimental literature and opinions from authorities in the field of electricity and electronics, biophysics, chemistry, medicine and radiology were consulted. Some aspects of the problem are explored in relation with the use, on the ground, of military radar systems of high power, operating in the ten centimeter portions of the spectrum. A theoretical explanation of the results of the analysis is included. Recommendations concerning protective measures for personnel are given.
G. I. R 10

12,581

Aronson, E. & Festinger, L. SOME ATTEMPTS TO MEASURE TOLERANCE FOR DISSONANCE. Contract AF 41(657) 140, Proj. 7739, WADC TR 58 492, Dec. 1958, 15pp. USAF Personnel Lab., Lackland AFB, Tex. (Stanford University).

12,581

This paper reports attempts to develop a measure of tolerance for dissonance. Five tests were developed, four of which were administered to criterion groups which had been selected on the basis of ability to tolerate cognitive dissonance in laboratory experiments. Scores from high tolerance and low tolerance groups were compared to see if the tests discriminated between them. A different approach to a criterion was also used; a group was selected that had demonstrated high tolerance in a real life situation. Personality tests were administered to the group and to a control group and the results analyzed for trends differentiating the two. Further validating studies are suggested.
G.

12,582

Dwyer, P.S. DEVELOPMENT OF GENERALIZED MATHEMATICAL PROCEDURES FOR OPTIMAL ASSIGNMENT OF POTENTIALLY EFFECTIVE CREWS. Contract AF 18(600) 1250, Proj. 7712, Task 7722, WADC TR 56 139, Dec. 1956, 60pp. USAF Crew Research Lab., Randolph AFB, Tex.

12,582

The group assembly problem is stated as follows: Given k positions in a group and n candidates for each position with the effectiveness of each group depending on the interrelations of individuals in the group as well as on the qualifications of each individual for his specific task, determine the assignments in such a way that the resulting assembly (in which each individual is assigned to some group) has a maximum sum. The method used to solve this problem makes extensive use of transformations featuring subtraction of constants. The basic method is that of reduced matrices. Approximate solutions with punched cards and machine methods are considered.
R 19

12,583

Dickinson, R.P. ASSESSMENT OF THE AIRCRAFT FOR ITS PART IN A DEFENSE SYSTEM. Rep. 32, Feb. 1956, 9pp. Advisory Group for Aeronautical Research and Development, North Atlantic Treaty Organization, Paris, France.

12,583

This report assesses the relative importance of the various aspects of behavior of the interceptor fighter aircraft in relation to its part in the overall defense system. Features governing the success of the aircraft in using its weapons effectively are discussed. The relevant features are presented diagrammatically with reference to the way the significance of the features might depend on the type of attack and type of weapon used.
I.

12,584

Bloetscher, F. DESIGN AND DEVELOPMENT OF A GENERAL PURPOSE EJECTABLE SEAT-CAPSULE FOR SUPERSONIC AIRCRAFT, PHASE II - FINAL REPORT. Contract NGA 53.820C, GER 7669, R 1173, May 1956, 113pp. Goodyear Aircraft Corporation, Akron, Ohio.

12,584

This report is concerned with the design of an ejectable seat-capsule that provides a safe means of escape from an aircraft traveling at Mach one at sea level and Mach 1.5 at 30,000 feet. The program described here presents 1) detail design of the capsule, 2) results of ejection tests of full-scale dynamic models, flotation tests, various structural tests, and 3) a complete stress-weight analysis. Recommendations are made for a program to fabricate and test prototype models.
T. G. I. R 15

12,585

Ferguson, A.R. & Dantsig, G.B. NOTES ON LINEAR PROGRAMMING: PART XXXVI. THE ALLOCATION OF AIRCRAFT TO ROUTES - AN EXAMPLE OF LINEAR PROGRAMMING UNDER UNCERTAIN DEMAND. RM 1833, Dec. 1956, 43pp. Rand Corporation, Santa Monica, Calif.

12,585

The purpose of this paper is to illustrate an application of linear programming to the problem of allocation of aircraft to routes in order to maximize expected profits when there is uncertain customer demand. The approach is intuitive; the theoretical basis of the work is found in an earlier study. The allocations are compared with those obtained under the usual procedure of assuming a fixed demand equal to the expected value. The computational procedure is similar to that of the fixed-demand case, with only slightly more computational effort required.
T. R 39

12,586

Fioravanti, Adriano, Janni, Michele & d'Francis, G.T. MEASUREMENTS OF DIFFERENTIAL THRESHOLD IN THE PRESENCE OF A SPATIAL ILLUMINATION GRADIENT. Contract AF 61(514) 634 C, ERDC Tech. Note 35 N.3, 1956, 17pp. Istituto Nazionale di Ottica, Arcetri, Firenze, Italy.

12,586

To describe quantitatively the subjective brightness distribution corresponding to a given luminance gradient in a field where luminance varies along a given direction, the photometric differential thresholds of three observers were measured in different points in the field. The luminance varies through three zones from a maximum of 1270 to a minimum of 105 nit. Observations were made with a number of different gradients of illumination by varying the distance between a screen and the field. The results are shown graphically. G. I. R. 10

12,587

Gerathewohl, S.J. & Stallings, H.D., Jr. EXPERIMENTS DURING WEIGHTLESSNESS. A STUDY OF THE OCULO-AGRAVIC ILLUSION. Rep. 56.105, July 1956, 22pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

12,587

To investigate visual illusions during flight with particular attention to conditions of sub- and zero-gravity, an F-94C type aircraft was flown through various maneuvers. They included turns, pushovers, pullouts, and aileron rolls producing accelerations of different directions and magnitude, as well as short periods of weightlessness. The observer induced a strong visual after-image and described its apparent motion. There were 15 reliable observers tested. Reports of apparent displacement were analyzed in terms of the condition that produced the illusion. The illusion connected with weightlessness (upward movement) was named the oculo-agravic illusion. I. R. 21

12,588

Griffith, R., Nordberg, W. & Stroud, W.G. THE ENVIRONMENT OF AN EARTH SATELLITE. SC Proj. 172, DA Proj. 3 99. 07 021, Tech. Memo. NR. M1747, March 1956, Rev. Nov. 1956, 41pp. USA Signal Corps Engineering Lab., Fort Monmouth, N.J.

12,588

This report is a collection of graphs, tables, and other data relevant to the environment of an earth satellite during both the launching and in-orbit phases. The information was assembled from recent sources and to some extent unpublished. The major topics include mechanical-thermal considerations, composition of the atmosphere, properties of the atmosphere, radiation at high altitudes, cosmic rays, variation of g with height, the earth's magnetic field, temperatures, pressures, densities, and winds, micrometeorites and meteorites. T.G. I. R. 2

12,589

Grandpierre, R., Munnich, R. & Colin, J. THE FRENCH PRESSURIZED SUIT. ATIC 270765, FTS 9003/V, May 1956, 10pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio.

12,589

The French pressurized suit, designed to protect the high-altitude aircraft crew from abrupt losses in pressure, is described in detail. The suit is composed of three main elements: body part (pressurized suit), head part (pressurized helmet), and pneumatic part (controls). Performance obtained with the suit is discussed; its limitations and defects are pointed out; and plans for design improvement are indicated. A brief review of the physiological effects of the use of positive-pressure regulators is given. G. I.

12,590

Lybrand, W.A., Hackman, R.C., Kassebaum, R.G., Havron, M.D. et al. INCOMPATIBILITY PROBLEMS OF QUARTERMASTER DESIGNED CLOTHING AND EQUIPMENT, FINAL REPORT, ON CONTRACT DA19 129 QM 258. Contract DA19 129 QM 258, Proj. 7 83 01 004, PRA Rep. 56 21, Dec. 1956, 50pp. Psychological Research Associates, Arlington, Va.

12,590

To determine the nature and extent of functional incompatibilities of Quartermaster issued clothing and personal equipment items with each other and with material and equipment issued by other Army Technical Services (the focus was on general purpose items in common use by front-line troops), interviews were conducted with 87 groups of item users. Approximately 1000 reports of incompatibilities were analyzed and 414 unique problems identified; critical information regarding each problem was specified; and user recommendations for reducing or eliminating the problems were made. Suggestions for further research in this area are specified. T. I.

12,591

Lybrand, W.A., Hackman, R.C., Kassebaum, R.G., Havron, M.D. et al. INCOMPATIBILITY PROBLEMS OF QUARTERMASTER DESIGNED CLOTHING AND EQUIPMENT, FINAL REPORT, ON CONTRACT DA19 129 QM 258, APPENDIX I - LISTING OF INCOMPATIBILITIES. Contract DA19 129 QM 258, Proj. 7 83 01 004, PRA Rep. 56 21, Dec. 1956, 188pp. Psychological Research Associates, Arlington, Va.

12,591

This appendix to a report on incompatibility problems of Quartermaster designed clothing and equipment (see 12,590) presents the 414 problems identified. There are three sections: 1) indices to the problems--alphabetical listing, incompatibility type, and cross-index of type with source, effect, and recommendations categories; 2) summary classification for each problem; and 3) a numerical listing of each problem with definition of the problem, information concerning the items and duty affected, total times reported, recommendations for eliminating the incompatibility, and other classification designations assigned to it. T.

12,592

Lybrand, W.A., Hackman, R.C., Kassebaum, R.G., Havron, M.D. et al. INCOMPATIBILITY PROBLEMS OF QUARTERMASTER DESIGNED CLOTHING AND EQUIPMENT, FINAL REPORT, ON CONTRACT DA19 129 QM 258, APPENDIX II - INTERVIEWER AND RECORDER MANUAL. Contract DA19 129 QM 258, Proj. 7 83 01 004, PRA Rep. 56 21, Dec. 1956, 73pp. Psychological Research Associates, Arlington, Va.

12,592

This manual was developed as a part of a research study on incompatibility problems of Quartermaster designed clothing and equipment (see 12,590). It was designed and used as an instrument for standardizing interview procedures to collect user reports on the problems. It is presented as a description of the technique used in the study and as a potentially useful guide for standardizing similar type interviews in further Quartermaster Corps Research and Development Command Research. Procedures, discussions of interviewing and recording principles, and the various aids and forms are included. I.

12,593

Lickey, H.R. MANAGEMENT OF UNITED STATES AIR FORCE BASE LEVEL SUPPLY-SUPPORT FUNCTIONS. M.S.A. Thesis, June 1957, 142pp. George Washington University.

12,593

This study concerns the resources, tools, and techniques employed in the management of a typical United States Air Force consolidated supply organization at airbase level. The problem areas in base level supply-support are discussed under four headings: planning, organization, directing, and controlling. The general thesis underlying the discussion is that the type and form of Air Force supply management which is employed at airbase level is the ultimate measure of effectiveness of the over-all Air Force supply system. I. R. 70

12,594
Peters, G.A. & McNeilson, S. SELECTING CONTROL DEVICES FOR HUMAN OPERATORS. Control Engng., March 1959, 6(3), 127. (Psychological Research Associates, Inc., Santa Monica, Calif.).

12,594
A simplified chart for use as a design guide in selecting control devices for human operators is presented. Only the more common control devices are listed (toggle switch, push button, rotary selector switch, knob, crank, lever and handwheel) with accompanying information on task requirements, task examples, common applications, necessary design features of the device, and human factors application of the devices. T.

12,595
Merlin, V.S. A CONTRIBUTION TO THE CHARACTERIZATION OF THE CONDITIONED GALVANIC SKIN REFLEX IN THE HUMAN BEING. ATIC 24938, FTS 8866/V, 7pp., ca. 1955, USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio.

12,595
This article describes methods used for elaborating a conditioned galvanic skin reaction (GSR) with electric skin reinforcement alone and in combination with a verbal reaction of the subject (pronunciation of the name of the stimulus and writing). Protocols of several subjects are presented to illustrate a discussion of some of the features that were found to characterize the conditioned GSR. T. R 9

12,596
Kozhevnikov, V.A. INSTRUMENTS FOR EXAMINATION OF THE GALVANIC SKIN REFLEXES IN THE LABORATORY AND CLINICAL PRACTICE. ATIC 24938, FTS 8866/V, 5pp., ca. 1955, USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio.

12,596
This paper describes two instruments developed for the examination of the galvanic skin reflexes in the laboratory and under clinical conditions. They are as follows: 1) a portable instrument for observation of reflexes on a needle galvanometer; and 2) an instrument giving a direct ink record of the galvanic skin reactions. Both instruments are fed from the A.C. electric light system and the reflexes are observed by measurement of skin resistance. The advantages of this method over measurement of skin potentials is discussed. Circuit diagrams and schematic drawings are included. I. R 1

12,597
White, W.J. SOME EFFECTS OF MODERATE ACCELERATION (g) ON OPERATOR PERFORMANCE. FDM 291, Nov. 1958, 13pp. Human Factors Section, Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

12,597
This report is an assessment of the empirical relations that have been found between reaction and response times and moderate accelerative force. Serious gaps in knowledge are pointed out. The application of the findings to future air traffic control simulators is presented. In addition, the possibilities of simulating the visual effects of acceleration are discussed. G. R 13

12,598
Turner, S.H., Wallace, W.H. & Wessel, A.E. EFFECTS OF REDUNDANT INFORMATION ON SPEED OF INFORMATION-PROCESSING BY HUMAN BEINGS. Contract DA 36 039 SC 63143, Proj. DA 3 99 12 003, SC Proj. 1320, April 1956, 14pp. Institute for Cooperative Research, University of Pennsylvania.

12,598
To investigate the effect of a specific type of redundancy (an alternate input message that can be used to obtain a desired output message as efficiently as some other input messages) on performance, 48 subjects were given 12 tasks consisting of 1) a series of input messages, 2) a single output message, and 3) a set of rules for deriving the latter from the former. Redundant messages were varied from zero to three and task difficulty was graded in three levels. Time to complete the problems, successful and unsuccessful completions, and the use of efficient or non-efficient solution methods were analyzed as a function of redundancy.

12,599
Arzuff, J. & Kay, H. SKILLED PERFORMANCE. Cogn. Psychol., April 1956, 3(2), 112-117.

12,599
In this paper motor skills are considered from the general standpoint of a perceptual skill in the receiving of information. Perceived signals are taken to include signals from either internal or external sources. Skilled performance is treated as a series of events with each event or cue providing information to the operator. The amount of information will vary according to the dependent probabilities. From this viewpoint are considered the general problems of training for two major kinds of tasks (those in which responses of operator do not influence the display and those which directly influence it), part-whole learning, correction of errors, anticipation, and knowledge of results. R 5

12,600
Rozman, G. THE EFFECTS OF ARCTIC CONDITIONS UPON HUMAN BEHAVIOR AND REACTIONS WITH SPECIAL EMPHASIS UPON RUSSIAN FINDINGS AND EXPEDITIONARY NEEDS. March 1943, 67pp. US Office of Strategic Services, Washington, D.C.

12,600
This is a review of a large number of articles, many of which are Russian studies, on a wide range of topics having to do with the effects of arctic conditions on human behavior and physiological processes. Limits of cold adaptation, recovery from cold exposure, subjective reactions to cold, individual differences in reaction to cold, arctic diet, and mental disturbances in the arctic are representative of the matters covered in this report. R 209

12,601
USA Quartermaster Food and Container Institute for the Armed Forces. CONFERENCE NOTES FROM COORDINATION MEETING ON THE ASSIGNMENT TO THE ARMY OF PRIMARY RESPONSIBILITY FOR RESEARCH AND DEVELOPMENT IN THE FIELD OF FOOD. Oct. 1957, 88pp. USA Quartermaster Food and Container Institute, Chicago, Ill.

12,601
Objectives of this conference were to understand the phenomenon of stress as it relates to appetite for food. Papers on the following topics, with the discussion following each, are included: confined area stress, survival stress, factors affecting physical performance, water requirements, and temperature regulation in the presence of restricted food and water, survival studies in hot and cold environments, demonstration of survival rations and of survival rations for arctic areas, food attitudes in survival situation, feeding and the flight stress-strain complex, forced restriction of dietary patterns, and nutrition and stress.

12,602
Nowlis, V. & Nowlis, Helen H. THE DESCRIPTION AND ANALYSIS OF MOOD. Ann. N.Y. Acad. Sci., Nov. 1956, 65(4), 345-355. (Department of Psychology, University of Rochester).

12,602
This monograph describes the use of mood, an old concept newly defined herein as the basis of a possible strategy by means of which research in drugs and research in other areas may fortify each other to increase the understanding and control of human behavior and functioning. A sample of work on drugs with human subjects is considered. The way in which the statistical analyses repeatedly revealed the operation not only of a variety of main effects due to specific factors, but also the overwhelming influence of these factors in complex interaction with each other is discussed. A method for investigating this interaction is described and its basic concept, mood, analyzed. R 14

12,603

Carlson, H. & Davis, E. REPORT ON "MAN MADE NOISE". Contract NMR R-56 0020 SC 91, Aug. 1957, 8pp. Federal Communications Commission, Washington, D.C.

12,603

This memorandum gives information concerning the usual location and general characteristics of these types of radio frequency noise generating equipments which are regulated by the Federal Communications Commission. Emphasis is on the interference capabilities of these devices and the need for proper installation and operation.

12,604

Rishbass, C. THE UNIMPORTANCE OF CARBON DIOXIDE AS A CAUSE OF NITROGEN NARCOSIS. RMP-35/554, OPS 153, Oct. 1955, 8pp. Royal Naval Physiological Lab., NRC, Alverstoke, Hants, England.

12,604

To evaluate the responsibility of carbon dioxide (CO_2) for nitrogen narcosis, the effect of voluntary hyperventilation under compression upon alveolar CO_2 and upon performance was studied. The performance task was a series of arithmetic problems and the score was the number of correct answers obtained in two minutes. Alveolar CO_2 samples and performance scores were obtained from eight subjects: 1) under normal pressure, 2) on reaching a pressure equivalent to 250 feet in compression chamber, and 3) after either five minutes of hyperventilating or resting. The data were studied to determine whether hyperventilation reduced alveolar CO_2 under pressure and alleviated the narcosis.

T. G. R 9

12,605

Sellers, E.A., Reichman, S. & Thomas, M. ACCLIMATIZATION TO COLD: NATURAL AND ARTIFICIAL. Amer. J. Psychol., Dec. 1951, 167(3), 644-650. (Department of Physiology, University of Toronto, Toronto, Ontario, Canada).

12,605

To study the nature of the adaptive processes that take place during acclimatization to cold, a series of experiments, using rats for subjects, was undertaken. The first series determined the period of exposure to cold required to produce acclimatization as measured by the survival of clipped animals. Acclimatization periods varied from one day to six weeks, after which the rats' fur was removed by clipping and the rat returned to the cold. The length of time acclimatization persisted after the animals were returned to room temperature was also determined. In a second series an attempt was made to produce a similar metabolic change by the administration of chemical or hormonal substances.

G. R 5

12,605

Burke, F.J. FLIGHT EVALUATION OF VISUAL APPROACH ANGLE INDICATORS. Proj. 6061; WADC TN 58 181, July 1958, 32pp. USA Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,606

To provide comparative data in the evaluation of six different types of visual approach angle indicators (WADC Two Bar System; Navy MIRROR Landing system; two types of tri-colored lights; interim mirror system and the British RAE System), six types of aircraft were photographed with a grid camera which, with photo-theodolites was used to obtain touch down and glide path data as the aircraft landed. Pilots were interviewed for their reactions to the systems. Two pilots were assigned to each aircraft; each was required to make 15 day landings and at least five night landings on each system. Spot landings made without the aid of an indicator were made for comparative purposes. Results are discussed in terms of relations between effectiveness of the system and type of aircraft.

G. I.

12,608

Jackson, K.F. AIRCRAFT FATIGUE IN LONG RANGE NIGHT-TIME RECONNAISSANCE. PILOT PERFORMANCE. FPRC 907.2, Aug. 1956, 23pp. Flight Personnel Research Committee, London, England. (Institute of Aviation Medicine, Royal Air Force, Farnborough, England).

12,608

To study changes in pilot performance during long performance flights, ten pilots were studied during a series in which each pilot undertook four 15-hour flights and in which he had control of the aircraft for four two-hour periods. Continuous records of the altitude and heading of the aircraft were made at chosen times during these periods. The records, which concerned straight and level flying only, were examined (a ten-minute section at a time) for both extent and variability of error. Turbulence was recorded in terms of vertical accelerations and certain personal factors were observed. These records were studied for effect of length of control period, effect of successive control periods, and effect of turbulence on performance.

T. G. R 7

12,609

Jennings, D.W. & Walker, F.G. THE DEVELOPMENT OF THE BASIC INPUT DATA IN A LINEAR PROGRAMMING APPLICATION. Paper presented at the Annual Meeting of the Operations Research Society of America, Washington, D.C., May 10 & 11, 1956, 7pp. Operations Research Society of America, Washington, D.C.

12,609

A case history is given of the applications of linear programming as an approximate method of optimally loading paper making machines. With certain adjustments, the machine loading problem took the form of the well-known transportation model. The development of input data for the computational procedure is discussed. Some end results of the programming are presented.

12,610

Webster, J.C. (Chm.). PROCEEDINGS AT NAVY ELECTRONICS LABORATORY SPEECH COMMUNICATION RESEARCH SYMPOSIUM. Res. Rep. 756, Dec. 1956, 70pp. USN Electronics Lab., San Diego, Calif.

12,610

These speeches are reported: Multichannel Communication, Transmission and Confirmation of Messages in Noise, Effects of Two Message-Storage Schemes on Communications within a Small Group, Study of MAYDAY and SOS as Radio-telephony Signals, Underwater Communications, Speech Reception and Temporary Hearing Loss as a Function of Exposure to High Level Noise, Intelligibility of UHF and VHF Transmission Representative Air Traffic Control Towers, Two Schemes of Speech Compression System, Some Systems for Speech-Band Compression, Studies of Formant Transmissions, Naturalness and Distortion in Speech Producing Devices, Experimental Studies of Time Compression of Speech, Electronically Timable Selective Amplifier for Formant Synthesis, and Predicting Intelligibility of Speech from Acoustical Measures.

T. G. I. R 106

12,611

Jensen, B.T. A SURVEY OF LITERATURE ON PERFORMANCE TESTING: SUMMARY MATERIALS FOR FURTHER RESEARCH. PJ 4807 01 Res. Note 52 50, Aug. 1952, 18pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

12,611

A survey of the literature on performance testing was conducted in order to identify principles of testing applicable to performance test construction and administration. Army materials in this area were also examined. On the basis of suggestions gained from the survey, summary materials were prepared as aids in research and development. These materials are included as appendices: definitions of terms, desirable characteristics for a performance test of basic military proficiency, procedures for test development, criteria for determining amenability for performance testing of an area of military training, format for a test script, and bibliography of materials.

R 30

12,612

Key, R., Davis, R., Galby, C.M. & Annett, J. CONDITIONS INFLUENCING THE RATE OF LEARNING OF PACED AND UNPACED MOTOR TASKS. FINAL REPORT. Sept. 1956, 51pp. Institute of Experimental Psychology, University of Oxford, Oxford, England.

12,612

This is the final report of a research study investigating some of the conditions which influence the learning of simple skills. The principle focus was on the perceptual side of the performance-how an operator handles the necessary information to carry out a skill. Primary use was made of experimental studies in the laboratory, although some contact with industrial operations was made. The report is divided into three parts: 1) particulars of the project, its personnel and publications; and suggestions for future research, 2) an outline of the theoretical position and the main findings of the experiments, and 3) the individual papers, written by the responsible investigator, which give experimental details.

G. I. R 50 (approx.)

12,613

USA Library. DATA PROCESSING OPERATIONS AND COMPUTERS FOR MANAGEMENT. Special Bibliography 10, Oct. 1956, 72pp. USA Library, Adjutant General's Office, Washington, D.C.

12,613

This bibliography consists of selected items in the area of data processing operations computers for management which were published mostly during the period February to September 1956. The greater part of the listings represent holdings of the Army Library. The major sections are: data processing and modern computer operations; equipment; applications (general; administration and management; banking, insurance, and underwriting; education; industry and technology; transportation; and United States Government Agencies); bibliographies and glossaries; computing and data processing centers, conferences and symposia, and directories of services, personnel, and equipment.

R 500

12,614

Hartley, E.R. JET AIRCRAFT GROUND RUN-UP NOISE SUPPRESSORS. PLANT ENGINEERING DIVISION REPORT 56-2. 95pp. USAF San Bernardino Air Material Area Directorate, Norton AFB, Calif.

12,614

This report furnishes information concerning the requirement, and the satisfaction of this requirement, for a sound suppressor at Norton Air Force Base, San Bernardino, California. The basic problem is the solution of modern jet fighter run-up noise elimination by means of sound suppressors. The various portions of the project are dealt with in three parts, as follows: 1) a summary of the requirement and historical data; review of commercial equipment, and development of specifications; 2) a resume of fabrication and installation problems encountered; and 3) a resume of the acoustical tests, performed at Noise Suppressors, acoustical data, and conclusions relative to adequacy for Air Force use.

T. G. I.

12,615

Metcalf, R.D. & Horn, R.E. VISUAL RECOVERY TIMES FROM HIGH-INTENSITY FLASHES OF LIGHT. Proj. 6332, Task 77653, WADC TR 58-232, Oct. 1958, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,615

A high-intensity carbon arc was used as a light source to determine the course of visual recovery after exposure to a level of illumination comparable to that likely to be encountered during nuclear operations. Four subjects were exposed to a source subtending 3 degrees 58 minutes at the eye with a luminance of up to 15×10^6 ft.-ls. Exposure time was constant at 0.1 second. Recovery time was plotted against illumination at the eye and source brightness. Extrapolation was made to the estimated burn threshold and the maximum recovery time to discriminate a brightness contrast comparable to reading red-lighted aircraft instruments was estimated. Recovery times to other levels were indicated.

G. I. R 9

12,616

MacCallin, E.F. & Levy, L. THE EFFECT OF FLINCHING ON RIFLE MARKSMANSHIP. TECHNICAL REPORT, July 1954, 26pp. USA Army Research Hall No. 1, Fort Knox, Ky.

12,616

To study the effects of flinching on rifle marksmanship, two preliminary studies were conducted: (1) to determine whether judgments of experts are reliable measures of flinching, and (2) to determine the extent to which flinching affects marksmanship scores. The trainees fired a series of live rounds interspersed with dummy rounds. The latter were judged for flinching and marksmanship data were obtained from the former. In the second study further marksmanship data were gathered from instructional and known-distance firing. The data were analyzed for reliability of expert judgments of rating and for amount of variation in performance due to flinching. Further research into methods for reducing flinch are suggested.

T. I. R 4

12,617

Kennington, K.W.L. & Stokes, A.W. AN INVESTIGATION OF THE USE OF SYNTHETIC FIBRE SOCKS UNDER HOT/DRY CONDITIONS. C.S.E.E. Rep. 73, March 1958, 32pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

12,617

To compare the suitability, for use under moderate hot dry conditions, of socks of nylon and Terylene with the standard worsted sock, 30 infantry subjects wore trial socks over a period of six weeks. Assessment was based on comparison of foot skin temperatures, sweat uptakes of footwear, clinical data, and subjective preference data. Climatic conditions ranged from 84 to 98 degrees Fahrenheit shade temperature and 113 to 135 degrees Fahrenheit ground surface temperature. The findings are discussed with reference to the actual socks used and it is pointed out that different fiber forms and fabric construction might affect the conclusions.

T. G. R 22

12,618

Kappauf, W.E. & Strand, A. A BRIGHTNESS DISCRIMINATION APPARATUS FOR THE STUDY OF VIGILANCE. Contract AF 33(038) 25726, Memo. Rep. B 4, Task B, July 1952, 5pp. University of Illinois.

12,618

This note describes a simple brightness discrimination apparatus for use in vigilance studies. The test situation is flexible with regard to 1) the nature of the background or "neutral" stimulus situation (steady or flashing light), 2) number of test areas (one to four), 3) temporal spacing of trials throughout the vigil, and 4) the nature of the trial (single presentation of a given intensity to a series of fixed or increasing flashes). In its present form it can be used for one subject at a time and is operated manually by the experimenter. The possibilities for automatic control and group testing are suggested.

I. R 2

12,619

Kalaba, R.E. & Juncosa, M.I. COMMUNICATION NETWORKS. II. INTEROFFICE TRUNKING PROBLEMS. RM 1688, Nov. 1956, 23pp. Rand Corporation, Santa Monica, Calif.

12,619

It is shown that several fundamental interoffice trunking problems for communications networks may be treated in a straightforward, computationally feasible manner by linear programming methods. Two representative problems were devised and tested on a computer. Various aspects of implementation and generalizations are discussed. This is the second in a series of memoranda dealing with communication networks that are characterized by facilities for transmission, switching, relaying, and the like. Various new analytical techniques are introduced in a systems approach for resolving the complex interactions among systems capacities, users' demands, and economic factors.

R 8

12,620
McGee, J.R., Jr. MILITARY INTELLIGENCE IN WAR GAMING. Paper given at the Washington meeting of the Operations Research Society of America, May 11, 1956. TICSRA 7004, Feb. 1957, 4pp. USA Combat Operations Research Group, Fort Monroe, Va.

12,620
This paper discusses problems encountered in development of the traditional terrestrial war game into an analytical tool for the United States Army. The major problem dealt with here is the search for reliable data on military intelligence (flow of information about the opponents in combat). Two types of military intelligence are distinguished (target and tactical) which affect the war game. The search for the level of intelligence reaching the commander, and thus affecting his decisions, can be approached by mathematical synthesis and historical example. Progress in the use of these two approaches is discussed.

12,621
Hilbert, S.F. & Mathewson, J.H. THE DRIVING SIMULATOR. Reprint 3, April 1958, 4pp. Institute of Transportation & Traffic Engineering, University of California.

12,621
This paper describes a proposed driving simulator to be used for obtaining quantitative criteria of driving performance. Drawing upon experience with flight simulators the proposal involves: 1) the vehicle, 2) the force-simulating system, 3) the visual simulating system, 4) the feedback system, and 5) means for measuring results. Each of these is discussed.
I. R 5

12,622
Jones, F.P. & O'Connell, D.N. APPLICATIONS OF MULTIPLE-IMAGE PHOTOGRAPHY IN THE TIME-MOTION ANALYSIS OF HUMAN MOVEMENT WITH A NOTE ON "COLOR CODING". Photographic Science & Technique, Feb. 1956, 3(1), 11-14. (Tufts University).

12,622
A method of time-motion analysis employing multiple-flash photographic techniques is described. The technique was developed as a tool for research in the course of an investigation into the role of head-neck reflexes in human movement. The human subject is dressed in dark clothing and marking patterns cut from reflective tape are attached to the portions of the body of interest for motion analysis. Stroboscopic illumination is used and both single and stroboscopic pictures in black-and-white and color are made. The historical development of multiple-image photography is given.
I. R 12

12,623
Girden, E. (Proj. Dir.). SENSING MECHANISMS IN CONTROL OF FINE MOVEMENTS IN PERCEPTUAL MOTOR PRECISION. ANNUAL PROGRESS REPORT. Contract DA 49 007 MD 625, Jan. 1958, 4pp. Brooklyn College, Brooklyn, N.Y.

12,623
Precision of performance is being measured for a range of sensitivities of a rotational pressure control in pursuit tracking of a one-dimensional moving target. Completed experiments have assessed the extremely sensitive controls and also the adjacent range of medium sensitivities. Test of the entire range of force requirements are to be completed this year.

12,624
Hick, W.E. HUMAN AS AN ELEMENT IN A CONTROL SYSTEM. Research, 1951, 4, 112-118. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,624
This paper discusses various broad aspects of the design of machines and instruments to suit the human operator. Some of the general principles that are known, the kind of logical and linguistic framework that seems necessary, and some of the scientific approaches that have been or might be fruitful are considered under the following general headings: features of a manual control system, some attributes of the human operator, the human time lag, training and transfer, and performance of the human operator.
R 1

12,625
Hick, W.E. SOME FEATURES OF THE AFTER-CONTRACTION PHENOMENON. Quart. J. exp. Psychol., Nov. 1953, 5(4), 166-170. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,625
To investigate some features of the muscular contraction that appears within a few seconds of the relaxation of the same set of muscles from a sustained voluntary contraction (after-contraction phenomenon), 14 subjects were tested. The task was to apply forces up to eight pounds by pushing or pulling on a handle mounted on a stiff spring. Instructions were used to vary the conditions following the voluntary contraction - relaxation, tension, difficult concurrent task, or graduated return to rest. After-contractions were recorded and analyzed for effects of these conditions. An explanation is suggested based on the interaction of sensory adaptation and some other process apparently related to fatigue.
T. R 2

12,626
Hauer, E.W. DESIGN OF MULTIPLE VIDEO MAPPING SYSTEM. Task 64540, WADC TN 56 415, Jan. 1957, 20pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

12,626
An improved video mapping unit to be used as an air traffic control aid is presented in this report. The need for the equipment is discussed and the various developmental steps and evaluations are detailed. This equipment gives a fast-selecting multiple map presentation on a radar indicator. The unit is designed for remote installation. Recommendations for future use are made.
I.

12,627
Hansen, R. & Cornog, D.Y. ANNOTATED BIBLIOGRAPHY OF APPLIED PHYSICAL ANTHROPOLOGY IN HUMAN ENGINEERING. Contract AF 33(616) 2353, Proj. 7214, Task 71727, WADC TR 56 30, May 1958, 301pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,627
This volume contains condensations of 121 reports in the field of Applied Physical Anthropology. A majority of the condensations are grouped under three headings, anthropometry, biomechanics, and comfort; a few are included in a general group. Working data and important illustrations are quoted directly from the original papers in most cases. A complete index is arranged by author and subject. An additional list of reports (not annotated) is included. Two appendices containing relevant commentary on seating comfort and anthropomorphic dummies are also included.
T. G. I. R 189

12,628

Hammock, J.C. & Prince, A.I. A STUDY OF THE EFFECTS OF MANIFEST ANXIETY AND SITUATIONAL STRESS ON M-1 RIFLE FIRING. Oct. 1954, 50pp. Human Resources Research Office, George Washington University.

12,628

To determine the relation of anxiety and stress to marksmanship proficiency and the relation of anxiety to the effects of stress on marksmanship, soldiers scoring at the extremes of a scale of manifest anxiety were test fired on the M-1 rifle under "normal" and "stress" conditions. Normal conditions were those obtaining in conventional record fire; stress condition was similar except for a series of explosions going off successively closer to the firer during firing. False instructions stated that a charge would go off directly in front if the firer did not make three bullseyes in the time allotted. Performance was measured in terms of accuracy and rate of firing. Other observational data were collected.
T. G. R 11

12,629

Hammes, J.A., McFann, H.M. & Ward, A.A. A COMPARATIVE TEST OF ACCURACY AND SPEED OF FIRE WITH THE IMPROVED LOOP SLING, WITH THE COMBAT RIFLE SLING AND WITHOUT A SLING. Interim Report. Aug. 1954, 41pp. USA Human Research Unit No. 3, Fort Benning, Ga.

12,629

This report is Part I of a study on the use of a sling in M-1 rifle fire and presents an evaluation of two slings (the Improved Loop Sling and the Combat Rifle Sling) proposed for Army use. Accuracy and speed of fire with each of the two slings and without a sling were measured at ranges of 200 and 300 yards using the prone position. The speed score was based upon time to go from a standing to a prone position, getting into sling, firing, and recovering original standing position. Subjective opinions were gained through questioning. The data were analyzed for differences due to the slings.
T. G. I. R 8

12,630

Cohen, J., Dearneley, E.J. & Hansel, C.E.M. THE MUTUAL EFFECT OF TWO UNCERTAINTIES. 8pp. University of Manchester, England.

12,630

To investigate the mutual effects of two uncertainties upon subjective estimates of success, two types of tasks were devised: uncertainty related to chance and uncertainty related to skill. In the first task the subjects (30 school children aged 12 to 14 years) were asked to estimate success in throwing darts at a circular target. Some darts were blunt and some targets were aluminum, thus causing failure, the proportion of each being varied separately and together. The second task varied each of two skills, separately and in combinations: throwing darts and obtaining the darts by drawing them over a narrow bridge. Estimates of success under these various conditions were compared.
T. R 2

12,631

Colman, K.W., Courtney, D., Freeman, J.B. & Bernstein, Rosa. THE CONTROL OF SPECULAR REFLECTIONS FROM BRIGHT TUBE RADAR DISPLAYS. Technical Report. Contract NMR 2346(00), Rep. 23, Proj. K, Nov. 1958, 20pp. Courtney & Company, Philadelphia, Penn.

12,631

A study of methods for controlling specular reflections from bright tube radar displays (displays not effected by ambient light) was conducted. A search of the literature and an analysis of reflection sources led to an investigation of the use of a circular polarizer (filter) combined with the invisible glass principle (curving glass surface so that light incident to the surface is reflected away from eye of observer into a light absorbing surface or trap). A prototype of the resulting Reflection Attenuator was built and installed in an air tower to be evaluated on the television monitor used to provide remote radar information of local air traffic to tower controllers.
I R 13

12,632

Mirrod, D., Belding, H.S. & Kingston, J.R. PREVENTION OF HEAT CASUALTIES. Res. Rep. NM 41.01.00.01.01, March 1958, 16, 275-320. USN Medical Research Institute, Bethesda, Md.

12,632

Between 1955 and 1956 modifications in the recruit training program and hot weather regulations were instituted at the Marine Corps Depot, Parris Island, South Carolina. The incidence of heat casualties during the summer periods of 1955 and 1956 were compared in light of differences in the training program, hot weather regulations, and intensity of summer heat. The changes included a new index of environmental heat stress with different cut-off points for new and for seasoned recruits, an expanded physical training program with conditioning platoons for obese recruits, and a breaking-in period for new recruits.
T. G. R 6

12,633

Murder, R.B. VERIFICATION OF AERIAL PHOTOGRAPHIC ANALYSIS OF URBAN RESIDENTIAL STRUCTURES: A STUDY OF ROCHESTER, NEW YORK. Proj. 7732, Task 77321, AFPCRC TR 58.4, Jan. 1958, 15pp. USAF Office for Social Science Programs, Lackland AFB, Tex.

12,633

To test the applicability of a photo-interpretation method developed for identifying residential structures, data from photo interpretations of aerial photographs of Rochester, New York (overlapping stereo-strip) were compared with data assembled from standard sources of information (United States census materials). The data included types of residential structures and descriptions of the structure components of sub-areas. Within the limits of the data, the following methodological considerations were explored: 1) a usable photo-scale; 2) photo-interpretation reliability, and 3) development of structure combinations as predictors of socio-economic status.
T. G. I. R 8

12,634

Moser, H.M., O'Neill, J.J., Oyer, H.J., Wolfe, Susan M. et al. HAND SIGNALS: FINGER-SPELLING. Contract AF 19(604) 1577, RF Proj. 664, Tech. Rep. 49, AFPCRC TR 58 56, Aug. 1958, 46pp. Ohio State University.

12,634

The possibilities of using the finger-spelling alphabet of the deaf as a supplementary medium of communication in high level noise and/or other situations where voice communications are not desirable or effective are investigated. Twenty-four deaf students were used as subjects for the intelligibility testing of nonmeaningful alphabet triplets under conditions of both artificial and natural lighting. Distances were varied from 20 to 125 feet indoors and from 125 to 400 feet outdoors. Intelligibility scores were analyzed for distance effects and for confusion patterns for each letter. Individual differences in receiving were studied. A history of finger spelling is included.
T. G. I. R 14

12,635

Moser, H.M. STUDY OF RADIOTELEPHONE VOICE PROCEDURES AND RELATED RESEARCH. Contract AF 19(604) 1577, AFPCRC TR 58.52, RF Proj. 664, Rep. FINAL, Sept. 1958, 18pp. Ohio State University Research Foundation.

12,635

This final report summarizes work accomplished over a three year period of research on radio-telephone voice procedures. Special attention was given to an International Language for Aviation, voice procedures, number telling, ear-emitted speech and use of hand signals. Theoretical and applied research problems were conducted. Abstracts of the reports are given. Other parts of the report list the personnel, laboratory and office equipment obtained, and projected plans and future research indicated by military interests.
R 21

12,636
Lord, Mary P. EYE MOVEMENT RESEARCH. Royal College of Science J., 1949, XIX, 116-124.

12,636
The photoelectric corneal reflex method for the measurement of eye movements is described. It satisfies the conditions of 1) detection of movements magnitude one minute of arc, 2) little interference with the natural state of the eye, and 3) satisfactory treatment of the head-movement problem. The method has been applied to the detailed study of the fixation eye movements of two observers. Some of the data from this study are presented and discussed.
G. I. R 10

12,637
Boynton, R.M. ON-RESPONSES IN THE HUMAN VISUAL SYSTEM AS INFERRED FROM PSYCHOPHYSICAL STUDIES OF RAPID ADAPTATION. A.M.A. Arch. Ophthalmol., Oct. 1958, 60(2), 800-810. (University of Rochester).

12,637
This paper reviews various experimental psychophysical studies of rapid light adaptation of the human visual system. Of particular interest are the initial changes of decreased threshold before the rise begins. Physiological reasons for the effect are presented and a previously published experiment of the author is described that was intended to identify the conditions under which the lowered threshold can be obtained. The importance of psychophysical methods in visual studies both for theoretical and clinical purposes are discussed.
G. I. R 16

12,638
Brown, R.H. INFLUENCE OF STIMULUS LUMINANCE UPON THE UPPER SPEED THRESHOLD FOR THE VISUAL DISCRIMINATION OF MOVEMENT. J. Opt. Soc. Amer., Feb. 1958, 48(2), 125-128. (USN Research Lab., Washington, D.C.).

12,638
To determine the upper speed threshold for the visual discrimination of movement as a function of luminance, three observers were tested. The observers viewed the center of a circular black area surrounded by a dimly illuminated area. A small moving spot of white light traversed the path (extent 16.8 minutes) of a horizontal line centered in the circle. The direction, speed and luminance of the moving spot were systematically varied; the task of the observer was to indicate direction of movement, an apparently stationary test pattern, or no apparent light. Responses were recorded as correct or incorrect discrimination of motion, response to light but not to motion, and no response. Threshold values are reported.
G. I. R 12

12,639
Brown, I.D., & Gibbs, C.B. FLASHING VERSUS STEADY LIGHTS AS CAR TURNING SIGNALS: THE EFFECTS OF FLASH FREQUENCY AND DURATION OF FLASH. A.P.U. 245/58, April 1958, 21pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,639
To investigate the effects of flash frequency and duration of flash upon attention-getting and discrimination of car turning signals (mounted in close proximity to rear and brake lights), two experiments were conducted. The first was designed to record reaction time to two signals falling within limits of central vision when 1) both were steady and 2) one or the other was flashing. Various frequencies and on-off conditions of flash were tested. The second experiment was designed so that attention-getting values of flash frequency and duration were studied. In addition to responding to a test sequence of light signals displayed at different visual angles, the subject was required to perform a series of addition calculations. Implications of the findings for turning signal design are discussed. T. G. I. R 4

12,640
Colman, K.W., Courtney, D. & Wallace, W.H. HUMAN FACTORS IN AIR TRAFFIC CONTROL SYSTEMS DESIGN. Summary Report. Contract HCAR 2346(00), Rep. 24, Proj. K, Dec. 1958, 46pp. Courtney & Company, Philadelphia, Penn.

12,640
This is a summary report of the activities of Courtney and Company as human factors members of a research study of problems in air traffic control. Services to the Air Navigation Development Board and the CAA Technical Development Center are described as 1) human engineering consultation, 2) criterion development, 3) program planning, and 4) bibliographic search. In the second phase—services to the Airways Modernization Board—three areas of human factors work are described: 1) air traffic control data processing and display, 2) development and evaluation of air traffic control systems, and 3) air traffic control simulation. Reports and memoranda issued during the contract are listed.
I. R 28

12,641
Connelly, R.E. EVALUATION OF WA-1 INTEGRATED ELECTRONIC AND CONTROL SYSTEM INSTRUMENTS. Task 61979(1), WADC TR 58 35, Feb. 1958, 17pp. USAF Directorate of Flight & All-Weather Testing, Wright-Patterson AFB, Ohio.

12,641
This report presents the results of the flight test evaluation of the "WA-1 Integrated Electronic and Control System Instruments" (cockpit "A"). The cockpit "A" instrument panel embodies the "outside-in" display concept where aircraft performance is displayed by moving aircraft symbols against stationary scales or background. Test results were based on pilot opinion obtained in flight by use of wire recorder and after flight debriefings and questionnaires. Four pilots performed a varied series of flight profiles. Analysis was made in terms of (1) specific instruments, (2) the integrated panel, and projected use of Horizontal Situation Indicator.
I.

12,642
Corey, E.L. & Webster, A.P. A STUDY OF MARKSMANSHIP EFFICIENCY UNDER CONDITIONS OF LOW ILLUMINATION. KPI36/All(V 1)X 290, M & S Res. Proj. X 290, July 1944, 10pp. USN Medical Field Research Lab., Camp Lejeune, N.C.

12,642
To evaluate marksmanship efficiency under low illumination as affected by 1) use of red goggles for dark adaptation, 2) use of red light in target illumination, and 3) dilation of pupils by means of a mydriatic, 60 expert riflemen were the subjects. Two groups of equal ability performed a series of test firings from dusk until complete darkness; one group wore red goggles except when actually firing, the other group wore no goggles. The second test involved firing upon targets alternately illuminated by red and white light. The third test used matched groups firing with either instillations of homatropine and cocaine or a placebo of water. Test scores were compared for all conditions.
T. G.

12,643
Crannell, C.W. & Debons, A. ILLUMINATION AND TILT AS FACTORS IN THE LEGIBILITY OF REFLEX-REFLECTIVE NUMERALS. Contract AF 33(616) 2844, Proj. 7186, WADC TR 58 47, Sept. 1958, 21pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Miami University).

12,643
The legibility of AND (Army-Navy Design) 10400 digits under nighttime conditions was investigated using four different sets of the ten digits: black on aluminum background, black on white painted background, black on reflex-reflective background, and reflex-reflective on black background. Three experiments dealt with (1) digits at four distances and at 27, 40, 60, and 90 degrees to line of sight; (2) digits at three distances and simultaneously turned and tilted from line of sight; and (3) distance of 500 feet when level of illumination was increased. The digits were presented in series of five for reproduction responses. Implications of the findings for air-to-air identification of aircraft were discussed.
T. G. h 2

12,644

Quirk, R.L. THE EFFECT OF NOISE ON THE PERCEPTION OF PITCH IN AUDIO-VISUAL DISPLAY SYSTEMS. PRESENTED AT THE 10TH ANNUAL MEETING OF THE AMERICAN SOCIETY OF PSYCHOLOGISTS, 1958. Contract NSC 40 000 00 018, Jan. 1958, 30pp. Institute for Applied Experiments, Psychology, Johns Hopkins University.

12,645

This progress report describes briefly five experiments, the results of which are still under analysis. The first experiment investigated the relative importance of reduced contrast and degradation of contour for the impairment of form recognition under visual noise. The remaining experiments were part of an unfinished series concerned with the effect of the degree of familiarization on recognition of irregular forms under noise. Card sorting techniques and direct reproduction of form during brief exposure were tested for the purpose of establishing graduated degrees of familiarity among different sets of forms. Testing under noise has not been completed.

12,646

Boris, R.R. THE NUMBER OF SKILL RESPONSES FOR ACCIDENTS. A.P.S. 94/48, Aug. 1948, 6pp. Applied Psychology Research Unit, M.C., Cambridge, England.

12,647

To investigate the nature of the disorder of function called "accident-proneness," 1,200 g. bags of coal miners were tested. Group selection was based on records of 1) no accidents, 2) one accident (median of the large group studied), and 3) more than four accidents. Trials were found consisting of one member from each group of approximately same age and occupations. 32 trials were conducted medically, by interview, and by application of several psychological tests, including the "Skilled Response" test. Performance on the latter test was analyzed (for this report) in relation to accident history. The findings are related to a theory of the nature of accident-proneness.

T. R 5

12,648

Doornik, R.F., Johnson, P.M. & Carmichael, L. PSYCHOLOGICAL WRITING, EASY AND HARD FOR ME? Amer. Psychologist, June 1952, 7(6), 195-196. (Tufts University).

12,649

To investigate peak stress (word by sentence receiving maximum emphasis) and "readability," two undergraduate majors in psychology were asked to read 20 sentences in each of five books on psychology and select the one word in each sentence they would stress the most if they were to read it aloud. The results were compared for agreement in markings and corrected for chance agreement. Percentage success between the two subjects was then taken as a "readability" score. These results were compared with a Flesch scoring of the same material. The use of "peak stress" as a measure of "readability" is discussed.

T. R 5

12,650

Chapanis, A. HOW WE SEE: A SUMMARY OF BASIC PRINCIPLES. Contract NSC 166, Task Order I, Tech. Rep. NAVTRAC-CEP 166 I 85, Reprint, May 1958, 60pp. Johns Hopkins University.

12,651

This is a reprint (1958) of an earlier (1949) summary of basic principles in the area of vision. There are sections on the nature and measurement of visual stimuli, dark adaptation, visual acuity, visibility of lights, and a useful appendix covering measurement and nomenclature in visual science.

T. G. I. R 103

12,652

George Washington University. BULLETIN OF HUMAN ENGINEERING RESEARCH. Vol. 1, No. 1, 1958, 3pp. Human Resources Research Office, George Washington University.

12,653

This bibliography lists publications of the Human Resources Research Office, its Divisions and its Human Resources Units and summarizes previous bibliographies issued in 1956 and 1957. Part I presents in chronological order an annotated list of technical and special reports, research bulletins and memoranda and work programs issued by the Research Office. Part II summarizes reports by task and by originating Division or Unit.

R 120

12,654

Enfield, F.D. EXPERIENCE WITH PORTAL PRESSURE SUITS AND GLOBAL SURVIVAL KITS. Presented at Sept. 1958 Flight Safety Meeting. Sept. 1958, 7pp. Lockheed Aircraft Corporation, Burbank, Calif.

12,655

This is a summary report of the experiences of Lockheed Aircraft Corporation with the partial pressure suit and its associated equipment as well as with the development of one version of a global survival kit. The objectives in the development of partial pressure suits and helmets are discussed and various problems connected with adequate protection, comfort, speed of donning and the oxygen regulator and supply system are discussed. The effects of wind blast resistance in ejection tests are indicated in terms of needed design changes. The problems in the development of the global survival kit are discussed.

G. I.

12,656

Edwards, T.W. & Howell, M.D. RECOMMENDATIONS ON COCKPIT-VISIBILITY STANDARDS FOR TRANSPORT-TYPE AIRCRAFT. Tech. Dev. Rep. 275, Feb. 1956, 6pp. Technical Development & Evaluation Center, Civil Aeronautics Administration, Indianapolis, Ind.

12,657

The standards that are discussed in this report are recommended minimums for cockpit visual angles. The basis for the recommendations were data obtained in a four part study: 1) an airline-pilot questionnaire in which present day aircraft were evaluated from a visibility standpoint; 2) the development and use of a binocular camera for recording cockpit visual angles; 3) recording and analyzing pilots' eye-movements during visual-flight conditions; and 4) determination of some geometric relationships relative to collision-flight paths. These standards when applied to initial aircraft-cockpit design will improve present safety level by affording the pilots better cockpit visibility.

G. R 5

12,658

Design & Associates, Inc. HUMAN ENGINEERING EVALUATION OF THE FARRAND STARTRACKER: SUPPLEMENT NO. 1. Contract NSC 17719, Memo. Rep. 15, Jan. 1958, 7pp. Design & Associates, Inc., Stamford, Conn.

12,659

This memorandum report is based essentially on an earlier report of a human engineering evaluation of the Farrand Startracker. Subsequent to the report, design changes were incorporated into the equipment, and this report presents a study of the redesigned Startracker. The operator's task is described and recommendations for changes in control movement are made. Further recommendations on both control and display aspects are made and discussed.

12,452
 Intarsio, R.A. & Lusk, J.J. PRELIMINARY INVESTIGATION OF HYPER ENVIRONMENTS AND METHODS OF SIMULATION. III. PROPOSED HYPER ENVIRONMENTAL TEST FACILITY. Contract AF 33(616) 3913, WADC TR 57 456, Jan. 1956, 43pp. USAF Wright Air Development Center, Wright-Patterson AFB, Ohio. (Radio Corporation of America, Camden, N.J.).

12,453
 This report is concerned with estimating the layout and cost of an over-all test facility for investigating hyper environment, such as high noise, temperature, air cooling, solar radiation, vibration, acoustic excitation, shock acceleration, high-speed particles, explosive decompression, ozone, and ionization. The size, layout, and cost of a building to house the test facilities needed to simulate these environments and the layout, cost, and manpower for each facility are estimated. Included are layout drawings. Simulation facility problems that require future development are listed. One section deals briefly with facilities necessary for environments below 75,000 feet.
 T. I.

12,453
 Milinski, C.R. A HUMAN ENGINEERING STUDY OF U.S. NAVY TEST INSTRUMENTS USED ABOARD LARGE SHIPS AND SUBMARINES. FO 05401, NE 091300 819.5 (NEL R1 5), Res. & Dev. Rep. 854, Aug. 1956, 28pp. USN Electronics Lab., San Diego, Calif.

12,453
 A human engineering study was made to determine the capabilities and limitations of the personnel who use test equipment, the field conditions to which such equipment are subjected, and design faults existing in the equipment. Interview-discussions were held with technicians aboard large United States Navy ships and submarines, and design and developmental factors affecting the efficiency of test instruments were analyzed. Details of human engineering difficulties associated with the instruments, with comments and recommendations, are presented as an appendix.
 T. G. I. R 2

12,654
 Bohneke, A.R. & Siri, W.E. THE ESTIMATION OF LEAN BODY WEIGHT FROM ANTHROPOMETRIC AND X-RAY MEASUREMENTS. Res. & Dev. Tech. Rep. USNMDL TR 203 NS 080 001, Dec. 1957, 42pp. USN Radiological Defense Lab., San Francisco, Calif.

12,654
 To determine whether dependable estimates of lean body weight can be made from measurements of "skeletal" size, measurements were made on 31 men by a physical anthropologist following a procedure outlined by the Air Force. In addition to the actual body measurements an x-ray study of the joints and trunk size was made. Estimates of lean body weight from these measurements were compared with those obtainable from density and total body analyses. The usefulness of this technique is discussed.
 T. G. I. R 22

12,655
 Beeding, E.L., Jr. DAISY TRACK AND SUPPORTING SYSTEMS. WADC TR 57 8, June 1957, 19pp. USAF Holloman Air Development Center, Holloman AFB, N.M.

12,655
 This is a report of equipment design, equipment function, and test sequence of the 120-foot catapult sled track and braking system developed for the Aeromedical Field Laboratory of Holloman Air Development Center and designated as the "Daisy Track". Detailed specifications of each component are presented.
 T. G. I.

12,456
 Bartlett, F.C. THE AFTER-CONTRACTION OF MUSCLE: A POSSIBLE FRESH APPROACH TO A STUDY OF THE CAUSATION OF TRANSPORT ACCIDENTS. IBC 47/442, A.P.M. 42, 1946, 2pp. Applied Physiology Research Unit, IBC, Cambridge, England.

12,456
 This note suggests that there is evidence indicating that the degree of after-contraction of muscles is related to speed and efficiency of learning new forms of muscular coordination, liability to quick onset of fatigue in skilled work, and the occurrence of particular kinds of accidents. It is proposed that an experimental study of the after-contraction be made on automobile drivers in the hope of finding a diagnostic sign of liability to road transport accidents.
 R 1

12,657
 Kucywanis, G.M. THEORETICAL AND EXPERIMENTAL RESEARCH IN COMMUNICATION THEORY AND APPLICATION. PROGRESS REPORT 5, AUGUST 15, 1956 TO NOVEMBER 15, 1956. Contract DA 36 039 SC 64704, Proj. DA 3 99 12 022, SC Proj. 17 1328 O, Dec. 1956, 17pp. Bureau of Engineering Research, Rutgers University.

12,657
 This is a progress report of work accomplished from August 15 to November 15, 1956 on a research project in communication theory and application. The areas of work undertaken and described here are: 1) continuation of research in the development of an appropriate vowel-consonant separator; 2) development of a new pitch frequency extractor using the periodic nature of vowel sounds; 3) development of a pitch frequency signal generator; 4) development of an extended range consonant sound amplitude detector for tracking consonant time envelopes; and 5) construction of a modified timbre selective amplifier to be used in the study of consonant sound synthesis.
 G. I. R 5

12,658
 Anthony, A. & Ackerman, E. BIOLOGICAL EFFECTS OF NOISE IN VERTEBRATE ANIMALS. Contract AF 33(616) 2305, Proj. 7210, WADC TR 57 647, Nov. 1957, 118pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Pennsylvania State University).

12,658
 This report deals with the stress effects of noise on bodily functions other than hearing. It includes physiological, biochemical and behavioral effects of intense acoustic noise at low and high frequencies. The approaches used are as follows: 1) flame spectrophotometric analyses of serum electrolytes, 2) serum ascorbic acid and blood sugar changes, 3) changes in adrenal and plasma cholesterol, 4) behavioral changes, and 5) relationship of seizure-susceptibility to noise stimulation in noise-exposed rats, mice, and guinea pigs. Responses to single noise bursts as well as effects of chronic exposure were studied. The nature of normal physiological defense mechanisms to excessive noise stimulation is discussed.
 T. G. I. R 53

12,659
 Naber, E.H. AN INVESTIGATION OF THE MAGNITUDES OF GALVANIC SKIN RESISTANCE RESPONSES THAT OCCUR WITH DIFFERENT INTENSITY LEVELS OF SHOCK, CONDITIONED TONE AND EXTINCTION TONE. Contract N6ONR22525, Res. Proj. Dec. NR 145 993, Bu Med Surg Proj. NM 18 02 99, Subtask 1, Joint Proj. Rep. 75, Feb. 1958, 34pp. USN School of Aviation Medicine, Naval Aviation Medical Center, Pensacola, Fla.

12,659
 To study the magnitude of the galvanic skin resistance reflex (GSR) during conditioning and extinction to an auditory stimulus as a function of the intensities of the variables, 170 subjects were studied in a series of experiments. There were three variables: 1) intensity of shock, 2) sensation level of the conditioned tone, and 3) sensation level of extinction tone. Each conditioned subject received nine reinforcement and nine extinction trials. Scores were obtained representing strength of conditioning, initial habit strength, resistance to extinction, and gradational habit strength. The data were analyzed as functions of the variables and the response criteria. The findings are related to the use of GSR's in hearing tests.
 T. R. 17

12,660
Olliger, R.E. OPERATION OF THE FUEL MANAGEMENT INDICATOR. Contract AF 33(616) 5167, Proj. 6190 61940, WADC TR 58 94, April 1958, 7pp. USAF Flight Control Lab., Wright Patterson AFB, Ohio. (Lear, Inc., Grand Rapids, Mich.).

12,660
One of the problems facing present-day pilots of high performance aircraft - that of precise fuel management - is considered. A display is described which not only indicates fuel and navigation information simultaneously but also provides memory information to enable the pilot to select optimum flight conditions.
1.

12,661
Petrie, A., Collins, W. & Solomon, P. PAIN SENSITIVITY, SENSORY DEPRIVATION, AND SUSCEPTIBILITY TO SATIATION. Science, Dec. 1958, 128(3336), 1431-1433. (Harvard Medical School, Boston City Hospital, & Boston Sanatorium).

12,661
To investigate the tolerance of pain and of sensory deprivation as related to susceptibility to perceptual satiation, 28 adult male subjects were tested. For one group (19 subjects) pain threshold data were available; the difference between the temperatures at which pricking pain and unendurable pain occurred from exposure to radiant heat was the measure of pain tolerance. For the second group (9 subjects) the measure of tolerance to sensory deprivation was the length of time each remained in a tank-type respirator. The mean amount of satiation measured by loss in apparent size of a "felt" object was related to the other two measures. The findings were discussed in relation to personality and tolerance.
T. R 13

12,662
Plutchik, R. AUDITORY PAIN THRESHOLDS FOR INTERMITTENT, "BEAT", AND STEADY TONES. Contract MONR 2252 (01), Dec. 1958, 28pp. Hofstra College.

12,662
To investigate the effect of frequency and intermittency of tones upon the auditory pain threshold, ten subjects were presented with a series of tones at either 1000 or 2500 cycles per second. For each frequency the tones were presented as steady, as interrupted pulses, or as "beats"; the two latter at repetition rates of three, six or fifteen per second. For each condition the intensity of the sound was increased by series of one-decibel steps. The subject indicated the "just noticeably unpleasant" and the "just noticeably painful" points. These thresholds (decibel attenuation from 130 \pm 2 decibels) were studied for effects of type of presentation.
T. G. I. R 15

12,663
Ramond, C.K., McFann, H.H. & Smith, S. THE EFFECT OF PERSONALIZED STOCKS ON RIFLE MARKSMANSHIP. March 1955, 24pp. USA Human Research Unit No. 3, Fort Benning, Ga.

12,663
To evaluate the effect of personalized stocks on rifle marksmanship, an Infantry School class of 169 advanced non-commissioned officers fired a record course with the standard M1 rifle (initial proficiency). New rifle stocks were then issued according to the lengths of their forearms (short-12 inches, medium-13 inches, long-14 inches) and 40 hours of marksmanship training was given. A second firing of the record course (final proficiency) was then made. The pit scores of both initial and final day's record-firing course were analyzed for differences due to personalized stocks.
T. G. R 6

12,664
Riopelle, A.J., Hines, Marion & Lawrence, Marie. THE EFFECTS OF INTENSE VIBRATION. Contract DA 49 007 MD 535 & DA 49 007 MD 634, USAMRL Proj. 6 95 20 001, Task USAMRL T 3, Rep. 358, Oct. 1956, 57pp. USA Medical Research Lab., Fort Knox, Ky.

12,664
To determine some behavioral, physiological, and pathological consequences of prolonged, intense low-frequency vibration, seven rhesus monkeys were used as subjects. Prior to vibration, the animals were given various behavioral tests and clinical examinations; they were then strapped to a chair in seated position and kept immobilized for eight hours. Following further testing, the animals were vibrated at ten cycles per second with a peak-to-peak excursion of 0.25 or 0.50 inches for eight hours. Survivors were again given the various tests, with post-mortem examination of all subjects.
T. I. R 16

12,665
Saldanha, E.I. ALTERNATING AN EXACTING VISUAL TASK WITH EITHER REST OR SIMILAR WORK. A.P.U. 289 57, Feb. 1957, 15pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,665
To study the differential effects on inspection work of interpolating either rest or another visual task, ten subjects were tested. The main task was setting a Vernier Calliper Gauge to an accuracy of 0.001 inches; the interpolated task was the detection and marking of Landolt rings whose gaps pointed in a given direction. All subjects participated in two sessions of three half-hour periods; the middle period being devoted to rest or Landolt Ring task. A comparable group of subjects worked continuously for two hours on the main task. Speed and accuracy of Vernier settings were compared in the first and third half-hours of work for all conditions. The results are discussed in terms of transfer and dispersion fatigue.
T. G. R 2

12,666
Tillinghast, N.W. & Henderson, B.E. A STUDY OF COCKPIT DISPLAY REQUIREMENTS FOR VTOL AIRPLANES. Contract AF 33(616) 3438, Proj. 6(1 6190), Task 61908, WADC TR 58 58, March 1958, 127pp. USAF Flight Control Lab., Wright-Patterson AFB, Ohio. (Ryan Aeronautical Co., San Diego, Calif.).

12,666
To determine the flight instrument display requirements of VTOL (vertical take-off and landing) aircraft, the flight characteristics of the United States Air Force Model X-13 vertical take-off and landing jet airplane were simulated. A functional rotating cockpit, hydraulic system mock-up and analog computers were utilized. A successive refinement procedure was used in dealing with improvements in instrumentation until display requirements were defined. A display that satisfies the requirements of the VTOL pilot for take-off, transition, low-speed conventional flight, and hovering flight has been built and tested in the simulator.
T. G. I.

12,667
Veghte, J.H. & Webb, P. EXTENDING HUMAN TOLERANCE TO HEAT BY PRIOR BODY COOLING. Proj. 7164, Task 71830, WADC TR 58 412, Sept. 1958, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,667
To determine the effect of prior body cooling on tolerance to a high level of heat stress, five subjects were exposed to three levels of precooling (30-, 60-, and 90-minutes exposure in a 60 degree Fahrenheit water bath) prior to entering the heat chamber at 160 degrees Fahrenheit. The physiological measurements were continuous rectal temperatures, pulse rates, intermittent metabolic rates, continuous skin temperatures at several body locations, initiation of sweating on four areas of the body as detected by the starch-iodine technique, and nude and clothed weights prior to and after each of the four exposures.
T. G. I. R 17

12,668
Whitfield, J.W. ACCIDENTS TO COAL MINERS - HAULAGE AND PIT BOTTOM ACCIDENTS. *MRC. 47/226, A.P.U. 36, 25.* 3.46., March 1946, 7pp. *Applied Psychology Research Unit, MRC, Cambridge, England.*

12,668
This report presents an analysis of accident reports from three collieries. Information recorded for each accident include personal details, place and time of accident, the accident situation, injury details, and length of absence. The analysis is a comparison of the accident risk in the six seams being operated (two by each colliery). Recommendations for improved safety measures are included.
T.

12,669
Missler, E.H. EFFECT OF THE TEMPERATURE DEPENDENCE OF THE HEAT TRANSFER COEFFICIENT ON THE RATE OF COOLING. Proj. 6 64 12 028, Subtask, USAMRL S 1, MEDEA, Rep. 319, July 1958, 20pp. *USA Medical Research Lab., Fort Knox, Ky.*

12,669
The dependence on surface temperature of the heat transfer coefficient for combined radiation and free convection is discussed. A numerical method for evaluating the effect of that dependence on the cooling of an infinite cylinder is given. Some calculated data are compared with experimental data obtained in a finger cooling experiment.
G. R 7

12,670
Woodhead, Muriel M. THE EFFECTS OF BURSTS OF LOUD NOISE ON A CONTINUOUS VISUAL TASK. *Brit. J. Indust. Med., 1958, 15, 120-125.* (Applied Psychology Research Unit, MRC, Cambridge, England).

12,670
The effects of short bursts of loud noise on the performance of men doing a matching visual task was investigated. The task ran for four minutes and four bursts of noise were given at irregularly spaced intervals during that time. Each burst lasted four seconds with a peak intensity of 100 decibels. Two groups, 12 subjects each, performed four trials, two with noise bursts, one with a visual signal warning of the coming noise, and one with no noise. In addition, one group received verbal encouragement and knowledge of results. Performance data were analyzed for effects of noise, of prior alerting to noise, and of instructions.
T. G. I. R 5

12,671
Zimmer, H. PSYCHOLOGIC IMPACT OF POLAR CLIMATE: SELECTED BIBLIOGRAPHY. Contract NONR 1530(06), Sept. 1958, 30pp. *Georgetown University Medical Center, Washington, D.C.*

12,671
The items in this bibliography were selected primarily from the period from 1940 to 1957, although a few come from earlier periods. The arrangement is alphabetic, by author. Various aspects of the psychologic impact of the polar climate are covered.
R. 250 (approx.)

12,672
Piomp, R. & Bouman, M.A. THE RELATION BETWEEN HEARING THRESHOLD AND DURATION FOR TONE PULSES. Rep. IZF1958-8, Oct. 1958, 23pp. *Institute for Perception RVO-INO, Soesterberg, The Netherlands.*

12,672
The masking threshold of hearing tone pulses was determined as a function of duration for two subjects. Six frequencies (250, 500, 1000, 2000, 4000, and 8000) were tested; the masking noise was 40 decibels. The data were presented graphically and were compared with results predicted on the basis of a new hypothesis: switching on a tone pulse of intensity (I) results in an effect (S) somewhere in the hearing pathway that approaches its final value asymptotically according to a power function; this final value is proportional to I; perception occurs when S exceeds a critical value (S₀). Experimental data from the literature are examined in light of the above hypothesis.
T. G. I. R 13

12,673
Madler, G. & Goldman, J. THE UNOPAR. *J. Indust. Engng., Jan.-Feb. 1958, 11(1), 1-8.* (Dept. of Industrial Engng., Washington University).

12,673
An electronic device for the measurement of human work performance is described. The Universal Operator Performance Analyzer and Recorder (UNOPAR) was developed to measure motion in all its aspects--velocity, acceleration, deceleration, position in space, distance, and time. UNOPAR is based on the Doppler effect with sound as the radiation medium with an operating frequency of 20,000 cycles per second. The sound emitting source is attached to the moving member of the body and three microphones are arranged such that movement in three dimensions can be secured. Basic operating procedures, future developments and anticipated uses of the device are discussed.
I. R-10

12,674
Mullinax, P.F., Jr., & Dion, R.L. CARBON MONOXIDE POISONING, HYPOGLYCEMIA, AND HYPERVENTILATION: IMPORTANT PROBLEMS FOR STUDENT HELICOPTER PILOTS. *Bull. Surg. Proj. M4 15 01 11, Subtask 5, TED PEN AE 6437, Rep. 1, June 1958, 8pp.* *USN School of Aviation Medicine, Naval Air Station, Fla.*

12,674
To evaluate the importance of carbon monoxide poisoning, hypoglycemia, and hyperventilation for student helicopter pilots, 40 apparently normal student pilots were examined during their routine training flights in the HUP-2 helicopter. Blood carbon monoxide, blood sugar, and alveolar air carbon dioxide and oxygen levels were determined on samples obtained immediately prior to, during, and immediately after the flight. The students were questioned about eating and smoking habits, and symptoms experienced during flight. The data were analyzed for departures from normal.
R 20

12,675
Moser, H.M., O'Neill, J.J., & Wolfe, Susan M. TESTS OF THE AURAL COMPREHENSION OF ENGLISH BY FOREIGN STUDENTS. Contract AF 19(604) 1577, AFRC TR 58 57, RF Proj. 664, Rep. 50, Aug. 1958, 10pp. *Ohio State University Research Foundation.*

12,675
To compare the efficiency of two tests of aural comprehension of English by foreign listeners, parts of the Lado Test of Aural Comprehension and the MDAP English Proficiency Examination were administered to 44 foreign students representing 25 nationalities and varying backgrounds in English. The data were analyzed in terms of differences between mean scores and for degree of relationship existing between them. The findings are discussed in relation to appropriate uses for each test for evaluating aural comprehension of foreign nationals.
T. R 7

12,676
Moser, H.M., O'Neill, J.J., Oyer, H.J., Wolfe, Susan M., et al. A SURVEY OF FLIGHT-LINE SIGNALS. Contract AF 19(604) 1577, AFRC TR 58 57, RF Proj. 664, Rep. 51, Sept. 1958, 20pp. *Ohio State University Research Foundation.*

12,676
This report is essentially a collection and preliminary survey of hand signals used by flight line personnel. Two Air Force publications were used as pictorial and descriptive sources. Visits were made to an Air Force Base, a Naval station, and an aircraft factory. Photographs were taken of hand signals previously represented in the publications by drawings. Modifications of these signs, new signs, and variation on the sign by a deaf man are also shown in photographs. Recommendations are made for further surveys and a pocket manual of photographed signs.
I. R 20

12,677

Becker, R.B. & Green, H.E. AERIAL PHOTOGRAPHIC INTERPRETATION AND THE HUMAN GEOGRAPHY OF THE CITY. *The Professional Geographer*, 1958, 2-3. AFPC TN 57 134. (USAF Personnel and Training Research Center, Maxwell AFB, Ala.).

12,677

The use of aerial photographic interpretation to obtain physical-structural-spatial data for predictors of certain aspects of the human geography of the city is discussed. A series of studies using the method on American cities of widely differing geographical and social structures are described. Some evidence on the validity of the data is offered along with evidence of their relationship to a great many elements of social and demographic structure of the city and a useful method of analysis for translating the physical items into information relevant to the human geography of the city.
R 9

12,678

McGuire, J.C. & Kraft, C.L. A RADIO CHANNEL LOAD DISTRIBUTION ANALYZER FOR USE IN STUDIES OF COMMUNICATION FLOW IN RADAR APPROACH CONTROL CENTERS. Contract AF 33(616) 3612, Proj. 7192, WADC TN 57 424, April 1958, 8pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio & Laboratory of Aviation Psychology, The Ohio State University and The Ocu Research Foundation).

12,678

The Radio Channel Load Distribution Analyzer, described here, was developed in order to obtain measures of frequency of use and time-in-use of radio channels in a radar approach control center. Essentially the device consists of 110 impulse counters arranged in pairs. One of the pair records frequency of use of a channel, the second records cumulative time-in-use of the same channel. Separate instrumentation is required for each control position. Microswitches serve to select the appropriate counting circuits. Other aspects of the equipment and its operation are given. Recommendations for improvements are made.
I. R 4

12,679

McCroskey, R.L. Jr. THE EFFECT OF SPECIFIED LEVELS OF WHITE NOISE UPON FLICKER FUSION FREQUENCY. OSU Res. Foundation Contract M6 ONR 22525, Proj. NR 145 993 & USN School of Aviation Medicine, BuMedSurg. Proj. NM 18 02 99, Subtask 1, Rep. 80, Aug. 1958, 10pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,679

The effect of noise upon visual frequency of flicker (FFF) was investigated. White noise (from 85 to 115 decibels) was introduced into a room in which individual subjects determined their threshold of fusion. For half the subjects the noise was continued for 19 minutes with fusion judgments made at regularly spaced intervals. There were 72 subjects. The difference between FFF's obtained in quiet and in noise were analyzed with respect to sound pressure level and duration of exposure to the noise.
T.

12,680

Marjon, P.L. RADIATION PROTECTION CHARACTERISTICS OF PARTIAL SHIELDS FOR NUCLEAR AIRCRAFT SERVICING. Contract AF 33(600) 32054, Proj. 6(1.9964), ANP, Doc. No. NARF-58 20T MR N 200, April 1958, 45pp. Engng. Dept., Convair Co., San Diego, Calif.

12,680

This paper reports the use of a reactor fuel element as a source to investigate the radiation protection characteristics of two versions of the partial shield concepts: one is the open-front type, which is simply a shield box with a work opening; and the other is the body-shielded, open-front type. The report defines the field conditions in which direct maintenance would be possible on a nuclear aircraft by use of such partial shields.
T. G. I. R 4

12,681

McKeworth, M.H. NOTES ON THE CLOCK TEST - A NEW APPROACH TO THE STUDY OF PROLONGED VISUAL PERCEPTION TO FIND THE OPTIMUM LENGTH OF WATCH FOR RADAR OPERATIONS. NRC 46/348, A.P.U. 1, May, 1944, 14pp. Applied Psychology Research Unit, NRC, Cambridge, England.

12,681

To investigate the optimum length of watch for radar operators, more than 170 subjects were tested on the clock test (described in appendix). The task was to report any double movement of a pointer, mounted on a blank clock face, which occurred during a two-hour period. In each half-hour, 12 such movements occurred at irregular intervals. Some groups were interrupted by a telephone call, others were given an additional task to perform. The incidence of missed stimuli and of slow responses were analyzed as a function of time. Effects of the other conditions were considered as were individual differences.
T. G. I.

12,682

Littler, T.S. MEMORANDUM ON THE TECHNICAL ASPECTS OF AUDIOMETRY. R.N.P. 58/929, No. 2, Dec. 1958, 5pp. Royal Naval Personnel Research Committee, NRC, London, England.

12,682

Types of audiometers, standardization and calibration, test procedures, hearing standards, selection of test rooms, and documentation of results are covered in this memorandum. An understanding of the general requirement and aim of audiometry is assumed.
I. R 5

12,684

Kimball, O.F. ESTABLISHMENT OF BELOW-ELBOW PREFORM DIMENSIONS FOR EXPANSIBLE SOCKET LAMINATES. Tech. Rep. 5744, Oct. 1957, 8pp. USA Army Prosthodontics Research Lab., Walter Reed Army Medical Center, Washington, D.C.

12,684

To obtain one or more standard below-elbow stump preforms that would eliminate the necessity of taking a plaster impression of each individual stump, measurements from 15 stumps were taken. An estimated root-mean-square (RMS) curve was drawn from the data by determining the average value of stump girths at each two-inch interval. The RMS curve represents the shape of the "average" stump. Three other shapes were determined by estimating different tolerances from the average. The 15 stumps were then studied to determine how many could be fitted by the four shapes. The dimensions of the four preforms are given.
T. G.

12,685

Keegan, H.J. & Schleiter, J.C. AN INDEX TO SPECTROPHOTOMETRIC CURVES OF COLOR RECONNAISSANCE PROJECT. Contract AF 33(616) 52 21, Task 62104, NBS Proj. 0201 20 2325, NBS Rep. 5183, Dec. 1957, 58pp. U.S. Department of Commerce, National Bureau of Standards, Washington, D.C.

12,685

This index pertains to the data on the 250 spectrophotometric curve sheets of the 717 specimens studied during a color reconnaissance studies project. It has been compiled as a guide in the location and use of the curves that are contained in nine of the 13 reports issued. There are spectrophotometric curves of 1) 104 color transparencies of man-made objects, 2) 85 color transparencies of natural objects, 3) 290 man-made objects, and 4) 238 natural objects. Seven German photographic filters are included in this spectrophotometric summary.
T. G. R 14

12,686

Kacemetzky, J., Pilgrim, F.J. & Schutz, H.G. RELATIONSHIP OF CONSUMPTION TO PREFERENCE UNDER DIFFERENT FIELD CONDITIONS. INTERIM REPORT. Proj. Food Acceptance Study, 7-84 15 007, GAFCI Rep. 37 57, Dec. 1957, 21pp. USA Food Labs., Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.

12,686

The validity of survey ratings of food preference in forecasting consumption was investigated. Consumption indices from four Army field studies and one civilian survey were compared with soldier's preference as measured by a nine-point hedonic scale. Two indices of consumption - percent of men accepting an item from the serving line and amount of consumption of an item - were analyzed for relationship to each other as well as to preference. Factors that may account for the discrepancies between preference and acceptance, and recommendations for research are presented.

T. G. R 7

12,687

Johnson, E.P. THE CHARACTER OF THE B-WAVE IN THE HUMAN ELECTRORETINOGRAM. *A.M.A. Arch. Ophthalmol.*, Oct. 1958, 60, 585-591. (Waterville, Me.).

12,687

This is a history and summary of investigations leading toward analysis of the human electroretinogram (ERG), with special attention given to work on the scotopic b-wave, the most prominent component of the response. Changes in ERG that result from alternating the spectral composition, the intensity, the area and locus, or the duration of the stimulus are described along with differences correlated with adaptation level of the eye. Four types of the b-wave are distinguished and designations are suggested for each. Those changes in the form of the b-wave of the dark-adapted eye that accompany variations in duration and intensity are analyzed. The unit response technique is discussed.

T. G. I. R 74

12,688

White, C.S. TEMPERATURE AND HUMIDITY. ADDENDUM TO CONVAIR AEROMEDICAL CONSULTANT'S REPORT. April 1954, 10pp. Lovelace Foundation for Medical Education and Research, Albuquerque, N.M.

12,688

This addendum to a report on temperature and humidity as related to high speed aircraft problems contains eight graphs as follows: the effect of airspeed on aircraft skin temperature compared to the temperature limits of component systems in the aircraft; the limits of heat tolerance for varying degrees of activity; humidity and maximum temperature on day of onset of 147 cases of fatal heat stroke; maximum tolerable environments for seated, clothed subjects; maximum tolerable exposure time for various temperatures; comfort zones; effective temperature charts; and chart for estimation of equivalent warmth for normally clad person doing very light work.

G.

12,689

Craig, J.H., Ditto, M.M., Gross, F.J., Haenschke, D.G., et al. TASK A PART 4. GENERAL AIR-GROUND COMMUNICATION STUDY. TASK D PART 3. EXPERIMENTAL AIR TRAFFIC CONTROL COMMUNICATION SYSTEM. INTERIM REPORT. Contract DA 36 039 SC 64567, May 1957, 132pp. Bell Telephone Laboratories, Inc., Murray Hill, N.J.

12,689

The work completed on a systems engineering research study of communication facilities for the common system of air traffic control during the period 1 July 1956 through 15 May 1957 is reported. An analysis of the present system of air traffic control is presented and discussed. The detailed work is presented in five appendices. Progress in planning and establishing an experimental arrangement enabling the routing of flight plans through an BIDI teletypewriter switching system and the printing of appropriate flight strips is discussed. A further development is in programming a high speed computer for the study of flow of air traffic in the experimental system.

T. G. I.

12,690

Graham, C.H. FORM PERCEPTION AND SENSORY PROCESSES. National Academy of Sciences - 1957, Publication 561, 25-27. National Research Council, Washington, D.C.

12,690

The general significance of the concept of sensory as related to perceptual is considered and the significance of this analysis for the theoretical understanding of perceptual functions generally is discussed. Specific reference is made to form perception.

12,691

Miller, G.A. SOME EFFECTS OF INTERMITTENT SILENCE. *Am. J. Psychol.*, June 1957, 70(2), 311-314. (Harvard University).

12,691

In this note the author derives a formula from simple assumptions regarding the random spacing of intermittent silences, which expresses Zipf's rule without appeal to least effort, maximal information, and so forth.

R 3

12,692

Craik, K.J.M. MEDICAL RESEARCH COUNCIL UNIT FOR APPLIED PSYCHOLOGY. *Nature*, Oct. 1944, 154, 476-478, APU 5. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,692

This brief note describes the general type of work carried out by the Medical Research Council Unit for Applied Psychology, Cambridge, England at the end of 1944. Common principles emerging from the war-time research, which may assist in guiding a fruitful approach to future and peace-time problems, are discussed. These principles are: suiting the job to the man, suiting the man to the job, and improving man's performance.

12,693

Campbell, F.W. THE DEPTH OF FIELD OF THE HUMAN EYE. *FPRC 868*, March 1954, 15pp. *Living Personnel Research Committee*, London, England. (Physiological Laboratory, Cambridge, England).

12,693

To determine the range of the depth of field of the human eye, a series of experimental measurements were made using a simple disc subtending a small visual angle (ten minutes) as the test target. The following variables were investigated: 1) pupil size, 2) color of the visual field, 3) contrast of test target and background, and 4) luminosity of test field. One subject was measured on all tests with a limited number of confirmatory experiments on six other subjects. The data were analyzed for effects of the above variables and for individual differences. The importance of the depth of field of the eye in relation to "day myopia" and range of target recognition is considered in the light of the result.

T. G. I. R 3

12,694

Wulff, J.J., Price, H.E., Gartner, W.B., Gilstrap, L.O., et al. THE MAINTENANCE OF PERFORMANCE CAPABILITY FOR BALLISTIC MISSILE SYSTEMS. A RATIONALE FOR THE DESIGN OF A UNIT PROFICIENCY SYSTEM FOR ATLAS-TYPE MISSILE SYSTEMS. Contract AF 04(647) 165, PRA Rep. 58 9, Aug. 1958, 75pp. *Psychological Research Associates, Inc.*, Arlington, Va.

12,694

This report provides general guidance for the development of a unit proficiency system (all materials and procedures necessary for maintaining mission performance capability) for any Atlas-type missile system with special focus upon the maintenance of personnel system performance. The material was developed in a three-step study: 1) determining over-all performance requirement for unit proficiency system (UPS), 2) determining the relationship of the UPS to the missile system, and 3) derivation of types of materials needed to develop a UPS. The body of the report is devoted to the design and maintenance of the system and its units.

I.

12,695

Drake, D.D. TOOLS FOR MORE EFFECTIVE TRAINING. SUMMARY REPORT FOR CONTROL LOADING SYSTEM STUDY. Contract NOME 1599(00); Proj. 2F35, Tech. Rep. 6344 104, March 1957, 20pp. Erco Division, ACF Industries Incorporated, Riverdale, Md.

12,695

This report presents a summary of results of a Control Loading System study that was conducted on the Device 4-21 Flight Simulator. The objective of the study was the establishment of design requirements and design characteristics for the elevator control loading system and associated aerodynamics computer in order to meet certain stability requirements. Test procedures, test results, evaluations and recommendations are contained in appendices under separate cover.

12,696

Derwort, A. THE FORMS OF OUR MOVEMENTS AGAINST VARIOUS RESISTANCES AND THE SIGNIFICANCE OF SUCH MOVEMENTS FOR THE PERCEPTION OF FORCE. TIL/T 4565, July 1957, 25pp. Technical Information and Library Services, Ministry of Supply, London, England.

12,696

To investigate various problems relating to the perception of force and formation of movements, a series of studies were performed in which the subject was required to move the forearm in different ways as the resistance was varied. Records were made of arm movement dimensions (direction, extent, and angular velocity), of force applied by the arm (magnitude and time development), of mechanical resistances used, and the subject's statement in regard to his perceptions. Resistances were produced by internal friction of viscous fluids, by mechanical braking, by gravity and pure inertia. In all the experiments the data were analyzed primarily as to extent to which motor behavior influenced force perception. Related problems are discussed.

G. I. R 18

12,697

Engstrom, B.A. THE EFFECTS OF SIMULTANEOUS DECELERATION TUNELING AND WINDBLAST ENCOUNTERED IN ESCAPE FROM SUPERSONIC AIRCRAFT. Contract AF 33(616) 2806, Proj. 7216 71720, WADC TN 54 18, Part II, July 1957, 68pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Cook Research Laboratories, A Division of the Cook Electric Company, Chicago, Ill.).

12,697

As a continuation of a supersonic ejection seat program, two tests using live chimpanzees as subjects were performed. The ejections occurred at a velocity of Mach 1.5 at altitudes of 20,000 and 17,700 feet using a standard Air Force downward ejection seat as modified by the Cook Research Laboratories. Test results are summarized and recommendations made for necessary investigations to learn more about high altitude supersonic ejections and recoveries.

T. I.

12,698

Craik, K.J.W., Harris, A.D. & Macpherson, S.J. THE EFFECT OF INFECTIVE HEPATITIS ON DARK ADAPTATION. MRC 47/351, APU 37, 1947, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,698

The course of dark adaptation was investigated in patients with infective hepatitis, using the Craik Adaptometer. The 37 patients available were all tested within one week of admission and in a few serial tests performed throughout their stay in the hospital; 14 cases were re-tested a month after discharge. The data were compared with 20 normal adults of comparable age. The findings are discussed in relation to Vitamin A abnormality.

T. R 4

12,699

Conrad, R. & Hille, Barbara A. THE ADAPTATION OF TELEPHONE OPERATORS TO VARIATIONS IN TRAFFIC LEVELS. A.P.U. 282/56, 1956, 15pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,699

To investigate whether the assumption that telephone operator time per call is independent of traffic-level, a test was carried out over a four-week period at a cordless auto-manual exchange. The traffic load per operator was experimentally varied from 20 to 55 calls per hour by presenting traffic levels and controlling at half-hourly intervals the number of operators on duty. The average time to answer a call was automatically recorded and a snap-reading method of observation was used to determine the proportion of total time during which operators had no work and hence the average time to deal with calls. These data were analyzed as a function of traffic-levels and discussed in relation to the mathematics of telephone exchanges.

T. G. I. R 6

12,700

Conrad, R. & Hille, Barbara A. THE TIMING OF SIGNALS IN SKILL. A.P.U. 227/54, Dec. 1954, 10pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,700

To explore some aspects of timing as related to skilled performance, a complex sensori-motor task was used in which a multi-dial display presented signals for response at approximately random time intervals. Subjects were tested under two conditions: 1) an operator control for changing the interval between each pair of signals and 2) no control but with signal rate adjusted to performance rate under condition one but with the inherent temporal structure unchanged. The two resulting distributions of the interval between signals were compared for effects of controlled timing. Performance scores were analyzed similarly. Drawing on the results the role of timing in skill is discussed.

G. R 9

12,701

Miller, J.W. STUDY OF VISUAL ACUITY DURING THE OCULAR PURSUIT OF MOVING TEST OBJECTS. II. EFFECTS OF DIRECTION OF MOVEMENT, RELATIVE MOVEMENT, AND ILLUMINATION. J. Opt. Soc. Amer., Nov. 1958, 48(11), 803-808. (USN School of Aviation Medicine, Naval Air Station, Fla.).

12,701

To determine whether visual acuity deteriorates when the test object is moved in a vertical plane the visual acuity of nine subjects was tested with the object moving in a vertical, then in a horizontal plane. The apparatus used (Landolt rings in apparent movement produced by an apparatus incorporating a rotating mirror) is fully described in a previous article. Results are plotted in terms of mean dynamic visual acuity obtained for vertical and for horizontal planes. Differences between the two are discussed. The research was extended to investigate the effect of rotating the observer in a modified Link Trainer. A semiempirical equation is presented which describes the three types of movement. The effect of changes in illumination also were investigated and results related to data on effect of angular velocity.

T. G. R 9

12,703

Clarke, N.P., Zuidema, G.D. & Prine, J.R. STUDIES OF THE PROTECTIVE QUALITIES OF CLOTHING AGAINST THERMAL RADIATION. Proj. 631., Task 63352, WADC TR 58 578, Nov. 1958, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,703

To study fabric characteristics that might serve as protection against thermal radiation, twelve fabrics were selected so that the following characteristics could be studied: color, weight, composition, and use of flame retardant agents. Samples of the materials were used to cover the experimental animals as they were exposed to thermal energy from a carbon arc lamp, for three or ten seconds. Both pulse wave and square wave delivery of energy were used. Protection was measured by 1) gross examination and classification of burns and 2) subsequent microscopic examination. Comparisons were made on the basis of all the above variables. A method of mathematical summation of the physical characteristics of fabrics to predict their protective character is proposed.

T. G. I. R 9

12,704
Durfee, J.R. THE ADVANCE IN AIR SAFETY. May 1958, 30pp. Civil Aeronautics Board, Washington, D.C.

12,704
This booklet presents a summary of the problems in air traffic and the regulatory activity that deals with them. The obligations of the Civil Aeronautics Board in protecting the safety of aircraft in flight through the development of regulations is set forth. Increases in air traffic since 1943 are portrayed graphically and summary treatment of near misses and collisions in civil flying is presented. The question of how much regulation is needed to meet safety requirements is discussed. Progress in terms of safety of passengers and crew members is portrayed.
T. G.

12,705
Chiles, W.D. EFFECTS OF SHOCK-INDUCED STRESS ON VERBAL PERFORMANCE. Proj. 7193, Task 71612, MADC-TR 58 117, June 1958, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio

12,705
To determine the effects of electric shock on the learning of two types of verbal tasks (a high degree of association or no association between stimulus and response) 54 subjects were tested, 30 of them under experimental anxiety (shock) and 24 under a non-shock (buzzer) condition. The shock and buzzer were presented in connection with a reaction time test performed between trials on the learning task; 48 trials were given to each group. After the completion of the basic experiment MAS (Manifest Anxiety Scale) scores were obtained for 18 subjects from each group. The implications of the results for behavior theory as well as their relationship to the experimental use of test-measured anxiety are discussed.
T. G. R 7

12,706
Carterette, E.C. MESSAGE REPETITION AND RECEIVER CONFIRMATION OF MESSAGES IN NOISE. J. acoust. S. Amer. Sept. 1958, 30(9), 846-855. (Department of Psychology, Indiana University).

12,706
A mathematical description is given for the communication situation where messages are sent repeatedly to a receiver who is required to record and confirm them under a criterion. A simple stochastic model assumes that the probability of confirmation is constant over a sequence and a formula is derived for the expected number confirmed after the first n presentations. Experimental tests involved receivers listening under two noise conditions to sets of several hundred messages each. Each message was repeated until confirmed. The data were analyzed for agreement with predictions from the theory.
T. G. R 11

12,707
Carpenter, A. AN EXPERIMENT WITH THE PURSUITMETER TO DETERMINE THE EFFECT OF DIFFERENT WEIGHT LOADS. A.P.U. 40, March 1946, 15pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,707
To determine whether there was a definite weight load beyond which further loading would cause a marked decrease in accuracy of performance on the pursuit-meter, loads from two to forty pounds were investigated. Five inexperienced subjects were given practice sessions at each weight load preceding test periods on five consecutive days. Each subject performed three spells (three minutes each) on each of the load conditions each day. The performance data (total mis-alignment) were analyzed for effect of practice and effect of handle load. The results are interpreted in terms of maximum permissible load and the treatment of practice effects when using the equipment for experimentation on heat stress.
T. G.

12,708
The Institution of Mechanical Engineers. RESEARCH IN AUTOMOBILE STABILITY AND CONTROL AND IN TYRE PERFORMANCE. 1956, 111pp. The Institution of Mechanical Engineers, England.

12,708
This volume consists of a series of progress reports on an experimental and analytical investigation of the fixed-control directional characteristics of automobiles, and those mechanical properties of tires used in the analysis of car stability and control. Aeronautical and control-theory techniques are used in deriving and substantiating equations of motion for the automobile. In addition, a six-component tire-testing machine for static and dynamic tests on flat road surfaces is described. An introductory paper presents the historical background of technological progress in automobile handling and the specific objectives of the research program.
T. C. I. R 190

12,709
Byford, G.H. THE DISTRIBUTION AND ACCURACY OF 'g' IN A HUMAN CENTRIFUGE. F.P.R.C./Memo 97, Sept. 1958, 54pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

12,709
The errors encountered in the production and measurement of "g" forces in a human centrifuge are examined from the point of view of the definition of the basic unit "g" (the force at a point in terms of the "standard terrestrial unit-g"), and of the spatial distribution of forces within the car. Theoretical equations are developed for this distribution and specific evaluations made for absolute and percent errors in the Royal Air Force Institute of Aviation Medicine centrifuge. The theoretical results are confirmed by measurements, and an analysis made of the centrifuge under normal operating conditions. It is suggested that standardized measurement techniques could be adopted.
T. G. I. R 5

12,710
Burns, W. REPORT OF A VISIT TO THE FIFTH MEETING OF THE ARMED FORCES-NATIONAL RESEARCH COUNCIL COMMITTEE FOR HEARING AND BIOACOUSTICS, WASHINGTON, OCTOBER, 1957. R.N.P. 58/932, No. S 9, Dec. 1958, 28pp. Royal Naval Personnel Research Committee, MRC, London, England.

12,710
A summary report of a visit to the fifth meeting. Armed Forces-National Research Council Committee on Hearing and Bioacoustics (CHABA) is presented. The proceedings of the meeting are given with summaries of important papers, such as one on the effect of high intensity noise on naval personnel, problems encountered in establishment of a hearing conservation program, and cutaneous communication possibilities. Personal discussions held by the author with various men at the meeting are reported along with an evaluation of the benefits derived from attendance at the meeting.
R 9

12,711
Burke, T.G. PROJECT FOUR WHEELS. RADC TR 58-37, March 1958, 35pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

12,711
Project Four Wheels is a series of highly mobile, air transportable communications and navigational facilities, developed for Airways and Air Communications Service, to support air operations under emergency or austere conditions. The various facilities, which have been operationally tested and accepted, are discussed in this report. The major components of each facility are listed in the appendix.
T. I.

12,712

Brown, M.K. STRESS SENSATION IN FLIGHT. VII. EFFECT OF THE DEGREE OF FILLING OF THE STOMACH ON TOLERANCE TO ACCELERATION. FPM:1057, Sept. 1958, 5pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

12,712

To investigate the mechanical effects of distension of the stomach on tolerance to accelerative forces, six experienced subjects were tested on the human centrifuge. Tolerance to acceleration was measured by the threshold at which central light loss occurred with the dark adapted eye. Thresholds were determined first with the stomach empty and immediately after drinking as much water as possible within a five minute period. Intra-abdominal pressure was recorded for three of the subjects. The data were analyzed for changes due to distension of stomach. The relationship between increased protection afforded by a full stomach and increased intra-abdominal pressure is discussed.

T. G. R 11

12,713

Black, J.W. THE RELATIONSHIP BETWEEN THE FREQUENCY SPECTRUM OF SPEECH AND SCORES YIELDED BY MULTIPLE-CHOICE INTELLIGIBILITY TESTS. OSU Res. Foundation Contract N6 ONR 22525, Proj. NR 145 993 & USN School of Aviation Medicine Joint Proj. NM 18 02 99, Subtask 1, Rep. 81, Aug. 1958, 12pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,713

Procedures developed by Fletcher and by French and Steinburg for determining equally contributing bands of frequencies to intelligibility were applied to multiple-choice and to monosyllabic intelligibility tests. The same system including both talkers and listeners were involved. The responsiveness of the two types of materials to frequency bands and to changes in signal level in quiet is analyzed.

T. G. R 6

12,714

Black, J.W. THE RECEPTION OF MESSAGES OF DIFFERENT LENGTHS. OSU Res. Foundation Contract N6 ONR 22525, Proj. NR 145 993 & USN School of Aviation Medicine, Joint Proj. NM 18 02 99, Subtask 1, Rep. 79, Aug. 1958, 6pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,714

To test the successes and failures that individuals have with sentences of various lengths, listeners heard sentences of 3, 5, 7, 9, 11, 13, 15, and 17 words. Immediately after hearing the sentence either of two tasks was accomplished: answering factual questions based on the sentence or writing the last three words of each sentence. The listening occurred in one of five acoustic conditions, from "quiet" to four decibels signal/noise ratio. There were eight groups of 48 listeners. The data were studied by analysis of variance for effects of sentence length, noise, and subjects.

T. R 1

12,715

Black, J.W. THE READING OF MESSAGES OF DIFFERENT TYPES AND NUMBERS OF SYLLABLES UNDER CONDITIONS OF DELAYED SIDE-TONE. OSU Res. Foundation Contract N6 ONR 22525, Proj. NR 145 993 & USN School of Aviation Medicine, Joint Proj. NM 18 02 99, Subtask 1, Rep. 78, Aug. 1958, 11pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,715

To study the relative influence of delayed side-tone upon rate of reading when forms of the stimulus material were systematically varied (order of consonants and vowels in syllables, number of sounds in syllables, and number of phonemes), each of 24 speakers read a set of phrases under 12 conditions of delayed side-tone ranging from zero delay to 0.30-second delay. The duration of the oral phrase was measured. The data were treated by analysis of variance for effect of order of sounds, length of syllable, and number of phonemes.

T. G. R 4

12,716

Black, J.W. A RELATIONSHIP AMONG FUNDAMENTAL FREQUENCY, VOCAL SOUND PRESSURE, AND RATE OF SPEAKING. OSU Res. Foundation Contract N6 ONR 22525, Proj. NR 145 993 & USN School of Aviation Medicine, Joint Proj. NM 18 02 99, Subtask 1, Rep. 77, Aug. 1958, 6pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,716

To investigate the effect of increased sound pressure level of talking on the fundamental frequency and rate of talking, two males who were capable of reaching specified soft and loud vocal levels (spanning 30 decibels) practiced and recorded three vowels and three phrases: 1) under directions to read the material naturally, 2) the same, while wearing sound attenuation earmuffs, and 3) at each of four specified levels, from soft to loud. Five sets of values were obtained (relative sound pressure levels of vowels and of phrases, fundamental frequency of the same, and duration of phrases) and studied by analyses of variance techniques.

T.

12,717

Howett, G.L. & Graham, C.H. TRANSFORMATIONS OF TRICROMATIC COORDINATES IN COLORIMETRY. May 1957, 34pp. Psychological Lab., Columbia University.

12,717

This paper furnishes colorimetrists and color theorists with explicit formulas for the conversion of trichromatic coordinates from one system of color primaries to another. The article is so designed that it may be used as a "manual". A summary of necessary notations and equations is followed by sections devoted to changes in luminous units of the primaries, changes in the primaries, and dichromatic coordinates.

R 13

12,718

Hodell, C.K. & Rosner, A.H. EJECTION SEAT TESTS CONDUCTED ON THE 10,000 FOOT AERODYNAMIC RESEARCH TRACK AT EDWARDS AIR FORCE BASE. Proj. NR 1362, WADC TR 52 63, Nov. 1957, 71pp. USAF Aircraft Lab., Wright-Patterson AFB, Ohio.

12,718

Ejection seat tests were conducted from rocket-propelled test carriages on the 10,000 foot Free Air Test Facility Aerodynamic Research Track, Edwards Air Force Base. Limit aircraft speed for emergency escape utilizing current ejection seat-catapult combinations was investigated. Ejection seat trajectory and acceleration data applicable to aircraft flying at or near sonic speed were secured. Discrepancy of data obtained "in flight", theoretically, and from the Aerodynamic Track rocket carried are discussed.

T. G. R 3

12,719

Henneman, R.H. CONDITIONS INFLUENCING CHOICE BEHAVIOR IN MULTIPLE TASK SITUATIONS. FOURTH ANNUAL REPORT. Contract DA 49 007 MD 537, Jan. 1958, 13pp. Psychological Laboratory, University of Virginia.

12,719

This progress report covers research accomplished during 1957 in three project areas, all concerned with the perceptual and decision-making capacities of the human operator. One set of experiments has related to conditions determining proficiency of performance on complex tasks, another group has been concerned with the effect on speed and accuracy of perceptual judgment of "noise", "clutter", or other extraneous data, not related to the observer's task; and finally other experiments have been accomplished on choice behavior in simple situations. Plans for future research are stated.

12,720

Hegernald, J.F., Jr. & Blockley, W.V. SURVIVABLE SUPERSONIC EJECTION. A CASE STUDY TO CORRELATE ANALYTICAL, EXPERIMENTAL, AND MEDICAL DATA BY RECONSTRUCTION OF AN INCIDENT. AN INTERIM REPORT PRESENTED ON APRIL 17, 1956, AT THE 27TH ANNUAL MEETING OF THE AERO MEDICAL ASSOCIATION, CHICAGO, ILLINOIS. Rep. MA-56-452, April 1956, 18pp. Human Factors Group, Engrg. Department, North American Aviation, Inc., Los Angeles, Calif.

12,720

The case of a pilot who survived ejection at supersonic speed is related. The data obtained from this case were used in a program of ejection tests to obtain force-time history. Four sled ejections, using an anthropometric dummy, were studied with respect to aerodynamic pressure, maximum acceleration forces imposed on the dummy at center of gravity, duration of period of maximal acceleration, and direction of application of peak force. The medical findings of the pilot were related to the force-time history. The findings are discussed in relation to improved design of ejection equipment. T. G. I.

12,721

Riggs, L.A. HUMAN RETINAL RESPONSES. *Ann. N.Y. Acad. Sci.*, Nov. 1958, 74(2), 372-376. (Dept. of Psychology, Brown University).

12,721

This paper indicates the difficulties and limitations of obtaining electrical records of human retinal responses and describes progress that has been made in overcoming them. The technique of sealing a metallic electrode to plastic contact lens for recording response is discussed. The form of the response thus obtained is discussed briefly. Methods of obtaining photopic responses through the use of flickering light, red light, and flashes of brief duration are mentioned. R 36

12,722

Rahn, W.E., Jr., Strother, W.F., Lucchini, G. & Gulick, W.L. THE EFFECTS OF AIR PRESSURE ON THE EAR. *Ann. Otolaryng. Rhinology and Laryngology*, March 1958, 67(1), 170-177. (Psychological Laboratory, Princeton University).

12,722

To test the hypothesis that altered air pressure in the external meatus or the middle ear cavity affects sound transmission mainly by changing the tension characteristics of the tympanic membrane, pressure changes were introduced simultaneously into both the external meatus and the middle ear. The cochlear response, used as an index of sound transmission, was recorded from each of 15 cats for each of several frequencies (from 100 to 10,000 cycles per second) for both positive and negative pressures (from four to twenty inches of water). The data analyzed graphically and compared to previous findings (12,724) where pressure change was introduced only into the external meatus. G. I. R 3

12,723

Rahn, W.E., Jr., Strother, W.F. & Gulick, W.L. THE STABILITY OF THE COCHLEAR RESPONSE THROUGH TIME. *Ann. Otolaryng. Rhinology and Laryngology*, Dec. 1958, 67(4), 972-977. (Psychological Lab., Princeton University).

12,723

To determine the stability of the cochlear response through time, electrophysiological techniques were used on two groups of cats. In one group the procedure for maintaining experimental preparations involved only the regulation of room temperature (84 degrees Fahrenheit), in the other attempts were made to maintain each preparation in as constant a physiological state as possible. The stimulus was a 1000 cycle tone with cochlear potentials picked up from the round window membrane, amplified and measured with a wave analyzer. Recording continued over a period of 85 hours or death. Changes in magnitude of response were analyzed with reference to the initial level established at onset of stimulus. G. R 4

12,724

Rahn, W.E., Jr., Strother, W.F. & Crump, J.F. THE EFFECTS OF PRESSURE IN THE EXTERNAL AUDITORY MEATUS. *Ann. Otolaryng. Rhinology and Laryngology*, Sept. 1956, 65(3), 656-664. (Princeton Psychological Lab., Princeton University).

12,724

In this experiment the effects of pressure in the external auditory meatus was investigated with cats as experimental animals and the cochlear potentials as an index of auditory reaction. Positive pressure was introduced by a rubber bulb (0 to 24 inches of water) and negative pressures produced by a syringe. Tonal stimuli ranged from a frequency of 100 to 10,000 cycles with intensity of each tone adjusted initially to give a response of 50 microvolts for zero value of pressure; some value of positive or negative pressure was then applied, and the altered magnitude of cochlear response observed. The results are shown graphically and are discussed in terms of probable physiological effects of pressure on the tympanic membrane. G. R 11

12,725

Harris, C.M. RESIDUAL MASKING AT LOW FREQUENCIES. Contract AF 33(616) 2454, Proj. 7210, Task 71700, WADC TN 58 221, Nov. 1958, 47pp. *USAF Aero Medical Lab.*, Wright-Patterson AFB, Ohio. (Columbia University).

12,725

Short duration auditory fatigue has been termed "residual masking" and is characterized by a shift in threshold of hearing following cessation of a masking noise. Residual masking was determined in the low frequency range (130 to 1000 cycles per second) for three subjects. Masking tones of 250 cycles and sound pressure levels of 90 and 110 decibels were used and thresholds determined at 150 and 200 milliseconds following cessation of noise. Curves of residual masking versus frequency (masking patterns) were constructed. The free-field threshold of hearing (binaural listening) was also measured between 130 and 1000 cycles. Auditory activity patterns were computed and the loudness of the pure tone masking source was evaluated. T. G. I. R 3

12,726

Gibbs, C.B. A NEW INDICATOR OF MACHINE TOOL TRAVEL. *APU-177/52*, July 1952, 10pp. *Applied Psychology Research Unit*, MRC, Cambridge, England.

12,726

A new type of quantitative visual indicator was designed to give an accurate and easily read display of a wide range of machine settings. The characteristics of the indicator are those required in a large variety of industrial instruments such as aircraft altimeters, or instruments used to measure travel of machine tools, thickness of rolled metal, and the like. A series of experiments was conducted comparing performance with the use of the new indicator and the conventional dial. Both skilled and unskilled operators using the new indicator were tested for learning effects. I. R 1

12,727

Folley, J.D., Jr. & Altman, J.W. GUIDE TO DESIGN OF ELECTRONIC EQUIPMENT FOR MAINTAINABILITY. *RADC Proj. 7502*, WADC Task 71502, WADC-TR 56 218, April 1956, 174pp. *USAF Aero Medical Lab.*, Wright-Patterson AFB, Ohio.

12,727

A major problem faced by the military services is effective maintenance of complex electronic equipments despite shortages of highly skilled maintenance technicians. This guide is intended to alleviate this problem by recommending design practices that will maximize the ease with which electronic equipments can be maintained. Factors to be considered in planning for maintainability are reviewed briefly. A schedule of steps to be taken in designing a maintainable system is presented. Specific characteristics are recommended for equipment and maintenance procedures. G. I. R 11

12,728
 Enoch, J.M. & Wild, S. A STUDY OF VISUAL SEARCH ON
 OBLIQUE AERIAL PHOTOGRAPHS. HUMAN ASPECTS OF PHOTO-
 GRAPHIC INTERPRETATION. Contract AF 30(602) 1580,
 OSURF Proj. 696, MCHL T.P. (696) 7 263, Oct. 1957,
 26pp. Mapping and Charting Research Lab., Ohio State
 University Research Foundation.

12,728
 To determine if unique search procedures are em-
 ployed by trained photo-interpreters in examining obli-
 que (graded scale) photographs, visual search patterns
 of three trained subjects were studied by ophthalmogra-
 phic techniques. A series of four oblique aerial photo-
 graphs were searched for specific critical details
 (either existent or non-existent) for a 30-second period.
 Each photograph was graded for variation of scale. Eye
 movement patterns, duration of eye fixations and linear
 extent of eye movements were analyzed and compared with
 earlier data obtained from viewing vertical (ungraded)
 photographs. The effect of scale on interfixation dis-
 tances and duration of fixation were examined. Practical
 implications of the results were discussed.
 G. I. R 3

12,729
 Duffus, H.B. (Chm.). AMERICAN STANDARD METHOD OF
 RECORDING AND MEASURING WORK INJURY EXPERIENCE. Rep.
 Z16.1 1954, UDC 313.1, Dec. 1954, 15pp. American
 Standards Association, Incorporated, New York, N.Y.

12,729
 This standard provides a practical and uniform meth-
 od for recording and measuring work injury experience.
 Injury rates compiled in accordance with the standard may
 be used to evaluate 1) the relative need for accident
 prevention activities in different departments of an es-
 tablishment, 2) the seriousness of the accident problem
 in an establishment industry, 3) the effectiveness of
 safety activities in establishment of comparable hazards
 and 4) the progress made in accident prevention within
 an establishment or industry. The various parts are def-
 initions, evaluations of severity, exposure, measures of
 injury experience, and classification of special cases.
 T. I.

12,730
 Davis, H. (Chm.). AMERICAN STANDARD SPECIFICATION FOR
 PURE-TONE AUDIOMETERS FOR SCREENING PURPOSES. Rep. Z24.
 12 1952, Aug. 1952, 11pp. American Standards Associa-
 tion, Incorporated, New York, N.Y.

12,730
 This American Standard comprises a part of a group
 of definitions, standards, and specifications for use in
 acoustical work. The audiometer covered here is a device
 designed to assign persons to groups according to their
 auditory sensitivity. It is not intended that medical
 diagnosis should be based on screening procedures. There
 is a section of the report devoted to definitions and one
 to the requirements.
 T. G. I. R 5

12,731
 Davis, D.R. VII. EMOTIONAL DISTURBANCES AND BEHAVIOUR-
 AL REACTIONS. Spec. Rep. Series 275, 1951, 18pp.
 Medical Research Council, London, England.

12,731
 To determine whether some of the common symptoms of
 undernutrition (insomnia, breathlessness, excessive sweat-
 ing, giddiness, exaggeration of tendon reflex, fatigue,
 reduction of sexual activity) exhibited by several groups
 of subjects were primarily the results of physical dietary
 deficiency or part of a behavioral reaction to external
 circumstances, both clinical and statistical data were
 gathered. The subjects were 1) German civilians applying
 for extra rations on account of hunger, oedema, or loss of
 weight, 2) prisoners of war repatriated from Russia, and
 3) a representative sample of factory workers and staff.
 Causes of the symptoms are discussed.
 T. R 23

12,732
 Davis, H. (Chm.). AMERICAN STANDARD SPECIFICATION FOR
 SPEECH AUDIOMETERS. Rep. Z24.13 1953, July 1953, 11pp.
 American Standards Association, Incorporated, New York,
 N.Y.

12,732
 The apparatus for delivering speech tests to the
 listener is dealt with in this standard specification.
 Definitions and requirements of a speech audiometer for
 diagnostic purposes, intended for testing one individual
 at a time, are set forth.
 G. R 2

12,733
 Carpenter, A. THE EFFECT OF AIR MOVEMENT ON THE PUR-
 SUITMETER TEST AT HIGH ROOM TEMPERATURES. A PRELIMINARY
 EXPERIMENT. MRC 47/397, APU 66, June 1947, 13pp.
 Applied Psychology Research Unit, MRC, Cambridge, England.

12,733
 To investigate the effect of air movement and
 high temperatures on performance of the pursuit meter
 test, nine subjects were studied under nine conditions.
 Three temperature conditions (80/70, 90/80, 100/90;
 on the dry bulb/wet bulb scale) and three degrees of
 air movement (40, 100, and 250 feet per minute) were
 used in all combinations. Each subject performed nine
 three-minute runs with a handle load of 24 pounds per
 condition. Error scores were analyzed for environmen-
 tal effects and for practice effects. Physiological
 measurements of weight loss and rectal temperature
 changes during the 2-3/4 hours stay in the hot room were
 also analyzed. The usefulness of the "effective tempera-
 ture" index is discussed.
 T. G. R 6

12,734
 Carpenter, A. REPEATING THE A.H.4 TEST IN THE HOT
 ROOM. MRC 47/396, APU 65, May 1947, 5pp. Applied
 Psychology Research Unit, MRC, Cambridge, England.

12,734
 To investigate the effect of high temperatures on
 performance of a written intelligence test, the A.H.4,
 nine subjects were acclimatized and then tested under
 three temperature conditions (80/70, 90/80, and 100/90
 on the dry bulb/wet bulb scale) and three degrees of air
 movement (40, 100 and 250 feet/minute). Each subject
 performed the test under each of the nine conditions in
 an order that insured all temperature and air movement
 conditions were represented at each stage of practice
 sequence. The test scores were analyzed for effects of
 environmental conditions, and the effects of practice.
 T. G. R 7

12,735
 Carpenter, A. A COMPARISON OF THE EFFECTS OF HANDLE
 LOAD AND OF UNFAVOURABLE ATMOSPHERIC CONDITIONS ON THE
 PERFORMANCE OF THE PURSUITMETER TEST. RNP 47/361,
 HS 182, APU 60, 1947, 12pp. Applied Psychology Research
 Unit, MRC, Cambridge, England.

12,735
 To compare the effects of handle load and high atmos-
 pheric temperatures on pursuitmeter performance, twelve
 subjects were tested on four different days. The exper-
 imental variables were six handle loads (from two to forty
 pounds) and four room temperatures (from 85/75 to
 100/90 - dry bulb/wet bulb, in degrees Fahrenheit, and
 air velocity 100 feet/minute). Each test period consist-
 ed of three test spells of three minutes duration on each
 weight. Tracking errors were analyzed to evaluate the
 significance of each source of variance and their inter-
 actions.
 T. G. R 6

12,736
 Craik, K.J.W. & Macpherson, S.J. THE EFFECT OF CERTAIN OPERATING CONDITIONS ON THE VISIBILITY OF P.P.I. RADAR ECHOES. APU 16/45, March 1945, 10pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,736
 To investigate some factors affecting echo-visibility on a Plan Position Indicator (PPI) display, synthetic electronic equipment in which an artificial "echo" was injected against a background of thermal noise was used. The factors investigated were 1) distance of eyes from screen; 2) intensity of external illumination; 3) use of admiralty pattern illuminated scales with amber filters; 4) amber filters alone and with varying grids; 5) duration of watch period (separately reported, see 12,681); 6) pulse-width; and 7) angular distance of echo from line of sight of operator. Threshold determinations were made on different groups (ten to twelve subjects each) and analyzed for effects of these variables.
 T. G. I.

12,737
 Craik, K.J.W. & Vince, M.A. A NOTE ON THE DESIGN AND MANIPULATION OF INSTRUMENT KNOBS. MRC 45/272, APU 14, Jan. 1945, 9pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,737
 To determine the degree of improvement which can be obtained by "muscular bracketing" of the halving technique in making manual settings, subjects were instructed to turn a knob until a cross-bar on a pointer appeared first above and then below a screen and then to attempt to divide this interval by "feel". Variables investigated were knob size, knob position, method of turning the knob, and size of "dead-zone". Errors in halving the dead-zone were analyzed with a view to defining optimum sizes, gear-ratios, and positions of instrument knobs for such manipulations.
 G. I.

12,738
 Craik, K.J.W. & Macpherson, S.J. MEASUREMENT OF PARA-FOVEAL FIXATION AT LOW BRIGHTNESSES. MRC 46/271, APU 11, May 1944, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,738
 A method of measuring the degree to which observers fixate objects parafoveally at low illuminations is described. A bright point-source of light is flashed in the center of the object that the subject is trying to see against a dim background so that a positive after-image is formed on that part of the retina; the subject is then asked to fixate a red dot in the center of the target and to report the position of his after-image on the target. The mean angle of parafoveal fixation was measured for 12 Royal Air Force personnel trained in night vision and for 18 untrained men.
 G. I. R 3

12,739
 Craik, K.J.W. THEORY OF THE HUMAN OPERATOR IN CONTROL SYSTEMS. II. MAN AS AN ELEMENT IN A CONTROL SYSTEM. APU 64, 1945, 6pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,739
 As an element in a control system a man may be regarded as a chain consisting of the following items: 1) sensory devices; 2) a computing system; 3) an amplifying system and 4) mechanical linkages. To show the advantages and disadvantages of the human operator as compared with an automatic system, it is necessary to discover in detail the characteristics of this human chain. Some of the techniques available for such study are discussed and an analysis presented of the first two steps in the chain of response--the sense organ and the computing system.
 G. I. R 2

12,740
 Carpenter, A. AUDITORY MASKING BY VERY LOW FREQUENCIES. AFU 253/57, Sept. 1957, 24pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,740
 To investigate auditory masking by stimuli below 100 cycles per second (cps) in frequency, measurements were made on three groups of subjects. In the first, one highly trained subject was used to obtain fairly extensive mapping of the extent of masking produced by four different masking tones (30, 40, 50, and 80 cps). In the second, two groups of untrained subjects were used to confirm the first results. With one group the masking frequency was 40 cps, and with another it was 95 cps. In the third part, untrained subjects were again used with a masking signal of 40 and test signal of 95 cps. There is some discussion of the practical importance of these low frequency sounds for conveying information.
 T. G. I. R 15

12,741
 Creelman, J.A. COCKPIT DESIGN PROBLEMS OF TRAINING COMMAND AIRCRAFT. PART I: T34 AND T28 DIFFERENCES AS REPORTED BY TRANSITIONING STUDENTS. Spec. Rep. 56 34, Dec. 1956, 6pp. USN School of Aviation Medicine, Naval Air Station, F13.

12,741
 To determine sources of difficulty arising from design and layout of cockpit, 121 flight students, who were undergoing transition from the T34 to the T28 aircraft, were given a questionnaire. The questions were designed to elicit comparisons between instrument and control location, accessibility, and legibility on the two types of aircraft. The comments were divided into two general categories: those pertaining to visual presentations and those related to location of controls, handles, and switches. The analyses are presented in tabular form and recommendations based upon the findings are made.
 T.

12,742
 Confalone, J.L. FINAL ENGINEERING REPORT ON RESEARCH, DEVELOPMENT, AND FABRICATION OF HIGH-FREQUENCY HOMING GROUP AN/ARA-36(XA-1). Contract AF 33(600)26796, Rep. 3202-1, July 1957, 140pp. Airborne Instruments Laboratory, Inc., Mineola, N.Y.

12,742
 This report presents a discussion of the research, development, and flight tests of an engineering model of the AN/ARA-36 (XA-1) homing group and a discussion of the fabrication of four final design models of this equipment. The homing group is an adaptor used with an H-F communications receiver to provide a right-left homing system for use on cargo-type aircraft. It enables the pilot to home on a transmitting station emitting vertically polarized signals. The information is presented to the pilot as an aural keyed signal from which he can determine whether he is flying toward, to the right, or to the left of the transmitting station.
 G. I. R 10

12,743
 Bond, G.W., Gale, K.S., Haake, J.W. & Moore, C.J. STUDIES AND INVESTIGATION OF AIR TRAFFIC CONTROL SYSTEMS. FINAL REPORT. JANUARY 10, 1957 TO JANUARY 9, 1959. ANDB Proj. ANDB/ARMY 14.3, SC Contract DA-36 039 SC 73104; Jan. 1958, 31pp. Armour Research Foundation of Illinois Institute of Technology.

12,743
 To improve methods for the analysis and evaluation of air traffic control systems, an enroute air traffic control system was postulated, and analyzed by simulation techniques to determine its response to expected 1965 traffic demand. Graphical simulation was used to evaluate four alternative traffic control procedures. A digital computer program for simulating airway traffic control was developed and the results compared with those obtained by graphical simulation.
 T. I.

12,744

Wendelstam, L. & Sjöqvist, A. (Eds.). **GENERAL SYSTEMS. YEARBOOK OF THE SOCIETY FOR THE ADVANCEMENT OF GENERAL SYSTEMS THEORY. VOLUME I. 1954, 162pp.** American Association for the Advancement of Science, Washington, D.C.

12,744

This publication contains a collection of 15 writings, most of which have been published elsewhere, selected for their pertinency to the development of theories of generalized systems and arranged in compact form and orderly sequence. The first section is devoted to introductory papers on general system theory. This second section is concerned with the exploration of mathematical models in the social sciences. The articles in the third part call attention to some unusual "tools of integration" such as cybernetics, qualitative mathematics as applied to biology, and a biological approach to the potentialities of human behavior.
T. G. 1. 2 300

12,745

Wendelstam, L. & Sjöqvist, A. (Eds.). **GENERAL SYSTEMS. YEARBOOK OF THE SOCIETY FOR GENERAL SYSTEMS THEORY. VOLUME II. 1957, 162pp.** American Association for the Advancement of Science, Washington, D.C. (University of Southern California & Mental Health Research Institute, University of Michigan).

12,745

This yearbook consists of 12 papers concerned with some aspect of systems theory. Various forms of reference are represented—mathematical deduction to the more philosophical and speculative. Following an introductory paper that sets forth the philosophy of general systems, the papers are grouped under the following headings: gross principles of system behavior, gross principles of mass behavior, structural units of behavior, and systems approach in psychology.
T. G. 1. 2 300 (approx.)

12,746

Erasmant, D.E. **NOISE AND BEHAVIOR. APU 293/57, 1957, 4pp.** Applied Psychology Research Unit, MCC, Cambridge, England.

12,746

Noise and behaviour are discussed in regard to findings from three types of psychological experiments. First, studies of hearing loss due to noise are treated and their practical importance pointed out. The frequencies and intensities of noise most liable to produce hearing loss and the question of "safe" noise levels are discussed. Secondly, results from studies on the way speech perception is affected by hearing losses in particular frequency bands are reviewed. And last, experiments on efficiency of work in noise are treated.
R 11

12,747

Bartlett, F.C. **THE TASK OF THE OPERATOR IN MACHINE WORK. APU 30/43, 1943, 7pp.** Applied Psychology Research Unit, MCC, Cambridge, England.

12,747

The task of the operator is defined in terms of displays that give a signal for action and controls that will give the desired results. Problems in each area are discussed briefly and some fact in each area, which have been experimentally determined, are listed. Under control, the following specific problems are considered: position, direction of movement, resistance to voluntary movement, speed of movement, radius of cranks, motor control and visual display, motor contrast and attenuation, and control and visual alignment. Display problems are: lighting, size of retinal image, brightness contrast, shape of object, general points in visual and auditory perception.

12,748

Barthel, C.J. (Ed.). **AMERICAN STANDARD METHOD FOR THE INTERFRED SEQUENCE CALIBRATION OF MICROPHONES. Rep. 22411-1954, Oct. 1954, 13pp.** American Standards Association, Incorporated, New York, N.Y.

12,748

This American standard comprises a part of a group of definitions, standards, and specifications for use in acoustical work. A standard method for obtaining the plane-wave, free-field calibration of a microphone through the use of laboratory standard pressure microphones is described. The standard defines necessary terms, specifies type of equipment and facilities needed, outlines procedures of measurement and the statistical tests to be used.
T. 1. 2 2

12,749

Anderson, R.O. **DESIGN FOR SPACE-VEHICLE CONTROL SYSTEM RELIABILITY. Proj. 1953-1954, AGC 14 58 156, April 1954, 18pp.** JSCF Flight Control Lab., Wright-Patterson AFB, Ohio.

12,749

This paper presents the results of an exploratory study to determine critical flight control system problem areas. The reliability of several manned and unmanned space vehicle attitude control systems was estimated using component reliability data gathered in an Air Force contract. Results show that reliability problems associated with space vehicle control systems are of major concern. Several promising design methods were analyzed to demonstrate the importance of design for space vehicle reliability and the need for more reliability analysis data.
T. G. 1. 2 7

12,750

Archibald, D. & Whitfield, J.K. **A STUDY OF REPETITION OF ACCIDENTS. APU 43, ca. '53, 15pp.** Applied Psychology Research Unit, MCC, Cambridge, England.

12,750

In a number of occupations at a Royal Ordnance Factory (Engineering) the accident records of individuals who had sustained two or more accidents over a five-month period were studied. Three major classifications were used for analysis: what the injured person was doing at the time of accident, body site of injury, and nature of injury. The data are studied in terms of probable factors in accident repetition and an indication is given of possible practical applications.
T.

12,751

Angvin, J.B.P. **AN EXPERIMENTAL CHART FEATURING SLOPES WITH OTHER AIDS TO AERONAUTICAL RADAR NAVIGATION, "M.C.R.L. XM-7-RAD, NORTHEASTERN RAMSES" ON SCALE 1:1,000,000. Contract AF 33(616) 2378, OSURF Proj. 595, Tech. Paper 205, Jan. 1957, 28pp.** Mapping and Charting Research Lab., Ohio State University Research Foundation.

12,751

This paper describes the salient features of design of a type of chart, to aid navigation by radar, in which all symbols simulate as nearly as possible the forms of return likely to be projected on the radarscope by the features on the ground which they represent. The thinking on the design and content of the chart is outlined. Lithographic prints of an experimental chart to their design are included as Annexes. Criteria for selection of the various elements of topography shown are discussed. A critical commentary gives pointers towards possible improvements and stresses the necessity for in-flight evaluation.

12,752

Agrell, J., Benoit, J., Bellard, A., Barrois, A., et al. BIBLIOGRAPHY OF AVIATION PSYCHOLOGY IN WESTERN EUROPE. 1930 - 1957. 31pp. British Aerospace Association for Aviation Psychology. c/o US Office of Naval Research, London, England.

12,752

This bibliography includes only psychological publications directly connected to aviation. The period covered is from 1930-1957. The items are arranged alphabetically by author according to general topics or sub-topics as follows: general (theory and systems, methods and apparatus, tests, reference works, professional problems); physiological psychology (receptive and perceptual processes (vision, audition, etc.); response processes; complex processes (personality, thinking, etc.); aging); social psychology; personnel psychology (selection, placement); training (systems, criteria); psychiatry, clinical psychology, counseling; and miscellaneous applications (flight safety, environmental factors). R 450 (approx.)

12,753

Barve, J.S. EVALUATION OF DECISION MAKING PERFORMANCE ON THREE PERSONAL NAVIGATION DISPLAYS. Contract AF 33(616) 3743, Proj. 6130 71556, WDC 12 58 49, Nov. 1958, 43pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Martin Company, Baltimore, Md.).

12,753

A group of pilots and a group of non-pilots solved two representative types of navigation problems using three map-type navigation displays representing different movement relationships between an aircraft symbol and a ground station symbol. The displays (aircraft movement, earth movement, and mixed movement) were presented by a static projection technique, with verbal explanation of movement relationships. To solve each problem, a directional and a heading decision had to be made. A number of measures reflecting the speed and accuracy of these decisions were obtained and analyzed for differences due to type of subject, kind of display and type of problem. T. I. R 16

12,754

Horton, J.M. & Must, F.J. GAMING: A METHOD OF STUDYING SUBMARINE TACTICS. Tech. Rep. 411-HE-15, P58-071, Aug. 1958, 17pp. Electric Boat Div., General Dynamics Corporation, Groton, Conn.

12,754

This report describes a method of studying submarine tactics called operational gaming. A realistic game and the rules for playing were developed which provide for the making of trial-and-error decisions and permitting the players to exercise some skills and judgments similar to those in an actual situation. This type of game makes possible the observation of many elements of real or hypothetical situations not easily investigated by other means. The possibilities of the game as a training device are discussed. The body of the report has been written in the form of instructions given to the participants and umpires in the game which concerns the submarine anti-submarine barrier employing both conventional and nuclear-powered ships. T. I. R 3

12,755

Morrow, P.E., Mehrhof, E., Casarett, L.J. & Warken, D.A. A STUDY OF THE DEPOSITION OF A SUBMICRONIC AEROSOL IN HUMAN SUBJECTS. Contract W 7401 ENS 49, Rep. UR 504, Nov. 1957, 41pp. Atomic Energy Project, University of Rochester.

12,755

An inhalation study of seven normal human subjects while seated at rest was undertaken. Seventeen different experiments were performed in which the respiratory tract deposition of a submicronic dust (sodium chloride) was measured. A variety of parameters were used which included physiologic factors, such as tidal volume, respiratory frequency, mean respiratory flow rate, and a size distribution of the dust. A general description of the background of the study and a review of some of the more important studies of dust deposition and retention in man and laboratory animals are included. T. G. I. R 68

12,755

Miller, M., Riley, M.E., Bondurant, S. & Hiatt, E.P. THE DURATION OF TOLERANCE TO POSITIVE ACCELERATION. Proj. 7222, Task 11745, WDC 12 58 635, Nov. 1958, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,756

To investigate man's ability to withstand low magnitude positive accelerations (g) applied over relatively long periods of time, eight young males were studied. Each subject was accelerated at levels of 3.0, 3.5, 4.0, 4.5, and 5.0 g, which were maintained until terminated by 1) fatigue or blackout, 2) appearance of cardiac abnormalities of rate or rhythm upon the continuously recorded electrocardiograms, or 3) the attainment of a previously agreed upon time limit (up to one hour). One series of experiments was made without and one with the standard United States Air Force cutaway anti-g suit. A third series was run on five subjects at 6.0g. The duration of tolerance at each level of acceleration was tabulated and physical symptoms of the subjects discussed. T. R 10

12,757

Blackworth, N.H. HIGH INCENTIVES VERSUS HOT AND HUMID ATMOSPHERES IN A PHYSICAL EFFORT TASK. REP 376, MS 108, AFU 13, Aug. 1947, 18pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,757

To determine the extent to which the harassing effect of a given situation (hot and humid atmospheres) can be modified by altering the incentive, physical output was measured for 30 men working to complete exhaustion on an arm ergograph. Both preliminary practice and acclimatization to high room temperatures preceded the testing periods in six different Effective Temperatures (from 61 to 92 degrees Fahrenheit). Two levels of incentive were used on different days: high incentive (knowledge of results, praise and encouragement) and ordinary incentives (neither of the foregoing items). Average amount of work was analyzed for effect of temperatures, incentives and their interactions. The influence of ability levels was also analyzed. T. G. I. R 7

12,759

Mitchell, M.J.H. DIRECTION OF MOVEMENT OF MACHINE CONTROLS. IV. RIGHT OR LEFT HANDED PERFORMANCES IN A CONTINUOUS TASK. AFU 85/48, April 1948, 12pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,758

To examine the effect of the relationship between direction of movement of control and display on the accuracy with which either the right or the left hand performs a continuous task, 24 right-handed subjects were studied. Six control-display relationships were used; half the subjects performing each with the right hand and half with the left hand. Amount of error was measured in arbitrary units and actual errors of direction were calculated. The error data were analyzed for each control-display relationship and for each hand used. Previous work in this area is discussed in relation to the results and functional differences between the preferred and non-preferred hands are speculated upon. T. I. R 14

12,759

Blackworth, N.H. LOCAL COLD ACCLIMATIZATION IN MAN. Polar Res., Jan. 1956, 2(52), 13-21. APU 25.7/56. (Applied Psychology Research Unit, MRC, Cambridge, England.).

12,759

To determine what impairments of sensation are produced by the cold and whether these changes occur when men become acclimatized, two sensory mechanisms were investigated: the tactile two-point discrimination and the vibration threshold. Field tests were conducted during a winter period at Fort Churchill, Canada, on 30 men who had been stationed there for two winters; half the men were indoor and half outdoor workers. Measurements were made in a warm room and compared with those taken after six minutes in the cold. Follow-up studies were made in England, both in winter and summer months. The results are discussed in terms of acclimatization processes and the practical implications for survival in the cold. G. R 9

12,760
Mackworth, N.H. EFFECTS OF HEAT ON WIRELESS TELEGRAPHY OPERATORS HEARING AND RECORDING MORSE MESSAGES. APU 25, ca. 1947, 15pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,760
To determine the effect of hot and moist atmospheres on the accuracy of hearing and writing down morse messages, 11 trained and physically fit wireless operators were tested. Extensive additional practice and acclimatization periods were given in the hot room before testing. Five dry bulb/wet bulb temperatures (85/75, 90/65, 95/65, 100/60 and 105/55) with wind velocity of 100 feet per minute were used; the test period was three hours. The men wrote the morse messages heard on their headphones while seated at a table and dressed in gym shoes and tropical shorts. Rectal temperatures were measured before and after each test period. The test scores were analyzed in relation to both atmospheric and rectal temperature scores.
T. G. I. R 5

12,761
Mackworth, N.H. & Mackworth, J.F. TEMPORAL IRREGULARITY IN A MULTISOURCE TASK. APU 264/57, Sept. 1957, 16pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,761
In many situations decisions must be based on visual information obtained from a number of different sources. This report is one of a series of laboratory experiments devised to study the environmental variables involved. The experiment attempts to determine the effect of systematically altering the average speed at which decisions were being demanded. A multi-source task (from 4 to 12 channels) was used; the speeds were varied at an average rate of 12, 15, and 18 signals per minute; signal duration was varied; and the presence or absence of fixed comparison signals was manipulated. These variables were examined in a series of experiments. An index of "momentary speed" was devised to combine effects of average speed, density and duration of signals and used to analyze performance data. T. G. I. R 6

12,762
Massey, P.M.G. ACCLIMATIZATION TO COLD IN ANTARCTICA. APU 262/56, Oct. 1956, 40pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,762
This paper deals with two aspects of acclimatization to cold, skin sensitivity and increase of subcutaneous fat, which were investigated in 14 months of Antarctic residence. Two hundred finger numbing experiments to cold exposures were performed on twelve men divided into first-year and second-year groups. The finger was exposed to a cold breeze (outdoor temperatures), numbness (two-point discrimination threshold) and skin temperature recovery were measured. Fold thickness and body weight were measured on 30 subjects on 192 occasions. One group of men were at a sledging base, another (control) at static bases. These data were analyzed as a function of time. Some data on frostbite, nail growth, and oral temperatures are also reported.
T. G. I. R 51

12,763
Pokorovski, Prof. STUDY OF THE VITAL ACTIVITY OF ANIMALS DURING ROCKET FLIGHTS INTO THE UPPER ATMOSPHERE. Trans. 625, Jan. 1957, 6pp. Royal Aircraft Establishment, Farnborough, Hants, England.

12,763
In the first phase of this work, vital activity of the body at high altitudes has been observed in dogs carried in a hermetically sealed compartment in the nose of a rocket. Equipment carried in the compartment allowed observations to be made of the conditions and of the animal's behavior during flight and free fall of the cabin from the rocket. In a second phase, dogs in space suits were placed in an unsealed compartment. Ejection of the dogs and subsequent fall by parachute through the upper atmospheric layers took place. Conclusions are drawn as to the possibility of man flying by rocket to the upper atmospheres.

12,764
Gibbs, C.E. THE WORKER AND HIS TOOLS. APU 304/57, 1957, 6pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,764
The role of the psychologist in improving working tools and technologies is the thesis of this paper. The aims and objectives of this new field of psychology are defined. Some examples of the way in which this new field relates to engineering and industry are given. And, finally, what the approach may mean to psychology as such is considered.

12,765
Gray, C.H.G. (Chm.). AMERICAN STANDARD SOUND LEVEL METERS FOR MEASUREMENT OF NOISE AND OTHER SOUNDS. Rep. Z24.3 1944, IUC 601.88, July 1944, 11pp. American Standards Association, New York, N.Y.

12,765
This American Standard for Sound Level Meters comprises a part of a group of definitions, standards, and specifications for use in acoustical work. The standard was prepared to aid in promoting uniformity in meter measurements of various types of sounds. In addition to the definitions a series of appendices give the following: (1) response-frequency characteristics of sound level meters; (2) tests for root mean square addition; (3) calibration adjustment of individual sound level meter; (4) tolerances in response-frequency characteristic; and (5) correction of reading on specific noises.
T. G.

12,765
Hick, W.E. & Clarke, P. A NOTE ON THE POST-CONTRACTION PHENOMENON. APU 39, April 1946, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,766
To examine after-contractions that follow a sustained voluntary muscular contraction in situations which (1) favor their appearance and (2) largely inhibit them, subjects were required to apply forces of 0.0, 2.5, and 8.0 pounds on a handle mounted on a stiff spring and hold it constant for 15 seconds. Four sets of conditions were arranged during which the after-contraction was measured: (1) rest, (2) holding pointer at zero, (3) writing name backwards with left hand, and (4) gradual reduction of force exerted. Frequency of occurrence of after-contractions were examined for each condition. A tentative explanation of the phenomenon and its relation to performance in motor skills is given.
T.

12,767
Hodge, M.H. & Reid, L.S. THE INFLUENCE OF IRRELEVANT INFORMATION UPON COMPLEX VISUAL DISCRIMINATION. Contract DA 49 007 MD 537, SGO Tech. Rep. 537 58 2, ISA Research and Development Div., Office of The Surgeon General, Washington, D.C. (Psychological Lab., University of Virginia).

12,767
This report is the first of a series on investigation of the effect of introducing irrelevant information upon performance of a complex visual discrimination task. (The stimuli were complex geometrical patterns which had to be identified on the basis of various stimulus dimensions such as form, size, kind of markings, and so forth). Three variables were manipulated: kind of irrelevant information, amount of practice, and difficulty of the discrimination required. Latency and error analysis were performed on the data with conclusions given relative to the variables studied.
T. G. I. R 9

12,768
Hunter, S. CORRELATION OF HEART-BRAIN DISTANCE AND OF SITTING HEIGHT AGAINST POSITIVE ACCELERATION THRESHOLDS. FPRC 1048, April 1959, 3pp. Flying Personnel Research Committee, London, England. (Institute of Aviation Medicine, Farnborough, Hants, England.).

12,768
To find out if any simple relation exists between the blackout threshold for positive acceleration and 1) heart-brain distance and 2) sitting height, ten unprotected subjects carried out a total of 674 runs on a human centrifuge. The results are presented in the form of correlation coefficients and are discussed in some detail.
T. G. I. R 3

12,769

Kanaseian, M.K., Metzger, C.A. & Horns, F.A. OPERATION, INSPECTION AND MAINTENANCE PROCEDURES FOR CUSHION, SEAT, OXYGEN AND SURVIVAL EQUIPMENT. Proj. 6363, Task 63282, WADC TN 58-26, Feb. 1958, 60pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,769

This report was prepared to assist users in the operation, maintenance, and inspection of the cushion, seat, oxygen and survival equipment which has become known as the rigid survival kit. The information applies mainly to kits designed for aircraft equipped with upward ejection seats.

I. R 4

12,770

Hosworth, C.I. THE HUMAN EYE AS A DETECTOR OF THRESHOLD SIGNALS. FPRC 1028, April 1958, 4pp. Elving Perssonal Research Committee, London, England. (Institute of Experimental Psychology, University of Oxford, Oxford, England).

12,770

This brief paper discusses some characteristics of the visual sense which the author feels must be taken into account in the design of detection equipment. The extent to which the threshold can be changed by the use of instructions, warning signals, and other threshold stimuli is pointed out and the author stresses the need to devise methods of lowering the threshold without paying the price of an increase in the false alarm rate.

R 12

12,771

Jackson, Margaret M. PASSENGER OXYGEN REQUIREMENTS FOR JET TRANSPORT AIRCRAFT. Proj. 7160, Task 71811, WADC TN 57 183, May 1957, 7pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,771

A guide for computing the total amount of oxygen required for passengers on military and civilian jet transport aircraft is presented. The oxygen supply requirements are given for three oxygen systems: 100 per cent oxygen, normal oxygen, and continuous flow.

T. R 11

12,772

Lybarger, S.F. (Chn.). AMERICAN STANDARD METHOD FOR MEASUREMENT OF CHARACTERISTICS OF HEARING AIDS. Rep. Z24.14 1953, UDC 681.88:534.6, Feb. 1953, 15pp. American Standards Association, Incorporated, New York, N.Y.

12,772

This American Standard comprises a part of a group of definitions, standards, and specifications for use in acoustical work. Practical and reproducible methods of evaluating certain physical performance characteristics of air-conduction vacuum-tube hearing aids are described. The measurement methods which are here standardized give essential information on frequency response, acoustic gain, maximum acoustic output, effect of tone controls, input-output characteristics, harmonic distortion, battery drain, and effect of battery voltages. Drawings, test procedures, and sample plots of test results are included as an aid in setting up the tests and interpreting test procedures.

G. I. R 14

12,773

McGill, J.R. & Cain, C.J. TO EVALUATE AND DETERMINE THE ADEQUACY OF THE HIGH SPEED (JN) NAVIGATION CHARTS. Proj. 30, April 1954, 9pp. USAF Senior Observer Technical Specialists, Mather AFB, Calif.

12,773

This paper gives some of the history of the development of the high speed (JN) navigation charts and evaluates the degree to which the charts fulfill the requirements for which they were produced.

I.

12,774

Poulton, E.C. THE DESIGN OF EQUIPMENT FOR HUMAN USE. AFU 305/57, 1957, 9pp. Applied Psychology Research Unit, NRC, Cambridge, England.

12,774

This report summarizes the proceedings of a meeting held to discuss problems in the design of equipment for human use. There were sessions on the military and industrial aspects of work design, on the use and abuse of simulators, on equipment design and training for maintenance, and on automatic data analysis in human research. There were also some practical demonstrations of various aspects of this work.

I.

12,775

Packard, J.M., Strutner, L.A., Melton, R.S. & Ackerman, I.F. ELECTROCARDIOGRAPHIC STANDARDS FOR HEALTHY PERSONS: 10 - 19 YEARS OF AGE; HEART SIZE IN ADOLESCENTS. Res. Proj. NM 14 02 11, Subtask 13, Rep. 3, Nov. 1957, 17pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,775

Measurements of heart size were made from the tele-jerentgenograms of 2,138 healthy school children 12 through 17 years of age. There were 1,072 boys and 1,066 girls studied, none of whom had clinical or electrocardiographic evidence of heart disease. Extensive statistical studies were carried out to determine the relationship of age, sex, body weight, body height and certain chest measurements to heart size (transverse diameter, frontal area, and cardiothoracic ratio). Presently available tables, formulas, and nomograms for predicting heart size were compared with obtained data. Prediction tables were prepared on the basis of the measurement of this study.

T. G. R 7

12,776

Peterson, A.P.G. (Chn.). AMERICAN STANDARD SPECIFICATION FOR AN OCTAVE-BAND FILTER SET FOR THE ANALYSIS OF NOISE AND OTHER SOUNDS. Rep. Z24.10 1953, UDC 681.88:534.6, Feb. 1953, 11pp. American Standards Association, Incorporated, New York, N.Y.

12,776

This American standard comprises a group of definitions, standards, and specifications for use in acoustical work. The standard given here for an octave-band filter set is limited to the requirements for analyzing, as a function of frequency, an electrical signal obtained from an electro-acoustic transducer-amplifier combination driven by a noise or other sound. Introductory material is given covering the subject of noise measurements and the problems encountered in such measurement.

G. I. R 23

12,777

Rositani, Lucia R. & Bittini, Marcella. BASIC RESEARCH IN THE FIELD OF VISION. PART I. ON THE ELECTRICAL RESPONSE OF THE HUMAN EYE TO RED STIMULI OF DIFFERENT SHAPE. PART II. EFFECT OF PULSE SHAPE ON CRITICAL FLICKER FREQUENCY AT DIFFERENT LUMINANCE LEVELS. Contract AF 61(052) 17, Tech. Note 1 TN 1.58, Jan. 1958, 13pp. Istituto Nazionale Di Ottica, Arcetri, Firenze, Italy.

12,777

The influence of the shape of the light stimulus on the electroretinogram when red light is used was observed on two trained subjects. The height and implicit time of the x-waves and b-waves were measured from the records and related to the shape (time-luminance distributions) of the stimulus. A second study investigated the influence of the shape of equal energy light pulses on the critical luminance at different frequencies of interruption in extra foveal vision and in dark adaptation.

T. G. R 14

12,778

Rosenblith, W.A. (Chm.). THE RELATIONS OF HEARING LOSS TO NOISE EXPOSURE. Contract N0001-07861, Exploratory Subcommittee Z24 X 2 Rep., 1954, 64pp. American Standards Association, Incorporated, New York, N.Y.

12,778

This report summarizes the findings of a committee assigned the task of exploring the possibility of establishing bio- and psycho-acoustic criteria for noise control, particularly in the area of industrial noise exposure; it suggests no standard and proposes no criteria. In addition to definitions of variables, and a discussion of human problems of industrial noise and listing requirements for field data, the following topics are accompanied by data: presbycusis, continuous exposure to steady noise, intermittent exposure to steady noise, intermittent exposure and non-steady noise. Unsolved problems are presented and discussed. T. G. R 20

12,779

Sarnoff, C.A. MEDICAL ASPECTS OF FLYING MOTIVATION. A FEAR-OF-FLYING CASE BOOK. Oct. 1957, 175pp. USAF Air University, Randolph AFB, Tex.

12,779

This book aims to give the flight surgeon a working knowledge of the many facets of aviation medicine in which flying motivation plays a part. Over 50 full case reports are presented to supplement the flight surgeon's own experience. The proper handling of cases from the standpoint of Air Force regulations and medical indications is discussed. A system for categorizing patients is offered. I.

12,780

Shepard, R.H., Campbell, E.J.W. & Martin, H.B. FACTORS AFFECTING THE PULMONARY DEAD SPACE AS DETERMINED BY SINGLE BREATH ANALYSIS. Rep. 58 138, Dec. 1958, 5pp. USAF Air University, Randolph AFB, Tex. (Department of Aviation Medicine, Johns Hopkins Hospital, Baltimore, Md.).

12,780

The pulmonary dead space was measured in a normal subject by the single-breath method of Fowler, using continuous simultaneous recordings of expired volume and carbon-dioxide concentration. Experimental data included for each dead space measurement, the end-inspiratory values of lung volume and intra-esophageal pressure, tidal volume, and time of breathholding. The data were analyzed in an attempt to isolate some of the factors which change the volume of the conducting airways and thus the dead space measurements. G. I. R 5

12,781

Spence, K.W. & Ross, L.E. EXPERIMENTAL EVIDENCE ON THE RELATION BETWEEN PERFORMANCE LEVEL IN EYELED CONDITIONING AND ANXIETY (DRIVE) LEVEL. STUDIES OF INFLUENCE OF MOTIVATION ON PERFORMANCE IN LEARNING. Contract N90NR 93802, Proj. NR 154 107, Tech. Rep. 5, June 1957, 23pp. Department of Psychology, State University of Iowa.

12,781

This paper summarizes the experimental evidence bearing on the relation between performance level in eyeled conditioning and the level of anxiety (drive) of human subjects. In addition to a discussion of consistent trends in the data, a number of methodological problems are considered. G. R 29

12,782

Schwartz, S.A. & Price, A. OBSERVATION OF EXPERIMENTAL AND STANDARD COLD WEATHER CLOTHING IN ANTARCTICA DURING DEEPFREEZE I AND II (DECEMBER 1955 - MARCH 1957). Proj. NT001 008 - Cold Weather Clothing, NT001 002 - Cold Weather Handwear and Footwear, NT001 004 - Shipboard Immersion and Rescue Clothing, Res. & Dev. Rep. 22, March 1958, 41pp. USN Clothing and Textile Office, Bureau of Supplies & Accounts, Brooklyn, N.Y.

12,782

This is a report on the effectiveness of various experimental, standard, and non-Navy cold weather clothing items during year round operating conditions in Antarctica. Findings regarding the adequacy of the experimental items under a wide variety of operating conditions are reported together with data on design aspects, sizing adequacy, and the general utility of present standard Navy cold weather clothing. Military and civilian personnel of other services and nations participated, so additional observations relative to the adequacy of other domestic and foreign types of cold weather clothing are also presented. T. I. R 7

12,783

Putnam, W.B. OPERATIONAL SUITABILITY TEST OF THE B-8 ENGINE MAINTENANCE SHELTER. Proj. APG/CSC/275 C, Final Report, June 1954, 22pp. USAF Operational Test Center, Eglin AFB, Fla.

12,783

To determine the operational suitability, including practicability of erection and utilization, of the Type B-8 shelter (a rigid, panel-covered shelter for use in maintaining engines of B-29, B-50, and C-97 aircraft where hangar facilities are limited) under low temperature field conditions, the shelter was airlifted to the test site in Alaska. It was erected, disassembled, transported by truck to another site. After re-erection, positioning tests were accomplished on all nacelles of B-29 and KC-97 aircraft. Towing characteristics were investigated and heating tests made. Outdoor temperatures ranged from -15 to -25 degrees Fahrenheit. Some modifications are recommended. G. I.

12,784

Putnam, W.B. OPERATIONAL SUITABILITY TEST OF THE B-3 AIRCRAFT MAINTENANCE STAND. Proj. APG/CSC/268 A, Final Report, May 1954, 27pp. USAF Operational Test Center, Eglin AFB, Fla.

12,784

To determine the operational suitability of the type B-3 Aircraft Maintenance Stand for use in the inspection and maintenance of empennages on large aircraft such as B-36, C-124 and B-52's, tests were conducted under temperate field conditions and in controlled low temperatures. Suitability of configuration and operation and maintenance requirements were studied. Some modifications are recommended. I. R 2

12,785

Taylor, F.V. HUMAN ENGINEERING AND THE DESIGN OF TASKS. APU 260/56, June 1956, 15pp. Applied Psychology Research Unit, MRC, Cambridge, England. (USN Research Lab., Washington, D.C.).

12,785

The objectives of the human engineer, or engineering psychologist, are defined and various approaches suggested. The approach dealt with in this paper is to consider the man as a data-processing element in the overall system and to seek to reduce the complexity of the processing task. Display-control compatibility is used as an example when man is called upon to make discrete responses. Systems requiring continuous performance by the operator require coding and computing operations. Ways of simplifying both operations are considered. Quickening is given a psychological explanation and shown to reduce both coding and computing operations. G. I. R 18

12,786

Tetz, A. ANALYSIS OF FLIGHT TEST DATA ON EVALUATION OF INSTRUMENT LANDING SYSTEMS. Contract AF 33(616) 2300. Proj. 64450, WADC TR 56 210, Oct. 1956, 30pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio. (Airborne Instruments Laboratory, Inc., Mineola, N.Y.).

12,786

This report describes the analytical and computational techniques developed for reducing, summarizing, and analyzing the raw data gathered in the course of flight testing the Instrument Landing System (ILS). These techniques are designed to describe ILS performance characteristics in quantitative terms. Sample results are presented.
T. G. I

12,787

Torrey, Jane W. EVALUATION OF COLOR-VISION TESTS. A COMPARISON OF DISCRIMINATION THRESHOLDS FOR BRIGHTNESS AND SATURATION IN DEUTERANOPIC, DEUTERANOMALOUS, AND NORMAL OBSERVERS. FINAL PROJECT REPORT. Contract NORR 996(03), Dec. 1958, 21pp. Connecticut College.

12,787

Discrimination thresholds for brightness and chromaticity differences were measured in observers ranging from deuteranopes to normals (two deuteranopes, two moderately and one mildly deuteranomalous, and two normals). Chromaticity discrimination was measured along two dimensions on the I.C.I. Diagram, both passing through the neutral center so that differences on either side were differences of saturation. One line approximated the dimension of maximum confusion for deuterans (bluish red and bluish green), the other of minimum confusion (blue and yellow). The thresholds were compared for differences due to degree of color defect.
T. G. I. R 12

12,788

Touger, M.L., Meeker, W.F. & Simshauser, E.D. STUDY OF COMMUNICATION IN HIGH-LEVEL AMBIENT NOISE FIELDS. FINAL REPORT. PHASE II. ELECTRONIC NOISE REDUCTION. Contract DA 36-039 SC 64469, Spec. SCL 1502, SIGEL CMB Projs. 132B, 843D, File 94 PH 91(4307), Feb. 1959, 88pp. Surface Communications Engineering Defense Electronic Products, Radio Corporation of America, Camden, N.J.

12,788

The use of electronic noise reduction to improve signal corps voice communication systems for use in high noise level environments was studied. Three systems were considered: a cavity open-loop system; a cavity feedback system; and a free-field feedback system. The theory of operation of the systems was developed and design procedures established. Each system was tested experimentally and its feasibility for use analyzed. Headsets with improved noise attenuation were also examined. Recommendations are included for means of improving communications in armored vehicle noise.
T. G. I. R 15

12,789

Turner, S.H., Wallace, W.H. & Wessel, A.E. ERRORS IN INFORMATION-PROCESSING BY HUMAN BEINGS. DA Proj. 3 99.12 023, SC Proj. 132C, WE 56 U M 6, Oct. 1956, 13pp. The Institute for Cooperative Research, University of Pennsylvania.

12,789

This report is third in a series concerning the effects of surplus information on the efficiency of human processing. The data from previous experiments were analyzed to answer the questions: 1) Does the number of mistakes made in information processing vary with general intelligence? and 2) Does the number of mistakes vary with the presence of increasing amounts of surplus information? The experiments involved 48 subjects selected on basis of high Army Classification Test scores (from 115 to 150). Each task contained input messages, rules, and the desired output message to be derived by applying the rules. Either excess or redundant messages were included. The implications of the findings for training, filtering and selection are discussed.
T. G. R 3

12,790

Tear, D.G., Turner, S.H. & Wallace, W.H. PRESENTATION: (II). HOW PREVIOUS EXPERIENCE AFFECTS RESPONSE IN AMBIGUOUS SITUATIONS. DA Proj. 3 99.12 023, SC Proj. 132C, WE 57 U M 1, Feb. 1957, 8pp. The Institute for Cooperative Research, University of Pennsylvania.

12,790

To investigate how past experience based on definite information affects present response to ambiguous information, three experiments were devised in which the task was to conclude which of the conditions (represented by symbols) was true. Three types of input sets of symbols were used; the first two sets were "forcing" in that they always resulted in a decision that a certain condition was true while the third set conveyed ambiguous information from which it was impossible to make a decision. The subjects, however, were required to make a decision in all cases. The experiments varied in the number of forcing sets (four, six, and eight) performed before the ambiguous set. Responses to ambiguous sets were analyzed as similar to or different from those previously made.
T. I. R 8

12,791

Victory Plastics Co. DESIGN, DEVELOPMENT, AND MANUFACTURE OF COLD WEATHER CANTEN CLOSURE. FINAL REPORT. MAY 1957 TO JANUARY 1958. Contract DA 19 129 OM 938, Proj. 7-84 09 011B, O.I. 5225, Jan. 1958, 30pp. Victory Plastics Co., Hudson, Mass.

12,791

This report details the developmental steps and the final design of a cold weather canteen closure prototype. A material list and detailed drawings are given of the final product.
T. G. I

12,792

Doerfler, L.G. (Chm.). ABSTRACTS---AUDIOLOGY SECTION. 34TH ANNUAL CONVENTION. AMERICAN SPEECH AND HEARING ASSOCIATION. Presented at Hotel New Yorker, New York City, Nov. 1958, 24pp. American Speech and Hearing Association, Washington, D.C.

12,792

These are abstracts of papers presented in the Audiology Section of the 34th Annual Meeting of the American Speech and Hearing Association. Major topics covered by the papers are: Auditory phenomena, audiologic evaluation of middle-ear surgery, screening audiometry, objective measurement in audiology, current research on hearing aids, problems in the measurement of hearing, clinical studies in nonorganic hearing loss, current research in binocular hearing, clinical audiometry, audiology, current research in speech reading, and speech discrimination testing.

12,793

Vernon, M.D. THE ASSESSMENT OF 'PERCEPTUAL ABILITY'. MRC 47/151, A.P.U. 29, July 1945, 17pp. Applied Psychology Research Unit, MRC, Cambridge, England.

12,793

To explore the problem as to whether there exists a definite and unitary "perceptual ability" varying with the individual, five series of perceptual material were presented to 22 subjects by the dazzle method (made gradually brighter against a mottled gray background). Errors in recognition (naming the object) and the illumination level at which the object was named were recorded. The data were analyzed by comparing performances of different individuals, and performance with different types of materials. The relationship of the performance on perceptual tests to performance on other tests was also examined.
T. G. I.

12,754

Woodhead, Mariel M. EFFECTS OF BRIEF LOUD NOISE ON THE PERFORMANCE OF A VISUAL TASK. IV. AN EXPERIMENT WITH SINGLE BURSTS AT THREE INTENSITIES. R.M.P. 58/931, O.E.S. 321, Dec. 1958, 4pp. Operational Efficiency Sub-Committee, RMPRC, London, England. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,794

To determine whether the unfavorable effects of a missile noise on performance vary with the level of intensity of the noise, a decision-making task (Multi-Channel Test) was presented to 18 subjects. They performed the task under four conditions: in silence and with single bursts of missile noise of 80, 95, and 115 decibels. The analysis was concerned with the performance one-half minute or so after each burst. Differences between decisions made on the noise runs were compared to those on the silent run.

12,795

Winick, D.L., Nolan, C.Y. & Bernstein, B.B. A SURVEY OF ORGANIZATIONAL MAINTENANCE OF THE MEDIUM TANK. Contract DA 44 109 QM 650, DA Proj. 095 30 000, Tech. Rep. 45, May 1958, 35pp. Human Resources Research Office, George Washington University, Washington, D.C.

12,795

As one step in improving the maintenance of armor equipment, a study was made of organizational maintenance and of tank maintenance problems and training methods. The M48 tank equipment system, types of maintenance operations, and maintenance activities of organization personnel in four tank battalions were studied. The data were obtained from experienced maintenance personnel, from personnel on the job in the four battalions, and from maintenance records. These data were analyzed to produce an estimate of the maintenance activity reported in the unit records and a description and frequency estimate of actual maintenance activities of first and second echelon personnel. Training methods were also studied. T. G.

12,796

Wilkins, E.W.C. OZONE AS A HAZARD IN HIGH ALTITUDE FLYING. Rep. 203, Sept. 1958, 22pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France.

12,796

The high ozone content of the upper atmosphere is discussed as a hazard to high altitude flying along with possible methods of circumventing the problem. The process of ozone formation and its seriousness as a biological hazard constitute the main part of the report and it is deduced that there is what may be called an "Ozone Barrier" extending from about 50,000 to 150,000 feet above the earth's surface. In this region ozone content is considered a biological hazard to be taken into account in the design of any aircraft depending for cabin pressure on the pressure of outside air. High ozone concentration is discussed as it may affect the functioning of aircraft components. Further research is recommended.

T. G. R 29

12,797

Woodcock, A.H., Thwaites, H.L. & Breckenridge, J.R. AN ELECTRICAL ANALOGUE FOR STUDYING HEAT TRANSFER IN DYNAMIC SITUATIONS. Proj. Ref. 7-83-01 005B, Tech. Rep. EP 86, April 1958, 17pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

12,797

An electrical analogue has been constructed to represent the heat transfer system between a clothed man and his environment. The primary purpose of the analogue was to provide a visual indication of the manner in which skin temperature and heat loss through clothing are affected by varying wind, air temperature, activity, and clothing system. The value of this approach in forcing the research worker to synthesize his concepts of heat transfer is discussed. An outline of methods, using the electrical analogue, for investigating the significance of various environmental activity, and clothing factors is presented. Problem examples are given and the possibility of using analogues for planning experiments with human subjects is discussed.

T. G. I. R 16

12,798

Whitfield, J.W. NOTES ON THE CAUSES OF ACCIDENTS. Brit. Med. Bull., 1950, 7(1-2), 73-75. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,798

The necessity for keeping accident records which describe the accident situation and the resulting injury in systematic form is stressed. The information needed for such records is indicated together with methods of analysis. It is suggested that two major lines of investigation need to be pursued: 1) the study of general conditions which affect the chance of failure and 2) the study of differences between individuals. These two lines of analysis are discussed briefly.

R 9

12,799

Meyer, E.G., Vernon, J.A., Rahn, W.E. & Strother, W.F. COCHLEAR POTENTIALS IN THE CAT IN RESPONSE TO HIGH-FREQUENCY SOUNDS. Proc. Nat. Acad. Sci., Wash., Oct. 1958, 44(10), 1087-1090. (Department of Psychology, Princeton University).

12,799

Measurements of the cochlear potentials in cats were extended to 100,000 cycles. Both young and old animals were used. The data were analyzed graphically as equal-response curves representing the sound pressure, in decibels relative to one dyne/cm² square centimeter, required to produce a cochlear potential of one microvolt and intensity functions for tones from 1,000 to 80,000 cycles. Consideration is given to the question whether the uppermost frequencies affect the neural elements of the auditory system.

G. R 7

12,800

Wever, E.G., Vernon, J.A. & Lawrence, Merle. THE NATURE OF THE COCHLEAR POTENTIALS IN THE MONKEY. Acta Oto-Laryng., 1957, 42, 87-92. (Psychological Lab., Princeton University and University of Michigan).

12,800

Cochlear potentials were recorded in six rhesus monkeys and one green monkey in response to tones from 100 to 50,000 cycles. A sensitivity function was obtained by determining the sound pressure necessary to produce a standard response of one microvolt. Intensity functions were determined by varying the sound pressure and measuring the resulting potentials. In some animals the distortion arising in the ear was determined by applying a carefully filtered tone of 1000 cycles and measuring the response at this frequency and at harmonic frequencies up to 5000 cycles. The functions were analyzed graphically and discussed in relation to those obtained from other animals.

G. R 6

12,801

Welborn, J.C. TEST OF VANE SIGHT FOR USE ON M41 SERIES TANKS (DA PROJECT NR 513-02-059), REPORT OF PROJECT NR 1953. ATBJ P 1953, Sept. 1957, 7pp. USA Armor Board, Fort Knox, Ky.

12,801

To determine the suitability of the vane sight for use as a tank commander's target designating device on M41 series tanks, the following tests were conducted: 1) physical characteristics were checked before operation; 2) ease of boresighting was studied and horizontal limits of the bore sight established; 3) the accuracy and speed of target designation and acquisition were tested with and without the vane; and 4) durability and reliability were checked. Recommendations are included.

R 4

12,802

Watson, C.W. (Princ. Investigator). PHYSIOLOGICAL MECHANISMS DETERMINING IRRADIATION OF STIMULUS IN LIGHT SENSITIVE INDIVIDUALS AND LIGHT SENSITIVE ANIMALS. ANNUAL PROGRESS REPORT. MARCH 31, 1957 TO MAY 1, 1958. Contract DA-49 007 MD 734 01, 5 57, May 1958, 8pp. New England Center Hospital, Boston, Mass. (Tufts University School of Medicine).

12,802

This progress report deals with studies on a research project having, as its principal aim, the provision of an effective method, adaptable to mass application, for the detection in man of excessive sensitivity to light and a susceptibility to epileptic seizures. The subjects tested were 150 individuals with previously demonstrated, consistently reproducible light-evoked cerebral electrical abnormalities. The subject was exposed to a flashing light source during electroencephalographic recording before, during, and after a particular parameter of the stimulus or condition of the subject. Progress on this program is reported.

R 7

12,803

Waldron, D.L. CENTRAL REPOSITORY FOR HEARING CONSERVATION DATA. AN EXAMINATION OF THE FIRST YEAR'S REPORTING. Rev. 3 59, Oct. 1958, 20pp. USAF Air University, Randolph AFB, Tex.

12,803

This report discusses the problem areas associated with the gathering and reporting of hearing conservation data as required by Air Force Regulation 160-3, "Hazardous Noise Exposure." One part of this regulation requires that a form on hearing conservation data be accomplished and one copy filed in the Central Repository for Hearing Conservation Data. This analysis and discussion of problem areas is based on one year's experience in handling and summarizing the data. The subtitles of the data form are used as paragraph headings: reference audiogram, department or location, job or noise code, time in job, exposure time, previous exposure, age, and loss of hearing.

T.

12,804

Yarcho, W.B. ENVIRONMENTAL TEST FACILITIES OF WRIGHT AIR DEVELOPMENT CENTER. Proj. 1111; Task 11115; WADC TN 57-27, Jan. 1957, 55pp. USAF Environmental Criteria Branch, Wright-Patterson AFB, Ohio.

12,804

This report provides a compilation of the major environmental test facilities available at Wright Air Development Center. An index, by facility, is provided as a means of locating test facilities to meet specific environmental requirements. The name, symbol, and telephone extension of a responsible person in each laboratory is also given. The listed facilities include high and low temperature, humidity, altitude, temperature-altitude; salt spray; fungus, sunshine, sand and dust, explosive atmosphere, vibration, acceleration, shock, and miscellaneous.

T. I.

12,805

Zwaan, E.W.J. THE MOON ILLUSION. Rep. IZF 1958-10, Dec. 1958, 16pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

12,805

The main concepts that have been used to explain the moon illusion, size constancy and angle of regard, are discussed. Limitations of these explanations are noted. An attempt is made to unify the two concepts in one theory, using vital spaces as a starting point. Directions and limitations of this vital space are defined by our potential movements; horizontally it is more extensive than it is vertically. Within the space there is size constancy; beyond it size constancy fails. This concept is further developed to explain the various aspects of the phenomenon under consideration.

T. R 7

12,806

Hopple, G. (Chm.). MONITORING AUDIOLOGY AND THE MEDICAL DISPOSITION OF CASES OF HEARING LOSS. FINAL REPORT OF WORKING GROUP 25. Contract WAKR 1151 (01), NR 140 059, Tech. Rep. 11, CHAB, Rep. 6, June 1957, 26pp. Armed Forces National Research Council Committee on Hearing and Bio-Acoustics, Central Institute for the Deaf, St. Louis, Mo.

12,806

This report summarizes the medical principles on which monitoring audiometry is based and outlines a general plan for medical disposition of cases of hearing loss that is consistent with these principles. The four central features of the general plan are 1) reference audiograms, 2) routine monitoring audiometry, 3) diagnostic centers, and 4) "monitor limits" of hearing loss that make referral to a Diagnostic Center mandatory. These features are discussed at length in the report.

R 12

12,807

Coppola, A.F. FINAL REPORT ON TEST OF THE T43 FULL FIELD COINCIDENCE RANGE FINDER TWENTY-FIRST REPORT ON PROJECT TT2-689. DATES OF TEST: 7 SEPTEMBER 1954 - 30 JANUARY 1956. DA Proj. 513-02-052, OOD Proj. TT2 689, Rep. 21, Feb. 1956, 67pp. USA Development and Proof Services, Aberdeen Proving Ground, Md.

12,807

To determine the effectiveness and performance of the coincidence Range Finder, T43, a series of studies have been completed. Three prototype T43 range finders were mounted according to specifications as an integral part of the sighting system in a standard tank, 90 millimeter gun, M47. The analysis of ease of operation, time necessary for obtaining proficiency, and general effects produced by weather conditions, camouflaged targets, light transmission, etc., uses data reported in earlier partial reports and memoranda. To further augment those data, comparisons in ranging were made with a stereoscopic Range Finder, M12. Recommendations for further testing are made.

T. G. I. R 4

12,809

USN Office of the Chief of Naval Operations. UNITED STATES NAVY STRUCTURAL FIRE-FIGHTING MANUAL, 1953. ISSUE, OPNAV 5560.7, 1953, 121pp. USN Office of the Chief of Naval Operations, Department of the Navy, Washington, D.C.

12,809

This manual establishes a coordinated policy for structural firefighter training and standardizes methods and procedures in fire department training and drill evaluation for the Navy. The various chapters deal with training and fire fighting equipment and its use.

I. R 20

12,810

Roos, C.A. (Head). BIBLIOGRAPHY OF SPACE MEDICINE. Public Health Service Publication 617, Series 21, June 1958, 49pp. US Department of Health, Education, and Welfare, National Library of Medicine, Washington, D.C.

12,810

References for this bibliography on space medicine were selected from a number of indexes and catalogs of the National Library of Medicine, and from examination of the principal aviation, aviation medicine, and astronautical publications. Items are arranged in broad subject classes (general, sealed cabin problems, acceleration/deceleration, fractional and zero gravity, cosmic radiation, survival problems, psychological and social problems, ground crew problems, extra-terrestrial aspects and bibliographies) in inverse chronological order alphabetically by author within the years 1928-1958. Brief annotations have occasionally been added.

R 381

12,811

USA Corps of Engineers. SAFETY. GENERAL SAFETY REQUIREMENTS. EM 385.1 1, Dec. 1941, Rev. 1958, 215pp. USA Corps of Engineers, Washington, D.C.

12,811

This manual establishes the General Safety Requirements for all United States Army Corps of Engineer activities and operations. The general subjects covered are as follows: Job instructions; drinking water; toilet and washing facilities; physical qualifications of employees; personal protective apparel and safety equipment; poisonous and harmful substances; lighting; signals, warning sirens, and signal men; materials handling, storage, and disposal; fire prevention; electric and gas welding and cutting; electrical wire and apparatus; hand and portable power tools; ropes, cables, and chains; machinery and mechanized equipment; pressure vessels; ramps, runways, and so forth; excavations; blasting; and floating plant and marine locations.

T. G. I. R 58

12,812

US Office of Technical Services. BODY MEASUREMENTS FOR THE SIZING OF WOMEN'S PATTERNS AND APPAREL. Commercial Standard CS 215.58, Aug. 1958, 38pp. US Office of Technical Services, Department of Commerce, Washington, D.C.

12,812

This report provides standard classifications, size designations, and body measurements for consistent sizing of women's ready-to-wear apparel for the guidance of those engaged in producing, or preparing specifications for, patterns and ready-to-wear garments. The measurements given are body measurements with adjustments in size scales to compensate for effect of foundation garments (the original measurements were for the nude body). The sample used for measurement was scientifically chosen and represents the predominant body types of the female population.

T. I.

12,813

Cooper, E.P. (Chm.). PROCEEDINGS OF THE SHIELDING SYMPOSIUM HELD AT THE NAVAL RADIOLOGICAL DEFENSE LABORATORY. 17-19 OCTOBER 1956. VOLUME I. Reviews and Lectures 29, Feb. 1957, 266pp. USN Radiological Defense Lab., San Francisco, Calif.

12,813

The proceedings of a symposium on nuclear radiation shielding from atomic weapons are reported in this volume (some papers classified as "Secret" have been omitted). The stated purposes were to learn the present military requirements for shielding information in connection with atomic weapon detonation, to assess the status of knowledge in relation to the military requirement, and to indicate the trends in shielding research and development. There are 22 unclassified papers included here.

T. G. I. R 60 (approx.)

12,814

Sharby, S.S. (Chm.). ARMY-NAVY INSTRUMENTATION PROGRAM. A SYMPOSIUM PROGRESS REPORT. 14-15 OCTOBER 1957. STATLER HOTEL, LOS ANGELES, CALIF. B 25 5532, Nov. 1958, 150pp. El Segundo Div., Douglas Aircraft Company, Inc., El Segundo, Calif.

12,814

The lectures presented during the 1957 Army-Navy Instrumentation Program Symposium are reproduced in this report. The purpose of the meeting was to report to the industry the accomplishments of the ANIP to date and to explain the overall philosophy and future plans of the program. The symposium theme was "The Man-Machine System". The particular system here is that of aircraft instrumentation.

I.

12,815

Pride, A.W. EVALUATION OF AF J-1 WORK STAND. Proj. TED PTR NA 380, ST 34 148, Dec. 1952, 7pp. USN Air Test Center, Naval Air Station, NJ.

12,815

To investigate the suitability of the Air Force type J-1 work stand for use in maintaining and servicing MU-1, P2V, P4M, P4Y, R50, R60, and R4Q type aircraft when no hangar is available, two stands were given to four squadrons for testing. They used the stands during normal maintenance (15 aircraft of the various models listed were given a 90 or 120 hour maintenance check) and reported on their evaluation of the safety features, all weather usage, and efficiency of the stand. The advantages and disadvantages of the workstand are listed and recommendations are included.

I. R 1

12,816

Ferguson, I.D. & Hertzman, A.B. REGULATION OF BODY TEMPERATURE DURING CONTINUOUS EXPOSURE TO HEAT. Contract AF-18(600) 3357, Proj. 7155, Task 71804, NADC TR 57 727, July 1958, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (St. Louis University).

12,816

To investigate the effect of continuously hot environment on the regulation of body temperature, three lean healthy resting nude young men were exposed to dry and wet bulb temperatures of 43.3 and 30.3 degrees centigrade for two 32-hour periods. Physiological regulation of body temperature was assessed by skin and oral temperature measurements, rates of water loss, and regional sweating rates. The data were analyzed for fatigue effects, for diurnal variations and for regional sweating patterns.

T. R 5

12,817

Duntley, S.Q. & Blackwell, H.R. A PROGRAM OF MILITARY VISIBILITY RESEARCH. Reprinted from the Minutes and Proceedings of the Thirty-second Meeting of the Armed Forces-NRC Vision Committee, April 2-3-4, 1953, pages 78-99, 22pp. Armed Forces-National Research Council Vision Committee Secretariat, University of Michigan. (University of California & University of Michigan).

12,817

The first of two papers reported here describes the Visibility Laboratory at the Scripps Institution of Oceanography of the University of California. The background and the program of research on military visibility problems are discussed. The second paper reviews the visual detection studies undertaken in recent years at the Vision Research Laboratory of the University of Michigan. This program is organized to provide the psychophysical data required to supplement data on military targets seen through atmosphere or water as provided by the Visibility Laboratory. Detection studies on target shape, spectral sensitivity, target area, peripheral sensitivity, aircraft models, and psychological variables are reported.

T. G. I. R 2

12,818

Duntley, S.Q. THE LIMITING CAPABILITIES OF UNAIDED HUMAN VISION IN AERIAL RECONNAISSANCE. Jan. 1953, 9 pp. Armed Forces-National Research Council Vision Committee Secretariat, University of Michigan. (University of California).

12,818

The ability of the human eye to recognize objects on the ground from moving aircraft was investigated as limited by the observer's speed and altitude, by atmospheric and lighting conditions, by contrast formed by the object and its background, and by the size and shape of the object. Limitations imposed by aircraft structure and by environment were ignored. Established techniques for the prediction of the limiting range at which objects can be visually detected were extended by means of new theory and new data and guided by reconnaissance experiments at model scale. Target recognition was studied and correlations between recognition and detection were found for the circumstances and targets encountered in visual aerial reconnaissance.

T. G. I. R 5

12,819
 Fiorentini, A. & Radici, T. BRIGHTNESS, WIDTH AND POSITION OF MACH BANDS AS A FUNCTION OF THE RATE OF VARIATION OF THE LUMINANCE GRADIENT. Contract AF 61 (514) 634C, AFOSR TN 58 676, Series II, No. 820, March-April 1958, 12pp. Pubblazioni Dell'Istituto Nazionale Di Ottica, Arcetri, Firenze, Italy.

12,819
 To make a quantitative evaluation of the Mach band (simultaneous contrast effect produced by sharp variation in luminance gradients) characteristics as perceived in a field where the luminance varies in one direction, two observers determined the brightness, width and positions of Mach bands by the method of binocular comparisons. Five fields were tested which varied in the extent of the graded zone of luminance distribution (from eight to 45 minutes of arc). Both the bright and dark bands were measured. The data were analyzed as a function of the width of the zone of varying luminance. An explanation of the results is offered.
 T. G. I. R 8

12,820
 Fitts, P.M. (Chm.). REPORT OF WORKING GROUP ON AIRFIELD TAXIWAY LIGHTING AND DESTINATION MARKING SYSTEMS. Jan. 1953, 3pp. Armed Forces-National Research Council Vision Committee Secretariat, University of Michigan.

12,820
 This note presents comments representing the opinions of the Vision Committee Working Group with regard to a project that is in progress on airfield taxiway lighting and destination marking systems. Some specific suggestions are offered for type of turn-off markers and symbols to be used as destination markers. A further suggestion is made concerning the testing of the legibility of these markers. Other comments deal with evaluative techniques and their usefulness.

12,821
 Foitzik, L. THE CONTRAST THRESHOLD OF THE EYE WITH RELATION TO THE PROBLEM OF VISIBILITY. CONTRIBUTIONS TO THE DETERMINATION OF THE DAYLIGHT VISIBILITY RANGE. Meteorological Service German Democratic Republic Publication No. 8, 1951, 78pp, 1958. Armed Forces-National Research Council Committee on Vision, Department of Physics, University of Florida. (Akademie-Verlag, Berlin, Germany).

12,821
 This report presents a series of investigations of the contrast threshold for natural visibility targets out-of-doors. Two methods were used: 1) photometric determination of the apparent brightness of such targets, which are found approximately at the limit of visibility, as well as the luminance of their immediate surroundings and calculations of the contrast and brightness threshold; and 2) visibility ranges for targets of different visual angles were determined with and without magnifying glasses and the contrast threshold calculated. The construction and testing of a large telephotometer are described. Summary tables of measurements are appended.
 T. G. I. R 36

12,822
 Fedorov, N.T., Sklyarevich, V.V., Yur'ev, M.A. & Mashirova, G.F. RELATION BETWEEN COMPLEMENTARY AND CONTRAST COLORS. Proc. Acad. Sci. (USSR), 1949, 67(1), 61-64. T 1786.

12,822
 An apparatus for measuring contrast colors is described. Complementary pairs of the spectral colors as well as those spectral colors complementary to any non-spectral purple were determined. The results obtained from a large number of experiments in which five persons participated are illustrated graphically.
 G. I. R 2

12,823
 Fedorov, N.T. ONE OF THE BASIC RULES IN THE FIELD OF SIMULTANEOUS COLOR CONTRAST. Proc. Acad. Sci. USSR. 1949, 67(3), 455-456. T 1896.

12,823
 A basic rule in the field of simultaneous color contrast is stated to be that the intensity of simultaneous color contrast is independent of the hue of the inducing color. This independence, which was established empirically, is considered in this paper. A diagram of a graphic method of determining differences in the hue between contrast colors and complementary colors is given.
 G. R 9

12,824
 Marsh, C.M. & Craig, E. EXPOSURE TIME AND PATTERN COMPLEXITY AS FACTORS AFFECTING FORM DISCRIMINATION. Subtask 2, Problem MEL M2 2A, ME 121303, Tech. Memo. TM 178, April 1956, 8pp. USN Electronics Lab., San Diego, Calif.

12,824
 To explore the relationship between complexity and/or irregularity of forms to be perceived, exposure time, and accuracy of perception, nine observers gave a total of 1944 responses to twelve stimulus slides tachistoscopically presented. Results (mean number of protrusions reported for stimulus figures) are plotted as a function of the number actually presented, and are discussed as they relate to the hypothesis that visual field of awareness is characterized by a progressive growth in complexity. Relations between eye movements and performance in this situation also are discussed.
 T. G. I.

12,825
 Garn, S.M. BI-MONTHLY REPORT NO. II. COVERING THE PERIOD 12 SEPTEMBER TO 15 NOVEMBER, 1951. Contract DA 18-108 CML 2829, Bi-Monthly Rep. II, Nov. 1951, 49pp. Forsyth Dental Infirmary for Children, Boston, Mass.

12,825
 Progress on a research contract investigating face sizes and masks for the civilian population is reported. Information on fitting and comfort tests is reported on several types of masks. Various problems connected with paper masks are discussed followed by data on a harness assembly. A description of the design and construction of a simple perimeter for measuring the visual field and the results of its application to subjects wearing a mask.
 T. I.

12,826
 Dunlap, J.W. RESEARCH ON THE ANALYSIS AND PREVENTION OF MOTOR VEHICLE ACCIDENTS TO OFF-DUTY MILITARY PERSONNEL. Contract DA 43 007 MD 876, Annual Report to the Commission on Accidental Trauma of the Armed Forces Epidemiological Board, March 1957-Feb. 1958, 39pp. Dunlap and Associates, Inc., Stamford, Conn.

12,826
 This report describes research progress in the development of procedures for the analysis and prevention of motor vehicle accidents to off-duty military personnel. A special reporting system for obtaining detailed data on the circumstances associated with each accident was developed and used at bases representing each military service. Analysis of data first on the accident population and then on the population of drivers revealed characteristics that suggest a basis for the development of remedial measures. One such measure is now in operation; evaluation of its effectiveness is in progress. Exploration in depth into the personal backgrounds of individuals recently involved in off-duty accidents has been started.
 T.

12,827

deBooy, K. & Shannon, J.A. TESTS OF A PORTABLE OPTICAL LANDING SYSTEM. FINAL REPORT. Proj. TED PTR SI 5004, FI35 163, June 1958, 12pp. USN Air Test Center, Naval Air Station, Md.

12,827

Tests of a portable optical landing system were conducted at the Naval Air Test Center to determine the optimum arrangement of the system and its suitability for advanced base use. Day, night, and limited visibility carrier landings were made using the system. The dimensions of the system and the number of lights in each bank were varied for each landing. Pilot opinion and performance were evaluated. Recommendations are included.

I. R 1

12,828

Davis, H. & Silverman, S.R. EDITORY AND MONAULTORY EFFECTS OF HIGH INTENSITY NOISE. FINAL REPORT. Contract MONR 1151 (02); Proj. a. NR(146 092) & BuMedSurg Proj. NA 13 01 99; Subtask 1, Rep. 7, June 1958, 226pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,828

To investigate the over-all effects of high-intensity noise caused by the use of jet aircraft aboard Navy carriers, carrier flight deck personnel on board two United States Naval ships and shore-based jet aircraft personnel at one field were tested by pure tone audiometry, psychological and psychomotor performance tests, group paper-and-pencil tests, psychiatric interviews, and analysis of sick-bay calls. The results were related to the estimated relative noise exposures of the various exposed and control groups tested. To meet the needs of the investigation a specially designed trailer laboratory for group testing was constructed. A method for measuring the total noise exposure of individuals was also designed and tested. Recommendations are included.

T. G. R 70

12,829

Damon, A. & McFarland, R.A. DIFFERENCES IN Calf CIRCUMFERENCE AS DIAGNOSTIC GUIDE TO THROMBOPHLEBITIS. J. Amer. Med. Ass., Oct. 1953, 153, 622-625. (Presbyterian Hospital, N.Y. & Harvard School of Public Health, Boston, Mass.).

12,829

In the course of an investigation of 369 professional bus and truck drivers, both calves were measured to determine the effect of differential use of legs in driving. The age range was from 20 to 64 years. The bilateral differences in calf circumference were compared with other comparable groups for whom such data were available (ROTC cadets, army fliers). The clinical applications of the data in the diagnosis of thrombophlebitis and possibly in the diagnosis and management of neuromuscular and bone or joint disease are discussed.

T. G. R 9

12,831

Coleman, H.S., Coleman, Madeline F., Clark, D.G. & Harding, S.W. OPTICAL QUALITY STUDIES OF INSTRUMENTS OF NAVAL INTEREST. Contract NORD 7958, Task C, NAVORD Rep. 436, April 1948, 100pp. USN Bureau of Ordnance, Washington, D.C. (Pennsylvania State College)

12,831

During and since World War II, a number of new or improved methods have been developed for evaluating the quality of optical systems. These methods, utilizing five different types of apparatus (Kinetic Definition Chart, Diopometer, Interferometer, Contrast Rendition, Light Transmission) were used to study a number of optical systems of interest to the Navy. The study involved 178 specimens of 55 different designs of visual telescopic systems. The summary data were tabulated and compared with data that should have been obtained from fault-free instruments. Such tabulations may be used to evaluate the various designs and form a basis for specifying desired properties of future designs.

T. G. I. R 3

12,832

Coleman, H.S., Coleman, Madeline F., Clark, D.G. & Harding, S.W. A METHOD OF PREDICTING THE RANGE AT WHICH TARGETS ARE DETECTABLE THROUGH VISUAL TELESCOPIC SYSTEMS. Contract NORD 7958, Task C, NAVORD Rep. 436, Dec. 1947, 14pp. USN Bureau of Ordnance, Washington, D.C. (Pennsylvania State College).

12,832

A method is presented for predicting the range at which objects may be detected through visual telescopic systems. The method depends upon knowledge of the contrast threshold of the human eye, the attenuation of the contrast of objects by the atmosphere, and laboratory measurements of the Contrast Rendition, the magnification, the light transmission, and the diameter of the exit pupil of the telescopic system under consideration. The validity of the method has been considered by comparing the predicted and experimental ranges at which targets were detectable from aboard ship.

T. G.

12,833

Coleman, H.S. LITERATURE SURVEY OF MATERIAL PUBLISHED RELATING TO SPECIFICATIONS OF HAND HELD BINOCULARS. Contract NSCNR 266, Nov. 1953, 59pp. Armed Forces-NRC Vision Committee Secretariat, University of Michigan. (The University of Texas).

12,833

A survey was made of literature pertinent to the design of hand held binoculars intended to be used visually. This survey covered over 5000 open and classified literature items published during the past 116 years (the majority of the more important works were completed during the World War II years). An analysis of the literature was based, for the most part, on the influence of the design properties of the binoculars on detection problems. Recommendations are made for the optical design and procurement agencies of the Armed Forces. A bibliography of references pertinent to binocular specifications is included.

I. G. I. R 313

12,834

Byrnes, V.A., Scofee, R.G. & Wolpaw, B.J. MANUAL OF INSTRUCTIONS FOR CLINICAL TESTING OF VISUAL ACUITY. Dec. 1951, 19pp. Armed Forces-NRC Vision Committee, University of Michigan.

12,834

This manual presents a revision of the Manual of Instructions for Testing Visual Acuity, Army-Navy-NRC Vision Committee, October 1, 1947. The developments that have made revision necessary are: a machine test for mass testing of visual acuity and new chart tests for clinical testing of far and near visual acuity. This present manual is for use in administering these clinical tests so that standard conditions will prevail. Directions are given for the examination and testing room, equipment and illumination. Test charts are included.

I.

12,835

Brown, D.R.E. SUN POSITION CALCULATOR. 13pp. USN Electronics Lab., San Diego, Calif.

12,835

Instructions and the necessary materials for constructing a sun position calculator are presented. Procedures for determining the sun's position (altitude and azimuth) are given. Several problems and their solutions are given to illustrate the use of the calculator.

G. I.

12,836

Zwislocki, J. EAR PROTECTION EFFECTIVENESS VS. COMFORT. Noise Control, Nov. 1958, 4(6), 14-15. (Bioacoustics Laboratory, Syracuse University).

12,836

This paper discusses the technical possibilities in the area of reconciling the acoustical effectiveness of ear protectors with comfort. Earplugs, earmuffs, and helmets are considered with special emphasis on semi-plastic models with malleable core and elastic walls.

12,837

Boudurant, S. & Finney, W.A. THE SPATIAL VECTOR-CARDIOGRAM DURING ACCELERATION. Proj. 7216, Task 71712, WADC TR 59 263, June 1958, 8pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,837

Electrocardiographic and spatial vector-cardiographic effects of several patterns of positive, negative, and transverse acceleration were recorded on healthy young male subjects. The patterns of acceleration included rapid and gradual onset, durations varying from a few seconds to one hour, use of anti-G suit, and number of runs from five to 28. The records were studied for changes that occurred and are discussed in relation to previous studies.

T. I. R 6

12,838

Blackwell, H.R. OPTICS AND VISION. PERIOD 1 FEBRUARY TO 31 JULY 1956. Report of Project Michigan, 2144 159 P, Nov. 1957, 25pp. Vision Research Labs., The University of Michigan.

12,838

The progress of this project, concerned with basic aspects of visual surveillance, is set forth. Three types of studies are described: 1) development and study of tests of illumination, optical, electro-optical and physiological aids, 2) improved visual and photographic surveillance procedures, and battle-area techniques, and 3) background studies leading to the construction of visibility-forecasting charts. These studies involve the following basic aspects of visual surveillance: 1) target and background characteristics, 2) optical properties of the atmosphere, and 3) operating characteristics of the eye.

G. I. R 7

12,839

Berger, C. LEGIBILITY OF LETTERS. Nordisk Medicin, 1951, 45, 789-797. O.N.I. TR. 1186. (Ophthalmological Div., National Hospital, Copenhagen, Denmark).

12,839

The experiments discussed in this paper concern the problem of legibility. The concept of legibility is deduced after an examination of Snellen's original theoretical idea for visual acuity measurements and the physiological-optical functions actually involved in visual acuity measurements with Snellen's letter types. Using the Snellen method of size measurement, modified by varying letter size through changing distance between the eye and the letter, two numerals "5" and "0" and one letter "E" were studied for the influence of height and width on legibility. Some clinical potentialities as well as implications for other research are discussed.

R 24

12,840

Barr, N.L. IFR FLIGHT WITHOUT ATTITUDE INSTRUMENTS. Res. Rep. NM 15-01 00.01.01, April 1958, 6pp. USM Medical Research Institute, Bethesda, Md.

12,840

To determine how effectively trained instrument pilots can fly without the primary attitude instruments, the performance of 14 pilots using only the gyrocompass, the altimeter, the air-speed indicator and the clock was compared with their performance using a normal instrument panel. Four trial flights were made and the maximum deviation from the prescribed values for heading, altitude, air speed, climb rate, or turn rate recorded for each maneuver. The results are discussed in terms of whether under practical conditions a pilot can perform instrument flight within acceptable limits when direct information on orientation to the earth is not available.

T. I. R 2

12,841

Ballard, S.S. A BIBLIOGRAPHY ON REFLECTING OPTICS COVERING THE PERIOD 1925 - 1950. June 1955, 28pp. Armed Forces-WRC Vision Committee, University of Michigan.

12,841

This bibliography contains 228 literature references and 60 patents in the field of reflecting optics. The period covered is from 1925-1950 although few references are dated prior to 1934. The items are listed alphabetically by senior author. Special care was taken to include technical papers that are relatively inaccessible because of foreign publication or limited circulation publication.

R 300 (approx.)

12,842

Auerstine, L.G. HUMAN PERFORMANCE IN INFORMATION TRANSMISSION. PART VI. EVIDENCES OF PERIODICITY IN INFORMATION PROCESSING. Contract DA 36 039 SC 36695, D A Subtask 3 99 06 111, Rep. R 75, Dec. 1958, 39pp. Control Systems Lab., University of Illinois.

12,842

This is the final report in a series dealing with man as an information transducer. The main interest in the studies has been to define man's capabilities in terms that are usually associated with the description of machines. In this study an attempt has been made to specify some of the properties associated with data processing. Subjects were presented a variety of tasks chosen so that 1) in the majority either a single response or very simple responses were required, 2) the stimuli consisted of simple and familiar symbols or situations, 3) each response could be formulated by making a sequence of simple, unambiguous decisions, 4) each response required many such decisions, and 5) the tasks were self-paced. Response times were analyzed in terms of the stated purpose. R 7

12,843

Ariadov, V.K. EFFECT OF EYE DEFECTS UPON THE CLEARNESS OF THE FIELD OF VISION. Proc. Acad. Sci. USSR, 1949, 68(2), 289-291. T 1923.

12,843

The laws underlying the detection of the presence of defects in optical systems are related to the transparent media of the eye as an explanation of an eye defect causing spots in the field of vision which cannot be detected by an ophthalmologist. This defect is said to occur in middle age and, since it can interfere with certain professions, a method is outlined for detecting it.

12,845

Krumm, R.L. & Newman, P.H. ACCURACY OF INFORMATION ON LINE WORK ORDERS FOR ARMAMENT-ELECTRONICS MAINTENANCE. Contract AF 41(657) 119, Proj. 7950, Task 17077, WADC TR 58 490, Dec. 1958, 34pp. USAF Personnel Lab., Lackland AFB, Tex. (American Institute for Research, Pittsburgh, Penn.).

12,845

To determine the accuracy of mechanics' statements of time required to complete a trouble shooting task for armament-electronics maintenance, ten weeks were spent at two Armament-Electronics squadrons observing representative tasks. Observations were made of time spent by mechanics in performing 76 typical steps of a trouble shooting job. These observations were compared with the mechanics' statements of time required as obtained from Line Work Orders for accuracy of report. Various sources of inconsistency and error are discussed. The feasibility of using the Line Work Orders to obtain work time data for use as a measure of job effectiveness is discussed.

T. G.

12,846

Lippert, S. THE ENGINEERING APPROACH TO THE HUMAN FACTORS PROBLEMS OF JET AIRCRAFT. Remarks prepared for presentation at the Panel on the Jet Age and Chest Medicine, 24th Annual Meeting of the American College of Chest Physicians, San Francisco, Calif., June 1958, 19pp. Douglas Aircraft Co., Inc., Santa Monica, Calif.

12,846

This paper discusses the human factors work that is implicit in jet transport design, as typified by the Human Factors Group at the Douglas Aircraft Company. In general, this Group investigates those aspects of aircraft design where medical, physiological, psychological, or anthropometric data and decisions are needed. Specific topics discussed are: cabin micro-climate (humans and animals), human body dimensions (cabin size, emergency exit), toilet facilities, seats, acoustics, and the DC-8 simulator.

G. I.

12,897

Johnson, E.V. & Ruck, G.E. **LINE VISION IN THE CHROMATIC.** *Psych. Arch. 24, 1943, 254-255, 1943-1944.* T 104.

12,897

This paper describes one experiment in a series on the effect of the extent of visual field on the accuracy of colorimetric measurements. The angular subtense of the visual fields equalled 1.9, 4.1, 5.3, and 10.5 degrees. Measurements were made for gray, pink, green, cyan, blue, and purple at each extent except the largest where only gray could be measured. The experienced observers participated in the measurements. On the basis of 100, 50, and 25 measurements, coefficients for color C_v of each sample and their errors were calculated in the system of the apparatus. The mean relative decrease in the error for a field of 5.3 degrees as compared with one of 1.9 degrees is shown. Graphical representation is included.

T. G. R 7

12,898

Michal, S.O. **MEASUREMENT OF COLOR CONSTANT AT CONSTANT ILLUMINATION.** *J. Opt. Soc. (Am.), 1947, 37(11), 1220-1222.* T 104.

12,898

The universally adopted system of specification and calculation of color is based upon experimental data and are not dependent upon any special theory of color vision. This paper adopts the view of the Young-Helmholtz theory. The threshold of differentiation of color, which meets with serious difficulties in the International Commission on Illumination system, is considered at length. A physical diagram of the visual process in the retina yielding an approximately quantitative account of mutual relationships of reactions of specified receptors of color vision under different conditions of excitation is presented.

T. G. R 11

12,899

McFarland, E.A. **ANEMIA: ITS EFFECT ON THE PHYSIOLOGY AND BIOCHEMISTRY OF THE BRAIN AND ON BEHAVIOR.** *Med. and Biol. Sci., 1932, Chap. 22, 325-326.* (Harvard School of Public Health).

12,899

The way in which anemia may give rise to certain physiological changes in the brain resulting in very direct and striking changes in behavior is discussed. The approach is biological, demonstrating that sensory and mental deterioration and even loss of insight may result from altered metabolism in the nervous tissue. Several studies are reviewed to show how it is possible to relate in a quantitative way alterations in sensory function, such as light sensitivity, to the amount of oxygen in the arterial blood. Effects of anemia on complex mental functions are considered. Experiments at high altitude in the Andes as well as in low-oxygen chambers at sea level are reviewed. The final section deals with the role of anemia in certain mental disorders.

T. G. I. R 43

12,900

McFarland, E.A. **PSYCHO-PHYSIOLOGICAL PROBLEMS OF AGING IN AIR TRANSPORT PILOTS.** *J. Aeronaut. Sci., June 1934, 23, 210-220.* (Harvard School of Public Health).

12,900

This study surveys data on the problems of aging and relates the findings to airline pilots. Age distributions of civilian pilots are presented and the factor of age in relation to accidents is examined. Changes in homeostatic mechanisms concerned with the maintenance of a constant internal environment of the organism are reported. Aging and the sensory functions (particularly hearing and vision), psychomotor functions, and mental functions are discussed in terms of those critical for pilot effectiveness.

T. G. R 18

12,901

McFarland, E.A., Massey, A.L. & Fisher, H.B. **AGE AND THE PROBLEMS OF PROFESSIONAL TRUCK DRIVERS IN HIGHWAY TRANSPORTATION.** *J. Aeronaut. Sci., July 1934, 23, 330-342.* (Harvard School of Public Health).

12,901

This report presents some data and interpretations concerning the age characteristics of workers in the highway transportation industry with the purpose of pointing out the significance of these considerations for personnel management in the field and also for broader problems of vocational adjustment of workers of all ages. The data show the ages of defined samples of truckdrivers, relation of occupational experience of newly employed drivers to age, ages at employment and separation, and age at which learning to drive automotive vehicles occurred. Known physiologic and psychologic changes associated with age are related to the occupation. Data on truck accidents are analyzed with respect to age. Retirement programs for the industry are discussed.

T. G. R 34

12,902

McFarland, E.A. & Fisher, H.B. **ADAPTATION IN DARK VISION AS A FUNCTION OF AGE.** *J. Aeronaut. Sci., Oct. 1934, 23(4), 424-428.* (Harvard School of Public Health).

12,902

To investigate changes in dark adaptation as a function of age, 204 males between the ages of 20 and 60 years were tested by means of the Night-Shiner adaptation meter. An artificial pupil was used to control the change in pupil size which is known to vary with age. The mean adaptation curves for each age group (five year groupings) were plotted. The final level of dark adaptation and the rate of adaptation were analyzed for their relationship with age. The results are discussed in relation to evidence in the experimental literature and the theoretical implications are pointed out. Practical significance for night driving and flying is considered.

T. G. R 18

12,903

McFarland, E.A. **SELECTED PROBLEMS IN CIVILIAN JET AIR TRANSPORTATION.** Sept. 1938, App. The Daniel & Florence Guggenheim Aviation Safety Center, Cornell University. (Harvard School of Public Health).

12,903

This paper presents the thesis that flight performance should be considered as a dynamic unit of interacting components including the pilot, his equipment, and the environmental flight conditions. A new approach to the study of this "system," which has been made possible through recent technological developments in the electronic field, is discussed. Important areas in which quantitative information is needed are the 1) relationship between pilot and design of aircraft, 2) influence of changes in skill with age on the safety and efficiency of flying, 3) operational aspects of fatigue, and 4) evaluation of flight proficiency.

T. G. I. R 25

12,904

McFarland, E.A. **HUMAN FACTORS IN INDUSTRIAL SAFETY.** *J. Aeronaut. Sci., Safety Engng., Aug. 1937, 39-48.* (Harvard School of Public Health).

12,904

Control of industrial accidents is discussed in relation to 1) the employee, 2) the worker in relation to his equipment, and 3) the environmental setting. The use of accident analyses in accident prevention and the role of such factors as personal adjustment and age are considered. The design of machines and equipment in terms of human capabilities and limitations is an area considered in the reduction of error and accidents. The interaction of the worker, equipment and environmental variables influencing comfort, efficiency and safety is stressed.

T. G. I. R 28

12,855

McFarland, R.A. & Phillbrook, F.R. JOB PLACEMENT AND ADJUSTMENT FOR OLDER WORKERS. UTILIZATION AND PROTECTION OF SKILLS AND PHYSICAL ABILITIES. *Geriatrics*, Dec. 1958, 13, 802-807. (Harvard School of Public Health).

12,855

A new, effective procedure for matching physical requirements of jobs with the physical capacities of workers is presented. The relative advantages and disadvantages of other job placement methods--the intuitive, rating, and disability methods--are discussed. Emphasis is placed upon the value of the "specific method" as described here, in its application to older workers, although it is pointed out that it has a broader range of application.

E. E. 1

12,856

McFarland, R.A., Decon, A. & Stoudt, H.W. Jr. ANTHROPOMETRY IN THE DESIGN OF THE DRIVER'S WORKSPACE. *Amer. J. Phys. Anthropol.*, March 1958, N.S. 16(1), 1-23. (Harvard School of Public Health).

12,856

This paper discusses differences in body size which may have serious implications for the comfort, efficiency, and safety of vehicle drivers. Methods whereby data on human body size may be systematically incorporated into vehicular design are outlined. The value of both "static" and "dynamic" human dimensions to the design engineer are considered. The 5th, 50th, and 95th percentiles of 30 pertinent body dimensions of 360 commercial bus and truck drivers are presented. Specific values are recommended for a sample of cab dimensions closely linked to human dimensions. General aspects and principles of applied anthropometry are discussed.

T. I. R 29

12,857

McFarland, R.A. HEALTH AND SAFETY IN TRANSPORTATION. *Publ. Hlth Rep.*, Aug. 1958, 73(8), 643-680. (Harvard School of Public Health).

12,857

This is a comprehensive account of the growing challenge of transportation hazards to health and safety. The proposal is made that accidental trauma be considered a non-contagious mass disease of epidemic proportions and that the epidemiological approach be applied to the study and control of injuries. This approach is used to analyze highway and airtransport fields under the headings of 1) host factors in accidents; 2) host-agent relationships; and 3) host-environment relationships.

T. G. I. R 34

12,858

McFarland, R. A. THE INTERNAL ENVIRONMENT AND BEHAVIOR. PART I. INTRODUCTION AND THE ROLE OF OXYGEN. *Amer. J. Psychiat.*, Jan. 1941, 97(4), 858-877. (Harvard School of Public Health).

12,858

The importance of constancy in the internal environment for the stability and well-being of the organism as a whole and the cerebral cortex in particular is discussed. Illustrations, drawn from studies at high altitude, are presented to demonstrate the basic role of oxygen in neural activity. The alteration of psychological functions produced by changes in oxygen tension is discussed with reference to experimental data. The application of these findings are discussed in relation to certain mental disorders.

G. I. R 26

12,859

McFarland, R.A. PUBLICATIONS OF ROSS A. MCFARLAND. March 1958, 11pp. *Harvard School of Public Health*.

12,859

This bibliography lists the publications of Ross A. McFarland under the following categories: books, chapters in books, monographs, symposia and conferences, and articles in technical journals. The period covered is from 1928-1958.

R 126

12,860

McFarland, R.A. & Dooley, E.G. EXPERIMENTAL STUDIES OF NIGHT VISION AS A FUNCTION OF AGE AND CHANGES IN ILLUMINATION. *Bull.* 191, 1958, 17-32. *Highway Research Board*, Washington, D.C. (Harvard School of Public Health).

12,860

The importance of a knowledge of night vision or dark adaptation phenomena facts for highway engineers and vehicle designers is discussed. Experimental studies of the effects of the more important variables upon the degree of night vision are reviewed: pre-exposure, light-wave frequency, levels of illumination on visual acuity, changes of illumination on depth perception, glare, light shock, and changes in physiological states such as occur with oxygen deprivation, insulin hypoglycemia, high blood sugar levels, and carbon monoxide anoxia. A series of experiments are reported on dark adaptation, recovery from light shock, visual acuity, depth perception and visibility under glare conditions when targets were seen through a tinted windshield.

T. G. R 55

12,861

Miller, E.F. EVALUATION OF CERTAIN VISUAL AND RELATED TESTS. 17. SIZE CONSTANCY. *Aviation Surg. Prof.* NM 14 01 11, Subtask 5, Rep. 4, July 1958, 24pp. *USN School of Aviation Medicine*, Naval Air Station, Fla.

12,861

This study evaluates a method of measuring size constancy with a stereoscope as a screening device for size-distance judgments of pilots. A sample of 113 naval aviation cadets was tested. The frequency distributions of the size-constancy values for various distances were determined as well as the mean, median, and mode of the size-constancy judgments. Test-retest reliability and intercorrelations of the findings at far and near point were also determined. The implications of the results for selection and training are discussed briefly.

T. G. R 8

12,862

Martycheva, L. THE DEVELOPMENT OF THE THRESHOLD OF COLOR PERCEPTION WITH TIME. *Proc. Acad. Sci. USSR*, 1949, 68(3), 625-628. T 1933.

12,862

A study was made of the threshold of color perception which develops in the observer upon short-term excitation of the foveal, parafoveal and peripheral zones of the retina by light of different wave-lengths. Consecutive determination of color thresholds from white were made during 5, 10, 20, 30, 40, 50, 75, 150 and more milliseconds. The dependence of the thresholds upon the duration of action of the color stimuli was analyzed as the process of development of color perceptions with time.

G. I.

12,863

Neugebauer, H.E.J. STANDARDIZATION IN COLORIMETRY. *Zelt. wiss. Phot.*, 1949, 44(10-12), 193-203. T 1843.

12,863

The basic ideas on which exact colorimetry is founded are discussed and some critical comments on some of the terminology are made. The position is then taken that colorimetry, in its present state, is not ready for standardization. The disadvantages of the International Commission on Illumination system and some advantages of an equidistant color diagram are pointed out. The Uniform Chromaticity Scale-Luther system is described and a color diagram given.

T. R 7

12,864

Noble, Rosalie & Hansen, L.W. DETERMINATION OF LOCATION FOR HIGH VISIBILITY AREAS ON EJECTION SEATS. Rep. NAMC ACEL 364, TED NAM AE 52124. Feb. 1958, 6pp. *USN Air Crew Equipment Lab.*, Naval Air Material Center, Penn.

12,864

A series of flight test observations were made to determine a high visibility, high noticeability, color scheme for ejectable seats. A system consisting of a tri-color pattern is proposed which would make the seat most noticeable from an aircraft searching for the ejectable mass. Flight observations were made to evaluate the proposed color scheme.

R 3

12,865

Kyberg, N.D. A NEW METHOD FOR DETERMINING THE POSITIONS OF BASIC PHYSIOLOGICAL COLORS FROM EXPERIMENTS WITH COLOR-BLIND OBSERVERS. *Proc. Acad. Sci. USSR*, 1948, 63(4), 379-381. T 1847.

12,865

The problem of determining the so-called basic physiological axes of color space, or the position of the basic physiological colors in the color triangle, is discussed. The accepted method, using experiments on dichromats, is discussed and its limitations pointed out. A new method for using the complete color specifications of the experimental data is suggested, that is, to examine the colors as vectors of three measurements. The theoretical basis for the method is discussed and the advantages delineated.

R 3

12,866

Rautian, G.M. & Dekina, V.I. SMALL VISUAL FIELDS IN COLORIMETRY. *Proc. Acad. Sci. USSR*, 1949, 66(5), 859-862. T 1869.

12,866

To establish a relationship between the size of the visual field and the sharpness of the discrimination of colors, the value of error in colorimetric measurements of a number of colored light filters (gray, bluish-green, violet, purple, and pink) were made for fields subtending visual angles of 1.9, 1.12, 0.84, 0.47, 0.33, and 0.12 degrees. One experienced observer made five consecutive determinations for the equality of color in both halves of the visual field of the colorimeter for each light filter. The effect of the decrease in visual field on error of color determinations was analyzed.

G. R-11

12,867

Rautian, G.M. INVESTIGATION OF COLOR VISION OF 995 PERSONS. *Proc. Acad. Sci. USSR*, 1950, 74(6), 1073-1076. T 2302.

12,867

The results of an investigation of color vision of 995 eighteen-year-old males are presented. The examinations were made using a new anomaloscope (see 12,868) based upon the principle that anomalies of color vision result from reduction of sensitivity of each of the three eye receptors. Distributions of the number in each group (red, green, blue) possessing one of the threshold values of the color discrimination in a direction parallel to the corresponding axis of the basic physiological coordinate system were analyzed. The data were also divided into three groups for further analysis: 1) normal--none of thresholds deviated by more than a factor of two, 2) one receptor with poorer sensitivity, and 3) any two receptors with poorer sensitivity.

T. G. R 6

12,868

Rautian, G.M. NEW ANOMALOSCOPE. *Proc. Acad. Sci. USSR*, 1950, 73(1), 99-101.

12,868

A new anomaloscope for investigating defects of color vision is described. The basic feature of the instrument is separate testing of the sensitivity of each of the three receptors of the eye by gradually changing the action on one of the receptors tested while the action of the other two is kept constant. The principle of operation and a sketch of the internal structure of the anomaloscope are presented.

I. R 14

12,869

Richter, M. THE PRESENT STATUS OF COLOR THEORY. *Z. wiss. Phot.*, 1948, 43, 209-237. T 1842.

12,869

This paper reviews international developments in color theory over the period of 1940-1948. The primary purpose is to indicate the major trends in research during the years covered. Topics covered are: terminology, standard illuminants, methods of measurement, colorimeters, photoelectric colorimetry, subtractive color mixture theory, experimental and theoretical studies of perceptually uniform color systems and application to color harmony, effect of surrounding field on object colors, fundamental color sensations, physiology of color vision, and defective color vision.

G. R 54

12,870

Hoffman, C.S. EVALUATION OF MODIFIED 24 INCH DUPLEX ROTATING BEACON LIGHT. Proj. 6172, WADC TN 57 77, March 1957, 13pp. USAF Directorate of Flight and All Weather Testing, Wright-Patterson AFB, Ohio.

12,870

To determine whether a new lamp developed for the 24-inch, duplex, rotating beacon corrected certain deficiencies of the standard lamp, rotating beacons equipped with standard and with the new lamp were compared and evaluated by pilots flying at altitudes up to 40,000 feet. Sample comments made by pilots concerning choice of light are included. Recommendations regarding usefulness of the new light are included.

T. G. I.

12,871

Cogle, K.W. SOME ASPECTS OF THE BASIS OF STEREOSCOPIC VISION. From the Confidential Proceedings of the 33rd Meeting, Armed Forces-WSC Vision Committee, Nov. 1953, Fort Knox, Ky., 6pp. Executive Secretariat, University of Michigan. (Division of Physics & Biophysical Research, Mayo Clinic, Rochester, Minn.).

12,871

The problem of whether stereoscopic vision rests upon a neuro-anatomical and physiological basis or whether it is fundamentally a psycho-physical phenomenon is discussed and the results of an experimental investigation are reported. The subject viewed a bright vertical line as a reference object through a horizontal slit-aperture and a septum and judged whether the test object (line or falling sphere) appeared farther or nearer than the reference line. A screening device of two baffle plates was adjusted in such a way that one eye saw the upper and the other the lower portion of the test line--both eyes could see a central portion of the line. The findings are discussed in terms of a "quantitative" and a "qualitative" concept of stereoscopic depth perception.

R 6

12,872

Richter, M. THE FUNDAMENTAL LAW OF COLORIMETRY. *Z. wiss. Phot.*, April 1949, 43, 246-251. T 1710.

12,872

This paper proposes a "fundamental principle of colorimetry" which contains the foundation of the entire structure of such measurement. The principle was formulated as an outcome of an effort to combine the three Grassmann laws in one statement. From the fundamental principle, the author derives other principles to explain the facts of colorimetry. The assumption is made that the three working functions operate completely independently one of another.

R 7

12,873

Samsonova, V.G. CHANGES IN THE LIGHT-SENSITIVITY RESULTING FROM THE INFLUENCE OF SUCCESSIVELY APPLIED MONOCHROMATIC EXCITATIONS. *Proc. Acad. Sci. (USSR)*, 1949, 64(5), 664-672. T-1737.

12,873

This paper reports experimental data collected during a study of changes in thresholds of light sensitivity of the organ of peripheral vision when stimulations were made successively with monochromatic light of a threshold intensity of the same or complementary color spectral radiation. The wavelengths used were 660, 580, 530, and 479 millimicrons; the field of observation subtended a visual angle of one degree. Three observers made ten successive threshold determinations in seven minutes, with a subsequent pause of five minutes, over a period of one hour. Control measurements were made every hour. The results are discussed in relation to the physiological basis for color vision.

G.

12,874

Schaefer, C., Kliefoth, W. & Von Wolff-Breslau, T. INFLUENCE OF COLORED GLASS FILTERS ON VISIBILITY. RESULTING FROM VARIATION OF LUMINANCE CONTRAST, HUE CONTRAST, AND SATURATION CONTRAST. *Zeitschrift Fur Technische Physik*, 1943, 24, 125-140, T 1379.

12,876

The influence of the change of the color contrast by ordinary colored sheets of glass (Neophane and Umbral) on visibility was investigated. On the basis of two older investigations, the effect of colored glass filters on luminance contrast and its effect on visual acuity are discussed. Some new experimental studies were conducted and are reported here. In addition, the influence of the glasses on chromaticity contrast of adjacent and non-adjacent hues and on the saturation of the hues is investigated experimentally. The results from studies on the three components of color sensation (luminance, hue, and saturation) were analyzed to yield the color contrast effects.

T. G. I. R 10

12,875

Sidorsky, R.C. & Newton, J.M. SHIP CONTROL IV. AN EMPIRICAL EVALUATION OF THE UTILITY OF A PITCH-RATE INDICATOR IN SUBMARINE DEPTH CONTROL. Contract NMR 2512(00), Proj. SUBIC, Electric Boat Tech. Rep. 411 HF 21, P58 217, Dec. 1958, 13pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn.

12,875

To determine whether or not a significant improvement in control of a submarine in depth results from the addition of a pitch-rate indicator to the instrument panel, seven operators performed simulated depth-control maneuvers under two display conditions. One display consisted of conventional depth-control instruments; the second used the same display with the addition of a pitch-rate indicator. Two maneuvers were performed, changing depth 200 feet up or down (depth seeking) and maintaining a constant depth while counteracting a cyclic forcing function (depth keeping). Graphic records of performance were analyzed for effects of the added display.

T. G.

12,876

Sidorsky, R.C. SHIP CONTROL VI. STEERING AND DIVING A SUBMARINE WITH A CONTACT ANALOG DISPLAY. Contract NMR 2512(00), Proj. SUBIC, Electric Boat Tech. Rep. 411 HF 20, P58 212, Dec. 1958, 27pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn.

12,876

This report details the fourth in a series of experiments designed to evaluate a display concept as embodied in the Contact Analog (CA) which displays information (by perspective transformation of a three-dimensional space model) about position, motion in all six degrees of freedom, and the cross-coupling effects between all degrees of freedom. Five men were trained over a five-day period to interpret a dual-surface CA display and to steer and dive a simulated submarine with conventional instruments. After training, the subjects were tested on their ability to perform the maneuvers using only information provided by the CA display. Performance data were compared.

T. G. I. R 9

12,877

Smith, B.J. (Ed.). HUMAN CONTROL DYNAMICS IN AIR AND SPACE CRAFT. 1958 FLIGHT SAFETY SEMINAR. SECOND ANNUAL HUMAN FACTORS DISCUSSION GROUP. Nov. 1959, 42pp. Flight Safety Foundation, Inc., N.Y.

12,877

Human Factors engineering specialists attending the 11th annual Flight Safety Seminar at Atlantic City (1958) convened to discuss the man-machine control dynamics. This report presents the edited papers and discussion of this group. Five papers are presented as follows: "Non-linearization, 'quickenings,' and man-machine dynamics," by James S. Sweeney; "The predictor-instrument," by Charles R. Kelley; "Human transfer functions," by Ezra S. Krendel; "Man-machine dynamics in orbital vehicles," by Malcolm L. Ritchie; and "Research on human performance during zero gravity," by Marty R. Rockway.

G. I. R 5

12,878

Marcum, E.R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. XII. ACUITY FOR OPEN AND BLACKENED CIRCLES. Proj. MICHIGAN, Rep. 2144 315 T, Sept. 1958, 14pp. Vision Research Lab., University of Michigan.

12,878

This study investigated the ability of observers to localize circular targets when these were in the frontal plane of the visual field. Targets consisting of single blackened circles (20 minutes in diameter) were presented tachistoscopically at each of four eccentric locations relative to the fixational center along four meridian lines passing through the center of fixation. The observers were required to indicate the half-meridian on which each target fell. Background luminance was 6.8 foot-lamberts and target exposure was for 0.075 seconds. Mean number of errors was determined for the thirty-two target positions.

T. G. I. R 19

12,879

Yrakov, S.V. EFFECT OF THE COLOR ADAPTATION OF THE EYE UPON ITS REACTIVITY IN RELATION TO INADEQUATE STIMULATING AGENTS. *Proc. Acad. Sci. USSR*, 1949, 64(2), 203-206. T 1935.

12,879

To determine the effect of color adaptation of the eye upon the character of change in the cone sensitivity of the eye when inadequate stimulating agents are used, thresholds of visibility of monochromatic radiations (green and red) were taken. The inadequate stimuli were electricity and/or sound. The procedure involved 15 minutes adaptation to one of the colors, threshold determinations, ten minutes stimulation with the inadequate stimulus, and further threshold measurements. The resulting changes in sensitivity were analyzed.

T. G. R 9

12,880

Huffaker, C.L. INVESTIGATION OF MAP REVISION TECHNIQUES AND EQUIPMENT. SECOND INTERIM TECHNICAL REPORT. Contract DA-44 009 ENG 3243, Proj. 8 35.03 222, Sept.-March 1958, 38pp. Mark Hurd Aerial Surveys, Inc., Minneapolis, Minn.

12,880

The second phase of an investigation into the field of military map revision is reported. The nature of the maps, aerial photography, and general problems likely to be encountered in map revision were investigated. Instrumentation of existing and possible map revision systems were analyzed. With consideration of certain photographic developments now in progress such as orthophotographs and/or tilt-free photography, an interim instrument is recommended which will permit efficient map revision while awaiting final development of the improved techniques.

I.

12,881

Hosey, A.D., Keenan, R.G. & Yaffe, C.D. (Eds.). THE INDUSTRIAL ENVIRONMENT...ITS EVALUATION AND CONTROL. SYLLABUS FOR SHORT COURSES FOR INDUSTRIAL HYGIENE, ENGINEERS AND CHEMISTS. Public Health Service Publ. 614, May 1958, 360pp. Bureau of State Services, U.S. Department of Health, Education, and Welfare, Washington, D.C.

12,881

This syllabus was developed for a two-week training course for industrial hygiene engineers and chemists. The material presented supports a course devoted primarily to a consideration of fundamental principles and methods employed in the evaluation and control of the working environment. Selected general reference sources and laboratory exercises are included.

T. G. I. R 400(approx.)

12,882

Hoover, R.M., Pietrasanta, A.C. & Staff of Bolt Beranek and Newman Inc. SIZE MEASUREMENTS OF NOISE REDUCTION OF AIR-BASE STRUCTURES. Contract AF 33(616) 3938, Proj. 7231, Task 71787, WADC TR 58 243, Nov. 1958, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Bolt Beranek and Newman, Inc., Cambridge, Mass.).

12,884

To measure the noise reduction of typical air base structure and to investigate the effect of operable such windows, open and closed, upon noise reduction, field data were obtained at an air base. Measurements were taken in two wood frame structures with typical air base jet air craft operations used for noise sources. The noise reduction data were compared with calculated data and correction factors introduced into the calculation procedures to account for the effect of the windows. I. G. I. R 5

12,885

Ward, R.L. & Staff, U.S. Army Research Office, Aberdeen Proving Ground, Md. RECOGNITION OF BINARY PATTERNS AND RECOMMENDATIONS FOR IMPROVED PACKAGE DESIGN. Proj. TW 360, Tech. Memo 5 58, June 1958, 11pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

12,886

This study compared the efficiency with which two different heights of ammunition containers (50 and 80 rounds) could be man-carried across a 150 yard course of irregular terrain. The optimal load for a single ammunition carrier was derived from the data and an ammunition package design concept was formulated embodying a combination folding box and a look-alike container. I. G. I. R 5

12,887

Hasell, P.G. NAVIGATIONAL TECHNIQUES AND DISPLAYS FOR INTERPLANETARY SPACE FLIGHT. Contract AF 33(616) 5523, First Quarterly Rep. 2752 3 P, Sept. 1958, 5pp. Willow Run Laboratories, University of Michigan.

or model of a human subject to be used in the discussion. Terrestrial navigation techniques and the physical phenomena of space are being investigated. Several criteria for space navigation are being studied. Limitations as to the scope of the study are discussed and specific objectives for the remainder of the contract are being studied.

12,888

This paper presents selected references in the following areas of human engineering: (1) general principles, methods and all other phases; (2) records of human engineering data--general handbooks, data from specific areas; (3) applications; and (4) human engineering journals, bulletins, and newsletters. R 44

12,886

Hirsh, E.R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. XIII. LINEAR BINARY PATTERNS AT KNOWN ECCENTRICITIES. Contract DA 36 039 SC 52554, Proj. MICHIGAN, Rep. 2144 316 T, Sept. 1958, 14pp. Willow Run Laboratories, University of Michigan.

12,888

To evaluate the importance of knowledge of target location relative to fixation in the recognition of multiple-element targets, two experiments were conducted using eight- and ten-element targets. The targets, consisting of linear patterns of blackened and open circles, were presented in the frontal plane of the visual field at inclinations of 0, 45, 90, and 135 degrees with respect to the horizontal meridian. The fixation point was varied so that it either bisected or appeared just off either end of vertical and horizontal targets. The observer knew that, regardless of location of fixation point, the target centers always registered with the center of the visual field. Errors in pattern reproduction were analyzed as a function of the eccentricities. I. G. I. R 5

12,887

Hirsh, E.R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. X. BINARY PATTERNS OF THE LETTERS "H" AND "O". Contract DA 36 039 SC 52554, Proj. MICHIGAN, Rep. 2144 308 T, Nov. 1958, 12pp. Willow Run Laboratories, University of Michigan.

12,887

To investigate human binary pattern reproduction accuracy for linear target arrays 11 observers were tested. Eight-element patterns of the printed letters "H" and "O" were presented tachistoscopically at inclinations of 0, 45, 90, and 135 degrees to the horizontal of the frontal plane of the visual field. The observer's task was to reproduce the meridian along which the target appeared as well as the pattern of letters. Errors in pattern reproduction were analyzed for effect of inclination and for letter position in relation to point of fixation. The results are discussed in relation to theoretical positions of visual perception. Implications for military surveillance problems are indicated. I. G. I. R 5

12,888

Hansen, R.G. & Blackstock, D.T. FACTORS INFLUENCING THE EVALUATION OF EAR PROTECTIVE DEVICES. Proj. 7210, Task 71700, WADC TR 57 772, May 1958, 30pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

Since the number of subjects and the number of measurements necessary to obtain a reliable value for the average attenuation of an earplug under specific, controlled conditions, the method established by the American Standards Association for determining "real-ear" attenuation of ear protectors was employed. Attenuation values for the V-51R earplug were obtained at each of nine frequencies for each of 20 subjects. Testing was repeated on five separate occasions. From the data analysis predictions were made as to how many measurements are needed to obtain attenuation values with given confidence limits. Some of the physical causes of the variability are discussed. I. G. I. R 9

12,889

Ward, R.L. THE EVALUATION OF PHYSICAL ABILITY. SPECIAL ARTICLE. Mod. Eng. J. Med., May 1958, 232, 986-993. (American Mutual Liability Insurance Company, Boston, Mass.).

12,889

This article discusses the need for a method for evaluating the physical abilities, rather than disabilities, and presents a specific method that has been tested and proved in the medical and personnel departments of some 50 industrial establishments. The method permits a numerical evaluation of each person's abilities in 10 factors representing practically all the significant human activities and hazards that it is possible to encounter in any one environment at any one time. The physician's evaluation form "Profile of Physical Abilities" is discussed and sample records are given.

12,870

Maig, T.O. & Norton, M.C., III. AN OPERATIONAL SYSTEM TO MEASURE, COMPUTE AND PRESENT APPROACH VISIBILITY INFORMATION WITH AN AFFORDIX PREPARED BY SPERRY GYROSCOPE COMPANY. AIR FORCE SURVEYS IN GEOPHYSICS NO. 102. Proj. 7694, AFSC TN-58 417, June 1958, 113pp. USAF Atmospheric Devices Lab., Geophysics Research Directorate, AFSC, Bedford, Mass.

12,870

This publication reviews briefly the history and major efforts of the Approach Visibility Project. The development of a simplified system for determining visual contact height is described in detail. The use of this information in military civil air operations is discussed and instructions for implementing the system on an interim basis are presented.

T. G. I. R 18

12,891

Guzzoni, Anna Maria E. & Fiorentini, A. SIMULTANEOUS CONTRAST EFFECT PRODUCED BY NON UNIFORM COLOURED FIELDS. Atti Della Fondazione Giorgio Ronchi, March-April, 1958, XIII (2), 135-144.

12,891

The visual contrast effect known as Mach bands, was investigated using colored fields. Three experiments were conducted: 1) observation of fields presenting color gradients of uniform luminance to discover whether colored Mach lines are perceived; 2) measurement of width and position of a bright Mach band on a field presenting two uniform zones at different luminance levels, separated by a zone with a linear luminance gradient using red, green, or white lights; and 3) measurement of apparent brightness, hue and saturation of different parts of the last named field by a binocular match method.

T. G. I. R 14

12,892

Gray, R.F. & Crosbie, R.J. VARIATION IN DURATION OF OCULOGYRAL ILLUSIONS AS A FUNCTION OF THE RADIUS OF TURN. Proj. NM 10 01 12 2, Rep. 2, NADC-NA-5806, May 1958, 26pp. USF Aviation-Medical Acceleration Lab., NADC, Johnsville, Penn.

12,892

To investigate the effect of varying the radius of turn on visual illusions of rotation (oculogyral illusions), two subjects were exposed on a human centrifuge at radii of 6, 19, 33, and 50 feet to various angular accelerations. They were kept at a maximum velocity for 45 seconds, then decelerated. The oculogyral illusion was recorded as to time of occurrence, direction, and duration. These data were analyzed for effect of radius and repetition. The results are discussed in relation to theories of semicircular canal function. An endnote includes an analysis of effect of rotation on a fluid filled ring at various radii and description of sensations of rotation and tilt which occur on centrifuges.

G. I. R 8

12,893

Girden, E. (Proj. Dir.). SENSING MECHANISMS IN CONTROL OF FINE MOVEMENTS IN PERCEPTUAL MOTOR PRECISION. FINAL REPORT. Contract DA 49 007 MD 625, July 1958, 46pp. Brooklyn College, Brooklyn, N.Y.

12,893

For this project, a series of 11 experiments were completed involving over 700 test sessions. In the final series of studies reported here, precision of performance was measured for a wide range of sensitivities (0.11 to 1.54 foot-pounds torque) using a rotational pressure control in the pursuit tracking of a one-dimensional moving target. Comparison of performance with the pressure control was made to that with a free-moving control. A technique was devised to measure the psychophysics of "pressure-kinesthesia" and preliminary observations were obtained by "fractionation" and "Weber's ratio."

T. G. R 3

12,894

Sethard, J.M. REVIEW OF HUYCHMAN'S WORK ON ELECTRICAL EXCITATION OF THE HUMAN EYE. Contract NED 7386, Reprinted from the Minutes and Proceedings of the 29th Meeting of the Armed Forces-NSC Vision Committee, Nov. 1951, 150-167. University of Michigan. (The Johns Hopkins University).

12,894

This paper reviews the work of Professor Hui-chuan and his associates at the Physiological Laboratory of the Tokyo University, Japan on the problem of interaction between psychic and electrical stimulation of the eye. A general description of the methodology is given. The results of the experiments reported by Hui-chuan are then presented and discussed under the following topics: 1) excitability, of the eye-effect of sensitization adaptation level, time, position, intensity, and effort; 2) color discriminations effect of wave length, intensity, color deficiency, color inhibition, microstimulation, and so forth; 3) summation, contrast, and optical illusions; 4) the strength-frequency relationship and 5) measurement of general fatigue.

T. G. I. R 81

12,895

Harcum, E.R. & Blackwell, H.R. VISUAL ACUITY FOR RECTANGULAR AREA LINE GRATINGS WITH VARIOUS INCLINATIONS OF LINES AND RECTANGULAR AREA. Proj. MICHIGAN, Rep. 2144 319 T, Sept. 1958, 10pp. Vision Research Labs., University of Michigan.

12,895

The present study is concerned with the role of dioptric astigmatism in the relative acuity for a line-grating, composed of parallel black and white bars at various inclinations presented along different meridians of the frontal plane of the visual field. The meridian (0, 45, 90, and 135 degrees from horizontal) on which the test object fell was varied independently of the inclination of the lines within the rectangular area line-gratings. Luminance of target and field was about 7.4 foot-candle. Three observers reported the inclination of the lines in the gratings and an analysis of the error was made for the various inclinations and meridians in the visual field.

T. G. R 12

12,896

Goldhaber, H. HUMAN FACTORS IN SYSTEMS ANALYSIS. Rep. RM 389, April 1958, 29pp. The Rand Corporation, Santa Monica, Calif.

12,896

This paper considers the relation of human factors to system analysis first through a very general account of some of the problems and characteristics of system analysis and then, more concretely, in terms of the work done at the RAND Corporation in California for the United States Air Force.

12,897

Harcum, E.R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. IX. MONOCULAR AND BINOCULAR RECOGNITION OF PATTERNS OF SQUARES AND CIRCLES. Contract DA 36 039 SC 52654, 2144-307 T, Nov. 1958, 22pp. Vision Research Labs., University of Michigan.

12,897

This report contains the results of an investigation of human pattern reproduction capacity for linear binary targets presented tachistoscopically along various meridians of the frontal plane of the visual field. Eight-element targets composed of squares and circles were presented at inclinations to the horizontal of 0, 45, 90, and 135 degrees such that four elements appeared on either side of fixation. The observers reproduced the patterns when viewing with one eye and binocularly.

T. G. I. R 7

12,898

Gillenwater, C.W. PLANETARY GEAR STEP-UP HINGE. Tech. Rep. 5827, Oct. 1958, 8pp. USA Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D.C.

12,898

This report covers the production design of a prosthesis hinge to enable an amputee to regain lost flexion of the forearm. Rationale of the design is given as well as details of the hinge in the form of drawings.

I.

12,899
Gordon, D.A. A SURVEY OF HUMAN FACTORS IN MILITARY NIGHT OPERATIONS. (WITH SPECIAL APPLICATION TO ARMOR). Spec. Rep. 11, Nov. 1957, 65pp. Human Resources Research Office, George Washington University.

12,899
This paper surveys the scientific and technical literature on human factors in night military operations and the research developments are considered particularly for their applicability to tank operations. Chapter headings are as follows: night vision training for arm personnel, night sights and optical systems, battlefield illumination, and some additional problems of night combat.
T. G. I. R 138

12,900
Garner, W.R. ADVANTAGES OF THE DISCRIMINABILITY CRITERION FOR A LOUDNESS SCALE. *J. acoust. Soc. Amer.*, Nov. 1958, 30(11), 1005-1012. (The Johns Hopkins University).

12,900
This is an exposition of the advantages of basing a loudness scale on the discriminability criterion. It is felt by the author that such a procedure is superior to those methods which assume that direct numerical responses adequately reflect the nature of the loudness experience. The reasons for this conclusion are outlined in some detail.
G. R 18

12,901
Forrest, J., Wade, E.A., Carter, W.K. & Slechts, K.F. LIGHT-WEIGHT SEATING: DESIGN RESEARCH ON A NYLON NET SEAT. ONE OF A SERIES OF STUDIES PERTAINING TO CREW COMPARTMENT HABITABILITY FOR EXTENDED MISSIONS. Contract AF 33(616) 3068, Proj. 7222, Task 71747, WADC TR 58 339, Dec. 1958, 33pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University).

12,901
This report describes a design research program for a light-weight aircraft seat made from nylon netting. An empirical approach was used to evaluate a series of exploratory designs and to modify solutions on the basis of subjective reports by individuals occupying the seats. The nylon net seat was evaluated from the point of view of human factors requirements for a seat for long-term occupancy and engineering requirements for light-weight seating.
T. I. R 18

12,902
Furchtgott, E. EFFECT OF HUNGER AND SATIETY ON ODOR SENSITIVITY. Contract DA19 129 QM 844, Proj. 7 84 15 007, Rep. 7 (Progress), File P 1110, March - April 1958. USA Quartermaster Food and Container Institute for the Armed Forces, Research and Engineering Command, Chicago, Ill. (University of Tennessee).

12,902
To study the effects of hunger and satiety on odor sensitivity, gustatory (sucrose) and olfactory (iso-amyl acetate) thresholds were measured between 12 and 1 p.m. and 4 and 5 p.m. after lunch had been eaten or withheld. Breakfast was standard for all subjects who were divided into two groups to provide a counterbalanced experimental design. The thresholds were examined for the effects of hunger and satiation.
T.

12,903
Fedorov, N.T., Sklyarevich, V.V. & Mashirova, O.F. DEPENDENCE OF THE INTENSITY OF SIMULTANEOUS COLOR CONTRAST ON THE SATURATION AND HUE OF THE INDUCING COLOR. *Proc. Acad. Sci. USSR*, 1949, 67(2), 267-269. T 1894.

12,903
To study the dependence of color contrast upon the hue of the inducing field, equiluminous fields of wavelengths 650, 620, 590, 570, 550, 530, 510, and 490 mμ were used. Intensity of simultaneous contrast was measured with three subjects by a matching technique. Curves of contrast and saturation are presented.
T.G.

12,904
Davis, H., Eldredge, D.M. & Usher, J.R. ARMED FORCES-NATIONAL RESEARCH COUNCIL COMMITTEE ON HEARING AND BIO-ACOUSTICS. FIFTH ANNUAL REPORT, 1 JUNE 1957 TO 31 MAY 1958. Contract WMR 1151 (01), NR 140 069; Tech. Rep. 15, June 1958, 43pp. Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics, Central Institute for the Deaf, St. Louis, Mo.

12,904
This is the fifth annual report of the Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics and summarizes 1) the proceedings of meetings held during the year, 2) the activities of various working groups, and 3) the titles of reports of the committee and material which has appeared in professional journals.
R 22

12,905
Day, R.H. SOME RELATIONS BETWEEN SHAPE AND AREA OF DISPLAY AND PERFORMANCE IN A CO-ORDINATION TRACKING TASK. (A PRELIMINARY REPORT). *EPRC* 829, April 1953, 9pp. Flying Personnel Research Committee, London, England. (Department of Psychology, University of Bristol, Bristol, England).

12,905
To investigate performance in a difficult tracking task as a function of shape and area of display, subjects performed a task involving coordinated feet and hand movements in response to deviations of a fugitive spot of light which followed a complete course over the surface of a cathode ray tube. The area of the display was varied by cardboard screens so as to give ten areas, while the two shapes of display studied were circle and square. The efficiency of performance under the various conditions is evaluated by means of "time on target" scores handled by analysis of variance.
T. G. R 7

12,906
Chapanis, A. THE DESIGN AND CONDUCT OF HUMAN ENGINEERING STUDIES. Contract N6NR 1268(01), Proj. NR 145 075, Tech. Rep. 14, July 1956, 73pp. San Diego State College Foundation.

12,906
This guide for the design and conduct of human engineering studies consists of fairly extensive chapters on methods of operational observation, methods for the study of accidents and near accidents, experimental methods, psychophysical methods, statistical methods, and, finally, a chapter on the special problems involved in experimenting with people. The style is simple and direct, but the contents are well documented.
T. G. I. R 93

12,907
Colman, A.E. APRIL ALIGNMENT FIXTURE FOR ARM CONTROL SYSTEM. Tech. Rep. 5833, Oct. 1958, 7pp. USA Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D.C.

12,907
This is a report on the design of an alignment fixture for a prosthetic arm control system. The fixture is expected to assist the limb fitter in properly locating the position of the control system anchor points while the amputee is wearing and operating the prosthesis. Drawings show complete detail for the fabrication of this device.
I.

12,908
Colman, A.B. VELOCITY LOCK ELBOW. (HOSMER E.400). Tech. Rep. 5836, Oct. 1958, 8pp. USA Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D.C.

12,908
This report covers the redesign of the H.J. Hosmer Corporation Elbow No. E-400 for use in a prosthesis. This velocity lock elbow is used in a dual control system that permits forearm flexion, positive locking of the forearm in the desired position, and terminal device operation. Results are given for eight amputees fitted with this type of elbow.
I.

12,909

Chisman, S.W. TESTING OF A R.A.E. COMBINED HARNESS (PRAGMEL TYPE) FOR USE ON EJECTION SEATS. Tech. Note M.E. 244, U.D.C. 629.13.012.31, Sept. 1957, 19pp. Royal Aircraft Establishment, Farnborough, Hants, England.

12,909

This technical note presents the results of an extensive range of tests undertaken to evaluate the feasibility and advisability of a combined harness as a replacement for the existing parachute and safety harnesses used on ejection seats.
G. I. R 2

12,910

Chaslow, M.L.E. 2 Amsterdam, N.F. SEEING AT LOW LEVELS OF ILLUMINATION. Ordnance Proj. TN 303E, DA Proj. SM13.01 009, Rep. TN 1104, Aug. 1958, 11pp. USA Fire Control Branch, Frankford Arsenal, Penn.

12,910

This study compares the low light level capabilities of the human eye (when aided by conventional optical systems) with systems incorporating various electrovisual devices (single or cascaded image converter tubes, image orthicons, or combinations of these). Comparison of the sensitivity of the various systems is made assuming the use of equal apertures.
T. G. R 13

12,911

Colman, A.B. HUMERAL POSITIONING UNIT. (PASSIVE FRICTION PROSTHETIC SHOULDER). Tech. Rep. 5828, Oct. 1958, 5pp. USA Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D.C.

12,911

This report relates the results of production engineering on a device for inclusion into a shoulder disarticulation prosthesis intended to give the amputee flexion and extension of the prosthetic arm in a pre-determined plane. Drawings furnish design and dimensions for fabrication of this humeral positioning unit (passive friction prosthetic shoulder).
I.

12,912

Beckman, E., McNutt, D.C. & Rawlins, J.S.P. USE OF THE STANDARD EJECTION SEAT SYSTEM AS A MEANS OF ESCAPE FROM SUBMERGED AIRCRAFT. (A PRELIMINARY REPORT). FPRC 1049, May 1958, 6pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

12,912

This is a preliminary report on the feasibility and advisability of using the standard Martin-Baker ejection seat system as a means of escape from submerged aircraft. Results of trials to date of publication are presented in terms of the physical forces which were found to act upon aircrew who fired an ejection seat underwater. Certain instructions for aircrew who may be forced to make such an ejection, as well as recommendations for modification, are also included.

12,913

Bennett, E.M., Kemler, D.K., Allen, P.S., Carter, W.K., et al. THE POLYDIAGNOSTIC METHOD OF MULTIPLE FORCED-CHOICE RANKINGS IN DESIGN ANALYSIS. Contract AF 33(616) 3058, Proj. 7222, Task 71747, WADC TR 58 308, Dec. 1958, 33pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University).

12,913

This report outlines a new method, the polydiagnostic method of multiple forced-choice rankings, and its applications to the area of design analysis and prediction of product acceptability. Three examples of the method are included. The first considers the telephone handset, while the second and third examples are concerned with one of the more vital elements of the crew station--namely, the seat on which a man might be expected to remain for many hours during many days or weeks in the course of extraordinary flights of long duration.
G. I. R 15

12,914

Billinski, C.R. THE U.S. NAVY TECHNICIAN IN ELECTRONICS. NRL Rep. 629, Dec. 1958, 19pp. USN Electronics Lab., San Diego, Calif.

12,914

In an effort to improve electronic maintenance in the Fleet and assist scientists and engineers involved in development of electronics systems by providing information about the men who perform maintenance, a representative sample of electronics personnel aboard Navy ships were questioned as to their maintenance duties and their education, training, and other qualifications. Detailed findings on skills, limitations, training, and duties are presented.
T. G.

12,916

Sampson, P.B. HUMAN FACTORS IN HELICOPTER INSTRUMENTATION HOVERING DISPLAYS. SIXTH QUARTERLY PROGRESS REPORT. STUDY, DESIGN, AND DEVELOPMENT OF NAVIGATION DISPLAY FOR HELICOPTERS. Contract AF 33(600) 34034, Rep. 484.6, June 1958, 42pp. Laboratory for Electronics, Inc., Boston, Mass. (Institute for Applied Experimental Psychology, Tufts University).

12,916

This progress report comprises a detailed description of a laboratory evaluation of three proposed helicopter hovering displays, which is part of a larger study on the design and development of navigation displays for helicopters. A vector, cross-pointer, and moving-grid type display were compared in terms of human tracking performance in response to these displays on a compensatory tracking task. The results are in terms of integrated error scores and time on target scores. The results are interpreted and suggestions for the design of a helicopter hovering display are incorporated in the report.
T. G. I. R 74

12,917

Salmon, R.D. MAX-LOAD CARRYING EQUIPMENT. SECOND INTERIM REPORT. Proj. ES 787, May 1957, 47pp. USMC Development Center, Quantico, Va.

12,917

This is a report on controlled testing and evaluation of equipment to 1) carry essential items of individual clothing and supplies and 2) hang combat equipment on the individual that relieves the strain on the shoulders and back. Consideration was given to combat efficiency under varying climatic and terrain conditions. Detailed results and recommendations with respect to the various items of equipment are given.
T. I.

12,918

Sanderson, J.A. & Tuve, R.L. THE ATTENUATION OF LIGHT BY SMOKE SCREENS. NRL Rep. H 1602, March 1940, 22pp. USN Research Lab., Washington, D.C.

12,918

In this study of attenuation of light by smoke screens, the spectral distribution of light transmitted by smoke screens sufficiently dense to hide completely a 500 watt tungsten lamp (focused) at a distance of 244 meters was determined. The transmission characteristics are analyzed and the problems of signalling and detecting enemy surface craft through smoke are discussed.
G. I. R 10

12,919

Spencer, J. JUDGMENT OF HEIGHT BY THE APPARENT OBLIQUITY OF FAMILIAR GROUND OUTLINES. FPRC 819, March 1953, 15pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

12,919

A series of experiments was performed to assess the accuracy with which people can judge their height when the judgment is based upon an obliquely-regarded familiar shape. Subjects viewed a basic shape produced by four small circular spots, one at each corner of an imaginary square (on the horizontal) and chose a "perspective shape" to match from a graded series of cards (placed perpendicularly to subject's line of sight). The three viewing heights gave angles between the subject's line of sight and the horizontal of 15°, 32°, and 48 degrees. Variations in illumination were achieved with neutral density filters placed over viewing position apertures. Viewing conditions were either monocular or binocular. The results are analyzed and discussed in relation to the problem of aircraft landing.
T. G. R 5

12,920

Scott, T.M. LITERATURE REVIEW OF THE INTELLECTUAL EFFECTS OF PERCEPTUAL ISOLATION. Rep. MR 66, POC D77-94 85 C1, July 1957, 13pp. Defence Research Board, Department of National Defence, Ottawa, Canada.

12,920

This paper reviews the literature on the intellectual effects of perceptual isolation. First, material on efficiency in relation to variability of the sensory environment is discussed. Next, problems in the explanation of performance change are handled, and, finally, the matter of habituation with the repetition of stimuli is reviewed.

R 93

12,921

Paelson, V.J. CONTRACT AF33(616)-3710. PROGRESS REPORT. AUGUST 29, 1957. 125pp. Western Electric-Acoustic Laboratory, Inc., Los Angeles, Calif.

12,921

Progress is reported in the study of four microphone systems: 1) close talking pressure microphone, 2) gradient microphone, 3) pressure pickup in a noise shield, and 4) gradient pickup in a noise shield. These systems have been studied regarding their ability to reduce the effects of external noise, and also their effect on human speech. A noise spectrum and suitable words for articulation testing have been chosen. Several studies on speech levels are also presented. Types of microphones, earphones, and loudspeakers are presented in charts, and progress reports on studies of a high pressure helmet and communication in jet engine noise fields are included.

T. G. I. R 11

12,922

Pickert, J.M. PERCEPTION OF COMPOUND CONSONANTS. Language and Speech, Oct.-Dec. 1958, 1(4), 288-304. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

12,922

This study examined the perceptual confusions which arise with English compounds of two consonants. One defined class of syllables, made up of 15 initial compound consonants in conjunction with three vowel sounds (i, a, and o), and another class of 15 final compound consonants in conjunction with the same three vowel sounds, were used. Recorded syllables were played back against a white noise background and against a low-frequency noise background. Confusion matrices were derived from the data of six listeners.

T. G. R 9

12,923

Neely, K.K. & House, P.W. INTELLIGIBILITY OF VERBAL SYMBOLS: I. TWO-, THREE-, AND FOUR-DIGIT SEQUENCES. DRML Proj. 118, POC Proj. D77-94-40-07, DRML Rep. 118-2, July 1958, 35pp. Defence Research Medical Labs., Defence Research Board, Ottawa, Canada.

12,923

This report describes a study designed to assess the effects of poor communication conditions on the intelligibility of digits in two-, three-, and four-digit sequences. The experiment employed five speakers and 45 trained listeners. The confusions arising for the digit zero to nine, in various combinations, were measured under adverse voice communication conditions.

T. I. R 5

12,924

Murphy, R.K. EFFECTS OF THREAT OF SHOCK, DISTRACTION, AND TASK DESIGN ON PERFORMANCE. Ph.D. Dissertation, 1958, 23pp. Johns Hopkins University.

12,924

To investigate the effects of threat of electric shock, aural distraction, and task design on performance, 80 male subjects dealt four decks of 52 cards, each deck consisting of a different design pattern of eight rangings. Subjects dealt the cards under different combinations of two levels of threat and two levels of distraction. Performance differences (time to deal deck) are evaluated for the different conditions of the experiment by analysis of variance.

T. I. R 11

12,925

Miller, L. DESIGN AND DEVELOPMENT OF A ONE QUART INSULATED RECTANGULAR BEVERAGE CONTAINER. Contract AF 33(616) 3574, Proj. 6331, Task 63604, WADC TR 57 635, Dec. 1958, 21pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (D.K. Manufacturing Company, Chicago, Ill.).

12,925

This report discusses the problems inherent in designing and developing a one quart insulated rectangular container. The problems are those of weight and heat loss. A prototype stainless steel vacuum insulated rectangular container was provided and is described in this report.

T. I.

12,926

Morehouse, L.E. & Butler, P.T. STRENGTH TESTS OF AN "AVERAGE" MAN. Rep. SA 18374, June 1954, 9pp. Douglas Aircraft Company, Inc., Santa Monica, Calif.

12,926

A series of tests was conducted in an effort to determine the strength or resistance of an average man under varying circumstances so as to gain data which might aid in devising ejection or bail-out procedures for jet pilots. The strength of a typical man was measured for thirty-five different positions by the number of pounds of pull he could resist. A series of photos, showing the positions and the related resistance measurements, is included.

I.

12,927

Lawrence, M. & Macmillan, J.W. ANNOTATED BIBLIOGRAPHY ON HUMAN FACTORS IN ENGINEERING DESIGN. Proj. X 651 (AY 3421), NAVMED 1079, Feb. 1945, 209pp. USAF Aviation Branch, Bureau of Medicine and Surgery, Washington, D.C.

12,927

This annotated bibliography on human factors in engineering design handles some 400 references in various degrees of detail. General topics covered are: anthropometric data, physiology, psychology, instruments, controls, work place, and group operations.

T. I. R 407

12,928

Lit, A. THE EFFECT OF FIXATION CONDITIONS ON DEPTH-DISCRIMINATION THRESHOLDS AT SCOTOPIC AND PHOTOPIC ILLUMINANCE LEVELS. Proj. MICHIGAN, Rep. 2144 323 T, Nov. 1958, 12pp. Vision Research Labs., University of Michigan.

12,928

This study measured the precision of depth discrimination with a two-rod test apparatus involving real-depth cues. Effects due to different methods of fixating the rods have been assessed at each of a number of levels of equal illuminance presented to the two eyes. One method of fixation involved steady fixation on the movable comparison rod, while a second method involved steady fixation on the immovable standard rod, and, in a third, the observers fixated either of the rods. The results are discussed in relation to photochemical theories of vision and the current controversy concerning the role of convergence in stereoscopic acuity.

T. G. R 8

12,929

Kristofferson, A.B. MONOCULAR AND BINOCULAR DETECTION THRESHOLDS FOR TARGETS VARYING IN SIZE AND RETINAL POSITION. Proj. MICHIGAN, Rep. 2144 290 T, Nov. 1958, 16pp. Vision Research Labs., University of Michigan.

12,929

This report presents detection probabilities, determined by the temporal forced-choice method, for targets of several diameters between 2 and 64 minutes, for binocular and monocular target presentation. In one series of tests, the target was presented 20 degrees peripherally at zero background luminance, while in a second series of tests the background luminance was approximately ten foot-lamberts and target presentation was foveal. The data are evaluated in terms of three mathematical models of the visual detection system. Some discussion of the relation of these results to the problems of designing optical devices is included.

T. G. R 13

12,930

Kaiser, J.G. PILOT EMERGENCY ESCAPE SYSTEM UPPER TORSO HARNESS WORK OVER PRESSURE SUIT BREATHING TEST OF MODEL F-106A. Test 9999, Rep. 9999-1, Sept. 1956, 1p. Engineering Test Lab., Convair, San Diego, Calif.

12,930

This is a brief report of the effects on breathing when the Convair Torsio Harness (climbed-up) is worn by a subject over an inflated pressure suit. Observations and conclusions are given, but specific data are recorded elsewhere.

12,931

Kahn, A. TESTING OF STATISTICAL HYPOTHESIS. Human Factors Data Bull. 31, Oct. 1959, 2pp. Analytical Section, Air Arm Division, Westinghouse Electric Corporation, Baltimore, Md.

12,931

As the first of a series of articles on statistical measures and techniques useful to the engineer, this paper discusses the problem of testing statistical hypotheses. The concepts involved are illustrated by a hypothetical problem (deciding which of two configurations of a control system to manufacture). Levels of confidence and the null hypothesis are discussed briefly in connection with this problem.

R 3

12,932

Kincaid, W.M. & Blackwell, H.R. APPLICATION OF PROBIT ANALYSIS TO PSYCHOLOGICAL DATA. I. TECHNIQUES FOR DESK COMPUTATION. Proj. MICHIGAN, Rep. 2144 283 T, Sept. 1958, 20pp. Vision Research Labs., University of Michigan.

12,932

The present report is the first of a series concerned with the reduction to usable form of data collected in experimental studies of visual detection. The method of data reduction discussed here is probit analysis. The method is described in general terms so that it should be readily applicable for use in the analysis of many classes of psychophysical data obtained in the study of human sensory processes of interest to surveillance systems. When thresholds are evaluated by probit analysis, a cumulative normal distribution function is fitted to the data in accordance with the principle of maximum likelihood. A procedure for solving the set of simultaneous equations with desk calculators is given.

T. G. R 14

12,933

Krendel, E.S. & Modinsky, J. VISUAL SEARCH IN AN UNSTRUCTURED VISUAL FIELD. Contract AF19(604) 1513, Final Rep. AFRC TR 59 51, July 1955 - June 1958. USAF Operational Applications Lab., Bolling AFB, Washington, D.C. (The Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

12,933

To determine the time required to detect small visual targets in a broad unstructured visual field, search was conducted in a conventional experimental room with unaided binocular vision under the following conditions: different search areas, contrasts, background luminances, and target sizes of possible significance in field operations. Three thousand, seventy-two trials for each of four practiced observers supplied the data for testing the adequacy of an exponential distribution as a description of visual search phenomena.

T. G. I. R 6

12,934

Kolers, P.A. A MULTI-FIELD ELECTRONIC TACHISTOSCOPE. Proj. 7183, Task 71617, WADC TN 58 349, Dec. 1958, 6pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,934

This report describes a multi-field electronic tachistoscope which has variable duration, sequence, and intensity controls. The device may be cycled automatically or run through a single cycle manually. Each viewing field can be illuminated for durations ranging from one millisecond to three seconds during automatic operation. Exposure duration may be increased by means of a manually operated switch. Intensity control of illuminated or transilluminated stimulus materials is also described.

I.

12,935

Kris, E.C. A TECHNIQUE FOR ELECTRICALLY RECORDING EYE POSITION. Contract AF 33(616) 3849, Proj. 7193, Task 71612, WADC TR 58 660, Dec. 1958, 33pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Massachusetts Institute of Technology).

12,935

This report presents a technique for electrically recording eye position and eye movements. The associated instrumentation, including a multichannel d-c differential input oscillograph and a special visual angulometer, is described in detail. Examples of several types of eye-movement recordings are presented, and the method of constructing "iso-potential eye-position maps" is outlined. Certain uses of these techniques in studies concerned with variations in the function of the visual system are briefly discussed.

G. I. R 7

12,936

Kahn, A. THE STUDENT "t" TEST. Human Factors Data Bulletin 33, Dec. 1958, 2pp. Analytical Section, Air Arm Division, Westinghouse Electric Corporation, Baltimore, Md.

12,936

This is the third in a series of brief articles describing statistical techniques for engineers. Here the Student "t" test for testing the hypothesis that the means of two sets of data are from the same population is described.

R 3

12,937

Kahn, A. MEASURES OF CENTRAL TENDENCY AND MEASURES OF VARIABILITY. Human Factors Data Bull. 32, Nov. 1958, 2pp. Analytical Section, Air Arm Division, Westinghouse Electric Corporation, Baltimore, Md.

12,937

In the second of a series of brief articles on statistical techniques useful to engineers, the author describes measures of central tendency and measures of variability.

R 3

12,938

Jones, B.F., Flinn, R.H. & Hammond, E.C. FATIGUE AND HOURS OF SERVICE OF INTERSTATE TRUCK DRIVERS. Public Health Bull. 265, 1941, 286pp. Division of Industrial Hygiene, National Institute of Health, Washington, D.C.

12,938

To study fatigue as a function of hours of driving, 839 truck drivers engaged in interstate commerce were examined at field stations set up in three cities. Tests used were simple reaction time, steadiness, accuracy of movement, speed of tapping, grip strength, estimation of size, auto driving test, visual acuity, flicker, speed of eye movement, and various medical tests. A detailed analysis of the data is used as the basis for certain recommendations.

T. G. I. R 75

12,939

Jones, G.M. PRESSURE CHANGES IN THE MIDDLE EAR AFTER FLIGHT. FPRC 1059, Nov. 1958, 15pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

12,939

This paper describes experiments on which middle ear pressure changes were measured after simulated flights in a decompression chamber, during which approximately known gas mixtures were introduced into the middle ear space by the breathing of gases of known composition during the simulated flight. Apparent changes in loudness related to change of pressure in a pneumophone were measured for five ears during the first few hours after simulated flight breathing of various concentrations of oxygen.

T. G. I. R 13

12,940

White, W.J. & Riley, M.B. THE EFFECTS OF POSITIVE ACCELERATION ON THE RELATION BETWEEN ILLUMINATION AND INSTRUMENT READING. Proj. 7216, Task 71712, WADC TR 58 332, Nov. 1958, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,940

This study is concerned with the manner in which accuracy of quantitative scale reading varies as a function of illumination and acceleration. Six subjects were exposed to accelerative levels ranging from one to four g and reading errors and time were measured for various levels of illumination of the instrument panel. Thus it was possible to determine whether or not a pilot's ability to read aircraft instrument dials at various levels of illumination is impaired by positive g-forces less than that required to produce blackout.
T. G. I. R 7

12,941

Wilkinson, R.T. THE EFFECTS OF LOSS OF SLEEP ON PERFORMANCE. RMP 58/913, OES 313, Dec. 1958, 39pp. Operational Efficiency Sub-Committee, RNPAC, London, England. (Applied Psychology Research Unit, MRC, Cambridge, England).

12,941

During the course of eight experiments performed to determine the effects on performance of some thirty hours without sleep, a wide variety of tasks were examined: a test of visual vigilance which lasted forty minutes, making decisions of a routine and repetitive nature as fast as possible for twenty-five minutes, and a number of learning and sorting tasks lasting less than ten minutes. Navy volunteers served as experimental and control (normal sleep) subjects and detailed comparisons of the performance of the two groups on the various tasks is made.
T. G. I. R 14.

12,942

Waller, M., Byrd, W.H., Jr. & Williams, R.R. EVALUATION OF THE INSTALLATION OF THE GRIMES ANTI-COLLISION LIGHT. Proj. MR AVN 356, Dec. 1957, 13pp. USA Aviation Board, Fort Rucker, Ala.

12,942

To evaluate the Grimes Anti-Collision light installed on various types of Army aircraft and to determine the most suitable location for this light, reports were obtained from 20 Army pilots to determine the adequacy of the light for indicating the presence, distance, speed and direction of other aircraft in the immediate area as well as possibilities for improvement.
T. R 10

12,943

Hearnshaw, L.S. ATTITUDES TO WORK. Occup. Psychol. July 1954, 1-11.

12,943

This paper offers a broad discussion on the topics of work attitudes. Three main lines of research suggest themselves to the author as being potentially most fruitful: comparative, genetic, and psychometric studies, with an emphasis on cross-cultural trends.
R 38

12,944

White, W.J. ACCELERATION AND VISION. Proj. 7216, Task 71712, WADC TR 58 333, Nov. 1958, 26pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

12,944

This is a review and evaluation of research pertaining to the effects of acceleration on vision. Studies of gross qualitative changes in vision, such as blackout, are discussed first, together with the physiological basis of these symptoms. Quantitative and analytic studies of the effects of acceleration follow, including electrophysiological studies and those using psychophysical techniques. Finally, areas where more investigation is required are pointed out.
T. G. I. R 52

12,945

Vining, T.W. (Chm.). PROCEEDINGS OF THE THIRD ANNUAL STATISTICAL ENGINEERING SYMPOSIUM. 2-3 MAY 1957. May 1957, 125pp. USA Chemical Corps Engineering Command, Army Chemical Center, Md.

12,945

This is a report of the proceedings of the third annual statistical engineering symposium held in 1957. Nine papers presented at the meetings are included and are illustrative of the many types of engineering problems that have been resolved through the use of statistical techniques of various types.
T. G. I. R ca. 60

12,945

Verplanck, W.S. (Chm.). REPORT OF THE WORKING GROUP ON ILLUMINATION AND DARK ADAPTATION. Jan. 1953, 3pp. Armed Forces-National Research Council Vision Committee Secretariat, University of Michigan.

12,946

This is simply a statement by a group appointed to prepare a critical review of the literature on dark adaptation for the Armed Forces National Research Council Vision Committee that such a review is to be prepared by the Laboratory of Applied Experimental Psychology at Tufts University.

12,947

Verplanck, W.S. & Cagood, C.E. FIELD TESTS OF OPTICAL INSTRUMENTS. NAVORD Rep. 77 46, March 1947, 331pp. USN Bureau of Ordnance, Washington, D.C.

12,947

This report describes the procedure and discusses the results of a series of field tests on various binoculars, monoculars, and gun sights, and states the relative merits of each. These tests were conducted to check the correctness of theoretical considerations and of laboratory tests which have been used in the selection and design of such optical instruments. The procedure was to approach a group of distant targets in a destroyer escort and, using the instrument to be tested, record the ranges at which each target could be glimpsed, seen continuously and, finally, identified.
T. G. I.

12,948

Van Valkenburg, E., Hasell, P. & Holland-Moritz, E. INSTRUMENTATION FOR AIRBORNE TARGET LOCATOR SUBSYSTEM. Proj. MICHIGAN, Rep. 2144 133 T, Oct. 1957, 41pp. Engineering Research Institute, University of Michigan.

12,948

To investigate the feasibility of designing an airborne optical sight for target detection and location which would be compatible with Army observation aircraft, the theoretical capabilities of three types of techniques were calculated and instrumentation requirements formulated and compared. The first type requires a vertical coordinate reference, while the other two types depend on measurements of included angles between the target and a known ground reference position. The study leads to specification of a subsystem for artillery target acquisition.
T. G. I. R 5

12,949

USN Physiological Psychology Branch. AN ANNOTATED BIBLIOGRAPHY AND CRITICAL REVIEW OF VOICE COMMUNICATIONS. OAR Rep. ACR 26, Jan. 1958, 117pp. USN Physiological Psychology Branch, OAR, Washington, D.C.

12,949

This report consists of a selective annotated bibliography on voice communications (conceived of as including the speaker, the electronic link, the listener, and the environment in which communication takes place), a record of the discussions which took place at a conference on the topic of voice communications, and a final section outlining expressed research needs in the area of voice communications.
G. I. R 200 (approx.)

12,950

Trumbull, R. & Maag, C.H. AN ANNOTATED BIBLIOGRAPHY AND CRITICAL REVIEW OF DRUGS AND PERFORMANCE. OMR Rep. ACR-29, Aug. 1958, 84pp. Physiological Psychology Branch, CMA, Washington, D.C.

12,950

This report consists of a selective annotated bibliography on drugs and performance, an outline of the many experimental variables inherent in research in this area, and a report of the discussions which arose at an informal symposium at which psychologists, pharmacologists, biochemists, and psychiatrists considered the effects of drugs on performance.

R 190

12,951

Pollack, I. & Knaff, P.R. MAINTENANCE OF ALERTNESS BY A LOUD AUDITORY SIGNAL. I. ACQUIS. Sci. Instr., Nov. 1958, 32(11), 1013-1016. (USAF Operational Applications Lab.; Bolling AFB, Washington, D.C.).

12,951

In order to study the changes in alertness brought about by the use of loud auditory signals, fifteen subjects performed a visual monitoring task under six conditions. In half of the tests, observers worked in a dark environment and, for half, in a light surrounding. In each environment, three reinforcement conditions were employed: neutral, reward, or punishment, which was a 0.5 second blast of a truck horn when the subject failed to respond appropriately to the display used. Effects of the various experimental conditions are analyzed and discussed in some detail.

T. G.

12,952

Zechman, F.W. Jr. THE EFFECT OF FORWARD ACCELERATION ON VITAL CAPACITY. Proj. 7222, Task 71746, WADC TN 58 376, Dec. 1958, 6pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Miami University).

12,952

This paper reports the measurement of the effect of forward acceleration on vital capacity for six human subjects. Vital capacities were measured using a Collins Respirometer. Using a rate of onset of 0.1 g per second, subjects were accelerated to maximums of 4, 6, and 8 g, after which subjects delivered two vital capacity volumes. The effect of the various levels of acceleration on vital capacity was determined with the subjects in two positions--trunk inclined 25 degrees and trunk perpendicular to the direction of acceleration. The results are analyzed and discussed.

G, R 9

12,953

Yaffee, M. BENDIX BEGINS WORK ON WEATHER SYSTEM. Aviation Week, Oct. 1958, 6pp.

12,953

This article describes plans for the development of a weather reconnaissance system (AM/ANQ - IS). To be integrated into a multi-jet transport aircraft, the flying weather system is intended to probe the atmosphere on a global scale, providing data for Air Force and commercial use. The airborne laboratory will include rocketsondes, dropsondes, aircraft probes and sensors, cloud and storm radars, computers, recorders, displays, and support.

I.

12,954

Yustova, E.N. REDETERMINATION OF THE SPECTRAL CHARACTERISTICS OF COLOR-VISION. Proc. Acad. Sci. (USSR), 1949, 55(5), 661-664. T 1752.

12,954

In this brief report, a technique for transforming the standard spectral mixture curves into spectral sensitivity curves is presented. Formulas for the transition from x, y, z coordinates to r, g, b coordinates are given. The resulting curves are compared with those previously obtained by different methods.

T. G.

12,955

Yustova, E.N. SPECTRAL SENSITIVITY OF EYE RECEPTORS. Proc. Acad. Sci. USSR, 1950, 74(6), 1069-1072. T 2031.

12,955

This paper summarizes previous work by the same author in the field of color vision: determination of the color perception of dichromats and development of a technique for transforming x, y, and z coordinates into a r, g, and b coordinate system.

T. G.

12,956

Yustova, E.N. DETERMINATION OF COORDINATE AXES OF THE BASIC PHYSIOLOGICAL SYSTEM FROM EXPERIMENTS WITH COLOR-BLIND OBSERVERS. Proc. Acad. Sci. USSR, 1949, 53(4), 383-385.

12,956

Using four red-blind observers and three green-blind observers, the direction of two axes of the three-color coordinate system was determined. Values for R and G were derived from five measurements at each of ten points in the color space. Results are compared with those of other workers.

T.

12,957

Yurov, S.G. SPECTRAL SENSITIVITY OF THE EYE AT A GIVEN LEVEL OF EQUIVALENT LUMINANCE. Proc. Acad. Sci. USSR, 1950, 74(6), 1077-1080. T 2003.

12,957

By means of a series of formulas, the author of this report advances the argument that the current method for determining the spectral sensitivity of the eye is in error.

G.

12,958

Whiteside, T.C.D. & Campbell, F.W. ACCOMMODATION OF THE HUMAN EYE IN AN EMPTY VISUAL FIELD. PPRC 821, March 1953, 8pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England & Institute of Physiology, University of Glasgow, Scotland).

12,958

The aim of this investigation was to determine the behavior of accommodation in an empty visual field. The subject using monocular fixation observed small or large test objects against a uniform background. Measurements were made at photopic and scotopic levels of illumination. The extent of accommodation exerted was determined by photographing and measuring images reflected from the anterior surface of the crystalline lens.

T. G. I. R 5

12,959

Welborn, J.C. REPORT OF PROJECT NR 1942, TEST OF HELMETS, COMBAT VEHICLE CREWMAN, QMC T56 6, AND MARINE CORPS GENEX DH16 3 (DA PROJECT NR 7 80 05 001). ATDEV 3 422/31, Nov. 1957, 24pp. USA Continental Army Command, Fort Monroe, Va.

12,959

This is the report on tests of two helmets for Army use: 1) Helmet, Combat Vehicle Crewman, T56-6 and 2) Helmet, Combat Vehicle Crewman, DH16-3. One hundred forty-seven individuals wore test helmets of one type or the other and detailed results for both types are given. Recommendations are included.

I.

12,960

Vinacke, W.E. "FASCINATION" IN FLIGHT. Proj. X 148 (AV-4 3), Rep. 13, July 1946, 12pp. USN School of Aviation Medicine, Naval Air Station, Fla.

12,960

A sample of 77 Naval aviators of widely diversified training and experience were interviewed on the subjects of "vertigo" and "fascination" (target-fixation; or auto-hypnotism) and were asked to describe in detail events of both kinds from their own flying careers. The protocols are included in the report as well as a summary of symptoms and situations in which they arise. Suggestions are advanced with respect to counteracting the phenomena.

R 5

12,943
Wilder, L.F., Selig, J.E. & Goss, A. PERFORMANCE OF
SUBMERGED SUBJECTS UNDER VARIOUS CONDITIONS OF VISUAL
STIMULI. Proj. 12,943, Task 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. Contract
DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 12p.
Vision Research Labs., University of Michigan.

12,944
To study the problem of maintaining elevated performance under conditions of extreme fatigue, tests comprising the Army Identification Battery, the 1944 and 1948 combat aptitude area composite, four 10 test series and background information, and some experimental tests were validated against a criterion obtained in field combat situations. The criterion was based on standing by ten minutes on the desirability of having the specific enlisted man along on another similar mission.
T. I. R 5

12,945
Wilder, L.F., Selig, J.E., Fisher, Margaret M. & Jackson, J. PERFORMANCE OF SUBMERGED SUBJECTS UNDER VARIOUS CONDITIONS OF VISUAL STIMULI. Contract DA 36-039 SD 52554, Task 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. Contract
DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 12p.
Vision Research Labs., University of Michigan.

12,946
This report describes the capabilities and limitations of vision as a means of identifying and interpreting the many phases of military action. These are chapters and sections describing: on the following topics: nature and measurement of light, anatomy of the eye, optical, refractive errors, the visual field, psychophysical, visual capabilities and problems of visual performance, factors influencing vision outside the aircraft, atmospheric visibility, air-to-ground visibility, take-off, and landing, factors influencing vision within the aircraft, instrument description-approach-landing, and finally, summary, main findings and their use in interpretation and understanding.
T. I. R 2, 200

12,947
Wilder, L.F., Selig, J.E., Home, R.D. & Friebe, R. PERFORMANCE OF SUBMERGED SUBJECTS UNDER VARIOUS CONDITIONS OF VISUAL STIMULI. Contract DA 36-039 SD 52554, Task 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. Contract
DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 12p.
Vision Research Labs., University of Michigan.

12,948
To ascertain the anatomical and/or physiological factors involved when experimental "convulsion" was produced, three principal factors were studied: rapid deceleration, total force imparted to the skull, and stretch of the cervical region. Methods were developed for effecting a reproducible "convulsion"; the criterion was abolition of reflex. With a test drop, and suitable instrumentation, the various force vectors were measured in rats. Anatomical studies were made in serial sections of the brain and kind of convulsed animals to establish the site and degree of neural damage.
T. I. R 53

12,949
Hamilton, G.E. THE EFFECTS OF PRACTICE ON THE VISUAL-DETECTION THRESHOLDS OF NAIVE OBSERVERS. Contract DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 12p.
Vision Research Labs., University of Michigan.

12,950
To investigate the effects of practice upon visual-detection thresholds, three groups of naive observers were each given initial practice for nine or ten days on one of three visual-detection tasks. The tasks involved forced-choice detection of a circular target exposed against a uniform background of ten foot-lambert luminance. The target subtended either two or four minutes, and was exposed for either 0.04 or 0.5 seconds. Following initial practice on the condition, either target size or exposure duration was changed and several additional sessions were given to assess transfer effects. The significance of the results for both psychophysical threshold methodology and military observer training are discussed.
G. E. R 5

12,951
Harris, R.R. & Hale, A. VISUAL RECOGNITION UNDER VARIOUS CONDITIONS OF THE VISUAL FIELD: II. LINEAR STIMULI PRESENTED IN DIFFERENT DIRECTIONS. Contract DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 4pp.
Vision Research Labs., University of Michigan.

12,952
To test the recognition capacity of human observers for linear binary targets at various locations in the visual field, linear arrays of eight elements (some open and others blocked) were presented tachistoscopically at four locations: vertical, horizontal, 45 and 135 degrees clockwise from vertical, and at nine eccentric locations relative to fixation. Each target was presented as a 4 element array and was to reproduce the location and choice pattern. Results were analyzed for effect of location in different areas of the visual field, of number fixation, and for sweep of information-identification.
T. I. R 9

12,953
Harris, R.R. WHAT IS INDUSTRIAL PSYCHOLOGY? Contract DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 1-6. (University of Liverpool, England).

12,954
This is one of the papers presented at a symposium which took as its topic the question "What is Industrial Psychology?" The author provides some constructive criticism by pointing out that the field is at the moment, confused with the choice of psychology was not an as worker.
T. I. R 1

12,955
Harris, R.R. & Gerasimovich, G.J. THE CONCEPTS OF WEIGHT AND STRESS IN HUMAN FLIGHT. Proj. 12,955, Task 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. Contract
DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 12p.
Vision Research Labs., University of Michigan.

12,956
The concepts of weight and stress in human flight are considered. The usage of terms and expressions is analyzed, their diverse meanings disentangled, and some of the physical facts are presented together with a simple and consistent set of concepts for their description.
T. I. R 15

12,957
Oake, J.D., Smith, R.J. & Stapp, H.G. LENS SYSTEM DESIGNED FOR WATER-TO-AIR VISION IN THE SUBMERGED HUMAN EYE. Proj. 12,957, Task 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. Contract
DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 12p.
Vision Research Labs., University of Michigan.

12,958
Is part of a project for the development of a method of protection against high accelerative forces by submerging a subject in water, this paper reports on the construction of a lens system designed for water-to-air vision in the submerged human eye. The lens system, and method of mounting, is described. In addition, acuity, field of vision, and range of accommodation possible with this system are stated.
T. I. R 1

12,959
Wilder, L.F. & Hale, A. PERFORMANCE OF SUBMERGED SUBJECTS UNDER VARIOUS CONDITIONS OF VISUAL STIMULI. Contract DA 36-039 SD 52554, 2144-321 1, Nov. 1958, 12p.
Vision Research Labs., University of Michigan.

12,960
To determine the effect of varying the time interval between trials in learning to track visually a rapidly moving object, three groups practiced under different conditions: 3.5 seconds, 7.0 seconds, and 15.0 seconds between trials. The data were studied by analysis of variance for differences due to conditions of learning.
T. G. R 5

12,970
Woods, J.H. (Chm.). THE PLAR KALIMAGAPY, WINE II.
WFO 200 112, 2d Pamphlet 70 2, GPO: Instruction 3473.3,
AMSC 1127, March 1957, 23pp. Technical Information
M-4, Library of Congress, Washington, D.C.

12,971
This bibliography contains 1900 abstracts (informa-
tive type) references, a detailed subject index and an
author index. It is based on materials not published
through the usual commercial media.
R 1000

12,972
Faulkner, B. ELECTROCARDIOGRAPHIC CHANGES OBSERVED
DURING THE FIRST HOUR OF RESIDENCE AT HIGH ALTITUDE.
Rep. 30 90, Aug. 1958, 4pp. USC School of Aviation
Medicine, Randolph AFB, Tex. (Institute of Avian
Biology, Faculty of Medicine, Lima, Peru).

12,972
To study the early electrocardiographic response to
hypoxia resulting from change in altitude, observations
were made on a group of 13 male subjects from the time of
their arrival at high altitude (10,000 feet) to the end
of one month's residence. The occurrence of the first
electrocardiographic changes was pinpointed, the magni-
tude of the changes was traced, and the evolution of
changes when the subjects returned to sea level was
noted.
T. G. R 15

12,973
McLison, J.L. AIRCRAFT EXTERIOR LIGHTING, TEST FACIL-
ITIES AND PERSONNEL, PROTECTING OF. FINAL REPORT. Proj.
150-72R AF 8226, Sep. 1, Dec. 1958, 2pp. USC Air Test
Center, Naval Air Station, Md.

12,973
This is a brief description of a project on aircraft
exterior lighting. The report describes the installation
of five lighting systems on a T-shaped rotating beam lo-
cated on a roof and an observation platform on the ground at
a distance of two miles. Communications were provided
between the two locations. Six pilot observers were used
as subjects for night observations over a period of one
month. The relative merits of each lighting system are
described in a subsequent report.

12,974
Hugh T. O'Neill & Associates. NEW COLOR RECONNAISSANCE
METHODS. FINAL REPORT. Contract AF 33(616) 262, Proj.
5(6 6271), Task 62104, 1956, 424pp. Hugh T. O'Neill
& Associates, Annapolis, Md.

12,974
To explore the possibilities of obtaining new and
better methods of military photo-reconnaissance particu-
larly by means of color photography, the recognition of
various military objects and their background on photo-
graphs was examined. A method of selecting best con-
trast conditions employing spectrophotometric reflectance
curves of objects, backgrounds and color filters is de-
scribed. Two instruments devised for comparing colored
and black and white films as they function in photo-recon-
naissance also are described. Other supplementary meth-
ods are listed. Tentative recommendations for manufac-
ture of film for this purpose are listed and discussed.
T. I. R 1

12,975
Koseley, H.G. & Shannon, R.H. USAF EJECTION ESCAPE
EXPERIENCE, 29 AUGUST 1949 THRU 30 JUNE 1958. M 12 58,
Nov. 1958, 35pp. USAF Directorate of Flight Safety
Research, Norton AFB, Calif.

12,975
This study analyzes 1,462 United States Air Force
ejection seat emergency escapes from the period 29 August
1949 through 30 June 1958. Results to personnel are
studied in relation to altitude, airspeed, attitude,
availability and use of automatic equipment, and other
pertinent factors. Problem areas associated with ejection
escape from high performance aircraft were sought
although few cases of attempted escape at supersonic
speeds were available. Recommendations designed to re-
duce the incidence of unsuccessful (fatal) ejections are
made in the areas of 1) operations and training, and
2) research and development.
T. G.

12,976
Miller, O.H. AN EXPERIMENT IN THE SYNTHETIC USE OF
COLOR IN COPIES. Contract AF 33(616) 2398,
CHRF Proj. No. 305, Tech. Paper 213, Sept. 1957,
13pp. Mapping & Charting Research Lab., Ohio State
University.

12,976
With the aim of developing better color reproduction
for use with maps, an experiment in reproducing a complex
color scheme from International Commission on Illumina-
tion tri-stimulus specifications was performed. Follow-
ing a description of the method used, an analysis of the
resulting illustrations is made. Errors are discussed
and certain conclusions are reached in regard to the
method.
T. G. I. R 5

12,977
Mintz, A. THE INFLUENCE OF ACCIDENT LIABILITY FROM
THE ACCIDENT RECORD. J. Appl. Psychol., 1954, 39(1),
41-48. (City College of New York, New York, N.Y.).

12,977
This paper presents a method for estimating the ac-
cident liability for a given individual in terms of his
known accident record. The solution is based on the as-
sumption that 1) accident liability of people is not
changed by accidents they are in and is not changed with
time, and 2) accident liability varies among people and
is distributed in a known manner Pearson Type-III curve.
Mathematical derivation of the formula is given and il-
lustrative results are presented. An error in the for-
mula as it appears in this article is corrected in a sub-
sequent note (Journal of Applied Psychology 32 (1955)
139.)
T. G. R 10

12,978
Mintz, A. TIME INTERVALS BETWEEN ACCIDENTS. J. Appl.
Psychol., 1954, 39(6), 401-406. (City College of New
York).

12,978
To investigate whether accident proneness is constant
for each individual or, conversely, increases with acci-
dents, accident records of 172 taxi drivers were studied
and time intervals between accidents compared to statisti-
cal expectancies based on the assumption that accidents
are distributed at random over a time period. Drivers
were classified according to number of accidents (1-25),
and mean time intervals between accidents were compared
for the various groups. Results are discussed as they
bear on the alternative hypotheses and findings are re-
lated to those reported by other investigators. Possible
reasons for disagreements are discussed.
T. R 13

12,979
Mintz, A. A METHODOLOGICAL NOTE ON TIME INTERVALS
BETWEEN CONSECUTIVE ACCIDENTS. J. Appl. Psychol.,
1956, 41(3), 189-191. (City College of New York).

12,979
In an earlier paper a suitable method of establishing
whether or not any given individual is accident prone was
based on comparison of the time interval before first ac-
cident, between early accident, and between later acci-
dents for the same individual. A different method, in-
volving comparison of frequency distributions of time in-
tervals between a particular pair of accidents to a the-
oretical distribution of time intervals, is presented in
this paper. Material is given which illustrates applica-
tion of the method to accident records of 67 taxi drivers
This material is compared to material presented by Horn
in his study of airplane pilots.
T. R 2

12,980
Martin, C.L., Jr., Byrd, W.H., Jr. & Williams, R.R.
FIXED-WING INSTRUMENT PRESENTATION, EVALUATION OF THE
COLLINS INTEGRATED FLIGHT SYSTEM. REPORT OF PROJECT
MR. AVN 1557.1, ATDEV 5 452/13, Feb. 1958, 16pp.
USA Continental Army Command, Fort Monroe, Va.

12,980
As part of a program to determine the optimum alti-
tude and navigation instrument, and/or instrument system,
for use in fixed-wing aircraft, this study evaluates the
Collins Integrated Flight System (CIFS). The CIFS was
flown approximately 500 hours over a period of 12 months.
Results and recommendations are indicated.
T. R 12

12,981

Margaria, Camillo; C. Spedini. INVESTIGATION OF THE FATIGUE IN MAN. FINAL REPORT. Contract AF 61(514) 637, AFOSR TR 59 117, Oct. 1958. 8pp. Laboratorio di Fisiologia dell'Universita di Milano, Italy.

12,982

This is a micrographed summary of techniques and research on the "Effect of stress on lower neuron activity," published elsewhere. To study some fundamental characteristics of lower neuron activity as a means of investigating fatigue in man, groups of volunteer medical students (number unspecified) were subjected to the activity of a) spinal neurons, motor, sensory and interneurons, b) the neuromuscular system and c) some supraspinal centers were studied under experimentally changed conditions. Results were treated in terms of: 1) fatigue proper, studying a number of stress inducing conditions, and 2) action of neurotropic drugs. There also was a group of experiments performed on animals to reproduce results in particular conditions in man. R 4

12,982

Kristofferson, A.B. & MacNeil, M.R. EFFECTS OF TARGET SIZE AND SHAPE ON VISUAL DETECTION. I. CONTINUOUS FORMAL TARGET AT MODERATE BACKGROUND LUMINANCE. Contract DA 36 039 SC 52854, 2344 270 T, Sept. 1958, 20pp. Vision Research Labs., University of Michigan.

12,982

In this study, target contrast for detection determined by the temporal forced-choice method was measured for each of 60 continuous targets of uniform luminance at a background luminance of 9.52 foot-lamberts, an exposure duration of 0.010 seconds, and with foveal target presentation. Targets varied from point sources up to those extending to the limits of the central fovea. Circular, rectangular, multiple-legged, and regular geometric forms were used. Data are analyzed empirically and theoretically. T. G. 1. R 11

12,983

Kapacoy, N.S. & Hopkins, R.E. DESIGN STUDY ON A RESEARCH PERISCOPE FOR PILOTING AIRCRAFT. Contract AF 33(600) 31623, Proj. 6304, Task 63006, WDC TR 57 419, May 1958, 28pp. USAF Area Medical Lab., Wright-Patterson AFB, Ohio.

12,983

Since the conventional windshield of subsonic aircraft is incompatible with supersonic flight, a research piloting periscope encompassing the widest possible range of visual requirements has been designed. Types of presentation and the optical design of this instrument are described. Pertinent mechanical and optical characteristics are summarized. Through testing of the periscope with various complements of performance parameters, characteristics for production instruments can be determined. An investigation of a method of optical field flattening using a bundle of transparent fibers is described. G. I. R 3

12,984

Knight, R. WHAT IS INDUSTRIAL PSYCHOLOGY? Comm. Psychol. April 1949, 1-9.

12,984

This paper is a discussion of six theses presented by L.S. Hearnshaw in which he seeks to redefine and clarify the concepts on which industrial psychology is based: 1) it is not applied psychology, 2) it has been too elementaristic, 3) it must be "person-centered," 4) social factors influence both the personality structure of people at work and their behavior at work, 5) it must aim at "maximization of achievement and minimization of stress," and 6) it is "at a forking of the ways." R 8

12,985

Kristofferson, A.B. & Dember, K.N. DETECTABILITY OF TARGETS CONSISTING OF MULTIPLE SMALL POINTS OF LIGHT. Contract DA 36 039 SC 52854, 2344 270 T, Sept. 1958, 22pp. Vision Research Labs., University of Michigan.

12,986

Data are presented on the detection probability of targets consisting of two, three, and five discrete points of light. Distance between points was taken as a major variable and probabilities were measured at several target luminance levels. The data are analyzed with respect to a modified element-contribution hypothesis and the hypothesis of statistical summation of independent events. T. G. R 9

12,987

Illuminating Engineering Society. ANNUAL REPORT OF THE RESEARCH FUND - RESEARCH IN '52. Illuminating Engineering Society, New York, N.Y.

12,987

This is an annual report of the Illuminating Engineering Society Research Fund. Progress in fund-sponsored projects is outlined. Effort in testing, measurement of visibility, colors under light sources, and bright pavements for seeing were among the subjects being investigated at the time of this report. R 6

12,988

University of Minnesota. BASIC STUDIES ON INDIVIDUAL AND GROUP BEHAVIOR, 16 FEBRUARY 1955 THROUGH 25 NOVEMBER, 1956. ANNUAL TECHNICAL REPORT. Contract NS ONR 66216, Nov. 1956, 24pp. University of Minnesota.

12,988

This report covering the period 16 February 1955 through 25 November 1956 briefly describes studies on the role of language in behavior, listing completed studies. The major portion of the report is devoted to new research in three areas: 1) The Semantic Differential, 2) studies of verbally mediated generalization, and 3) the analysis of word association phenomena. Additionally, research studies on the relation between cognition and behavior are reported in less details: research on isolation, two studies on time perception and drive state, studies of affiliation motivation, research on conflict, and effects of power difference on interpersonal influence. T. R 4

12,989

Webb, N.G., Jr. SOME EFFECTS OF ACCELERATION ON HUMAN SUBJECTS. Proj. DA 11-02 12-5, Rep. 1, WDC TR 5812, Sept. 1958, 8pp. Naval Air Development Center, Pens.

12,989

Acceleration as it affects the cardiovascular system, central nervous system and some nonspecific areas in human centrifuge subjects (18-40 years old) is discussed. Possible long term effects are indicated and suggestions for protection and prevention are made. T. R 11

12,990

Wright, G.O., Deiningger, R.L., McGuire, J.C. & Quail, R.W., Jr. EQUIPMENT MAINTENANCE WITH VARIOUS NUMBERS OF SERVICE MEN: A SIMPLE ANALYSIS. Proj. 7192, WDC TR 58 543, Nov. 1958, 36pp. USAF Area Medical Lab., Wright-Patterson AFB, Ohio.

12,990

Using the Markov Process, an analysis of a maintenance problem involving a piece of equipment and a group of maintenance men is made. The probability statements thus derived form the basis for judging alternative modes of action in particular situations. The simplest case is considered thoroughly and several more complicated ones briefly. T. I. R 2

12,991

Vincent, D.F. SPEED AND PRECISION IN MANUAL SKILL. Rep. 11, 1935, 19pp. National Institute of Industrial Psychology, London, England.

12,991

The purpose of this investigation was to seek evidence of the existence of separate inherent abilities which make for success in work demanding speed and work demanding precision and to relate such evidence to preferences expressed by workers. The factorial approach was used with data of three groups of tests (speed group, speed-accuracy group, and precision-accuracy group). The emergent factors are discussed in some detail. T. G.

12,992

Vincent, D.F. ABOVE CORRELATIONS. Psychol. at Work, Nov. 1951, 1-8.

12,992

This is a simple exposition of the concept of correlation, illustrated with brief descriptions of rank-order correlation and correlation between test scores. T.

12,993

van Laer, J., Galanter, E.H., & Klein, S.J. FACTORS RELEVANT TO THE DEVELOPMENT OF AIRCRAFT WARNING AND CAUTION SIGNAL SYSTEMS. TECHNICAL REPORT NO. 1. Contract N196 33946, SMC ACEL 548, TED SAN E. 52034, Part 15, Tech. Rep. 1, July 1957, 40pp. USN Air Crew Equipment Lab., Naval Air Material Center, Port.

12,993

A detailed examination of the alerting and directing functions of aircraft warning and caution signal system is made in terms of visual, auditory and efference capabilities as input channels. General recommendations are presented which translate to problems for further research. R 25

12,994

Vincent, D.F. ABOVE THE NORMAL CURVE DISTRIBUTIONS. Psychol. at Work, Jan. 1951, 1-8.

12,994

The purpose of this article is to try to clear away some of the superstitions surrounding the content of the normal curve without minimizing its importance. The topic is discussed by employing a variety of illustrations. T. G.

12,995

Vincent, D.F. AGE AND TEST PERFORMANCE. N.I.I.P. Occasional Paper. National Institute of Industrial Psychology, London, England.

12,995

This paper on age and test performance includes, first, a general discussion of the nature of the decline in intelligence test scores with age after twenty and, secondly, a study of the form of the age-score curve on intelligence test scores. T. G. R 9

12,996

USN Training Device Center. BIBLIOGRAPHY OF UNCLASSIFIED HUMAN ENGINEERING REPORTS. NAVEXOS P 1491, Jan. 1958, 18pp. USN Training Device Center, Port Washington, N.Y.

12,996

This bibliography of human engineering reports covers a period from 1946 to 1957 on the following broad subject matter areas: learning, motor skills, perception, voice communications, systems analysis, controls and displays, training devices, research tools, and human engineering. R 350

12,997

Pylo, J.T. A REPORT OF PROGRESS AND DEVELOPMENTS AS OF JULY 1957, PROGRESS REPORT NO. 2. Progress Rep. 2, July 1957, 23pp. U.S. Civil Aeronautics Administration, Washington, D.C.

12,997

This is the second report by the Civil Aeronautics Administration on jet age progress and planning and outlines the progress of the program since July 1956 to the time of publication. There are sections on the following topics: flight operations and airworthiness, civil jet aircraft noise, airports, air traffic control, and communication and navigation aids. T. G.

12,998

Rodger, L. WHAT IS INDUSTRIAL PSYCHOLOGY? Genes, Psychol., July 1947, 1-10.

12,998

This is the third paper in a symposium on the topic, "What is Industrial Psychology?". The author points out that the field is both a science and a technology and disagrees with other opinions stated at the symposium which held that a choice between the two must be made. R 2

12,999

Sealand, G.E., Corney, D.V. & Courtney, D. EXTERIOR LIGHTING FOR NAVAL AIRCRAFT. FINAL REPORT. Contract N1545 32735, Proj. F, Rep. 13, Dec. 1956, 122pp. Courtney & Co., Philadelphia, Penn.

12,999

This is the final report of research on the exterior lighting of naval aircraft, the main objective of which was to delineate the characteristics of an optimal system. The methods of study included observation and participation in all normal naval aviation operations, interviews with Naval aviation personnel, cataloging of existing exterior lighting components, and reviewing applicable literature on human capabilities for coping with exterior lighting. Both an optimal and an interim system are presented and discussed. Other chapters deal with visibility of lights, human capabilities and limitations, and research and development recommendations. T. I. R 219

13,000

Garvey, M.D. & Taylor, F.V. INTERACTIONS AMONG OPERATOR VARIABLES, SYSTEM DYNAMICS, AND TASK-INDUCED STRESS. J. Appl. Psychol., April 1959, 43(2), 79-85. (USN Research Lab., Washington, D.C.).

13,000

Three experiments were conducted to determine the effect of stressing the human element in each of three man-machine systems (manual tracking) on the performance of these systems: 1) acceleration control and acceleration-aided control system, 2) same as in 1) but with poor and good subjects, 3) acceleration control and position control system. Forty-eight subjects (16 per experiment) were trained on the respective systems and then required to operate them under a series of task-induced stress conditions (seven). Performance was analyzed by Wilcoxon's comparison of several treatments test. T. G. I. R 8

13,001

Herison, H.J. EFFECTS OF NOISE ON HUMAN PERFORMANCE. J. Appl. Psychol., April 1959, 43(2), 96-101. (Antioch College, Yellow Springs, Ohio).

13,001

The effects of noise level (80 decibels (db)-quiet, 110 db-noise) on a vigilance task (monitoring clocks), a complex mental counting task (counting number of flashes on each of several lights), and a time judgment (estimating passage of a ten-minute interval) were studied. The results were analyzed by analysis of variance technique. These effects are discussed in terms of noise as a source of psychological stress. T. G. I. R 16

13,012

Brandelise, E.P. & Gottadicker, E.W. THE DIFFERENCE THRESHOLD OF THE MAGNITUDE OF VISUAL VELOCITY. *J. exp. Psychol.*, Feb. 1959, 57(2), 83-89. (University of California, Los Angeles, Calif.).

13,012

To make a new assessment of the difference threshold of the magnitude of visual velocity, ten subjects adjusted the rate of one (comparison) of two rotating black discs (velocities of 10, 20, 30, 60, 90 revolutions per minute) so as to equate the velocity of the two white dots located near the edge of each disc. The standard deviation of adjustment was the threshold measure employed; an analysis of variance was performed. These findings were compared with those of other researchers; differences in experimental methods and individual variability were discussed. T. G. I. R 6

13,013

Edwards, M. INFORMATION AND AUTOKINETIC MOVEMENT. *J. exp. Psychol.*, Feb. 1959, 57(2), 86-90. (University of Michigan, Ann Arbor, Mich.).

13,013

To examine the hypothesis that autokinetic movement occurs if the visual world is highly redundant and not if it is full of information, 20 subjects (after 10 minutes dark adaptation) viewed a pattern of 289 lighted holes which were arranged either disorderly (randomly) or orderly and pressed a button when movement of the pattern began. Amounts and latencies of movement were recorded. The findings were examined in light of the above hypothesis. R 2

13,014

Stevens, S.S. & Scope, Geraldine. FINGER SPAN: RATIO SCALE, CATEGORY SCALE, AND JND SCALE. *J. exp. Psychol.*, Feb. 1959, 57(2), 91-95. (Harvard University, Cambridge, Mass.).

13,014

To determine, by method of magnitude estimation, how subjective thickness varies with width of object grasped between thumb and middle forefinger, and to compare this with category and Fechnerian scales constructed from just noticeable differences (jnd), about 33 subjects made these judgments by: 1) assigning numbers to blocks proportional to their apparent thickness (5 to 65 millimeters (mm.) in 5 mm. steps), the standard block being presented before each variable block or only at beginning of series (12 blocks); 2) assigning numbers between one and seven, having been presented with both one and seven for references; 3) assigning "long" or "short" method of single stimuli with two stimuli and two categories. The above three scales were constructed and compared. G. I. R 8

13,015

Vanderplas, J.M. & Garvin, E.A. THE ASSOCIATION VALUE OF RANDOM SHAPES. *J. exp. Psychol.*, March 1959, 57(3), 147-154. (Washington University, St. Louis, Mo.).

13,015

To assess the interaction of association value and stimulus complexity as determinants of recognition, 50 subjects viewed 180 random shapes (30 at each of six complexity levels) and responded with a word, phrase or yes if these reminded them of something and no if they did not. Associative values, content values and heterogeneity indices were thus computed for each shape, and a contingency analysis on associative value as a function of complexity level was conducted. Correlations between pairs of variables, for example complexity and content, were also computed. T. G. I. R 6

13,016

Vanderplas, J.M. & Garvin, E.A. COMPLEXITY, ASSOCIATION VALUE, AND PRACTICE AS FACTORS IN SHAPE RECOGNITION FOLLOWING PAIRED-ASSOCIATES TRAINING. *J. exp. Psychol.*, March 1959, 57(3), 155-163. (Washington University, St. Louis, Mo.).

13,016

To study the effects of four levels of practice in labelling on the recognition of random shapes of three levels of complexity and three levels of association value, 144 subjects (four for each of 36 conditions) first attempted to learn a nonsense label for each of a set of eight random shapes (complexity level one and associative value about same for a given subject). Next the subject attempted to select from a group those shapes for which he had learned labels in part one. For the four levels of practice, means and standard deviations were computed. For the recognition task, mean number and time of responses for: 1) correct recognitions, 2) correct rejections and 3) incorrect rejections were computed; separate analyses of variance were carried out for each of these three classes of response. T. G. I. R 15

13,017

Charles, J.P. & Duncanson, C.P. THE DISTANCE GRADIENT IN KINESIC FINGER AFTEREFFECT. *J. exp. Psychol.*, March 1959, 57(3), 164-170. (Northwestern University, Evanston, Ill.).

13,017

To obtain quantitative measurements of kinesiographic finger after-effect (FAE) and to determine if a distance gradient in FAE similar to that in vision exists in kinesiography, each of nine groups (20 subjects/group) judged one of nine widths of blocks by: 1) making four judgments of test block (constant error data), 2) inspecting different block for one minute by running thumb and forefinger along sides, 3) judging test block with same hand by adjusting scale with other hand, 4) one minute rest; 5) inspecting as in 2, and 6) judging as in 3. A control group without inspection also was run. Trend analyses were used to test FAE and distance gradients. Also, analysis of variance using successive blocks of trials was performed to further check on practice effects. T. G. I. R 13

13,018

Stevens, S.S. CROSS-MODALITY VALIDATION OF SUBJECTIVE SCALES FOR LOUDNESS, VIBRATION, AND ELECTRIC SHOCK. *J. exp. Psychol.*, April 1959, 57(4), 201-209. (Harvard University, Cambridge, Mass.).

13,018

To compare the dynamic characteristics of three different sense modalities, numerical ratio scales of subjective magnitude for loudness, vibration and electric shock were used to predict the form of equal-sensation functions that should result from matching apparent intensity in any two of these modalities. About 30 subjects served in one or another parts of experiment. Cross-modality matches were made between each modality; comparisons between predicted and experimental functions were made. G. I. R 17

13,019

Stevens, S.S. TACTILE VIBRATION: DYNAMICS OF SENSORY INTENSITY. *J. exp. Psychol.*, April 1959, 57(4), 210-218. (Harvard University, Cambridge, Mass.).

13,019

To determine, by the method of magnitude estimation, how subjective intensity of a vibratory stimulus varies with amplitude of vibration applied to finger and to arm and to compare the function obtained on finger with category scale and Fechnerian scale constructed from just noticeable differences (jnd), six experiments were performed using between ten and 12 subjects. The judgments yielded ratio, category and jnd scale for 60 cycles per second vibration applied to the finger and a ratio scale for the arm. These scales are compared and discussed in terms of possible mechanisms involved. G. R 22

13,020

Stewart, E.D. THE GELB EFFECT. *J. exp. Psychol.*, April 1959, 57(4), 235-242. (University of Texas, Austin, Tex.).

13,020

To examine the parameters that affect the Gelb phenomenon, within the framework of Heisen's adaptation level theory - particularly the contrast principle, four subjects made judgments as to the appearance of the Gelb disk (by adjusting a measuring disk from 360 degrees white to 360 degrees black) when three different sizes of white disks were suspended in front of the Gelb disk. (Position of white disk in relation to Gelb disk varied from center to tangent). Equations for the data were determined, and the findings were discussed in terms of the laws of lightness-contrast.
T. G. I. R 16

13,022

Dignan, J.M. GROWTH OF A MOTOR SKILL AS A FUNCTION OF DISTRIBUTION OF PRACTICE. *J. exp. Psychol.*, May 1959, 57(5), 310-312. (University of Hawaii, Honolulu, Hawaii).

13,022

To compare the growth of a pursuit tracking skill under massed versus distributed practice, two groups of subjects had six sessions of eighteen 30-second trials per session. One group (22) had 1.5 minute intervals (distributed) between trials, the other (19) had two seconds (massed); but both groups had 1.5 minute intervals for the sixth session. Then both groups had four test trials. The performance of the two groups on the test trials was compared by the Mann-Whitney signed rank test. An index of skill level and work decrement were computed for each group and curves fitted to these data. The results are interpreted in terms of several relevant views.
G. R 13

13,023

Giles, S. SET TO RESPOND AND THE EFFECT OF INTERRUPTING SIGNALS UPON TRACKING PERFORMANCE. *J. exp. Psychol.*, May 1959, 57(5), 333-337. (University of Bristol, England).

13,023

To compare pursuit tracking performance with and without a simultaneous auditory task (pressing key when auditory signal occurred), 20 subjects performed under five experimental conditions of tracking alone, auditory task alone and the two in combination at different rates. Mean timing and mean amplitude error scores for tracking were compared, as well as auditory reaction times. The results were explained in terms of interference and set to respond. The second part of the study compared tracking with and without instructions to expect the auditory signals, though none were presented, as a further examination of the set to respond explanation.
T. G. R 9

13,024

Rhule, W. & Smith, M.W. EFFECTS OF INVERSION OF THE VISUAL FIELD ON HUMAN MOTIONS. *J. exp. Psychol.*, May 1959, 57(5), 338-343. (University of Wisconsin, Madison, Wisc.).

13,024

To study the effects of four perceptual conditions ranging from normal vision and kinesthetic feedback to inverted vision and kinesthetic feedback on the travel and manipulative movements of handwriting in handwriting tasks of three levels of complexity, four groups of six subjects wrote patterns of three symbols (levels of complexity) in various sequences for ten sessions. Analyses of variance were made of first and last session performance for each symbol and both types of movement. Also, Duncan Range tests were computed for performance differences at three difficulty levels for four perceptual conditions. Results were interpreted in terms of the theory of space-structured motion.
G. I. R 14

13,025

Van Fleet, E. & Gibson, J.J. THE SENSITIVITY OF THE EYE TO TWO KINDS OF CONTINUOUS TRANSFORMATION OF A SHADOW-PATTERN. *J. exp. Psychol.*, May 1959, 57(5), 344-347. (University of Helsinki, Norway & Cornell University, Ithaca, N.Y.).

13,025

To compare the perceptions induced by two kinds of continuous transformation and determine whether corresponding impressions of rigid and non-rigid motion would occur spontaneously, 20 observers viewed the shadow of a net undergoing the two classes of motion and described these movements. For the second and third parts, they used the names developed in part one (spontaneous terms) to identify these movements presented with and without intertrial intervals. The findings were discussed in terms of Fechner's question about the eye's ability to distinguish between change of position and change of state.
I. R 5

13,026

Koriat, R.B. THE VISUAL PERCEPTION OF THE MEDIAN PLANE AS INFLUENCED BY LABYRINTHINE STIMULATION. *J. Psychol.*, Jan. 1959, 57(First Half), 25-35. (Brandeis University, Waltham, Mass.).

13,026

To study the influence of labyrinthine stimulation on visual perception of the median plane, 18 subjects were asked to adjust a luminous gold spot to apparent median plane while sitting in a rotating chair which subjected each to acceleratory or deceleratory rotation around his vertical axis. All testing was done in the dark. Subjects were retested after a lapse of at least one day. Results were evaluated by analysis of variance and *t*-tests. Findings are discussed in terms of a residual displacement theory of space perception and in terms of a sensory tonic theory as these can account for the phenomena.
R 22

13,027

Karvonen, T.M. THE VERTICAL-HORIZONTAL ILLUSION IN ARTIFICIAL VISUAL FIELDS. *J. Psychol.*, Jan. 1959, 57(First Half), 41-45. (University of Stockholm, Sweden).

13,027

To investigate quantitatively how artificial visual fields with different ratios of vertical axis to the horizontal (*y/h*) influence the size of overestimation of the vertical line (*y/v*), and test the hypothesis that the shape of the visual field is one of the factors influencing subjective estimation of vertical direction, spectacles producing artificial visual fields were worn by 16 subjects, each of whom made 96 adjustments (to a point at which length of a vertical line appears subjectively equal to the horizontal line) under each of six conditions. Differences in over or underestimation under the various conditions are tested for significance. Results are discussed as they relate to the general hypothesis.
T. G. I. R 7

13,028

Mayner, H.S. & Tresselt, M.E. SHIFTS IN CONNOTATIVE MEANING OF WORDS AS A FUNCTION OF VARYING AMOUNTS OF PREVIOUS RESTRICTIVE EXPERIENCE. *J. Psychol.*, Jan. 1959, 57(First Half), 107-116. (Bell Telephone Laboratories, Inc., N.J. & New York University, New York, N.Y.).

13,028

To discover the optimum number of discrete stimuli needed to produce the greatest anchoring effect for a series of word-concept scales, 100 subjects were given a list of 600 words and asked to check each as belonging to none, or one of six concepts. Profiles were obtained which showed frequency with which each word was judged as belonging to a given concept. From these data anchoring concepts were selected and word lists prepared in which the number of anchoring stimuli was varied systematically from zero to 30 per conceptual category and administered to 450 new subjects. Analysis of variance was performed for each conceptual category.
T. G. R 5

13,029

Mayzner, M.S. & Tresselt, M.E. ANAGRAM SOLUTION TIMES: A FUNCTION OF TRANSITION PROBABILITIES. *J. Psychol.*, Jan. 1959, 47(First Half), 117-125. (Bell-Telephone Laboratories, Inc., N.Y. & New York University, New York, N.Y.).

13,029

To study the effect of different transition probabilities (digram frequency associated with each letter pair) 40 subjects, randomly assigned to one of two major conditions (the same 20 words presented as anagrams having (1) low transition totals, or (2) high transition totals; hard letter order obtained under both conditions), were asked to solve the 20 anagrams verbally. The Mann-Whitney U test was employed to evaluate effect of the transition probability variable. Results are discussed as they relate to relative loss of the patterned letter groups; hard or easy letter orders; methodological considerations, and so forth.
T. R 19

13,030

Donaldson, J., Magnusch, K., McHugh, L., Nicer, R., et al. PSYCHOLOGICAL ASPECTS OF CONFINEMENT IN FALLOUT SHELTERS. *J. Psychol.*, April 1959, 47(Second Half), 163-170. (Johns Hopkins University, Baltimore, Md.).

13,030

The psychological problems which might arise in large public fallout shelters occupied over an extended period of time by a heterogeneous group are discussed under the headings - traumatic (immediately after the disaster) and post traumatic (after the initial shock waves). Measures (taken before any attack) to help alleviate these problems are suggested.
R 3

13,031

Jones, F.P., Gray, Florence E., Hanson, J.A., & O'Connell, D.M. AN EXPERIMENTAL STUDY OF THE EFFECT OF HEAD BALANCE ON PATTERNS OF POSTURE AND MOVEMENT IN MAN. *J. Psychol.*, April 1959, 47(Second Half), 247-258. (Tufts University, Medford, Mass.).

13,031

To study change in postural pattern following change in distribution of tonus, six normal adults were trained to recognize and inhibit tensional responses that disturb head balance. Single and multiple-image photography was employed to record these patterns, t-tests were performed on the data and the findings were discussed in terms of anti-gravity reflexes and resultant patterns of movement.
T. G. I. R 9

13,032

Comelli, P.E., Jr., Napier, S. & Werner, H. PERCEPTION OF VERTICALITY IN MIDDLE AND OLD AGE. *J. Psychol.*, April 1959, 47(Second Half), 259-266. (Clark University, Worcester, Mass.).

13,032

To study changes in spatial organization - the perception of verticality - in old age and compare it to that in younger ages, 75 men between 20 and 60 years adjusted a luminescent rod to the vertical under each of 12 conditions which included different body positions in combination with different starting positions of the rod. Deviation from vertical in degrees for each condition was analyzed as a function of age by analysis of variance. The findings are discussed in terms of the orthogenetic principle.
T. G. R 4

13,033

Bartley, S.H. & Adair, H.J. COMPARISONS OF PHENOMENAL DISTANCE IN PHOTOGRAPHS OF VARIOUS SIZES. *J. Psychol.*, April 1959, 47(Second Half), 289-295. (Michigan State University, East Lansing, Mich.).

13,033

Actual viewing distance necessary to obtain a judgment of equal distance for different sizes of photographic prints was determined psychophysically for 15 subjects using several print sizes and viewing distances. An analysis of variance was performed on the data and the findings discussed in terms of the laws of visual angle and constancy.
G. I. R 5

13,034

Kunnas, T.M. VISUAL FIELD AND SUBJECTIVE CENTER OF A DIAMOND. *J. Psychol.*, April 1959, 47(Second Half), 305-316. (University of Stockholm, Sweden).

13,034

To investigate whether and to what extent the shape of the monocular visual field influences the interocular differences both for horizontal and vertical diagonal distances, ten subjects bisected these distances by fixing the center point of a diamond under each of four experimental conditions (natural visual field-right eye, left eye; artificially limited visual field-right eye, left eye). Average differences between right and left halves when they appeared equal subjectively were compared graphically and statistically by t tests for the various conditions. The findings are discussed in terms of the four predicted effects.
T. G. I. R 16

13,035

Eckrig, K.C. THE INFLUENCE OF AREA ON THE CRITICAL FLICKER-FUSION THRESHOLD. *J. Psychol.*, April 1959, 47(Second Half), 317-330. (The Psychiatric Institute, N.Y.).

13,035

To investigate effect of area on critical flicker fusion (cff) thresholds using foveally-fixed testpatches (from 3.4 to 49.6 degrees diameter in six steps), three practiced observers judged the point of flicker for each size at seven frequencies (35 to 85 cycles/second). Also to determine maximum cff when area and intensity of test patch were as great as apparatus would permit, five observers made judgments for the 49.6 degree testpatch. The results were discussed in terms of the Granit-Harper law and the Ferry-Porter law and related to previous findings.
T. G.

13,036

Ekman, G. WEBER'S LAW AND RELATED FUNCTIONS. *J. Psychol.*, April 1959, 47(Second Half), 343-352. (University of Stockholm, Sweden).

13,036

This paper investigates in some more detail the relation between subjective magnitude (R) and the subjective correlate (MR) of a just noticeable stimulus difference in four continua, and, on this basis, derives an adequate form for Weber's law and tests it by fitting some experimental data to the function. Also, possible relations between differential and absolute sensitivity are discussed.
G. R 18

13,037

Royer, F.L. THE FORMATION OF CONCEPTS WITH NON-VERBAL AUDITORY STIMULI. *Amer. J. Psychol.*, March 1959, LXXII(1), 17-31. (Veterans Administration Hospital, Perry Point, Md.).

13,037

The purposes of two experiments were: (1) to compare the learning of concepts based on a prominent partial in a complex tone with learning based on harmonic structure of a complex tone; and (2) to determine effect of prior experience and stimuli and hierarchical order on concept formation. Both experiments used the method of anticipation. In the first, six stimuli and six responses were presented to 20 subjects. In the second, 28 subjects were given a comparable task but the stimulus included temporal changes along various dimensions. Analysis of variance was performed on results from both experiments, and results from the two are compared.
T. I. R 13

13,038
Meinmann, E.G., Tulving, E. & Kuchlas, J. THE EFFECT OF OCULOMOTOR ADJUSTMENTS ON APPARENT SIZE. *Amer. J. Psychol.*, March 1959, **LXXII**(1), 32-45. (Vassar College, Poughkeepsie, N.Y., University of Toronto, Toronto, Ontario, Canada & Swarthmore College, Swarthmore, Penn.).

13,039
Three related experiments are reported bearing on the problem of whether changes in apparent size are: 1) caused by one of the oculomotor adjustments, 2) caused by several of them, or 3) are the optical consequences of these adjustments. Apparatus used in all experiments consisted of an arrangement for presenting in rapid succession two stimulus objects whose size or distance was to be compared. The first experiment dealt with relative apparent size of objects presented at different distances and relative apparent distance of the same objects. The second experiment tested the effect of eliminating oculomotor adjustments; in the third, all three of the associated oculomotor adjustments occurred together. Results are discussed as they relate to size constancy experiments. T. G. I. R 11

13,039
Story, Anne. FIGURAL AFTER-EFFECTS AS A FUNCTION OF THE PERCEIVED CHARACTERISTICS OF THE INSPECTION-FIGURE. *Amer. J. Psychol.*, March 1959, **LXXII**(1), 46-56. (USAF Cambridge Research Center, Bedford, Mass.).

13,039
To test the hypothesis that set operates, and that figural after-effects (FAE's) differ according to the way subject (S) perceives the inspection-figure (I-figure) 360 S's were divided into seven groups, five of which were controls. I-figure was an ambiguous B-13 presented to group one as a "B" and to group two as "13". It was postulated that greater FAE's should result from inspection of the figure presented as "B". FAE's for the two groups are compared and discussed in terms of the hypothesis. A second experiment tested the hypothesis that kinesthetic after-effects would be greater for S's set to perceive inspection object as open instead of closed. T. I. R 3

13,040
Jenkin, N. & Hyman, R. ATTITUDE AND DISTANCE-ESTIMATION AS VARIABLES IN SIZE-MATCHING. *Amer. J. Psychol.*, March 1959, **LXXII**(1), 68-76. (Harvard University, Cambridge, Mass.).

13,040
To obtain evidence on the general question whether subjects (Ss) who overestimate projected size of a standard under the "analytic" attitude (depth cue available, but S instructed to compare areas of space projected at a given distance; b. two stimulus objects) would do likewise under the objective attitude (cue available), 77 subjects were individually tested in a one-hour session and made judgments under both instructions. Differences in size-distance judgments (scores) were intercorrelated and factors extracted by the centroid procedure. Relationships between estimated distance and size matches were tested for significance. Results are discussed as they relate to a general "tendency toward constancy," and compared with those obtained by other investigators. T. R 11

13,041
Grew, S. COMPLEXITY OF RESPONSE AND TIME OF INITIATING RESPONSES IN RELATION TO AGE. *Amer. J. Psychol.*, March 1959, **LXXII**(1), 83-82. (University of Bristol, England).

13,041
To investigate the effect of complexity of response on response time as this related to age, twelve subjects 20-26 years old, and twelve subjects 50-57 years of age were given a simple perceptual-motor task involving the element of choice. Effects of increased complexity of response on performance in both continuous and discontinuous performance were compared for older and younger subjects. Analysis of variance was used and differences tested for significance. Some possible explanations of obtained results are discussed. T. G. I. R 4

13,042
Shankel, B. SKIN-DRILLING: A METHOD OF DIMINISHING GALVANIC SKIN-POTENTIALS. *Amer. J. Psychol.*, March 1959, **LXXII**(1), 114-121. (Psychological Research Lab., Feltham, England).

13,042
Various methods which were tried in order to convert the skin into an inert, "noise-free" conducting medium were described, and results obtained from the method which was deemed best were presented in graphs and tables. The value of this technique to the field of electro-oculography was discussed. T. G. R 7

13,043
Turner, R.H. NEW USES FOR THE OSCILLOSCOPE AS AN INSTRUMENT OF RESEARCH AND DEMONSTRATION. *Amer. J. Psychol.*, March 1959, **LXXII**(1), 122-124. (Cherlin College, Cherlin, Ohio).

13,043
Thirteen phenomena which may be readily demonstrated with the oscilloscope were listed and briefly discussed. It was suggested that this approach might be used by small laboratories to replace more expensive specialized equipment.

13,044
Eason, R.G. & White, Carroll T. A PHOTOELECTRIC METHOD FOR INTEGRATING MUSCLE-ACTION POTENTIALS. *Amer. J. Psychol.*, March 1959, **LXXII**(1), 125-126. (USN Electronics Lab., San Diego, Calif.).

13,044
The principle basic to the method described in this note consisted of passing light through a given segment of the ink-tracing and measuring with a sensitive photometer the amount of blockage caused by the tracing. The procedure was described in detail and some advantages of the method were noted.

13,045
Thurlock, W. & Tabory, L. EFFECTS OF REPEATED PRESENTATIONS OF A TONE UPON ABSOLUTE LOUDNESS JUDGMENTS. *J. gen. Psychol.*, April 1959, **60**(Second Half), 161-166. (University of Wisconsin, Madison, Wisc.).

13,045
To determine: a) whether repeated judgments of a soft tone will change one's frame of reference so this tone will eventually sound louder and b) whether repeated judgments of a loud tone will cause it eventually to sound weaker, 70 subjects rated the loudness of a 1000 cycles per second tone, repeated 100 times, on an "absolute scale." A different sensation level (10, 30, 50, 70 or 90 decibels) of the tone was used for each experimental group. Friedman's rank test was applied to average ratings for blocks of ten trials for each condition. The results are discussed in terms of Helson's Adaptation Level Theory and other relevant concepts. G. R 5

13,046
Tabory, L. & Thurlock, W. JUDGMENTS OF THE LOUDNESS OF A SERIES OF TONES WITH TWO DIFFERENT RANGE EXPECTANCIES. *J. gen. Psychol.*, April 1959, **60**(Second Half), 167-172. (University of Wisconsin, Madison, Wisc.).

13,046
To determine how the end stimuli of a series of tones affect judgments of the loudness of the series, two groups of subjects (12 in each - all had a minimum of two years training in music) rated, on a numerical scale by the method of Single Stimuli, a 1000 cycles/second tone which ranged in six steps either from 30 to 50 decibels (group 1) or from 70 to 90 decibels (group 2). A set of judgments (50 of each stimulus) was made for each of two expectancies: 1) that range of tones would be as they were demonstrated, 2) that range may be as demonstrated, larger or smaller. Mean ratings as a function of intensity for two expectancies and ratings for end stimuli were analyzed by Wilcoxon signed rank test. T. G. R 5

13,047

Kyan, T.A. MULTIPLE COMPARISONS IN PSYCHOLOGICAL RESEARCH. *Psychol. Bull.*, Jan. 1959, 56(1), 26-47. (Cornell University, Ithaca, N.Y.).

13,047

Methods such as the F test only permit rejection of the over-all null-hypothesis, that all the means are equal, but do not provide a procedure for comparing specific means with each other. Several basic issues involved in multiple comparisons are discussed - a priori versus a posteriori comparisons, concept of error-rate, nonindependence of comparisons, and so forth - and five specific methods for multiple comparisons of means are discussed.

13,048

Cyano, T. A NEW PSYCHOPHYSICAL METHOD: METHOD OF TRANSPOSITION OR EQUAL-APPEARING RELATIONS. *Psychol. Bull.*, Jan. 1959, 56(1), 74-79. (Hokkaido University, Japan).

13,048

Questioning whether in using the method of adjustment the amount of illusion (as in the Muller-Lyer) can be measured without destroying or altering the stimulus pattern, the author describes a method which leaves the original stimuli intact while the apparent relation between the stimulus parts is measured. Results obtained with both the old and the new method are compared, using the Muller-Lyer illusion, figural after-effects, and the size-constancy experiment. Theoretical considerations, such as proper classification of the new method, are discussed.

G. I. R 14

13,049

Plutchik, R. THE EFFECTS OF HIGH INTENSITY INTERMITTENT SOUND ON PERFORMANCE, FEELING, AND PHYSIOLOGY. *Psychol. Bull.*, March 1959, 56(2), 133-151. (Hofstra University, Hempstead, N.Y.).

13,049

This paper reviews studies published since 1950. Three hypotheses are advanced relating to research on the effect of noise on various kinds of performance. The effects of sound on feeling are discussed in terms of fatigue effects and the characteristic repetitive sounds in terms of subjective reports. Studies of the physiological effects of repetitive sounds and of loud sounds are also reviewed.

R 80

13,050

Buchwald, A.M. DATA DISTORTIONS DUE TO INHERENT DIFFERENTIAL SAMPLING. *Psychol. Bull.*, May 1959, 56(3), 224-227. (Indiana University, Bloomington, Ind.).

13,050

The term "inherent differential sampling" is defined and illustrations of kinds of distortions it produces are given. Ways of overcoming such distortions are described.

R 4

13,051

Clarke, N.P., Bondurant, S. & Leverett, S.D. HUMAN TOLERANCE TO PROLONGED FORWARD AND BACKWARD ACCELERATION. *J. Aviat. Med.*, Jan. 1959, 30(1), 1-21. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

13,051

This report stresses the need for further study of man's tolerance for acceleration due to the imminence of manned space flight and extends previous observations by defining optimal body positions for both forward and backward acceleration. Using a rate of onset of 0.5 g per second, plateaus between two and 12 g were maintained with subjects optimally-positioned, until subjective loss of a critical faculty occurred. Tolerance limits were defined and spatial vectocardiography, respiratory rate and changes in functional residual capacity and pulmonary compliance were observed.

T. G. I. R 30

13,052

Bergin, K.G. MEDICAL ASPECTS OF CIVIL JET AIR TRANSPORT OPERATIONS. *J. Aviat. Med.*, Jan. 1959, 30(1), 22-28. (British Overseas Airways Corporation, London Airport, London, England).

13,052

This paper discusses some of the medical aspects of civilian jet air transport operations. The characteristics of the good pilot are mentioned first and then some of the consequences of decompression at altitude. Oxygen requirements in normal flight and in emergency are discussed generally and then related to Comet aircraft equipment. Finally, brief consideration is given to such special matters as glare and radiation hazard.

G.

13,053

Phillips, P.B. & Zariello, J.J. EPILEPTIFORM SEIZURE AND LOW G TOLERANCE. *J. Aviat. Med.*, Jan. 1959, 30(1), 35-37. (USN School of Aviation Medicine, Naval Air Station, Fla.).

13,053

This is a report of a case in which epileptiform seizure and low tolerance to acceleration were found to be associated. The case is described and it is suggested that convulsive seizures of any type should be picked up early in flight training.

T. R 1

13,054

Bending, G.C. SPATIAL DISORIENTATION IN JET AIRCREWS. *J. Aviat. Med.*, Feb. 1959, 30(2), 107-112. (Royal Canadian Air Force Station, Comox, British Columbia, Canada).

13,054

This report describes the physiology of spatial disorientation, discusses several instances of this that have occurred with jet aircrews, indicates methods of preventing or alleviating the serious effects of such disorientation, and considers the management of such problems.

R 5

13,055

Zeller, A.F. HUMAN ABILITY AND HIGH PERFORMANCE FLIGHT. *J. Aviat. Med.*, Feb. 1959, 30(2), 126-135. (Directorate of Flight Safety Research, Norton AFB, Calif.).

13,055

To assess human ability for high performance flight, this paper analyzes accidents which have occurred with the 100 series fighter aircraft. The overall accident trend at various levels of pilot experience is given and discussed. Accidents are also analyzed by phase of operation, type of accident, causative factors, and emergency procedures used.

T. G.

13,056

Ward, J.E., Hawkins, W.R. & Stallings, H. PHYSIOLOGIC RESPONSE TO SUBGRAVITY. I. MECHANICS OF NOURISHMENT AND DEGLUTITION OF SOLIDS AND LIQUIDS. *J. Aviat. Med.*, March 1959, 30(3), 151-154. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

13,056

To study the mechanics of nourishment during weightlessness, 165 sub-gravity parabolas were flown in an F-94C aircraft. Twenty-five subjects attempted to drink from an open container, a container with a pierced lid and plastic straw, and a plastic squeeze bottle. Observations were also made regarding deglutition of solids, including swallowing of both well and poorly masticated pieces of food.

I. R 4

13,057
von Döbeln, W., Engstrom, C.G. & Strom, G. PHYSICAL WORKING CAPACITY OF SWEDISH AIR FORCE PILOTS. *J. Aviat. Med.*, March 1959, 30(3), 162-166. (Medical Division, Royal Swedish Air Force, Stockholm, Sweden).

13,057
The physical working capacity of Swedish Air Force pilots, staff personnel, and pilot applicants was determined as the pulse rate response in steady state to stepwise increased sub-maximal loads on a bicycle ergometer. The groups are compared and such factors as the effects of age discussed.
T. G. R 14

13,058
Hall, F.G. & Salzano, J. MAXIMAL INSPIRATORY AND EXPIRATORY STROKE VOLUMES IN HUMAN SUBJECTS AS RELATED TO BODY POSTURE. *J. Aviat. Med.*, March 1959, 30(3), 167-172. (Duke University, Durham, N.C.).

13,058
In this experiment, timed maximal expiratory and inspiratory stroke volumes were measured as a function of posture. Subjects were 18 normal young men ranging in age from nineteen to thirty years. During the tests, the subjects were placed in four postures: standing, supine, head up, and body axis at 45 degrees from horizontal, and head down and body axis at 45 degrees from horizontal. Percentage of maximal stroke volume was related to posture.
T. G. I. R 3

13,059
Sarnoff, C.A. & Haberer, C. Elizabeth. THE TECHNIQUE OF STUDYING DISTURBANCES OF CONSCIOUSNESS AT ALTITUDE. *J. Aviat. Med.*, April 1959, 30(4), 231-240.

13,059
A technique for planning and objective monitoring of diagnostic altitude chamber flights and for setting up the electronic monitoring devices is presented in this paper. The method is felt to be useful for studying the factors involved in the etiology of disturbances of consciousness occurring under conditions of decreased barometric pressure. Three cases are reported to illustrate the usefulness and versatility of the technique.
G. R 5

13,060
Gell, C.F., Hays, E.L. & Corneale, J.V. DEVELOPMENTAL HISTORY OF THE AVIATOR'S FULL PRESSURE SUIT IN THE U.S. NAVY. *J. Aviat. Med.*, April 1959, 30(4), 241-250.

13,060
This paper presents a history of the development by the U.S. Navy of aviators' full pressure suits. There is a description of the full pressure suit system, followed by a section which outlines developments and changes in design from 1935 to the present. Finally, brief mention is made of a number of physiological studies which have been made in connection with pressure suits.
G. I. R 2

13,061
Posenbaum, D.A. EXPLOSIVE DECOMPRESSION STUDIES WITH ANIMALS WEARING FULL BLADDER SUIT AND HELMET. *J. Aviat. Med.*, April 1959, 30(4), 251-257.

13,061
This paper describes explosive decompression studies made with animal subjects outfitted with full bladder suits and helmets. Seventeen dogs were divided into three groups. Group I was decompressed from 8,000 to 65,000 feet (ft.) in 28 milliseconds (ms.) after which the animals were autopsied or followed clinically. Group II was decompressed from ground level to 70,000 ft. in 30 ms. and Group III from 8,000 to 65,000 ft. to measure suit bladder and mask pressures. Pathological and clinical results are discussed.
T. G. I. R 13

13,062
Berry, C.A. & King, A.M. USE OF ALTITUDE CHAMBER IN THE DIAGNOSIS AND DISPOSITION OF PROBLEM AEROMEDICAL CASES. *J. Aviat. Med.*, April 1959, 30(4), 258-267.

13,062
The use of the altitude chamber as a diagnostic aid in aeromedical cases is discussed in this paper. Illustrated with case histories, the chamber's use is described for ear, nose, and throat problems, cardiac and pulmonary conditions, hypoxia, hyperventilation, and head injuries.
G. R 8

13,063
Robbins, J.H., Kratochvil, C.H., Ellis, J.P. & Howell, T.R. STUDIES OF HYPOGLYCEMIA IN FLIGHT. *J. Aviat. Med.*, April 1959, 30(4), 268-272.

13,063
To study hypoglycemia (faulty glucose metabolism) in relation to flight safety, pre-flight and post-flight blood sugar determinations were performed on 144 U.S.A.F. jet aircraft crew members. In addition, 112 modified oral glucose tolerance tests were done. The data are presented and evidence for episodes of hypoglycemia sought.
T. G. R 10

13,064
Webb, P. CLOSED BREATHING-VENTILATING SYSTEMS USING RECIRCULATED OXYGEN. *J. Aviat. Med.*, April 1959, 30(4), 273-279.

13,064
The possibilities of employing closed breathing-ventilating systems using recirculated oxygen for prolonged flight beyond the atmosphere are explored in this study. The functional requirements for such an apparatus are defined and a laboratory system to test the approach was developed and used. Laboratory results are described briefly and future work is outlined.
G. I.

13,065
Michel, E.L. & Sharma, H.S. DETERMINATION OF EFFECTIVE DEAD AIR SPACE OF AVIATORS' RESPIRATORY EQUIPMENT BY PHYSIOLOGIC MEASUREMENT. *J. Aviat. Med.*, April 1959, 30(4), 280-286.

13,065
This paper describes a method which permits measurement of the resultant dead air space effect produced by dead space inherent in breathing equipment. The method, which maintains constant both breathing frequency and end tidal CO₂ concentration, measures the increase in respiratory tidal volume resulting from the effect of equipment dead space. Such measurements are considered to be important for determining the physiological limitations of the equipment and as a criterion for improving the design of future breathing apparatus.
T. G. I. R 7

13,066
Simons, D.G. THE "MANHIGH" SEALED CABIN ATMOSPHERE. *J. Aviat. Med.*, May 1959, 30(5), 314-325. (USAF Aeromedical Field Lab., Holloman AFB, N.M.).

13,066
This paper discusses some of the factors involved in the selection of a sealed cabin atmosphere and illustrates its arguments with discussion of the Manhigh program. The atmosphere of the Manhigh capsule is described in three sections: the effect of certain design parameters on choice of atmosphere, characteristics of the atmosphere (total pressure, oxygen concentration, and inert gas), and the flight experience and measurements made during flight.
T. G. R 10

13,067
Ross, M.D. REACTIONS OF A BALLOON CREW IN A CONTROLLED ENVIRONMENT. *J. Aviat. Med.*, May 1959, 30(5), 326-333. (CGR, Washington, D.C.).

13,067
This is a discussion of the results of two representative flight simulation tests and two actual flights of a two-man balloon crew in a spherical sealed cabin gondola with a controlled atmosphere. The reactions of the crew members, as well as such measurements as air pressure, air temperature, relative humidity, and oxygen content at successive altitudes, are given and discussed. Implications for space flight are also mentioned.
I. R 19.

13,068
Schaefer, K.E. EXPERIENCES WITH SUBMARINE ATMOSPHERES. *J. Aviat. Med.*, May 1959, 30(5), 350-359. (USN Medical Research Lab., Conn.).

13,068
This paper reviews the problems experienced during prolonged submarine submerge periods. Thermal exchange in a normal apartment and a submarine are compared. The role of trace substances and ionization patterns of the atmosphere in confined spaces is discussed. Carbon dioxide toxicity is considered and differences in the combined effects of increased CO₂ and lowered oxygen under acute and chronic conditions are analyzed.
G. I. R 18

13,069
Miller, H., Riley, W.B., Bondurant, S. & Hiatt, E.P. THE DURATION OF TOLERANCE TO POSITIVE ACCELERATION. *J. Aviat. Med.*, May 1959, 30(5), 360-366. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

13,069
Human tolerance to prolonged positive accelerations of sub-blackout magnitude were studied in 11 subjects who made a total of 73 runs on the human centrifuge at g levels of 3.0, 3.5, 4.0, 4.5, 5.0, and 6.0. A gradual rate of onset of acceleration was used (0.07 g per second). The duration of tolerance to g of these levels is discussed, as well as clinical observations of various kinds.
T. R 10

13,070
Rippen, K.H. MODULAR SPACE PLANNING. *Systems*, March-April 1959, XXIII(2), 6-7. (Kenneth Rippen Co., N.Y.).

13,070
An argument for "open space" office layout is presented in this brief paper. Such a layout, using movable partitions, is said to lead to better morale and better provision for change and expansion in the business.
I.

13,071
Feld, A. & White, C.T. THE EFFECTIVENESS OF THE EYE AS A SENSORY-CONTROL MECHANISM. Navy Electronics Laboratory Rep. 934, Oct. 1959, 19pp. (Navy Electronics Lab., San Diego, Calif.).
This investigation was undertaken in order to study the characteristics of human bio-electric potentials to determine the utility of these phenomena for human engineering applications; specifically, to determine the feasibility of controlling electromechanical devices directly by means of the potentials elicited by voluntary eye movements. The results were as follows: a) The control of electromechanical devices by means of bioelectric potentials produced by voluntary eye movements appears to be technically feasible with current electronic and servomechanism techniques; b) Operators could become proficient at this type of task with relatively little training; c) This method of control has several possible future applications. Based upon these results it was recommended that it should be determined to what extent other bioelectric phenomena, such as muscle action potentials, might be used as control mechanisms. (HFIAS)
R 12

13,072
von Eekes, G. SYNCHRONISM OF NEURAL DISCHARGES AND THEIR DEMULTIPLICATION IN PITCH PERCEPTION ON THE SKIN AND IN HEARING. *J. acoust. Soc. Amer.*, March 1959, 31(3), 338-349. (Harvard University, Cambridge, Mass.).

13,072
To investigate the role of volleys in the sensation of "pitch" on the skin, experiments using mechanical and electrical stimulation of the skin were performed and described. Results were discussed as they relate to theoretical expectations, to results obtained in previous experiments, as they relate to auditory pitch perception, to the understanding of problems raised by application of the volley principle, and to the question of why frequencies of neural potential in the cortex are lower than frequency of the stimulus.
G. I. R 12

13,073
Scharf, B. CRITICAL BANDS AND THE LOUDNESS OF COMPLEX SOUNDS NEAR THRESHOLD. *J. acoust. Soc. Amer.*, March 1959, 31(3), 365-370. (Northeastern University, Boston, Mass.).

13,073
To measure the loudness of faint sounds as a function of band width and level, over 100 different subjects were asked to match in loudness complexes of different band widths to a comparison sound which was either a pure tone of the same frequency as the center of the complex, or a band of white noise. Subjects used a "bracketing" method in approaching the loudness match. Results are discussed in terms of a critical band "which defines limits with which the spreading of energy leaves the loudness of a complex sound unchanged."
G. R 13

13,006

Edwards, R. ACCESSIONS IN SET ADJUSTMENT. *J. ACQUIS. Soc. Amer.*, May 1959, 21(5), 547-557. (Western Electric-Aerometric Lab., Inc., Los Angeles, Calif.).

13,007

This paper reviews the relationships between the noise resulting from commercial jet and propeller airplane operations, including takeoff, taxi, and idle, for various projected traffic densities and various airport building functional design criteria. Presently used criteria are evaluated and new criteria are suggested to fill a gap in the over-all evaluation procedure for short time delays. Methods and examples are presented which expedite initial visualization of the major structural factors in an airport design situation, facilitate decisions for preliminary airport building layout, and enable evaluation of possible wall and roof structures. T. G. I. R 21

13,008

Ward, W.R., Glorig, A. & Silar, Hans L. HEARING SENSORY DEVIATION FROM TEMPORARY THRESHOLD SHIFT AND DEVIATION OF EXPOSURE. *J. ACQUIS. Soc. Amer.*, May 1959, 21(5), 600-602. (Research Center, Subcommittee on Noise, Los Angeles, Calif.).

13,009

To determine whether the manner in which a temporary threshold shift (TTS) is produced is irrelevant to the recovery process, i.e., "If two recovery curves coincide at any point in time they will agree at all points," three groups of five listeners each were exposed to (1) 105 decibels (dB) Sound Pressure Level (SPL) for 12 minutes, (2) 98 dB for 27 minutes, or (3) 90 dB for 117 minutes. One week intervened between successive tests, and order of presentation was balanced so each experimental condition was presented first to one group, second to another, and so forth. Apparatus and procedures were described in earlier articles. Results were discussed in terms of hypotheses presented in the literature, and of generalizability of the findings. G. R 8

13,010

Garner, W.R. ON THE GAMMA LOGNESS FUNCTION, MASKING AND THE LOGNESS OF MULTICOMPONENT TONES. *J. ACQUIS. Soc. Amer.*, May 1959, 21(5), 602-607. (Johns Hopkins University, Baltimore, Md.).

13,011

The loudness data of Fletcher and Munson for multi-component tones were predicted, using the lambda loudness function and two basic assumptions: (1) loudness of components add as the sum of their squares, and (2) the effect of masking is to subtract a constant amount of loudness. The usefulness of the lambda function as compared with other loudness functions for integration of auditory data was discussed. G. R 9

13,012

Galliksen, H. MATHEMATICAL SOLUTIONS FOR PSYCHOLOGICAL PROBLEMS. *Amer. Scientist*, June 1959, 47(2), 178-201.

13,013

This paper attempts to show the value of the mathematical-deductive approach to various psychological problems, and in particular to indicate the very general applicability of two techniques: 1) the usefulness of matrix algebra for expressing a large number of psychological theories and for comparing the theory (observation equations) with data, and 2) the generality of multidimensional scaling as an approach to a variety of psychological problems. T. G. I. R 21

13,014

Brown, J.L. THE BIO-DYNAMICS OF LAUNCH AND REENTRY. *Naval Res. Rev.*, May 1959, 8-15. (University of Pennsylvania, Philadelphia, Penn.).

13,015

This paper, in consideration of the stresses to which man will be subjected upon leaving and returning to earth, reviews recent work on tolerance of acceleration, performance under conditions of acceleration, and design of control mechanisms and pilot restraint equipment. G. I.

13,016

Koper, R., Yaglom, R. & Purdie, R., Jr. PERCEPTION OF DIRECTION AND THE CHANGING PRINCIPLE. *J. ACQUIS. Soc. Amer.*, Feb. 1959, 21(1), 7-12. (Harvard University, Cambridge, Mass.).

13,017

To test whether reciprocal orientation may constitute a basis for perceptual unit formation, 48 subjects were shown slides on which groups of dots were "painted" by reciprocally oriented lines. Slides were removed and subjects asked to reproduce the lines to test facilities concerning dot-patterns (without the lines). Results are discussed as they relate to the perceptual principle of good continuation and as they may relate to high visibility of mutual interpersonal choices. T. G. I. R 3

13,018

Millard, J.C. COUNTING BY MEMOS ON A FORMED-BY-REINFORCEMENT. *J. ACQUIS. Soc. Amer.*, April 1959, 21(2), 179-180. (Harvard University, Cambridge, Mass.).

13,019

The task was to detect deflection of a meter-needle on a face which subject was required to light in order to detect the signal. The problem was one of possible explanation for changes in over-all response rate when subjects counted verbally the number of times they lighted the light. To test whether this might impose pacing, hence affect rate, two subjects were instructed that they could obtain shorter latencies by counting. Results are compared with those of a subject who began counting his responses spontaneously, and all are related to the problem of differences in results which might be due to variables beyond control of the experimenter. G. R 3

13,020

Astin, K.M. SOME EFFECTS OF NOISE ON HUMAN BEHAVIOR. *J. ACQUIS. Soc. Amer.*, April 1959, 21(2), 183-200. (Anna State Hospital, Anna, Ill.).

13,021

To differentiate the effects of the stimulus, noise, in terms of its use as a discriminative stimulus or as response-contingent stimulus, the effects of noise were studied (1) when the presence or absence of noise had fixed temporal relationships to neither the response or the reinforcement, (2) to reinforcement, and (3) to responses. 80 subjects participated approximately six hours a day for one to three days. The task was to detect deflection of a meter-needle on a face which subject was required to light in order to detect the signal. Subject was in a closed sound-attenuating room. Noise was delivered through two enclosed speaker systems. Results are discussed in terms of modification in performance which accompanied noise under each of the three conditions. G. R 29

13,022

Pollock, I. & Johnson, L.B. REPRODUCTION AND IDENTIFICATION OF ELEMENTS OF AUDITORY DISPLAYS. *J. ACQUIS. Soc. Amer.*, Jan. 1959, 21(1), 7-8. (USAF Cambridge Research Center, Bolling AFB, Washington, D.C.).

13,023

The ability to identify the frequency of tones was examined under four training procedures: 1) control (no information provided), 2) information (informed of correct tone), 3) production (produced tone on oscillator and then informed of correct tone), 4) reproduction (duplicated tone by whistling and then informed of correct tone), the aim being to improve such identifications. For each procedure, 16 listeners identified one out of a set of 12 different possible tones (932-1760 cycles/second) by assigning a numeral to it - experimental series. All four groups of listeners then identified tones with no information provided - control series. The results were analyzed by nonparametric statistical tests and their implications for the operational situation are indicated. G. R 5

13,074

Stelcock, J., Pridgen, E. & Davis, R. ON SOME POSTSTIMULATORY EFFECTS AT THE THRESHOLD OF ACTIVITY. *J. Acoust. Soc. Amer.*, Jan. 1959, 31(1), 9-14. (Syracuse University, Syracuse, N.Y.).

13,081

To determine the nature of the poststimulatory shift at the threshold of audibility as a function of duration of test stimulus (10-50 milliseconds), duration of prime stimulus (10-1000 milliseconds), sensation level of prime stimulus (15-85 decibels) and interval between prime and test stimulus (20-about 700 milliseconds), listeners responded to the second of a pair of 1000 cycles/second tones by a modification of Dekey's tracking method. Also, the effects of gradual as well as abrupt cutoffs of the prime stimulus were determined. The results are discussed in terms of other relevant findings, with some mention of underlying neural activity. G. R. 15

13,084

Fullack, L. & Pickard, J.M. EXPERIMENTAL OF PEAK-CLIPPED SPEECH AT HIGH NOISE LEVELS. *J. Acoust. Soc. Amer.*, Jan. 1959, 31(1), 14-16. (NSA Operational Applications Lab., Bolling AFB, Washington, D.C.).

13,084

To determine whether peak-clipping of speech improves speech intelligibility in high-level noise environments, symmetrical peak-clipped (0, 12 and 24 decibels) power-compensated speech signals mixed electrically with noise (uniform and low frequency, from 250-4000 cycles at both 90 and 125 decibels) for a range of speech-to-noise ratios were presented to five listeners over matched bilateral earphones. The test materials were the Harvard 19 monosyllabic word tests; the check-list method was employed. Intelligibility scores were presented as a function of the aforementioned variables and a statistical analysis of the test variance of these scores was performed. G. R. 8

13,085

Starrick, C.E. EFFECT OF BACKGROUND NOISE ON THE ACTIVITY INTENSIVE DIFFERENCE LIMIT. *J. Acoust. Soc. Amer.*, Feb. 1959, 31(2), 239-242. (Washington University, St. Louis, Mo.).

13,085

To study the effect of random background noise (signal-to-noise ratios of -15, -10, 0 and 10 decibels and quiet) on the difference limit (DL) for pure tones which were varied in frequency (250, 1000, and 4000 cycles/second) and sensation level (20, 40 and 60 decibels), three trained listeners judged when the tone was modulated under all combinations (45) of the above conditions at each of three separate sessions. In addition, the DL of a 1000 cycle/second tone at 10, 30, 50 and 70 decibels for signal-to-noise ratios of -10, 0, 10 and 20 decibels was studied using a loudness matching technique (method of average error). All data were treated by analysis of variance technique. The results are discussed in terms of the simple masking hypothesis. T. G. I. R 9

13,086

Goldfried, M.R. ONE-TAILED TESTS AND "UNEXPECTED" RESULTS. *Psychol. Rev.*, Jan. 1959, 66(1), 79-80. (University of Buffalo, Buffalo, N.Y.).

13,086

This is a critical note on the use of one-tailed tests of significance when results in the opposite direction either would be psychologically meaningless or could not be deduced by any psychological theory. Also, three possible courses of action when such results occur are presented with their associated difficulties. R 9

13,087

von Békésy, G. STIMULUS-RESPONSE RELATIONS BETWEEN HEARING AND SKIN SENSATIONS. *Psychol. Rev.*, Jan. 1959, 66(1), 1-32. (Harvard University, Cambridge, Mass.).

13,087

A comparison of hearing and the sensation of vibration along the skin, in which neurophysiological observations and differences were pointed out, demonstrates the feasibility of the analogy between these senses for research in hearing, the phenomena of which are not directly observable. The mode of the cochlea constructed from various threshold denervation studies were utilized for experiments comparing the two senses. Problems of inhibition and summation are discussed and the functioning (law of contrast) of the nervous system demonstrated for both hearing and skin sensation. G. I. R 21

13,088

Loeb, E.D. ON THE POSSIBLE PRODUCTION LINE. *Psychol. Rev.*, March 1959, 66(2), 42-53. (Harvard University, Cambridge, Mass.).

13,088

To determine the functional relations between subjective continua and the underlying physical continua, an approach is outlined considering all combinations of ratio, interval and logarithmic interval scales to determine what possible forms such a substantive theory could take. A principle of theory construction is set forth which limits significantly the possible laws relating the two continua, and two circumstances for which these do not hold are discussed. T. R 16

13,089

Staats, A.M. & Staats, Carolyn K. HEARING AND IN CORRELATED BUT SEPARATE. *Psychol. Rev.*, March 1959, 66(2), 136-144. (Arizona State University, Flagstaff, Ariz.).

13,089

Two approaches to word meaning were summarized and contrasted: 1) verbal responses made to the word and 2) conditioned mediating responses, part of the response elicited by the object denoted by the word. Word meaning is distinguished from a word's verbal associates and the correlation between intensity of meaning and verbal-associate measures were reported. These approaches were discussed also in terms of the manner in which words acquire meaning. Conclusions as to semantic generalization are set forth. T. I. R 17

13,090

Mandler, G. STIMULUS VARIABLES AND SUBJECT VARIABLES: A CAUTION. *Psychol. Rev.*, May 1959, 66(3), 145-149. (Harvard University, Cambridge, Mass.).

13,090

The need for distinguishing between those variables associated with subjects and those associated with situations or stimuli in two-variable or multi-variable research designs is discussed for two types of problems: individual differences (subject sampling) and situational (stimulus sampling). In order to make meaningful use of the findings from such research the author demonstrates by examples that the population of subjects or stimuli as well as the operational and conceptual function of the variables must be completely specified. R 7

13,091
Fischer, H.L. SUBJECTIVE PROBABILITY AND CHOICE UNDER UNCERTAINTY. *Psychol. Rev.*, May 1959, 66(3), 108-144. (University of New South Wales, Australia).

13,091
This is a discussion of the manner in which the concept of subjective probability is incorporated into each of five approaches which relate to decision under uncertainty: the Linds, et al., analysis of level of aspiration behavior, Tolman's principles of performance, Rutter's basic equation in his social learning theory, Edwards' subjectively expected utility model in decision theory, and Atkinson's risk-taking model. Two hypotheses are advanced in terms of (1) categorization among these approaches and an experimental study outlined to test these. Several implications of this study for decision under uncertainty are considered and discussed. T. G. I. R 35

13,092
Taylor, F.Y. & Himmelfarb, H.P. THE COMBINED SYSTEM PERFORMANCE MEASURE - A CONCENTRATION. *Psychol. Rev.*, May 1959, 66(3), 178-187. (NSA Research Lab., Washington, D.C.).

13,092
To demonstrate the inappropriateness of inferring behavioral properties of any one component, man or machine, from the performance of the total system, an analogue computer study was conducted in which tracking performance of three man-machine systems was compared, using an amplifier in place of the man. For all three systems, the "behavior" of the robot-man was made to change in exactly the same way; the performance curves thus obtained are comparable for the "man" component. The findings are analyzed and discussed in terms of their implications for the study of human motor skills. G. I. R 4

13,093
Sherr, D.J. INTELLIGIBILITY OF REITERATED SPEECH. *J. Acoust. Soc. Amer.*, April 1959, 31(4), 423-427. (G. and C. Merriam Company, Springfield, Mass.).

13,093
To determine the intelligibility of reiterated speech (interrupted speech with repetitions), several trained listeners responded to 18 PB (phonetically balanced) word lists in quiet and in noise with two duty cycles (25 and 50 per cent) with different rates of interruption of the speech signal (0.05 to 3.6 and 24 to 2640 interruptions/second) and with different build-up and delay times (0.1 to 2.5 milliseconds) in the switching operation. Also a few selected conditions were tested with interrupted speech. Analysis of variance was performed on the data for reiterated and interrupted speech for the 25 per cent duty cycle and several switching rates. The data are interpreted in terms of previous findings and intelligibility functions are presented. T. G. I. R 9

13,094
Lehiste, Ilse & Peterson, G.E. VOWEL AMPLITUDE AND PHONEMIC STRESS IN AMERICAN ENGLISH. *J. Acoust. Soc. Amer.*, April 1959, 31(4), 428-435. (University of Michigan, Ann Arbor, Mich.).

13,094
This paper is primarily concerned with consideration of the parameters which contribute to the judgment of phonemic stress in American English within a framework of physiological effort in which four acoustical parameters predominate: speech power, fundamental voice frequency, phonetic quality and duration. The main emphasis here is the inter-effects of amplitude and phonetic quality. Volume indicator and instantaneous amplitude observations on sustained vowels produced under various conditions of speech effort, and on vowels produced in CMC words in a carrier phrase with stress held constant are reported. A theory concerning the perception of linguistic stress, based on judgments of physiological effort involved in producing vowels, is proposed. T. G. I. R 17

13,095
Decherage, P.M. & Marsh, J. AUDITORY LOCALIZATION OF CLICKS. *J. Acoust. Soc. Amer.*, April 1959, 31(4), 486-492. (Central Institute for the Deaf, St. Louis, Mo.).

13,095
To determine the relationship between intensity differential and temporal differences of auditory clicks in the situation where sound is localized in the median by intensity increases compensating for time differences, four observers at each of three click intensities (40, 60, and 80 decibels) adjusted (10 trials) the interaural temporal difference to the auditory sound image of the click was in the median plane. In a second experiment, five observers made the same series of judgments in the presence of each of four levels of high-frequency masking noise which interfered with reception in the basal turn of the cochlea. These results plus various physiological observations are the basis for a discussion concerning the underlying peripheral mechanism for auditory localization. T. G. I. R 23

13,096
Solomon, L.K. SEARCH FOR PHYSICAL CORRELATES TO PSYCHOLOGICAL DIMENSIONS OF SOUNDS. *J. Acoust. Soc. Amer.*, April 1959, 31(4), 492-497. (CSN Electronics Lab., San Diego, Calif.).

13,096
This is an attempt to correlate physical measurements of sounds with their rank orders on seven psychological dimensions: magnitude, aesthetic-evaluative, clarity, security, relaxation, familiarity and mood, which were isolated in a previous study by factor analysis. Fifty subjects ranked 20 passive sound recordings, which had been analyzed for average sound pressure level in each of eight octave bands from 37.5 to 9600 cycles/second, in terms of their acoustically perceived characteristics on the seven dimensions. Correlations (rho) between sound pressure level measurements and rank orders on these seven dimensions were calculated. Also, an analysis of the manner in which 20 sounds clustered within the space defined by the seven dimensions was made. T. G. I. R 3

13,097
Pollack, I., Rubinstein, H. & Dicker, L. INTELLIGIBILITY OF KNOWN AND UNKNOWN MESSAGE SETS. *J. Acoust. Soc. Amer.*, March 1959, 31(3), 273-279. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

13,097
To examine the effect of the tendency of concurrence of words upon intelligibility, for unknown and known message sets, five listeners responded to an unknown 144-word message (monosyllabic English content words, 13 from each frequency class in the Large Magazine Count) and five listeners responded to known eight-word messages (composed of aforementioned words) all of which were presented against white noise for a range of signal-to-noise (s/n) ratios (-10 to +15 decibels) which corresponded to several fixed levels of intelligibility (10, 25, 50, 75 and 90 per cent). Also the effect of successive presentations of lists of known and unknown sets without and with correction information was determined. The results are discussed in terms of the adequacy of the PB word lists for intelligibility testing. T. G. I. R 13

13,098
Kivra, Doreen. THE EFFECT OF LETTER POSITION ON RECOGNITION. *Canad. J. Psychol.*, March 1959, 13(1), 1-10. (McGill University, Ottawa, Canada).

13,098
Three experiments were performed to answer these questions: 1) Is response sequence the same over a wide range of stimuli, e.g. when gaps and non-alphabetical material are introduced? 2) What is the effect of reading experience? 3) Do changes in duration of the stimulus affect the way in which letters are reported? Materials consisting of letters and geometric forms were presented tachistoscopically. Subjects (83) of two different educational levels were used. Differences in accuracy in recognition of letters were compared for each of four positions, for varied arrangements of stimuli and as between the two educational levels. Results are related to other experiments in the area. T. I. R 4

13,099

Baker, C.H. **THEORY OF VIGILANCE.** *Canad. J. Psychol.*, March 1959, 13(1), 30-42. (Defence Research Medical Labs., Toronto, Ontario, Canada).

13,099

This paper discusses and expands the expectancy hypothesis of vigilance proposed by Baker. Illustrations and supporting data are drawn from studies involving (1) rate of signal appearance, (2) inter-signal interval, (3) signal magnitude, (4) knowledge of results, (5) environmental factors and, (6) knowledge of signal location.

G. R 23

13,100

McDonnell, P.R. **PERFORMANCE IN A VIGILANCE TASK WITH AND WITHOUT KNOWLEDGE OF RESULTS.** *Canad. J. Psychol.*, June 1959, 13(2), 68-77. (Defence Research Medical Laboratories, Toronto, Ontario, Canada).

13,100

To investigate performance in a vigilance task with and without knowledge of results, two job subjects were required to depress a microswitch each time light was seen through an aperture. Response time was plotted as a function of task duration and length of inter-stimulus interval for both knowledge and no-knowledge conditions. Analysis of variance was performed on the data and results are discussed as they relate to the hypothesis that inhibition is generated at a faster rate under condition of no-knowledge than under knowledge.

T. G. R 3

13,101

Coxon, J.F. **AGE AND SEX DIFFERENCES IN PURE-TONE THRESHOLDS.** *J. Acoust. Soc. Amer.*, April 1959, 31(4), 478-507. (Pennsylvania State University, Philadelphia, Pa.).

13,101

To determine normal thresholds of hearing for pure tone, for an age-stratified sample, 500 subjects exposed to minimal levels of industrial noise were given detailed otological examination, required to complete a life-history questionnaire, and given audiometric examinations. Results are presented in tabular form by sex, age group, and for each ear for the total group, for a screened group, and for a truncated distribution. Age range was 18-69 years. Curves of presbycusis are presented and compared to those of the American Standards Association (ASA). Differences between curves obtained in this study were compared with those reported by ASA, and related to the proposed revision of present standards of normal hearing.

T. G. R 18

13,102

Small, A.M., Jr., Bacon, W.E. & Fozard, J.L. **INTENSIVE DIFFERENTIAL THRESHOLDS FOR OCTAVE-BAND NOISE.** *J. Acoust. Soc. Amer.*, April 1959, 31(4), 508-510. (Lehigh University, Bethlehem, Penn.).

13,102

To investigate the effect of four band widths of different center frequencies presented at three sensation levels on size of differential threshold for intensity, 11 untrained and three trained subjects listened to the stimuli monaurally in a sound treated room, and discriminated loudness differences. Effects of center frequency on size of different thresholds for intensity were discussed, and findings were compared with those reported by other investigators.

G. I. R 9

13,103

Swets, J.A. **INDICES OF SIGNAL DETECTABILITY OBTAINED WITH VARIOUS PSYCHOPHYSICAL PROCEDURES.** *J. Acoust. Soc. Amer.*, April 1959, 31(4), 511-513. (Massachusetts Institute of Technology, Cambridge, Mass.).

13,103

To test the assumption made by decision theory that a given signal-to-noise ratio should yield a particular value of the index of detectability (d') regardless of the procedure by which the data are collected, two studies were conducted. One, estimates of d' were obtained from the forced-choice method, with different numbers of alternatives; in the other the yes-no method was used. Estimates of d' obtained under the two conditions were compared and theoretical implications of findings discussed.

G. R 7

13,104

Swets, J.A., Shipley, Elizabeth F., Hilly, Sally J. & Green, D.M. **MULTIPLE OBSERVATION OF SIGNALS IN NOISE.** *J. Acoust. Soc. Amer.*, April 1959, 31(4), 544-551. (Massachusetts Institute of Technology, Cambridge, Mass.).

13,104

For sets of experiments investigating the relationship between gain in detectability resulting from additional observations, and type of signal and noise employed were reported. The first presented five observations of each signal in noise, the second employed signals whose frequencies were unknown to the observer. Inferences were made about (1) observer's ability to integrate over time, (2) amount of noise generated by the auditory system, (3) nature of the process of frequency analysis, and (4) observer's mode of dealing with uncertainty as to signal frequency.

T. G. R 7

13,105

Ward, M.E., Glorig, A. & Sklar, Hans L. **HYPERBOLIC REDUCTION OF OCTAVE-BAND NOISE: APPLICATIONS TO DAMAGE-RISK CRITERIA.** *J. Acoust. Soc. Amer.*, April 1959, 31(4), 522-534. (Research Center, Los Angeles, Calif.).

13,105

To investigate the effect of specific octave bands of noise on growth and recovery of temporary threshold shifts (TTS) in normal observers average TTS of 26 dB of 13 min were obtained using apparatus described in a prior study. General equations for octave-band noises were derived and compared with that for broad-band noise. Recovery curves for the two types of noise were compared. Results were discussed as they relate to damage-risk criteria for continuous noise and to need for ear protection.

T. G. R 5

13,106

Leycock, F. **A SIMPLE VIEWER TO AID IN "READING" EYE-MOVEMENT FILM RECORDS.** *Percept. Mot. Skills*, June 1959, 9(2), p. 98. (University of California, Riverside, Calif.).

13,106

This note describes the materials and their dimensions which were used to construct a simple viewer for reading eye-movement records and for tracings of various sorts. The economy, transport and storage of the device are its major features.

R. 1

13,107

Loveless, W.E. & Holding, D.M. **REACTION TIME AND TRACKING ABILITY.** *Percept. Mot. Skills*, June 1959, 9(2), p. 134. (University of Durham, Durham, England).

13,107

To determine the correlation between reaction time and tracking ability, the scores on a pursuit tracking task and three levels of visual reaction time were analyzed by the Spearman rank-order correlation. Eight subjects were used. Practice sessions preceded each test run for both types of tasks.

T.

13,108

Lewis, C. **SPACE TRAINER SIMULATES HYPERSONIC ORBIT.** *Aviation Week*, April 1959, 70(16), 56-63.

13,108

This article describes an orbital navigation simulator with a wide variety of flight characteristics ranging from the Project Mercury capsule to a powered space glider. However, since its specific purpose is for the study of boosted, unpowered hypersonic gliders, the description is framed within the problems accompanying such flight, i.e. orbital, re-entry and hypersonic glide. A full orbital and re-entry run in the simulator is described in considerable detail.

I.

13,109

Land, C. S. HOW TO EVALUATE HELL HELICOPTER IIS.
Aviation Weekl. Jan. 1959, 2(2), 61-67.

13,109

The Bell Helicopter Corporation helicopter instrument landing system for use in remote areas is described briefly. The major components are the simplified pilot instrument display and instrument panel and the ground beacon. The beacon is a microwave transmitter which assists the pilot in landing by providing information about altitude and elevation of the beacon in relation to the helicopter, distance and ground speed. The display and panel are equipped with several new automatic components—the integrated system allowing the pilot to fly by monitoring two displays.

13,110

Bransford, R., Milner, B. C., & Goldstein, R. ELECTROPHYSIOLOGIC RESPONSES TO SOUND AS A FUNCTION OF INTENSITY, EEG PATTERNS AND SEX. *J. Speech Res., March 1959, 2(1), 28-39.*

13,110

The aims of this study were: 1) to study the properties of electroencephalogram (EEG) and electroencephalic (EEG) responses as a function of intensity close to threshold of hearing, 2) to learn how the percentage of responses varies with sex and with patterns of the EEG, and 3) to derive a criterion for the estimation of threshold from the percentage of EEG and EEG as a function of intensity. Subjects were 22 men and 14 women (17-40 years) with normal hearing. The aforementioned responses were recorded simultaneously from the subjects while tones of 1000 cps at -6, 0, +5 and +10 db sensation level were presented in random order in either ear. The data were evaluated by analysis of variance and a criterion developed for estimation of threshold.

T. G. I. R 12

13,111

Myask, E. D. PITCH AND EXHALATION CHARACTERISTICS OF OLDER MALES. *J. Speech Res., March 1959, 2(1), 46-54.* (University of Connecticut, Storrs, Conn.).

13,111

This study was aimed at determining the central tendency data for six criteria variables: 1) mean and median vocal frequency level, 2) total range, 3) functional range (between fifth and 95th percentiles), 4) standard deviation of individual's distribution of vocal frequencies, 5) words per minute, and 6) phonation/voice ratio under conditions of oral reading and impromptu speaking for older males. Two groups (12 each), 65-79 years and 80-92 years, and one group (15) of sons, 32-62 years participated. Analysis of variance technique was used to interpret the differences between the age groups and correlation analysis to test for family relationships.

T. G. R 25

13,112

Marg, W. S-Y. TRANSITION AND RELEASE AS PERCEPTUAL CUES FOR FINAL PLOSIVES. *J. Speech Res., March 1959, 2(1), 66-73.* (University of Michigan, Ann Arbor, Mich.).

13,112

To investigate the significance of various acoustical cues in the perception of final plosive consonants, 84 monosyllabic words recorded naturally and with systematic modifications were presented to two groups of 20 listeners, one with intensive phonetic training and one with no background in phonetics. The perception of plosives and duration of gaps were correlated. Results are discussed with suggestions in the direction of an absolute scale of measurement for phonetic differences between speech sounds regardless of linguistic code.

T. G. I. R 11

13,113

Milgram, W. R., & Booth, P. L. DETERMINATION OF A REPERCUSSIVE SCORE FOR SIMPLE REACTION AND MOVEMENT TIME. *Percept. Mot. Skills, June 1959, 2(2), 187-189.* (College of Osteopathic Physicians and Surgeons, Los Angeles, Calif.).

13,113

The aim of this study was to determine the number of trials necessary to reach a representative performance level in reaction time and movement time and to study the effect of chronological age on the improvement of these through practice. These measures were time to release a switch upon presentation of a light stimulus and time to extend the arm upon release of the switch. Two hundred sixty male subjects (9-30 years) were tested for 30 trials. Successive five-trial blocks were compared for differences in performance by the analysis of variance technique. The Kruskal-Wallis one-way analysis of variance was used to test the age factor.

T. G. R 13

13,114

Perinsek, G. E. VOWEL FORMANT MEASUREMENTS. *J. Speech Res., June 1959, 2(2), 173-178.* (University of Michigan, Ann Arbor, Mich.).

13,114

This paper discusses the measurement of formant frequency according to the concept of the vocal mechanism as the basic information source in speech communication. The formant frequencies represent essential acoustical properties of the vocal mechanism. The problems in detection of these frequencies and subsequent measurement with present spectrographic instruments and techniques are discussed. A procedure which provides the most meaningful data regarding vowel formant frequencies is indicated.

G. I. R 16

13,115

Fillmore, T. M., & Jerger, J. F. SOME FACTORS AFFECTING THE SPONDEE THRESHOLD IN NORMAL HEARING SUBJECTS. *J. Speech Res., June 1959, 2(2), 141-146.* (Northwestern University, Evanston, Ill.).

13,115

To isolate the effects of two variables: 1) knowledge of spondee test vocabulary and 2) practice in responding to faint spondee words on the spondee threshold, 30 subjects (normal-hearing screened at hearing level of ten db at each octave interval from 125 to 8000 cps) were first measured for a 1000-cps pure tone threshold and two separate spondee word thresholds, then with ten subjects in each of three groups, they were subjected to different amounts of practice and prior knowledge and again measured. The experimental material (recorded List E of CID Auditory Test W-1) and procedure (up-and-down method of threshold measurement) were standard.

T. R 3

13,116

Sutton, Florence H., & Link, J. D. HANDEDNESS, BODY ORIENTATION, AND PERFORMANCE ON A COMPLEX PERCEPTUAL-MOTOR TASK. *Percept. Mot. Skills, June 1959, 2(2), 165-166.* (University of Toronto, Canada).

13,116

To examine left- and right-handed performance on a complex motor task, 15 left- and 15 right-handed male university students performed on the Toronto Complex Coordinator. The three measures were: total number of matches, error-match ratio, and error persistence-total error ratio. An analysis of variance was done on each measure.

R 8

13,117

Worthen, M. & Arnes, J.J. EFFECTS OF EXPOSURE TIME ON ADAPTATION TO DISARRANGED HAND-EYE COORDINATION. *Percept. Mot. Skills*, June 1959, 9(2), 159-164. (University of Colorado, Boulder, Colo. & Albany Medical College, Albany, Ga.).

13,117

To determine the effect of exposure time on the adaptation to disarranged hand-eye coordination, 50 male undergraduates (25 for each exposure condition) performed a writing task in which the visual and kinesthetic images were in conflict. There were five exposure times, ranging from one second to 20 seconds; therefore, the amount of sensory-motor "practice" in the disarranged condition varied from almost none to about 20 seconds. The results are compared to those of E. Held and the differences discussed in terms of procedure.

G. I. R 4

13,118

Vernon, J.A., McGill, T.R., Colick, M.L. & Canfield, D.L. EFFECT OF SENSORY DEPRIVATION ON SOME PERCEPTUAL AND MOTOR SKILLS. *Percept. Mot. Skills*, June 1959, 9(2), 91-97. (Princeton University, Princeton, N.J.).

13,118

To determine the effects of sensory deprivation on several perceptual and motor skills, nine male subjects were confined to a light and sound proof chamber for periods of 24, 48 or 72 hours. Before and after which (immediately after and 24 hours after) they performed on five tests: color perception, depth perception, pursuit rotor, mirror drawing and trail walking. This performance was compared to that of a control group of nine matched subjects and the differences evaluated by a Wilcoxon test.

I. R 7

13,119

Sweeney, R. CRASH OF ELECTRA MAY ACCELERATE STUDIES TO IMPROVE PILOT DISPLAY. *Aviation Week*, Feb. 1959, 29(7), p. 37.

13,119

This is a brief note indicating the need for improvement of pilot displays. This interest has been revived as a result of recent indications that the drum pointer altimeter is subject to misleading.

13,120

Yaffee, M. CHAMBER SIMULATES SPACE ENVIRONMENT. *Aviation Week*, April 1959, 20(15), 91-96.

13,120

This article describes the latest project of the Air Force on development of a universal test chamber to simulate all environmental factors from 75,000 feet out through interplanetary space. In a separate project the problem of nuclear environment simulation was studied, and a facility capable of simulating such radiation is under construction. Also the importance of combined environmental testing for various equipments is indicated. Finally the estimated costs of such simulation facilities are presented. Included is a chart which summarizes the characteristics of various simulation facilities.

I.

13,122

Stewart, E. LONG RANGE PLANNING-A KALEIDOSCOPIC VIEW. *Operat. Res.*, July-Aug., 1958, 6(4), 552-560. (Vertol Aircraft Corporation, Morton, Penn.).

13,122

This article describes corporate long-range planning for aircraft manufacture. Corporate goals in an expanding economy are indicated; the time span, administrative organization and procedures for such planning also are presented.

G.

13,123

Westley, S.H. & Thompson, P. A FURTHER STUDY OF HORIZONTAL ASYMMETRY IN THE PERCEPTION OF PICTURES. *Percept. Mot. Skills*, June 1959, 9(2), 125-128. (Michigan State University, Ann Arbor, Mich.).

13,123

To determine whether there are differences in the perception of distances on the left as compared to the right portion of the visual field, 25 observers equated the size of the human figure in a large and a small photographic print (identical except for size) by adjusting the distance of the large print. Five sets of three prints were used for each set the mask had been placed so the human figure occupied a different portion of the print. The data were analyzed by analysis of variance technique, and compared to those of other researchers. A principle is arrived at which accounts for the results obtained.

I. R 2

13,124

Bell, A.M. BILATERAL TRANSFER OF WORK DECREMENT EFFECTS AS A FUNCTION OF LENGTH OF REST. *Percept. Mot. Skills*, June 1959, 9(2), p. 181. (Veterans Administration Hospital, Augusta, Ga.).

13,124

This is a brief summary of an experiment designed to investigate whether the bilateral transfer of work decrement effects is the same function of the length of interpolated rest as is "bilateral reminiscence". Twenty-five right-handed male students practiced on a manual crank device under each of five rest conditions. A covariance analysis was employed to adjust post-rest scores in terms of pre-rest scores and to compare scores as a function of the rest condition.

R 2

13,125

Bell, A.M. EFFECTS OF EXPERIMENTALLY-INDUCED MUSCULAR TENSION AND FREQUENCY OF MOTIVATIONAL INSTRUCTIONS ON PURSUIT ROTOR PERFORMANCE. *Percept. Mot. Skills*, June 1959, 9(2), 111-115. (Louisiana State University, Baton Rouge, La.).

13,125

To investigate the effects of muscular tension and motivational instructions on pursuit rotor performance, 216 male subjects (24 for each of nine experimental conditions) were tested. Tension was varied by the amount of weight subjects were required to hold in their non-preferred hands; motivational instructions by the frequency of introduction of instructions to improve. A Lindquist Type III factorial design was employed and an analysis of variance performed. The results are discussed in terms of their implications for Hull's theory.

G. R 10

13,126

Eutler, R.A. & Galloway, F.T. PERFORMANCES OF NORMAL-HEARING AND HARD-OF-HEARING PERSONS ON THE DELAYED FEEDBACK TASK. *J. Speech Res.*, March 1959, 2(1), 84-90. (University of Chicago, Chicago, Ill.).

13,126

To determine whether the delayed speech feedback task can effectively differentiate persons with mild to moderate hearing losses from those with normal hearing, 60 hard-of-hearing and 48 normal hearing persons read series of five two-digit numbers (flashed singly on a panel) under these conditions: no delayed feedback, 50 dB delayed feedback, 60 dB delayed feedback (delay is .17 second). Error scores for the two groups were compared by chi-square test, and the advantages and disadvantages of predicting hearing loss from this measure of feedback disturbance are discussed.

T. I. R 4

13,127

Chase, R.A., Sutton, S. & First, Daphne. BIBLIOGRAPHY: DELAYED AUDITORY FEEDBACK. *J. Speech Res.*, June 1959, 2(2), 193-200. (Columbia University, New York N.Y.).

13,127

This bibliography systematically reviews the published literature and includes current titles (obtained through correspondence) and a section on related topics.

R 147

13,128
Macmill, A.C. SINGLE STIMULI JUDGMENTS BASED ON A STANDARD OF FAMILIAR SIZE. *Percept. Mot. Skills*, June 1959, 2(2), 119-126. (University of Glasgow, Glasgow, Scotland).

13,128
To examine the application of the principles of judgment of size when the standard is based on a familiar object, subjects judged a series of different-sized reproductions of an ordinary matchstick by the method of single stimuli when the center of the stimulus series and the norm based on prior experience did not coincide exactly. Also series of large stimuli were presented in order to determine the shift in the standard. Analysis of variance and t tests were employed to compare the judgments.
I. R 15

13,129
Churchill, A.V. NOTE ON "COMPARISON OF TWO VISUAL DISPLAY PRESENTATIONS". *Percept. Mot. Skills*, June 1959, 2(2), p. 116. (Defence Research Medical Labs., Toronto, Ontario, Canada).

13,129
This note describes a repeated experiment which compared dial reading time and accuracy on two visual displays: a panel of dials and a photographic slide of the panel. Ten subjects participated. The results are discussed and compared to the earlier data.
R 2

13,130
Comelli, P.E., Jr., Moorer, S. & Werner, H. EFFECT OF MUSCULAR INVOLVEMENT ON SIZE PERCEPTION. *Percept. Mot. Skills*, June 1959, 2(2), p. 116. (Clark University, Worcester, Mass.).

13,130
To determine whether apparent tactual size of an object varies depending on the degree of tension with which it is held by thumb and forefinger, 24 subjects matched the distance between one pair of rods to that between another pair (the standard) by grasping one pair with each hand. The two main conditions were with and without the application of pressure for an equal number of judgments with each hand.
R 1

13,131
Draper, M.H., Ladefoged, P. & Whitteridge, D. RESPIRATORY MUSCLES IN SPEECH. *J. Speech Res.*, March 1959, 2(1), 16-27. (University of Edinburgh, Edinburgh, Scotland).

13,131
This study investigated the action of some of the respiratory muscles during speech by electromyography. Simultaneous recordings also were made of oesophageal pressure, volume of air in the lungs and wave-form of utterances. Data were obtained from 18 subjects, five of whom served as principal subjects, for spontaneous conversation, word lists, and short sentences. The recordings indicate the pattern of change-over from the use of one muscle to another as volume and pressure change. These data are reduced to a schematic form from which predictions of muscle involvement can be made.
G. I. R 11

13,132
Heuse, A.S. A NOTE ON OPTIMAL VOCAL FREQUENCY. *J. Speech Res.*, March 1959, 2(1), 55-60. (Syracuse University, Syracuse, N.Y.).

13,132
This article describes a physical characteristic of vowel production sufficient to account for systematic and presumably perceptible variations in overall vowel level as a function of vocal frequency. The discussion is in terms of the adequacy of current methods for locating optimum pitch levels.
G. I. R 5

13,133
Jeryer, J.F., Corbett, R., Tillman, T.M. & Peterson, J.L. SOME RELATIONS BETWEEN NORMAL HEARING FOR PURE TONES AND FOR SPEECH. *J. Speech Res.*, June 1959, 2(2), 126-140. (Northwestern University, Evanston, Ill.).

13,133
To determine the physical discrepancy between thresholds for a 1000-cps pure tone and for speech, both thresholds were measured in three groups of normal-hearing subjects. The specific variables examined were: sophistication of listener, effect of practice, method of threshold determination, order of test administration, sex, ear and familiarity with test vocabulary. The preliminary experiment used two groups of ten each to examine the first two variables. The main experiment used 96 (third group) to study the other variables (five-factor design). Analysis of variance was employed to interpret the threshold differences for pure tone and speech words as a function of the above variables.
I. R 14

13,134
Harris, E., Hauptschein, A. & Schwartz, L.S. OPTIMUM INFORMATION-ACQUISITION SYSTEMS. *Operat. Res.*, July-Aug., 1958, 6(4), 516-529. (College of Engineering, New York University, New York, N.Y.).

13,134
This paper suggests and describes a criterion for rating communication systems which takes into account both the risk cost of a decision and the corresponding communication cost, both of which depend on the magnitude of the parameter's power, bandwidth and time. Optimum operating condition (i.e. reliability) for three kinds of binary communication systems (unidirectional, bidirectional employing information feedback, bidirectional employing decision feedback) is determined.
R 9

13,135
Branch, M.C. THE CORPORATE PLANNING PROCESS. PLANS, DECISION, IMPLEMENTATION. *Operat. Res.*, July-Aug., 1958, 6(4), 539-552. (Rand-Woodbridge Corporation, Los Angeles, Calif.).

13,135
This article defines and explains the different categories of comprehensive planning as it refers to business and industry. Specifically, the three phases of such a corporate planning process in operation - plans, decision, implementation - are described for a fully developed program.

13,136
McEachron, W.D. PREDICTION AND FEEDBACK IN BUSINESS PLANNING. *Operat. Res.*, July-Aug., 1958, 6(4), 560-572. (Standard Oil Company of Indiana, Chicago, Ill.).

13,136
The importance of prediction and feedback as components of business planning is discussed and illustrated by a description of such procedure for a large-size corporation which is engaged in the manufacture and sale of essential consumer goods.
G. I.

13,137
Arnoff, E.L., Kania, E.B. & Day, Elizabeth S. AN INTEGRATED PROCESS CONTROL SYSTEM AT THE CUMMINS ENGINE COMPANY. *Operat. Res.*, July-Aug., 1958, 6(4), 467-497. (Operations Research Group, Case Institute of Technology, Cleveland, Ohio).

13,137
This article analyzes order processing and production scheduling for a company with large inventory accompanied by excessive costs. The procedure for solution of this problem is outlined and a detailed schedule for implementing these changes is set forth. Included are the development of mathematical models and decision rules.
I. G. I.

13,138

Flickinger, D. ZERO-GRAVITY EFFECTS LARGELY UNKNOWN. Aviation Week, Jan. 1959, 70(1), 31-39.

13,138

This is one part of a survey on the ability of man to function usefully in the weightless state. Existing data on this and other bio-medical aspects of space flight are reviewed briefly and discussed in terms of physiological effects and indications for new types of equipment. The physiological parameters include motion sickness, gastrointestinal problems, and skeletal muscle activity problems. Types of equipment needed include all manner of devices for simulators and trainers plus those for food storage and dispensing.

13,139

Fusca, J.A. ICAO WILL TRY TO SETTLE KAWAID DISPUTE. Aviation Week, Feb. 1959, 70(5), 34-37.

13,139

This article describes the problems arising from the physical limits of optical resolution as it relates to reconnaissance. Both the optical limits of the apparatus and of the human are considered. In the former category, diffraction phenomena are considered as they relate to diameter of the objective and wavelength of the observed radiation. In the latter category, visual acuity limits are considered which take account of target size and contrast. The principle of image enhancement as an aid to improved image resolution is described and illustrated.

G. I.

13,140

Stanfield, R.I. ADDITION OF FLASHER LIGHTS AIDS LAGUARDIA RUNWAY IDENTIFICATION. Aviation Week, Feb. 1959, 70(6), 37-38.

13,140

This note describes the condenser discharge flasher lights which have been and are being installed on some LaGuardia runways as a measure toward improved runway identification.

13,141

Aviation Week. HUMAN ASPECT SPECIALISTS AID DESIGNERS. Aviation Week, March 1959, 70(9), 72-73.

13,141

This is a brief presentation of the role of the human engineering specialist in the design of various machinery. In particular, the role of the consultant as represented by Dunlap and Associates is indicated. Some of the kinds of problems handled are demonstrated in a brief account of Dunlap's work on the Navy's Polaris missile and the Polaris-carrying high speed submarine.

13,142

Llewellyn-Thomas, E. SUCCESSIVE TIME ESTIMATION DURING AUTOMATIC POSITIVE FEED-BACK. Percept. Mot. Skills, Sept. 1959, 2(3), 219-224. (Defence Research Medical Labs., Toronto, Ontario, Canada).

13,142

The primary purpose was to describe and demonstrate a method to investigate time estimation which employs positive feedback as an aid in stabilizing judgments quickly. A visual stimulus was employed here; 75 subjects participated. The first stimulus was five seconds in duration and each succeeding one was the subject's most current reproduction. The results were discussed briefly in terms of the hypothesis and as a potential clinical diagnostic aid.

T. G. R. 4

13,143

Aviation Week. AERONAUT FACILITY STUDIES SHOCK ABSORBER SEATS FOR JET PASSENGERS. Aviation Week, May 1959, 70(21), p. 136.

13,143

This brief article describes an hydraulic shock absorber system whereby passengers in jet transports would be able to survive fairly high impact acceleration. The data from which the proposed system was designed were obtained by Cornell Automotive Crash Injury Research. Two methods of applying the shock absorbers for deceleration are described and seat fittings are indicated.

13,144

Tripp, C.A., Fleckiger, F.A. & Weinberg, G.M. EFFECTS OF ALCOHOL ON THE GRAPHOMOTOR PERFORMANCE OF NORMALS AND CHRONIC ALCOHOLICS. Percept. Mot. Skills, Sept. 1959, 2(3), 227-236. (Handwriting Institute, Inc., New York, N.Y.).

13,144

To compare motor functioning in normals and in alcoholics both when sober and when inebriated, a variety of handwriting tasks, e.g., standard sentence, w-shaped loops, were performed by 60 alcoholics and 18 normals (all were males 20-60 years). The following measures were obtained: pressure, variability, stasia, speed. Each task was performed spontaneously and under instructions to write as lightly as possible. The performances of the two groups were compared when sober, when inebriated; also performances were compared within groups for these two conditions. These differences were analyzed by t, and discussed as a function of possible physiological and psychological conditions.

T. I.

13,145

Maltzman, I. SEX DIFFERENCES IN THE EFFECTS OF AMOUNT OF TRAINING ON EINSTELLUNG. Percept. Mot. Skills, Sept. 1959, 2(3), 239-242. (University of California, Los Angeles, Calif.).

13,145

To determine whether there are sex differences in the effects of amount of training on Einstellung, 406 students, 136 men and 270 women, divided into four groups, received a single water-jar problem as an extinction test. One group (control) received the test problem without prior training, three groups (experimental) received 5, 10, and 20 problems which required a different solution from the test problem. The results were analyzed by chi square technique. Hypotheses were offered to account for the effects of the sex and training variables.

T. R. 7

13,146

Goldberg, F.M. & Fiss, H. PARTIAL CUES AND THE PHENOMENON OF "DISCRIMINATION WITHOUT AWARENESS". Percept. Mot. Skills, Sept. 1959, 2(3), 243-251. (Research Center for Mental Health, New York University, New York, N.Y.).

13,146

To test the hypothesis that better than chance discrimination can occur only when the stimuli have been at least partially recognized, 28 male students responded to tachistoscopically exposed familiar geometric figures (square, circle, triangle) under three experimental conditions (following a threshold series): exposure time where partial recognition of the figure is possible (32 trials), same exposure time to check on effects of practice (32 trials), briefer exposure time where partial recognition was not possible (32 trials). The results were analyzed as a function of experimental conditions and discussed in terms of the concept of sensory threshold vs. continuous reception of information.

T. R. 21

13,147

Aviation Week. MEASURING WHOLE-BODY RADIATION DETERMINES EFFECT ON X-15 PILOTS. Aviation Week, May 1959, 70(19), p. 69.

13,147

This article briefly mentions the use of a whole-body radiation counter for determining the effects of cosmic radiation on X-15 pilots. Some gross results from isolation and sensory deprivation studies are presented. Also a few problems that accompany the use of pure oxygen are indicated.

13,148

Goldstone, S., Jernigan, C., Lhamon, W.T. & Boardman, W.K. A FURTHER NOTE ON INTERSENSORY DIFFERENCES IN TEMPORAL JUDGMENT. Percept. Mot. Skills, Sept. 1959, 2(3), p. 252. (Baylor University College of Medicine, Waco, Tex.).

13,148

This note describes an experiment which compares visual and auditory temporal judgments in order to determine the importance of visual field size. Twenty-one subjects judged Second Estimation Points in the same manner as in previous studies; however, the visual stimulus situation was both small (1 degree) and large. Nonparametric techniques were employed to analyze the differences.

R. 1

13,149
Spitz, H.M. FORMULAS FOR MEASURING RECOVERY FROM FIGURAL AFTEREFFECTS. *Percent. Mot. Skills*, Sept. 1959, 2(3), 223-234. (Edward R. Johnstone Training & Research Center, Bordentown, N.J.).

13,149
This note presents and describes two formulas for measuring recovery from figural after-effects, the first a measure of rate of recovery relative to the amount of total initial after-effect, the second a measure of the residual after-effect.
R 1

13,150
Quartermain, D. & Mangan, G. ROLE OF RELEVANCE IN INCIDENTAL LEARNING OF VERBAL MATERIAL. *Percent. Mot. Skills*, Sept. 1959, 2(3), 225-236. (Victoria University, Wellington, New Zealand).

13,150
To examine the relationship between relevance of the incidental to the intentionally learned material (words selected on basis of Thorndike-Lorge Word Count) and the amount of incidental learning occurring, 50 students (25 male, 25 female) were asked to select from a list a key word previously identified in a preliminary speed test. The remaining words (16) were relevant, less relevant or irrelevant to the key word. Recall and recognition scores were obtained for these three categories of words and the data analyzed by nonparametric techniques.
T. R 4

13,151
Smith, A.H. OUTLINE CONVERGENCE VERSUS CLOSURE IN THE PERCEPTION OF SLANT. *Percent. Mot. Skills*, Sept. 1959, 2(3), 259-266. (Defence Research Board, Toronto, Ontario, Canada).

13,151
To determine the accuracy of perceiving slant, percepts produced by stimuli with three degrees of closure were compared with those produced by stimuli with three degrees of freedom of outline convergence from other cues within the stimulus complex. Eleven students viewed monocularly and binocularly eight stimulus conditions (outline figures of rectangles and trapezia exposed in the frontal plane and at three angles of slant—10, 25, and 40 degrees) and recorded their percepts by setting a pointer on an ungraduated circular dial. The data were handled by analysis of variance by ranks and one-tailed sign tests.
T. G. I. R 8

13,152
Goldstein, A.G. LINEAR ACCELERATION AND APPARENT DISTANCE. *Percent. Mot. Skills*, Sept. 1959, 2(3), 267-269. (University of Missouri, Columbia, Mo.).

13,152
This is an exploratory investigation of the effects of linear, sagittal acceleration upon distance perception. Thirty-three subjects were accelerated from zero to 60 mph (in about 10 to 11 seconds) in a fluid drive automatic transmission automobile, while viewing an illuminated ring. The subjects reported any change in perception of the ring, e.g. size, distance, during forward and backward acceleration and deceleration. McNemars test of the significance of changes was employed to compare the effects of direction of acceleration.
T.

13,153
Arens, C.J. & Popplestone, J.A. VERBAL FACILITY AND DELAYED SPEECH FEEDBACK. *Percent. Mot. Skills*, Sept. 1959, 2(3), p. 270. (Western Michigan University, Yalamazoo, Mich.).

13,153
This note briefly describes an experiment aimed at examining the relationship between verbal facility and resistance to delayed speech feedback. Male students (30 each in low and high verbal group) read a passage of English under conditions of non-delay and delay. Differences in reading time were analyzed by t tests for both groups.

13,154
Shepherd, A.H. & Cook, T.W. BODY ORIENTATION AND PERCEPTUAL-MOTOR PERFORMANCE. *Percent. Mot. Skills*, Sept. 1959, 2(3), 271-289. (University of Toronto, Toronto, Ontario, Canada).

13,154
To investigate changes in performance of a particular control-display relation on the Toronto Complex Coordinator with systematic changes in body orientation during practice, six groups of ten male subjects each practiced for five successive five-minute periods at various combinations of four body positions. Performance (number of matches and number of errors per match in moving the control stick so as to light up a disc) measures were compared for the practice periods, and for body positions in pairs using t. The results are interpreted in terms of stimulus-response compatibility considering body position.
T. G. I. R 6

13,155
Crovitz, H.F., Daston, P.G. & Zener, K.E. LATERALITY AND A PHENOMENON OF LOCALIZATION. *Percent. Mot. Skills*, Sept. 1959, 2(3), p. 282. (Veterans Administration Hospital, Durham, N.C. & Duke University, Durham, N.C.).

13,155
This brief note describes a finding (obtained in a preliminary study) on the relationship between laterality (hand and eye dominance) and a perceptual localization phenomenon.
R 3

13,156
Thurlow, W.R. & Rawlings, I.L. RECOGNITION THRESHOLDS FOR SIMPLE TONAL PATTERNS. *Percent. Mot. Skills*, Sept. 1959, 2(3), 295-301. (University of Wisconsin, Madison, Wisc.).

13,156
To determine whether recognition thresholds for two-tone patterns are distinctly larger than for one-tone patterns, a series of experiments was performed in which such thresholds were obtained at two loudness levels for the simple tonal patterns (50 and 80 db) and at three levels for the two-tone patterns (80, 20 and 42 db). In the first two experiments only two subjects were used and the tones were between 897 and 1793 cps; in the last two 15 and 12 subjects were used and the tones were 1000 to 1603 cps. Analyses of variance were performed on the duration thresholds for each pattern in each experiment.
G. R 5

13,157
Kling, J.W., Williams, Joanna P., & Schlosberg, H. PATTERNS OF SKIN CONDUCTANCE DURING ROTARY PURSUIT. *Percent. Mot. Skills*, Sept. 1959, 2(3), 303-312. (Brown University, Providence, R.I.).

13,157
To study the relations of performance to an index of general activation, plantar skin conductance was measured during a rotary pursuit task. Three groups of 16 female Ss, after five minutes practice, were given different degrees of massing of practice and different lengths of work period. Performance scores were obtained for successive 45-sec. work periods and conductance readings were taken at 15-sec. intervals. The results are discussed in terms of reminiscence and relaxation and compared to other findings.
T. G. R 17

13,158
Thurlow, W.R. & Hartman, T.F. THE "MISSING FUNDAMENTAL" AND RELATED PITCH EFFECTS. *Percent. Mot. Skills*, Sept. 1959, 2(3), 315-324. (University of Wisconsin, Madison, Wisc.).

13,158
To explore further the perception of a "missing fundamental" when only three harmonics of a fundamental are used and to investigate individual differences in perception of the "missing fundamental," 35 subjects matched the pitch of several three-tone combinations of harmonics with an oscillator tone. The binomial test was used to analyze the differences in scores for the various conditions (different periodicities). The findings are discussed in terms of a possible neural time analyzing system.
T. I. R 12

13,159

Botha, E. EFFECT OF PREFERENCE ON PERCEPTION OF SIZE. *Percept. Mot. Skills*, Sept. 1959, 9(3), p. 325. (University of Cape Town, Cape Town, South Africa).

13,159

This note offers an interpretation of data on size perception where size is perceived as smaller than life-size for those objects evoking an approach response and larger for those evoking an avoidance response.
R 4

13,160

Whele, W. & Smith, K.U. EFFECT OF VISUAL PRETRAINING IN INVERTED READING ON PERCEPTUAL-MOTOR PERFORMANCE IN INVERTED VISUAL FIELDS. *Percept. Mot. Skills*, Sept. 1959, 9(3), 327-331. (University of Wisconsin, Madison, Wisc.).

13,160

To determine the effect of visual pretraining in perceptual inversion on perceptual-motor performance under inverted vision, 12 subjects read one page of such material each day for five days and then transferred to the writing task while a second group of 12 performed the writing task without reading practice. The writing task consisted of drawing dots, triangles and the letter-s. The two performance measures were contact time and travel time, and separate analyses of variance were carried out on these data.
G. I. R 2

13,161

Burg, A. & Hulbert, S.F. DYNAMIC VISUAL ACUITY AND OTHER MEASURES OF VISION. *Percept. Mot. Skills*, Sept. 1959, 9(3), p. 374. (University of California, Los Angeles, Calif.).

13,161

This is a brief note of a study which investigated binocular dynamic visual acuity at four target velocities (60, 90, 120 and 150 degrees per second) with the head fixed or free and compared these scores to CFF and ACA ratio and Static Acuity. One hundred twenty subjects were employed. Correlations between each of these and the dynamic acuity scores were found.
R 2

13,162

Quinn, M., Kleeman, C.R., Bass, D.E. & Henschel, A. FURTHER STUDY OF SURVIVAL RATIONS WITH ADEQUATE WATER INTAKE. 64 12 001, 64 12 002, Rep. 205, March 1953, 17pp. *USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.*

13,162

To determine the body effects of consuming survival rations with an adequate water intake, ten males, after a nine-day control period, were divided into a protein (46.25 grams/day) and non-protein (.63 grams/day) group and given 900 calories and 27 cc. of water/kg. of lean body mass daily for nine days. The following analyses were made: body weight changes, nitrogen balance, water balance and body water changes, mineral balances, urine ketones, ammonia and titratable acid, and urine creatinine. General recommendations on survival ration composition are indicated.
T. G. R 19

13,163

Sampson, H. PACING AND PERFORMANCE ON A SERIAL ADDITION TASK. *Canad. J. Psychol.*, Dec. 1956, 10(4), 219-225. (Defence Research Medical Labs., Toronto, Ontario, Canada.).

13,163

To determine the effects of pacing of digits and duration of each digit presentation on the task of serial addition, two experiments were performed in which subjects were given a series of 61 digits to add. In one, the digits were on for .4, .8, and 1.2 seconds and off for the same periods, thus giving five different paces. An analysis of variance was performed on these data. In the second, the digits were on for .3, .6, and .9 seconds and off the same periods. The data from the two were compared and discussed.
T. R 8

13,164

Smith, A.A. & Boyes, G.E. OPTIMAL OPERATING CONDITIONS FOR RADAR DISPLAYS EMPLOYING MAGNESIUM FLUORIDE PHOSPHORS. *Canad. J. Psychol.*, Dec. 1956, 10(4), 248-252. (Defence Research Medical Labs., Toronto, Ontario, Canada.).

13,164

To determine optimal conditions of bias and illumination for Plan Position Indicator displays using magnesium fluoride phosphors, visibility thresholds were determined for five subjects under 20 conditions of cathode-ray tube bias and ambient illumination variation. The illumination levels were: darkness, 0.1, 0.3, 1.0, and 1.2 foot-candles. Bias voltages were measured from Visual Reference (VRI) Intensity, 5, 10, and 15 volts positive from VRI. Mean visibility thresholds are recorded. The results are discussed in terms of their relation to other data obtained in this area.

13,165

Lauer, A.R. & Suhr, Virginia, W. THE EFFECT OF A REST PAUSE ON DRIVING EFFICIENCY. *Percept. Mot. Skills*, Dec. 1959, 9(4), 363-371. (Iowa State College, Ames Iowa.).

13,165

This is a road study to test the effect of a rest pause on driving efficiency. Eighteen males participated under both conditions: with rest pause and refreshments at the beginning of each 50-mile cycle, with no pauses or refreshments. Several tests were given before and after driving, e.g., discriminative reaction time; parking efficiency and several intransit evaluations were made, e.g., accelerator movements, modal speed. Analysis of covariance was based on before and after scores, t tests were computed on the road evaluations.
T. G. R 6

13,166

Gocka, E.F. CFF AND PHOSPHORE THRESHOLD MEASURES AS RELATED TO AGE AND EACH OTHER. *Percept. Mot. Skills*, Dec. 1959, 9(4), 373-374. (Veterans Administration Hospital, American Lake, Wash.).

13,166

This brief study investigated the relationship of phosphore and critical flicker frequency thresholds and age. After some preliminary training, these thresholds were obtained on 12 subjects by the bracketing method. Two scores, each based on ten determinations, were obtained from each subject. Correlations of these thresholds and age were obtained.
T. R 4

13,167

Cook, T.W. CUMULATIVE TRANSFER IN THE REPRODUCTION PATTERNS ON THE TORONTO PEG BOARD. *Percept. Mot. Skills*, Dec. 1959, 9(4), 375-385. (University of Toronto, Toronto, Ontario, Canada.).

13,167

To investigate the cumulative transfer in reproducing patterns on the Toronto Peg Board, five groups of five subjects learned to reproduce each of five patterns of 25 colored pegs after five-second presentations. The presentations and attempts at reproduction continued until an errorless trial occurred. The interval between trials was 30 seconds and between learning periods was five minutes. Performance scores included form, displacement, and color errors. These measures were interpreted in terms of transfer effects.
T. G. I. R 5

13,168

Conklin, J.E. LINEARITY OF THE TRACKING PERFORMANCE FUNCTION. *Percept. Mot. Skills*, Dec. 1959, 9(4), 387-381. (System Development Corporation, Santa Monica, Calif.).

13,168

To investigate the tracking performance function when control lag is varied between 0.0- and 1.0-second in 0.2-second intervals, one skilled subject performed ten trials each of pursuit and compensatory tracking with the various lag periods randomized over the trials. The displacements and slopes of the obtained curves were compared statistically.
T. G. R 3

13,169
Kemp, R.C. EFFECTS OF VIBRATION ON SPEECH SOUNDING
DURING ON-SCREEN WORK UNDER TWO LEVELS OF ILLUMINATION.
J. Speech Res., Dec. 1959, 2(4), 335-339.
(University of Rochester, Rochester, N.Y.)

13,170
To evaluate the effects of vibration in rifle sighting
scopes on aiming errors under two levels of illumination,
60 SMC scopes were carried in a laboratory ex-
periment with six sighting units—22, 24, 26, 28,
30 inches—on 24 and 30 foot-candle. The variable and
constant aiming errors were measured and analyzed by
analysis of variance.
T. G. I. R 10

13,171
Fitzpatrick, R.J. THE EFFECTS OF VIBRATION ON
SPEECH SOUNDING. J. Speech Res., Dec. 1959, 2(4), 335-339.
(George Washington University, Washington, D.C.)

13,172
To determine whether a sound (threshold) to pro-
duce a temporary threshold shift (TTS) can satisfy the
necessary threshold to a noise exposure sound, TTS measure-
ments were made following two conditions of exposure
one in which a period of silence followed a broad-band
noise exposure, and one in which the same exposure was
followed by noise at levels which alone do not produce
TTS. The noise, 120 db, SPL (sound pressure level) was
presented for three minutes then three minutes of sil-
ence or of noise of 70 and 90 db. The data were ana-
lyzed by t tests.
G. R 4

13,173
Barford, E.R. & Jörger, J.F. EFFECTS OF LOUDNESS IN-
CREASE ON RELATED SPEECH PERCEPTION. J. Speech Res.,
Dec. 1959, 2(4), 341-348. (McGill University,
Montreal, Quebec, Canada & Northwestern University,
Evanston, Ill.)

13,174
Delayed speech feedback behavior was compared in
three groups: ten hearing-impaired subjects with re-
cruitment, ten hearing-impaired subjects without re-
cruitment, ten normal listeners, ten hearing-impaired
with recruitment but without speech discrimination loss,
and ten with artificially obstructed external canals.
Each subject went through pure-tone testing, speech
audiometric testing, and speech feedback testing. The
delayed effect was measured at feedback sensation levels
of 0, 10, 20, 30, 40, and 50 db. Median error scores
were compared. Implications of these data for clinical
predictors of spoorer threshold are discussed.
T. G. R 3

13,175
Feldt, L.S. THE LATIN SQUARE DESIGN IN SPEECH AND
HEARING RESEARCH. J. Speech Res., Sept. 1959, 2(3),
216-226. (University of Iowa, Iowa City, Iowa.)

13,176
This paper describes the nature of the Latin square
design, discusses the assumptions which underlie it, and
outlines some of its advantages and limitations in
speech and hearing research. The origin of the Latin
square design is touched upon briefly and its modifica-
tions are noted, particularly as related to its use in
psychological research. Some factors which can be dealt
with effectively by this design, and which otherwise
would impair the validity of the experiment if allowed
to operate out of control, are examined and discussed.
A major limiting factor and its solution is also pre-
sented. Most of the discussion is based on a comparison
of Latin design with simple factorial analyses.
I. R 5

13,177
Chaffin, J.L. THE RELATIONSHIP BETWEEN HEARING
AND SPEECH RECEPTION. J. Speech Res., Sept.
1959, 2(3), 227-231. (Stanford University, Stanford,
Calif.)

13,178
This study investigated, on an experimental basis,
the relationship between speech reception threshold (SRT)
for the hearing, threshold for the loudness (LTL) and
SRT for speech reception, speech reception threshold of
speech (SRT) and threshold of perception for speech
reception (SRT). Eleven male and 14 female subjects, all
with normal hearing, participated. All stimulus materi-
als were tape recorded by the speakers they consisted of
three A, B, and C of the SRT, SRT, and SRT for the
SRT, and a sample of speech for the SRT and SRT. For
statistical analysis of the data, t tests
and correlation coefficients were run. The results are
discussed and compared to previous findings.
T. R 13

13,179
Bartlett, C.D. SILENCE PERIOD AND SPEECH RATE, RE-
DUCTION AND PERIOD. J. Speech Res., Sept. 1959,
2(3), 244-250. (Florida State University, Tallahassee,
Fla.)

13,180
This study was aimed at determining the effect of ex-
ternal silence transmission times of approximately
0.005 (shorter-than-normal), 0.010 (normal), and 0.015
seconds (longer-than-normal) on 1) oral reading rate of
normal speakers, 2) precision of articulation, and 3.
pitch variability as measured by number, mean extent, and
mean rate of inflections. Twenty-four college males with
normal hearing participated. Subjects read several kinds
of materials (e.g., five-syllable phrases, 70-word reading
passage) with each of the silence delays. From the tape
recordings of these readings, the aforementioned measures
were obtained. Analysis of variance technique was used
for evaluating the differences in the three measures per
condition.
T. R 4

13,181
Goldman, J.C., Nelson, L. & Ashburn, D.D. SPEECH
RECEPTION BY DIRECT MICROPHONE AT HEAD AND NECK POSITIONS.
J. Speech Res., Sept. 1959, 2(3), 277-281. (University
of California, Santa Barbara, Calif.)

13,182
This preliminary study is part of a larger program
aimed at selecting microphones and pickup sites which
give satisfactory intelligibility, quality, and usability
under high ambient noise. Specifically, the present
study investigated the relative power of the vowels and
the relative quality preference for a six-card sample of
continuous speech as picked up by a crystal vibration
microphone at eight different locations on the head and
neck. The vowels and a short speech sample of one talker
were recorded from each position. Twenty-four judges
rated the pleasing quality of the speech samples by
paired comparison technique, and intelligibility on a
five-point scale. The data were evaluated by analysis
of variance and chi square. The implications of the
findings are discussed briefly. T. G. I. R 9

13,183
Stromme, C. EXPERIMENTAL BLOCKAGE OF PHONATION BY
DISTURBED SIDETONE. J. Speech Res., Sept. 1959, 2(3),
286-291. (Ohio State University, Columbus, Ohio.)

13,184
To determine the influence of air-conduction side-
tone signal distortion on the phonation of a vowel sus-
tained in falsetto, and to probe the relationship of
phase and distortion of signal to the experimental effect
of phonatory blockage, eight normal-hearing male college
students, after practice, sustained a vowel in falsetto
under two experimental conditions: 1) the signal had no
appreciable nonlinear distortion, and 2) the signal had
62.5 per cent nonlinear distortion. Phonations were
scored by: 1) number of phonatory blockages, and 2)
total time consumed by blockages. Additional groups of
subjects, with no experience and with various kinds of
experience, also participated under either the same con-
ditions or additional ones. Sound spectrograms were ob-
tained and analyzed. I. R 33

13,170

Chickerman, J.A. EFFECTS OF HUMAN FACTORS. *Hum. Factors*, Sept. 1959, 1(3), 2-7. (USAF Aeronautical Lab., Wright-Patterson AFB, Ohio).

13,171

This article attempts to describe and evaluate some of the changes in the human factors area since World War II. The characteristics of the early work are indicated. Present and future trends are described for the following areas: controls, information displays, decision making, training, space travel.

R 3

13,172

Michay, A.L., Jr. & Blair, W.C. MAN AS A MONITOR. *Hum. Factors*, Sept. 1959, 1(3), 8-15. (Electric Res. Div., General Dynamics Corp., Fort Worth, Texas).

13,173

This article proposes the use of the feedback principle in monitoring as well as in continuous control situations. A simple feedback model was discussed and the associated variables identified: frequency of observation and response, sensitivity, time constants in feedback and control, reversibility of control. Ten monitoring or vigilance experiments were analyzed in terms of the model. The model was extended to show monitors combined in series and in parallel.

I. R 18

13,180

McFadden, E.P. & Gossinger, J.J. FORCES THAT MAY BE EXERTED BY MAN IN THE OPERATION OF AIRCRAFT DOOR HANDLES. *Hum. Factors*, Sept. 1959, 1(3), 16-22. (Civil Aeronautical Medical Research Lab., CMA Aeronautical Center, Hill Roberts Field, Ohio).

13,180

This study determined the torque exerted in the operation of each of six handle configurations by eight male subjects. These handles were presented on a test arrangement simulating an aircraft door. Three handle types—L-shaped, double L-shaped, and T-shaped—and two lengths—ten and four inches—were used. Torque was measured at 45-degree intervals in clockwise and counter-clockwise directions and under load conditions. For each subject, 19 anthropometric measurements were also obtained. The results are discussed in terms of the variables.

T. I.

13,181

Drillie, R.J. THE USE OF GLIDING CYCLOGRAMS IN BIO-MECHANICAL ANALYSIS OF MOVEMENTS. *Hum. Factors*, April 1959, 1(2), 1-11. (College of Engineering Research Div., New York University, New York, N.Y.).

13,181

This article discusses and illustrates three basic optical methods for recording movements: motion pictures, chronophotography and gliding cyclograms and describes in detail the methods of bio-kinematic and bio-kinetic analysis of gliding cyclograms. Some examples of biomechanical and ergological movements are worked through.

G. I. R 28

13,182

Warren, N.D. EDUCATIONAL PROGRAMS IN THE HUMAN FACTORS AREA. *Hum. Factors*, April 1959, 1(2), 12-15. (Dept. of Psychology, University of Southern California, Los Angeles, Calif.).

13,182

This paper briefly reports the nature of some of the recently developed programs leading to degrees in the human factors areas and the trends in this field. Two general types of programs are indicated and examples of these are briefly described.

R 1

13,183

Radford, M.E., Mann, L.F. & Wilson, C.E. RESEARCH FOR HUMAN-MACHINE SPACECRAFT. *Hum. Factors*, April 1959, 1(2), 16-29. (Hinkle and Associates, Inc., Dayton, Ohio).

13,183

This article was aimed at providing "a basis for planning the crew station development effort for the military spacecraft of the next decade." Accordingly, the military objectives have been studied and analyzed, e.g., training, navigation and guidance, communications, as well as human and technological resources, e.g., seating or reading, interpreting. Finally, these situations are considered in relation to these objectives.

T. R 46

13,184

Fogel, L.J. A NEW CONCEPT: THE KINEMATIC DISPLAY SYSTEM. *Hum. Factors*, April 1959, 1(2), 30-37. (Reliability Group, Convair, San Diego, Calif.).

13,184

This article describes a technique of displays "which may be used to resolve sensory conflict between visual and kinesthetic inputs. The forces acting on the operator's kinesthetic senses are shown visually and related to the attitude of the airplane and to the earth's surface for both individual cockpit instruments and an integrated pictorial display."

I.

13,185

Marquess, L.E. THE STRENGTH OF A MAN. *Hum. Factors*, April 1959, 1(2), 43-48. (University of California, Los Angeles, Calif.).

13,185

The strength of one man is shown graphically in 35 different ways. In addition he is described by 20 anthropometric measures.

I.

13,186

Tipton, C.L. & Birmingham, H.P. THE INFLUENCE OF CONTROL GAIN IN A FIRST-ORDER MAN-MACHINE CONTROL SYSTEM. *Hum. Factors*, Aug. 1959, 1(3), 69-71. (USN Research Lab., Washington, D.C.).

13,186

To investigate the effect of changes in control stick sensitivity upon tracking performance in a velocity control system, eight naval enlisted men received eight test runs on eight control sensitivities which ranged from 128 to 1. An integrated error score was obtained per sensitivity condition; these data were analyzed by Wilcoxon's sign test.

T. G. I. R 9

13,187

Kurke, M.I. OFFICIAL SYSTEM DESIGN AND THE EMPTY FIELD. *Hum. Factors*, Aug. 1959, 1(3), 72-74. (Dunlap and Associates, Inc., Washington, D.C.).

13,187

To determine significant equipment design parameters for overcoming the accommodation disturbances in untextured visual fields, six ground-based search systems were investigated using targets of 1/4 inch to 3 inches viewed against backgrounds of either sky alone or sky and terrain through each of four optical systems: two low power telescopes, and two variable power rifle telescopes. Six enlisted men served as observers. The threshold data thus obtained were analyzed by analysis of variance technique.

R 5

13,188

Chapanis, A. & Lindenbaum, L.E. A REACTION TIME STUDY OF FOUR CONTROL-DISPLAY LINKAGES. *Hum. Factors*, Nov. 1959, 1(4), 1-7. (Johns Hopkins University, Baltimore, Md.).

13,188

Four control-burner arrangements as found on gas and electric stoves were evaluated by measuring reaction times and errors made by subjects whose task was to match a control with a particular burner as quickly as possible. Fifteen subjects were tested on each model. After an initial exposure to the model, each subject was tested for 80 trials. The error data were analyzed by the Kruskal-Wallis one-way analysis of variance; reaction times by analysis of variance.

T. G. I. R 3

13,189

Tobias, P. EFFECTS OF RADIATION ON PERFORMANCE. *Hum. Factors*, Nov. 1959, 1(4), 8-15. (Kerckhoff Lab., University of Southern California, Los Angeles, Calif.).

13,189

This article reviews and discusses some of the experimental studies on the effects of various types of radiation on learning, activity and manipulation, conditioning, and discrimination with the aim of providing some information on the changes in performance that might be expected in man under daily exposure to sublethal doses. Most of the work has been done on subhuman animals and the results were found to be contradictory in many cases. Some suggestions for future research are offered.

R 39

13,190

McFadden, E.B., Swearingen, J.J. & Wheelwright, C.D. THE MAGNITUDE AND DIRECTION OF FORCES THAT MAN CAN EXERT IN OPERATING AIRCRAFT EMERGENCY EXITS. *Hum. Factors*, Nov. 1959, 1(4), 16-27. (Civil Aeronautics Medical Research Lab., CAA Aeronautical Center, Will Rogers Field, Okla.).

13,190

This experiment determined the maximum force that men and women were capable of applying to emergency exit release mechanisms under various conditions. Both unprotected and rubber-covered handles on port and starboard sides were compared using right, left and both hands, operated from seated and standing positions. The findings are discussed in relation to design standards.

I. G. I. R 1

13,191

Mickler, F.A. HUMAN FACTORS RESEARCH ON WEAPON SYSTEMS PROJECT TEAMS. *Hum. Factors*, Nov. 1959, 1(4), 28-31. (The Martin Company, Baltimore, Md.).

13,191

This brief article attempts to describe the roles of the human factors specialists and the problems they confront in meeting these roles. In addition, the nature and objectives of project research on weapon systems are indicated as well as the limitations of this research. Finally, the future developments necessary for making effective such research are presented.

R 8

13,192

Bamford, H.B., Jr. HUMAN FACTORS IN MAN-MACHINE SYSTEMS. *Hum. Factors*, Nov. 1959, 1(4), 55-59. (Boeing Airplane Co., Seattle, Wash.).

13,192

This paper analyzes the field of human factors in an attempt to discover its scope and organization. The field is first partitioned into three zones: systematic, functional, and general, and then into eight mutually exclusive, jointly exhaustive and interdependent sectors (e.g., human utility to system, behavioral characteristics of crew stations, behavioral demands on crew, ecological characteristics of crew, ecological demands on life support system). These are also defined and discussed.

I. R 14

13,193

Von Beckh, H.J. HUMAN REACTIONS DURING FLIGHT TO ACCELERATION PRECEDED BY OR FOLLOWED BY WEIGHTLESSNESS. *J. Aerospace Med.*, June 1959, 30(6), 391-409. (USAF Aeromedical Field Lab., Holloman AFB, N.M.).

13,193

The literature on weightlessness is reviewed; it includes experiments in aircraft, in rockets, and in other methods. The present study used a F-94C jet in the following flight program: pre-weightlessness acceleration simulating the thrust of a rocket, weightlessness following turnout by a diving spiral of 40 to 60 seconds duration, post-weightlessness acceleration simulating re-entry by a Keplerian trajectory. The subject sat upright and was instructed to avoid fighting the g's. The pilot was protected by an anti-g suit. Electrocardiogram, blood pressure, and other physiological measurements were taken.

13,194

Langham, R.M. IMPLICATIONS OF SPACE RADIATIONS IN MANNED SPACE FLIGHTS. *J. Aerospace Med.*, June 1959, 30(6), 412-417. (Los Alamos Scientific Lab., University of California, Los Alamos, N.M.).

13,194

The effects of ionizing radiation, acute, chronic, delayed, are described in detail. The two major potential radiobiological problem areas in space and thus in manned space flight, heavy primary cosmic rays and the Van Allen layers, are described together with their potential danger.

T. C. I. R 25

13,195

Kraft, J.A. MEASUREMENT OF STRESS AND FATIGUE IN FLIGHT CREWS DURING CONFINEMENT. *J. Aerospace Med.*, June 1959, 30(6), 424-430. (Lockheed Aircraft Corporation, Marietta, Ga.).

13,195

This paper discusses some of the problem areas and experimental approaches in the measurement of stress and fatigue in flight crews during confinement. A facility is described which has considerable flexibility for conducting a variety of human factors studies. Variables can be manipulated, controls exercised, and many measures taken simultaneously.

I.

13,196

Kashler, R.C. HUMAN PILOT PERFORMANCE DURING BOOST AND ATMOSPHERE REENTRY. *J. Aerospace Med.*, July 1959, 30(7), 481-486. (Human Factors Group, North American Aviation, Inc., Los Angeles, Calif.).

13,196

The objectives here were: (1) compare and evaluate pilot performance using center and right-hand stick configurations during varied accelerations; (2) evaluate the proposed X-15 arrest; (3) evaluate integrated harness, head restraint and general physiological tolerance aspects during special and unusual accelerative conditions. The centrifuge was programmed for boost and emergency re-entry conditions; a tracking task was employed. Mean integrated error rate as a function of roll, pitch, and control stick is indicated.

G. R 3

13,197

Konecni, E.B. & Trapp, R. CALCULATIONS OF THE RADIO-BIOLOGIC RISK FACTORS IN NUCLEAR-POWERED SPACE VEHICLES. *J. Aerospace Med.*, July 1959, 30(7), 487-506. (Douglas Aircraft Company, Santa Monica, Calif.).

13,197

This article evaluates the risk factors involved in manned space flight by calculating human risk in direct and scattered radiations at various separation distances from the reactor and at different power outputs without shielding and with varying amounts of shielding weights. The biological aspects of ionizing radiation are discussed including pathological effects. The assumptions used for calculating these radiations and shieldings are listed and then the calculations presented. Two flight missions--Earth to Mars and Mars to Earth--are used to illustrate radiation doses and shield weights.

T. G. I. R 31

13,198

Jacobius, A.J. BIBLIOGRAPHIC CONTROL OF AVIATION AND SPACE MEDICAL LITERATURE. *J. Aerospace Med.*, July 1959, 30(7), 507-516. (Science and Technology Div., Library of Congress, Washington, D.C.).

13,198

The scope, purpose, and organization of aviation and space medicine bibliographies are briefly discussed; their historical development is outlined; and their most representative products are listed. The rate of literature growth is indicated as well as the need for improving methods and techniques of bibliographic coverage and presentation.

13,199

Zeller, A.F. HUMAN ASPECTS OF MID-AIR COLLISION PREVENTION. *J. Aerospace Med.*, Aug. 1959, 30(8), 351-360. (USAF Directorate of Flight Safety Research, Merton AFB, Calif.).

13,199

The role of the pilot in mid-air collision is discussed, particularly in terms of the limitations in the perceptual and decision-making processes of the individual. Factors limiting the successful prevention of mid-air collisions are considered: e.g., cockpit design, pilot training and experience, boredom, fatigue, special hazards and age. Possible solutions are analyzed, generally within the framework of air-traffic control. Included are Air Force air collision statistics.

I.

13,200

Ward, J.E., Hawkins, M.R. & Stallings, H.D. PHYSIOLOGIC RESPONSE TO SUEGRAVITY. II. INITIATION OF MICTURITION. *J. Aerospace Med.*, Aug. 1959, 30(8), 572-575. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

13,200

This study was concerned with the elimination of liquid body wastes in the null-cavity state. Specifically the accomplishment of urination was observed for 26 male subjects during 30 to 40 seconds of weightlessness in an F-94C Starfire jet under special flight maneuvers. A urine receptacle, fabricated from scrap oxygen hose and a weather balloon, was used since the relief tube was completely unacceptable. Thirty-seven flights were made. Implications for space flight are indicated.

I. I. R 3

13,201

Glenn, W.G. PRELIMINARY STUDY OF HUMAN SERA IN SUBJECTS EXPOSED TO SIMULATED ALTITUDE. *J. Aerospace Med.*, Aug. 1959, 30(8), 576-579. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

13,201

This is an immunochemical study of human sera from subjects constantly exposed for eight days to effective altitude chamber conditions from 10,000 to 17,000 feet. The conditions permitted limited samples of blood to be obtained before, during, and after the chamber test. The sera were analyzed for total protein concentration and albumin-globulin ratios. Further research is indicated.

G. R 7

13,202

Ruff, G.E., Levy, E.Z. & Thaler, V.H. STUDIES OF ISOLATION AND CONFINEMENT. *J. Aerospace Med.*, Aug., 1959, 30(8), 599-604. (USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio).

13,202

A series of experimental studies of isolation and confinement, carried out to be used as sources of inferences about what to expect in space flight, are summarized. Two types of experiments are covered. 1) Simulated operational conditions with groups of five men over a period of five days as they lived in a compartment 17 by 7 by 6 ft. were studied; measures of group and individual behavior, of physiological, biochemical, and medical status were taken. 2) Isolation of individuals under a variety of unusual conditions, such as reducing sensory inputs to a minimum, was studied. Implications of the findings for space flight were discussed.

R 4

13,203

Schaefer, H.J. RADIATION DOSAGE IN FLIGHT THROUGH THE VAN ALLEN BELT. *J. Aerospace Med.*, Sept. 1959, 30(9), 631-639. (USN School of Aviation Medicine, Naval Air Station, Fla.).

13,203

The composition of the Van Allen belt is described in detail. The problem of adequate shielding is discussed in terms of these components and the weight problem. The radiation dose on a lunar trip is investigated for two different trajectories--transfer ellipse and radial shot. Also, the polar escape route is considered.

G. I. R 3

13,204

Diamond, S. TIME, SPACE AND STEREOSCOPIC VISION. *J. Aerospace Med.*, Sept. 1959, 30(9), 660-663. (Pacific-Alaska Div., Pan-American World Airways, San Francisco, Calif.).

13,204

To determine the function and usefulness of stereoscopic vision in aviation at increasingly high speeds of flight, theoretical stereoscopic ranges were calculated for different but constant parallax threshold differences and the time a pilot has available to fly through these ranges at different speeds was determined. Little known factors influencing spatial perception and stereoscopic range, e.g., hypoxia, acceleration, are indicated. Other calculations and estimations include minimum depth perceptive time and stereoscopic range-time. Critical airspeeds for these are also computed.

G. I. R 37

13,205

Kraus, R.M. DISORIENTATION IN FLIGHT. *J. Aerospace Med.*, Sept. 1959, 30(9), 664-673. (USAF School of Aviation Medicine, Brooks AFB, Tex.).

13,205

The development of instrument flight and the physiological mechanisms involved in maintaining aerial orientation were briefly reviewed. Three experiments were performed to determine the time it takes to make the transition from VFR to IFR, to determine the deviations in flight path which occur while an inflight cockpit procedure is performed, and to determine deviations in the flight path which occur during the absence of a visual reference. Three subjects flying F-100F aircraft were used.

G. R 13

13,206

Ades, H.W., Morrill, S.M., Graybiel, A. & Tolhurst, G.C. THRESHOLD OF AURAL PAIN TO HIGH INTENSITY SOUND. *J. Aerospace Med.*, Sept. 1959, 30(9), 678-684. (USN School of Aviation Medicine, Naval Air Station, Fla.).

13,206

To obtain systematic data on aural pain threshold produced by pure tone and wide band noise, two groups of subjects--one with no hearing at the highest sound level, one with some auditory sensation at sound levels above 115-120 db.--presented with continuous sound beginning at 120 db. and increasing in two db. steps at two second intervals made judgments of: 1) feeling, 2) discomfort, and 3) pain. These thresholds were compared for the normal and deaf ears and possible explanations set forth.

G. R 6

13,207

Glantz, W.M., Stenbridge, V.A., Dominguez, A.M., Goldbaum, L.R., et al. CARBON MONOXIDE DETERMINATION IN AIRCRAFT ACCIDENT FATALITIES. *J. Aerospace Med.*, Oct. 1959, 30(10), 711-715. (Aviation Pathology Section, US Armed Forces Institute of Pathology, Washington, D.C.).

13,207

In this investigation, 747 cases of aircraft accident fatalities were studied for the presence of carbon monoxide in postmortem tissues. The carboxyhemoglobin levels were evaluated as to exposure to fire and visibility at the time of the fire.

T. R 7

13,208

Gerathwohl, S.J. WORK PROFICIENCY IN THE SPACE CABIN SIMULATOR. *J. Aerospace Med.*, Oct. 1959, 30(10), 722-735. (Bioastronautics Research Office, USA Medical Research and Development Command, Redstone Arsenal, Ala.).

13,208

These experiments attempted to assess work proficiency in an hermetically sealed cabin. The subject occupied a modified pilot seat in the simulator and did Kraepelin's work performance test, which requires continuous adding of single digits, for one-hour periods. Two subjects worked under temperatures of 26 to 36 degrees C at altitudes from 13,000 to 17,000 feet; the other under normal temperature, ground level conditions. The performance curves are compared among subjects for each of the nine days.

T. G. I. R 8

13,209
Zelator, J. AGE, EXPERIENCE AND AIRCRAFT ACCIDENTS. *J. Aerospace Med.*, Oct. 1959, 30(10), 736-750. (USAF Directorate of Flight Safety Research, Norton AFB, Calif.).

13,209
This paper evaluates the age, experience, aircraft-accident relationships and how these are affected by or affect the type of equipment flown, the type of accidents experienced, the portion of flight in which errors are most often committed, and the types of errors involved. Approximately 1500 air force accidents were considered. Tables of pilot errors vs. age, causative agency vs. age, phase of operation vs. age, type of accident vs. age, etc., were constructed.
T. G. R 1

13,210
Goodson, J.E. & Miller, J.W. DYNAMIC VISUAL ACUITY IN AN APPLIED SETTING. *J. Aerospace Med.*, Oct. 1959, 30(10), 755-763. (USAF School of Aviation Medicine, Naval Air Station, Ft. and Kresge Eye Institute, Detroit, Mich.).

13,210
To determine the relationship between performance in the laboratory and in the air on visual pursuit of moving targets, 15 males were tested using 12 sizes of Landolt "C" presented for 0.4 seconds, at angular velocities of 20, 60, and 90 degrees per second in the air, and at velocities of 20, 50, 75, 95, and 110 degrees per second in the laboratory. Acuity thresholds were compared for threshold method as well as laboratory versus air setting. Correlations and variance analyses were performed.
T. G. I. R 6

13,211
Willis, H.S.K. & Hoffman, I.L. HEARING LOSS FROM HIGH INTENSITY SOUND OF JET ENGINES. *J. Aerospace Med.*, Oct. 1959, 30(1), 764-772. (USAF Hospital, Westover AFB, Mass.).

13,211
This field study analyzed the audiograms of 1685 persons exposed to high intensity sound from jet engines and a control group of 362 persons, in order to obtain evidence for the theory that repeated exposure to high intensity noise can be a primary cause of hearing loss. All subjects met pre-established criteria to insure that no other compounding pathological condition existed. Some of the relationships examined were years of exposure and hearing loss, and age and exposure. Suggestions for testing such persons are indicated.
T. R 19

13,212
Nareff, M.J. PASSENGER PHLEBITIS. *J. Aerospace Med.*, Nov. 1959, 30(11), 791-796. (USAF Hospital, Wiesbaden, Germany).

13,212
Eight cases of venous thromboembolism (Phlebitis) in human passengers who underwent long distance flights are discussed. Ten factors which may contribute to passenger phlebitis are considered and indexed for each of the eight passengers. These factors are: sex, age, usage of tobacco, obesity, past history (of related pathology), flight duration, seat type, onset in hours, pathology, and complications. The relation of leg movement and position, increase of intra-abdominal pressure and other factors which may contribute to phlebitis are considered. A recommendation concerning passenger immobility in flight is included.
T. R 8

13,213
San-Jacobsen, C.M. ELECTROENCEPHALOGRAPHIC STUDY OF PILOT STRESSES IN FLIGHT. *J. Aerospace Med.*, Nov. 1959, 30(11), 777-801. (Electroencephalographic Lab., Graceland Hospital, Windsor, Colo., Norway).

13,213
Eight channel EEG tracings were obtained from 30 experienced military jet pilots in order to determine 1) the effect of combat flight stress on pilot consciousness levels; 2) if the brain is stressed under combat flight conditions to such a degree that this stress can be measured by airborne EEGs; and 3) if there is a correlation between the pilot's in-flight EEG, his ability to fly an interceptor, and his accident rate due to pilot error. The flight conditions were a composite of ten maneuvers common to combat interceptor flight. EEG tracings were compared with pilot flight performance. The feasibility of EEG as an in-flight determinant of physiologic response to flight stress is considered.
T. G. R 3

13,214
Reinhardt, R.F. MOTION SICKNESS: A PSYCHOPHYSIOLOGIC GASTROINTESTINAL REACTION? *J. Aerospace Med.*, Nov. 1959, 30(11), 832-805. (Menninger Foundation, Topeka, Kan.).

13,214
This article suggests that susceptibility to motion sickness is governed by the pattern of the individual's psychological development and presents a concept of motion sickness as a psychophysiological reaction to stress. Further research on the relationship between psychological test results and motion sickness is indicated.
R 2

13,215
Rowen, B. HUMAN FACTORS SUPPORT OF THE X-15 PROGRAM. *J. Aerospace Med.*, Nov. 1959, 30(11), 816-821. (USAF Flight Test Center, Edwards AFB, Calif.).

13,215
This article describes the human factors data which will be obtained during the flight phases of the X-15 program. Some of these physiological measurements are: body-surface temperature, electrocardiographic data, blood pressure, respiratory rate, whole-body cosmic radiation. A simulator for the X-15 is described, as well as protective equipment and the escape system.

13,216
Clarke, N.P. & Headley, R.N. STUDIES OF PRIMATE TOLERANCE TO COMPLEX ACCELERATIONS. *J. Aerospace Med.*, Nov. 1959, 30(11), 825-831. (University of Washington School of Medicine, Seattle, Wash.).

13,216
Five monkeys were exposed to complex accelerations similar to those of an unstable satellite re-entry. Simulated deceleration in the forward facing position up to 20 g was combined with sine wave pitch oscillations lasting up to 60 seconds through half amplitudes of 20 degrees at three and five cps. Maximum accelerations were recorded backward, forward, and headward. Ability of animals to make coordinated movements after centrifugation was observed. Post mortems on the animals were made to determine the locus of hemorrhages, evidence of brain damage, etc.
T. G. I. R 4

13,217

Lawrence, S.D. & Clarke, H.P. A TECHNIQUE FOR DETERMINING CHANGES IN FORCE OF CARDIAC CONTRACTION DURING ACCELERATION. *J. Aerospace Med.*, Nov. 1959, 30(11), 830-839. (USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio).

13,217

This article describes a technique for measuring changes in force contraction of the heart during positive acceleration in intact, anesthetized dogs, using modification of the Walton-Bridge strain gage arch. The equipment and surgical techniques are detailed. Three profiles of positive acceleration were studied using 11 animals: 1) rapid acceleration to 3g and centrifuged here for 15 seconds; 2) gradual acceleration with and without dibenylol, 3) positive acceleration of 3g for four to ten minutes. Arterial pressure and force contraction were compared.

T. 1 R 19

13,218

Phillips, P.B. & Zariello, J.J. CENTRAL NERVOUS SYSTEM INJURY FROM HIGH RADIAL G FORCE. *J. Aerospace Med.*, Nov. 1959, 30(11), 647-651. (USN School of Aviation Medicine, Naval Air Station, Fla.).

13,218

A case of central nervous system injury from positive g stress is described. Neurological symptoms and results of examinations are included. Successful recovery is noted.

13,219

Behnke, A.R. THE ESTIMATION OF LEAN BODY WEIGHT FROM "SKELETAL" MEASUREMENTS. *Hum. Biol.*, Dec. 1959, 31(4), 295-315. (USN Radiological Defense Lab., San Francisco, Calif.).

13,219

This study compared lean body weight (LBW) estimated from skeletal anthropometric and x-ray measurements with that estimated from body density and total body water determinations on 31 male subjects. Various combinations of the anthropometric and x-ray measurements were correlated with body density and body water determinations, thus demonstrating the greater role played by some dimensions in estimating LBW. Skeletal measurements and LBW proportionality constants for a Reference Man and Woman were derived.

T. G. I. R 18

13,220

Roberts, D.F., Provins, K.A. & Morton, B.J. ARM STRENGTH AND BODY DIMENSIONS. *Hum. Biol.*, Dec. 1959, 31(4), 334-343. (Dept. of Human Anatomy, Oxford University, Oxford, England).

13,220

This study investigated the relationships between arm strength, arm morphology, and body size. Seven anthropometric measurements, e.g., stature, weight, were taken and three tests of muscle strength, e.g., hand grip, were administered on about 60 young adult males. Simple, multiple, and partial correlation coefficients among these measures were computed. Three factors were isolated to account for the greater part of the variance.

T. R 29

13,221

Montgomery, H. THE PHYSIOPATHOLOGY OF IMMERSION FOOT. *Naval Res. Rev.*, Sept. 1959, 14-19. (University of Pennsylvania, Philadelphia, Penn.).

13,221

Exposure of a part of the human body to cold water for long periods of time may cause an injury called "immersion foot." This report describes a series of studies, using rabbits as experimental subjects, on immersion foot. Preliminary prophylactic and therapeutic trials were made, followed by an extensive series on the degree of damage in the different tissues. The relative dysfunction of muscle and nerve were studied further.

I.

13,222

Kissling, R.J. & Haag, C.M. NITROGEN NARCOSIS AND ITS EFFECTS ON PERFORMANCE. *Naval Research Bulletin*, Dec. 1959, 6-12. (USN Experimental Diving Unit, Naval Gun Factory, Washington, D.C. & USN Physiological Psychology Branch, ONR, Washington, D.C.).

13,222

This report describes an initial experiment in a study directed toward the determination of the extent of behavioral impairment or decrease in performance efficiency and its systematic relation to increasing degrees of nitrogen partial pressure. Five subjects underwent three measures of performance—choice reaction time, modified Purdue Pegboard Test (manual dexterity), and conceptual reasoning—at sea-level pressure, at simulated 100-foot salt-water pressure, and during decompression at ten-foot depths. Performance data were analyzed for differences due to pressure level. The implications of the findings for increasing deep-sea divers' effectiveness and safety during rescue operations is discussed.

I.

13,224

Thurlow, W.R. & Elfiner, L.F. PIPE-TONE CROSS-EAR LOCALIZATION EFFECTS. *J. Acoust. Soc. Amer.*, Dec. 1959, 31(12), 1606-1608. (University of Wisconsin, Madison, Wisc.).

13,224

To determine the frequency limits within which a tone in one ear would effect localization of a tone of a different frequency in the other ear, three experiments were performed. In Experiment I (12 subjects) separate tone sources were used for each ear to obtain an estimate of the shape of the function relating localization effect to frequency level of standard used. Experiment II examined three of the frequency ranges (600, 1000, and 4000 cps) used in Experiment I. In Experiment III four subjects examined binaural localization effects for low frequencies, with the frequency in one ear a simple multiple of that in the other. Some theoretical implications of the results are presented.

T. G. R 6

13,225

Wansdrunk, C. ON THE INFLUENCE OF THE DIFFRACTION OF SOUND WAVES AROUND THE HUMAN HEAD ON THE CHARACTERISTICS OF HEARING AIDS. *J. Acoust. Soc. Amer.*, Dec. 1959, 31(12), 1609-1612. (Philips Research Labs., N.V. Philips' Gloeilampenfabrieken, Eindhoven, Netherlands).

13,225

To assess the influence of diffraction of sound waves around the human head on the frequency characteristics of hearing aids, three specimens of hearing aids were measured on ten male and ten female subjects. Sound fields for each hearing aid were taped. The subjects, in four different experimental positions, were situated so that the hearing aid was at the same point as it was during the taping of the sound field. The taped sound field was played back and output of the hearing aid was measured. Other methods of measuring the effects of diffraction are discussed, and the possible use of a simulated "standard" head is investigated.

G. I. R 2

13,226

Pickett, J.M. BACKWARD MASKING. *J. Acoust. Soc. Amer.*, Dec. 1959, 31(12), 1613-1615. (USAF Operational Applications Lab., Applications Research Branch, AFRC, Bedford, Mass.).

13,226

To determine the auditory masking effect of a noise burst on a preceding weak stimulus, three subjects were subjected to a short 1000-cycle tone which preceded a burst of white noise by a variable silent interval. Tone durations were 5, 10, 15, 20, 25 and 50 milliseconds; silent intervals were 0, 2, 5, 10, 25 and 100 milliseconds; and noise burst levels ranged from 50 to 130 db above threshold. The threshold-intensity level of the tone was taken as a measure of the masking provided by the noise burst. The relative contributions of the tone-noise interval (as opposed to the tone duration) as variables in backward masking are investigated. Implications for further research are suggested.

G. R 7

13,227

Pollack, I. & Trittipoe, W. INTERNAL NOISE CORRELATIONS: EXAMINATION OF VARIABLES. *J. acoust. Soc. Amer.*, Dec. 1959, 31(12), 1616-1618. (USAF Operational Applications Lab., Applications Research Branch, AFMRC, Bedford, Mass.).

13,227

To examine the relationship between interaural noise identification and: 1) noise burst duration, 2) sound level, 3) frequency range, and 4) interaural noise level imbalance, experienced listeners made subjective discriminations in terms of the phenomenal "diffuseness" and "compactness" of the noise. Noise frequency spectrum was 100-6800 cps; duration of noise burst was 100 milliseconds; noise burst at earphones was 90 db; interaural balance was 0 db. Results also included a discussion of the interaction between noise level and burst duration.

G. R 2

13,228

Small, A.M., Jr. PURE-TONE MASKING. *J. acoust. Soc. Amer.*, Dec. 1959, 31(12), 1619-1625. (Depts. of Speech Pathology and Audiology and Psychology, State University of Iowa, Iowa City, Iowa).

13,228

To determine the influence of one pure tone on the threshold of another, six subjects of normal hearing (125-8000 cps) were utilized in determining the level of the masker necessary to mask a signal as a function of the frequency of the masker. Frequencies of the masked signal were: 400, 800, 1600, 3200 and 6400 cps. Frequencies of the masking signal were multiples of the masked signal and ranged from 0.05-3.0 times the masked signal. Results are discussed and related methods of investigating pure tone masking effects are considered.

T. G. R 32

13,229

Nicks, D.C. PREDICTION OF SEQUENTIAL TWO-CHOICE DECISIONS FROM EVENT RUNS. *J. exp. Psychol.*, Feb. 1959, 57(2), 105-114. (San Fernando Valley State College, San Fernando Valley, Calif.).

13,229

This study was an investigation of trial-by-trial behavior in sequential two-choice decision tasks (probability learning tasks, as a function of event runs). Seventy-two subjects made 380 anticipatory guesses of red or green light under the following conditions of red versus green light occurrences: 50:50, 67:33, 75:25, and 50:50 non-random sequence. Run curves were plotted for each group, showing the proportion of prediction of one event after n successive previous occurrences of that event and after n successive previous occurrences of the other event. Results were discussed in terms of decision-making and decision-making theory.

T. G. R 5

13,230

Pollack, I., Johnson, L.B. & Knaff, P.R. RUNNING MEMORY SPAN. *J. exp. Psychol.*, March 1959, 57(3), 137-146. (USAF Operational Applications Lab., Bedford, Mass.).

13,230

To compare the recall of messages composed of randomly selected digits under two conditions of presentation, running digit spans (optimal reproduction of digits) were established for more than 68 subjects when the list of digits was: 1) of uncertain length and 2) of certain length. Further experiments examined the effects on the recall of uncertain and certain length messages of a number of other experimental variables. The results are discussed in terms of proactive interference and the behavioral strategy employed by the subjects.

T. G. R 4

13,231

Boehm-Carter, J.G., Rogers, M.S., Atkinson, M.H. & O'Connell, D.M. SWEETNESS AND SALTINESS OF COMPOUND SOLUTIONS OF SUCROSE AND NaCl AS A FUNCTION OF CONCENTRATION OF SOLUTES. *J. gen. Psychol.*, April 1959, 57(4), 231-234. (Harvard University, Cambridge, Mass.).

13,231

To determine the effect of concentration of solutes on sweetness and saltiness of compound solutions of sucrose and salt (NaCl), two subjects made four comparative judgments of sweetness on each of nine salt and sucrose compounds in solution and four matching judgments of sweetness on another 16 salt-sucrose compounds in solution. The compound solutions used were the 25 possible binary combinations of -.52, -.02, .48, .98, and 1.48 log grams NaCl and .001, .50, 1.00, 1.50, and 2.00 log grams sucrose per 100 centimeters tap water. Results are discussed in terms of masking effects and relation to masking effects of quinine sulfate and other experiments involving the interaction between salt and sucrose.

G. R 8

13,232

Goldstone, S., Boardman, W.K. & Lhamon, W.T. INTERSENSORY COMPARISONS OF TEMPORAL JUDGMENTS. *J. exp. Psychol.*, April 1959, 57(4), 243-248. (Baylor University College of Medicine, Waco, Tex. & Houston State Psychiatric Institute, Houston, Tex.).

13,232

This paper investigates audio-visual differences in absolute judgments of (403) subject conceptualizations of one clock second, derived from judgments of lights and sounds from the following experimental conditions: 1) Successive auditory and visual judgments were obtained under the same conditions to determine the effect of prior experience on intersensory temporal (1.00 seconds) judgments. 2) Long (2.00 sec.) and short (.10 sec.) stimulus anchors under the same conditions were employed to determine the effect of recent and remote anchors upon audio-visual judgments of the apparent duration of one clock second. 3) To explore sensory dominance and stimulus effectiveness, auditory and visual signals were presented simultaneously, with varied intensity and instructions. T. G. R 12

13,234

Pearson, R.G. & Hauty, G.T. ADAPTIVE PROCESSES DETERMINING PROPRIOCEPTIVE PERCEPTION OF VERTICALITY. *J. exp. Psychol.*, June 1959, 57(6), 367-371. (Carnegie Institute of Technology, Pittsburgh, Penn. & USAF School of Aviation Medicine, Brooks AFB, Tex.).

13,234

To determine the effects of knowledge of results (KR) and alternation of tilt on perception of verticality, 96 subjects, on a lateral-tilt chair under darkroom conditions, were required to return themselves from a position of 30 degrees tilt to the perceived vertical (24 times each). Data were analyzed by means of analysis of variance. Functions of the effects of the two main variables were plotted. Results were considered in terms of experimental factors and competition between sensory events. Implications for the design of spatial orientation studies were discussed.

13,235

Ingham, J.G. VARIATIONS IN CROSS-MASKING WITH FREQUENCY. *J. exp. Psychol.*, Sept. 1959, 58(3), 199-205. (Medical Research Council Neuropsychiatric Research Unit, Cardiff, Wales).

13,235

To determine the differential masking effect of one tone upon another in the opposite ear (cross-masking) when frequency separation of the two tones was separated, monaural thresholds were obtained from 30 subjects for six frequencies (600-1400 cps) determined before and during exposure to a continuous masking tone of constant frequency (30 db above threshold) using a modified method of limits. Functions are presented of the average masking effect for test tones of the different frequencies. Results were discussed in terms of three hypotheses: 1) mutual inhibition, 2) overlapping patterns of activity, and 3) a statistical model.

G. R 13

13,237

Siegel, S. & Goldstein, D.A. DECISION-MAKING BEHAVIOR IN A TWO-CHOICE UNCERTAIN OUTCOME SITUATION. *J. exp. Psychol.*, Jan. 1959, 57(1), 37-42. (Pennsylvania State University, Philadelphia, Penn.).

13,237

This experiment tested the hypothesis that the asymptotic probability of S's predicting the occurrence of the more frequent event in a two-choice uncertain outcome situation is a function of the level of reinforcement present in the situation, such that the probability of predicting the more frequent event will tend toward unity as the rewards (positive utility) and costs (negative utility) of correct and incorrect predictions are increased. Thirty-six subjects (Ss) made predictions in a two-choice uncertain outcome situation according to one of three conditions: no payoff, reward, and risk. A nonparametric k-sample test against ordered alternatives was used to test the data. T. R. 17

13,238

Kaprauf, M.E. & Powe, M.E. PERFORMANCE DECREMENT AT AN AUDIO-VISUAL CHECKING TASK. *J. exp. Psychol.*, Jan. 1959, 57(1), 43-56. (University of Illinois, Urbana, Ill. & USAF Personnel and Training Research Center, Lackland AFB, Tex.).

13,238

To determine whether performance on an audio-visual checking task would change with time and whether such changes would be related to 1) rate of occurrence of discrepancies in the digit series or 2) aptitude level of the subject, 235 basic airmen, distributed over all four scoring categories on the Armed Forces Qualification Test (AFQT), were tested. Each subject listened to a continuous series of digits (on tape) and checked these against an almost identical series in a test booklet. The task continued uninterrupted for two hours. The discrepancies in the digits varied from 2 to 20 per 15-minute section. The results were analyzed by .05 level median tests and Pearson's r. G. R. 4

13,239

Beck, J. STIMULUS CORRELATES FOR THE JUDGED ILLUMINATION OF A SURFACE. *J. exp. Psychol.*, Oct. 1959, 58(4), 267-274. (University of Pennsylvania, Philadelphia, Penn.).

13,239

This study was aimed at determining for surfaces with clearly perceptible pattern texture composed of two different intensities 1) whether consistent judgments of surface illumination can be made and 2) whether variables can be found in the light array which will specify these judgments. Observers adjusted the illumination on a comparison surface to match a standard surface for four different patterns, each at brightness levels of 1.1 and 3.2 ft-L. Each surface was viewed monocularly, simultaneously in a dark room. The standard had a grey background and white pattern and the comparison a black background and white pattern. Medians, confidence intervals, and ranges of the matches were determined. The possible correlates for such judgments are discussed. T. I. R. 11

13,240

Engen, T. & Pfaffmann, C. ABSOLUTE JUDGMENTS OF ODOR INTENSITY. *J. exp. Psychol.*, July 1959, 58(1), 23-26. (Brown University, Providence, R.I.).

13,240

To determine 1) the greatest number of intensities of an odor that can be identified correctly by rank order, and 2) the effect of a) selection of the odorants, b) the size step between stimuli, c) intensity of stimuli, and d) practice and number of stimulus categories on accuracy of odor intensity identification, 250 absolute judgments of odor intensity for each of five sets of stimuli were made by eight experienced subjects. Four odorants (amyl acetate, n-Heptanal, n-Heptane, and Phenylethyl alcohol) were utilized at five concentrations (100, 50, 25, 12.5 and 6.25 per cent dilution). Data were analyzed by means of the "informational analysis" (Erickson and Hake). T. G. R. 10

13,241

Carlson, V.R. AFTEREFFECT OF A MOVING PATTERN. *J. exp. Psychol.*, July 1959, 58(1), 31-39. (National Institute of Mental Health, Bethesda, Md.).

13,241

To determine the after-effect of a pattern of curved lines when the pattern was moving versus the after-effect of a stationary pattern, ten subjects made adjustments on a variable-curvature test line (to apparent straightness), following inspection of a pattern of alternating light and dark stripes (each ten millimeters and 145 centimeters in radius of curvature). The inspection pattern either moved at rate of 24 millimeters/seconds or was stationary. An additional 15 subjects were utilized in control experiments. Data were analyzed in terms of correlation of curvature between inspection patterns and the lines adjusted by the subjects. Results were discussed in terms of effects of 1) motion, 2) optimum fixation time before eye movement, and 3) the interaction between movement and curvature of the inspection line. T. R. 21

13,242

McGuigan, F.J. THE EFFECT OF PRECISION, DELAY, AND SCHEDULE OF KNOWLEDGE OF RESULTS ON PERFORMANCE. *J. exp. Psychol.*, July 1959, 58(1), 79-84. (Hollins College, Hollins, Va.).

13,242

To determine the effect of 1) precision (specificity), 2) delay, and 3) schedule of knowledge of results (KR), on performance at a line drawing task, 84 female subjects performed on 70 "learning" trials and 70 extinction trials. The task was to draw a six-inch line while blindfolded. Values of precision (specificity) were one-eighth inch, five-eighths inch, and ten-eighths inch (subjects were told within these limits how much their lines deviated from the six-inch standard). Values of length of delay were 0, 15, and 30 seconds, and the values of KR furnished were 10, 55, and 100 percent. Results were analyzed by means of a three-by-three-by-three analysis of variance and discussed in terms of the interaction between the three variables. T. R. 12

13,243

Underwood, B.J. & Scholz, R.W. STUDIES OF DISTRIBUTED PRACTICE: XIX. THE INFLUENCE OF INTRALIST SIMILARITY WITH LISTS OF LOW MEANINGFULNESS. *J. exp. Psychol.*, Aug. 1959, 58(2), 106-113. (Northwestern University, Evanston, Ill.).

13,243

To determine the influence of intralist similarity on the learning of lists of low meaningfulness and to explore the effect of intertrial interval, eight groups of 30 subjects learned one of four ten-nonsense syllable lists with either a two-second or seventeen-second intertrial interval. Each list was presented for 40 trials; the anticipation method was used. Correct responses were analyzed as a function of degree of intralist similarity, massed vs. distributed practice, and serial position in list. These results are compared to those from the previous study and interpreted as compatible with an inhibition (by interference) theory. G. R. 2

13,244

Schnore, M.M. INDIVIDUAL PATTERNS OF PHYSIOLOGICAL ACTIVITY AS A FUNCTION OF TASK DIFFERENCES AND DEGREE OF AROUSAL. *J. exp. Psychol.*, Aug. 1959, 58(2), 117-128. (University of Western Ontario, London, Ontario, Canada).

13,244

To determine the effects of 1) task differences and 2) degrees of arousal on individual patterns of physiological activity, nine physiological functions were obtained from subjects while they performed at two tasks (tracking and arithmetic) under two levels of arousal (auditory distraction and electric shock). Results were analyzed by means of analysis of variance, coefficient of concordance, and chi square and discussed in terms of intra-individual variability of physiological functions and the effectiveness of the various measures in differentiating among conditions. T. G. R. 29

13,243

Murphy, R.E. EFFECTS OF THREAT OF SHOCK, DISTRACTION, AND TASK DESIGN ON PERFORMANCE. *J. exp. Psychol.*, Aug. 1959, 58(2), 134-141. (Johns Hopkins University, Baltimore, Md.).

13,245

To investigate the effects of threat of electric shock, aural distraction, and task design on performance, 80 male subjects dealt four decks of 32 cards, each deck consisting of different design patterns. Time taken to deal each deck and errors in identifications of patterns were recorded. Shock was administered through attached electrodes and aural distraction was induced by presenting random series of numbers through earphones. Results were submitted to an analysis of covariance and discussed in terms of the interaction between and effects of distraction, shock threat and task difference on performance.

T. I. R 11

13,246

Bilodeau, E.A., Bilodeau, Ina McD., & Schumsky, D.A. SOME EFFECTS OF INTRODUCING AND WITHDRAWING KNOWLEDGE OF RESULTS EARLY AND LATE IN PRACTICE. *J. exp. Psychol.*, Aug. 1959, 58(2), 142-144. (Tulane University, New Orleans, La.).

13,246

To investigate effects of introduction and withdrawal of knowledge of results (KR) early and late in practice on learning, 160 male subjects performed on 24 trials at a lever-displacement task. KR was the amount and direction of reported error. Data were analyzed in terms of mean absolute error and results were considered in terms of applicability to Hull's (19) theory.

G. R 4

13,247

DeWolfe, Ruthanne K.S. & Duncan, C.P. TIME ESTIMATION AS A FUNCTION OF LEVEL OF BEHAVIOR OF SUCCESSIVE TASKS. *J. exp. Psychol.*, Aug. 1959, 58(2), 153-158. (Northwestern University, Evanston, Ill.).

13,247

To determine the effect of level of task related behavior on time estimation, 135 subjects made 15 time estimates each by working on a standard task for a fixed time interval and working for the period of time (on a comparison task) which the subject felt equalled the time spent on the standard task. Three tasks—rest, reversed alphabet printing, and anagram solving—were used in all combinations as both standard and comparison tasks. These tasks represented, respectively, low, intermediate, and high "Levels of Behavior." Data were analyzed by means of analysis of variance.

T. G. R 9

13,248

Howell, W.C. & Briggs, G.E. THE EFFECTS OF VISUAL NOISE AND LOCUS OF PERTURBATION ON TRACKING PERFORMANCE. *J. exp. Psychol.*, Aug. 1959, 58(2), 166-173. (Ohio State University, Columbus, Ohio).

13,248

To determine the effects of visual noise and locus of perturbation on tracking performance, 24 Ss each tracked (on a five-inch cathode ray tube) four consecutive 65-sec. trials under 28 combinations of visual noise magnitude (four levels including a noise-free condition), locus of perturbation (four loci), and input complexity (two levels). Noise signals had a peak of 30 cycles per min. with a two-octave bandwidth. Data are analyzed by means of the analysis of variance. Results are discussed in terms of performance as a function of visually coded response feedback versus input information.

T. G. R 8

13,249

Stevens, J.C. & Meck, J.D. SCALES OF APPARENT FORCE. *J. exp. Psychol.*, Nov. 1959, 58(5), 405-413. (Harvard University, Cambridge, Mass.).

13,249

This study was designed to explore the functional relations between the subjective magnitude and the physical magnitude of mechanical forces by: 1) obtaining a ratio scale for apparent magnitude of a force exerted by an observer (O) on a hand dynamometer, 2) obtaining a ratio scale for force applied to O's hand, 3) comparing 1 and 2 by having O match the force in 2 on the dynamometer, 4) comparing subjective scale for force and subjective scale for lifted weights. To avoid bias, magnitude estimation, magnitude, ratio, and category production were employed. For each procedure, several Os made a fairly large number of judgments of the kind appropriate to that scale. The scales of apparent force thus constructed were compared and discussed in terms of the generality of the power function. T. G. I. R 7

13,250

Jones, A. THE EFFICIENCY OF UTILIZATION OF VISUAL INFORMATION AND THE EFFECTS OF STRESS. *J. exp. Psychol.*, Dec. 1959, 58(6), 428-432. (University of Pittsburgh, Pittsburgh, Penn.).

13,250

To determine the effect of variations in intensity of stress on efficiency of utilization of visual information, 37 male subjects were asked to identify various simple forms, each reproduced in a series of 17 ascending levels of information. Recognition thresholds were determined as a function of varying degrees of subject shock expectation. Results are plotted and the data submitted to analysis of variance. Implications of the findings for further investigation of information processing in visual perception are considered.

T. G. I. R 7

13,251

Stevens, J.C. & Shickman, G.M. THE PERCEPTION OF REPETITION RATE. *J. exp. Psychol.*, Dec. 1959, 58(6), 433-440. (Harvard University, Cambridge, Mass.).

13,251

To determine the effects of intensity, rate of stimulus and sense modality on perception of repetition, 109 observers made subjective estimates of frequency of: 1) periodic flashes of light, 2) bursts of noise, 3) clicks, 4) tactual pulses on the fingertip, and 5) electric pulses applied across the fingers, by methods of fractionation and magnitude estimation. Curves of repetition estimations for the various sense modalities were compared as a function of rate of stimulus repetition (signals/second). Results were discussed in terms of just-noticeable differences and ratio scale.

G. I. R 11

13,252

White, C.T. & Chestnam, P.G. TEMPORAL NUMEROSITY: IV. A COMPARISON OF THE MAJOR SENSES. *J. exp. Psychol.*, Dec. 1959, 58(6), 441-444. (USN Electronics Lab., San Diego, Calif. & USN Office of Naval Research, Washington, D.C.).

13,252

To investigate the perceived number of vibratory stimuli as a function of the number presented for rates of 10 per second and 30 per second, five subjects made 200 judgments each of the number of vibratory stimuli presented (under the thumbnail). Visual perception of number when the eye was adapted to a high light level was also investigated. Results were compared with previous work on vision and audition, and discussed in terms of physiological hypothesis.

T. G. R 5

13,253

Lit, A. THE EFFECT OF FIXATION CONDITIONS ON DEPTH DISCRIMINATION THRESHOLDS AT SCOTOPIC AND PHOTOPIC ILLUMINANCE LEVELS. *J. exp. Psychol.*, Dec. 1959, 58(6), 476-481. (University of Michigan, Ann Arbor, Mich.).

13,253

To determine the effects of different methods of fixation on precision of depth discrimination, as a function of varying levels of equal illumination (to both eyes), two subjects performed at least 60 equality settings (in a two-rod test apparatus involving real-depth cues) for each of 14 levels of illumination which were repeated for the following methods of fixation: 1) steady fixation on the movable comparison rod, 2) steady fixation on the immobile standard rod, and 3) fixation on either of the rods at the subject's discretion. Depth discrimination threshold curves were plotted for all three methods of fixation as a function of illumination level. Results are discussed in terms of chemical postulates and related to other studies.

T. G. R 8

13,254

Lehiste, Ilse & Peterson, G.E. LINGUISTIC CONSIDERATIONS IN THE STUDY OF SPEECH INTELLIGIBILITY. *J. acoust. Soc. Amer.*, March 1959, 31(3), 260-286. (University of Michigan, Ann Arbor, Mich.).

13,254

This is an attempt to define intelligibility as a basic aspect of the communication process by taking account of the linguistic facility of both the speaker and listener. Toward this end the dialect intelligibility ratio was described and defined. Essential considerations for the construction of intelligibility test materials were discussed. The Harvard Phonetically-Balanced word lists were analyzed for phonetic balance vs. phonemic balance. CNC lists of phonemically balanced monosyllables also were constructed.

T. R 3

13,255

Wright, H.N. AUDITORY ADAPTATION IN NOISE. *J. acoust. Soc. Amer.*, July 1959, 31(7), 1004-1012. (Northwestern University, Evanston, Ill.).

13,255

To describe the initial rate, extent, and recovery from auditory adaptation to tones of 250, 1000, and 4000 cps measured both in the presence and absence of noise; ten experienced listeners participated in an experimental session consisting of: establishment of the unadapted level of the experimental ear, seven minutes of stimulation, determination of adaptation and recovery. The method of fixed intensities was used; the stimulus to the control ear was presented dichotically in phase with the sustained stimulus to the experimental ear for 15 seconds at one-minute intervals, the subject varied the level in his control earphone until the fused sound appeared in the median plane. Adaptation was determined for two conditions where only the tone was present and five where tone and noise were present. T. G. I. R 7

13,256

Miskolczy-Fodor, F. RELATION BETWEEN LOUDNESS AND DURATION OF TONAL PULSES. I. RESPONSE OF NORMAL EARS TO PURE TONES LONGER THAN CLICK-PITCH THRESHOLD. *J. acoust. Soc. Amer.*, Aug. 1959, 31(8), 1126-1134. (New York Eye and Ear Infirmary, New York, N.Y.).

13,256

To examine the relationship between loudness sensation and pulse duration: 1) threshold intensity as a function of selected pulse duration was studied monaurally (40 subjects) for frequencies of 250, 1000, and 4000 cps; and 2) at selected suprathreshold levels, intensity was held constant as pulse duration was gradually increased for 20 subjects (141 measurements). Discussion concerns: 1) the duration-intensity relationship as a function of frequency, 2) the relationship between time threshold and loudness in sones, and 3) a comparison between monaural and binaural time threshold.

T. G. R 26

13,257

Pollack, I. & Trittipoe, W.J. BINAURAL LISTENING AND INTERAURAL NOISE CROSS CORRELATION. *J. acoust. Soc. Amer.*, Sept. 1959, 31(9), 1250-1252. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

13,257

To study the effect of noise level, duration, and filtering on identification of interaural correlations obtained from bursts of wide-band noise, six subjects made a total of at least 5600 identifications under the following conditions: correlated bursts of wide-band noise at 1) 30-90 db, 2) 10-1000 milliseconds, and 3) 0.2-4.0 kilocycles per second (filtered). Also studied was the interaural cross-correlation necessary for correct identification in 75 percent of the trials. Effects of polarity and of the experimental procedure on identification of interaural noise correlations were discussed.

G. R 9

13,258

Emmer, R.H. MASKING BY TONES VS NOISE BANDS. *J. acoust. Soc. Amer.*, Sept. 1959, 31(9), 1233-1236. (USN Medical Research Lab., New London, Conn.).

13,258

To compare the masking effects of pure tones versus noise, thresholds and masked thresholds were obtained from two listeners with normal hearing; masking stimuli were pure tones at 500, 1000, 2000 and 4000 cps (at 60 and 80 db sensation level) versus one-third octave bands of noise of equal intensities and centered at the same frequencies. Results were discussed in terms of the cochlear mechanisms of masking.

G. R 7

13,259

Pickett, J.M. LOW-FREQUENCY NOISE AND METHODS FOR CALCULATING SPEECH INTELLIGIBILITY. *J. acoust. Soc. Amer.*, Sept. 1959, 31(9), 1259-1263. (USAF Operational Applications Lab., Applications Research Branch, AFRC, Bedford, Mass.).

13,259

To explore the effects on speech intelligibility of adding low-frequency bands of a free-field noise, four trained listeners scored for reception, on a checklist, sets of 25 words to which were added low-frequency bands of intensities ranging from 20-600 cps and noise levels ranging from 73-115 db. Direct low-frequency masking was measured as well as any upward spread of masking to higher frequencies. Implications for calculating the effects of noise interference upon intelligibility are discussed.

G. R 13

13,260

Woodhead, Amiel M. EFFECT OF BRIEF LOUD NOISE ON DECISION MAKING. *J. acoust. Soc. Amer.*, Oct. 1959, 31(10), 1329-1331. (Applied Psychology Research Unit, MRC, Cambridge, England).

13,260

To determine the effect of brief loud noise on decision-making, two experiments (and one control) were performed utilizing 48 subjects. In experiment I, 18 subjects were administered 10 bursts (lasting 0.95 second) or recorded rocket noise (110 db. pressure) while performing at the Mackworth multi-channel test. In experiment II, 18 subjects were administered three single blasts each (0.95 second in duration) of the rocket noise to determine effects on variations in intensity of the rocket noise on decision-making. Intensities were 85, 95, and 115 db. Results were discussed and a critical threshold for the effect of noise burst intensity on performance is considered.

T. G. R 10

13,261

Thurlow, W.R. & Rawlings, I.L. DISCRIMINATION OF NUMBER OF SIMULTANEOUSLY SOUNDING TONES. *J. Acoust. Soc. Amer.*, Oct. 1959, 31(10), 1332-1336. (University of Wisconsin, Madison, Wisc.).

13,261

The aim of the present experiments was to investigate the accuracy with which the number of simultaneously sounding tones can be perceived. Various 1-, 2-, and 3-tone stimuli were presented to 13 Ss, who had to judge how many tones were present. Results showed that discrimination of number of different tones sounding was far from perfect (even though Ohm's acoustic law would lead us to expect high accuracy). The discrimination of the average person was not improved even when frequency components were widely spaced. Accuracy of perception was poorer for 2- and 3-tone combinations than for 1-tone stimuli. Number of allowable response categories also affected percent correct responses. Individual differences in performance were found to be large.

R 2

13,262

Kryter, K.D. SCALING HUMAN REACTIONS TO THE SOUND FROM AIRCRAFT. *J. Acoust. Soc. Amer.*, Nov. 1959, 31(11), 1415-1429. (Bolt Beranek and Newman Inc., Cambridge, Mass.).

13,262

To determine the "annoying" characteristics of commercial jet aircraft (to persons on the ground) in comparison with commercial reciprocating-engine aircraft, 136 subjects compared recorded sounds from six jet aircraft with sounds from two reciprocating-engine aircraft in a series of three experiments utilizing the following methods of comparison: 1) for indoor listening, the method of individual adjustment; 2) for indoor listening, the method of paired comparison; and 3) for outdoor listening, the method of individual adjustment. Criteria were discussed for calculating subjective reactions to noise, in terms of speech interference level, equal listener response loudness level, overall sound pressure, etc. Indoor and outdoor listening were compared as were age and sex differences. T. G. I. P 14

13,263

Green, D.M., McKey, Mary J. & Licklider, J.C.R. DETECTION OF A PULSED SINUSOID IN NOISE AS A FUNCTION OF FREQUENCY. *J. Acoust. Soc. Amer.*, Nov. 1959, 31(11), 1446-1452. (Massachusetts Institute of Technology, Cambridge, Mass. & Bolt Beranek and Newman, Inc., Cambridge, Mass.).

13,263

To determine the effect of frequency versus signal energy on 1) the detectability of single pulsed sinusoids (0.1 second in duration) and 2) the detectability of compound pulsed sinusoids of the same duration, 11 subjects made 500 judgments of detectability for each of 16 single frequencies (250-4000 cps) and each of 16 compound frequencies. Results were discussed in terms of other data and in terms of the independent-threshold "model" of signal detection.

13,264

Pollack, I. MESSAGE UNCERTAINTY AND MESSAGE RECEPTION. *J. Acoust. Soc. Amer.*, Nov. 1959, 31(11), 1500-1508. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

13,264

To determine the effect of message uncertainty vs. response uncertainty on accuracy of reception of masked messages, nine experiments were performed using experienced subjects. Words were wired electrically with white noise (110-6500 cps) at a level of 80 db. above threshold. Investigated were possible contributing factors such as the parameters of message vs. response uncertainty as well as irrelevant alternatives; response uncertainty vs. response diversity; listener strategy; confidence ratings and conceptual operations; categorization vs. representations; relation to signal detectability theory; and measure of response discriminability. Results are related to information theory.

T. G. R 24

13,265

Pollack, I. MESSAGE REPETITION AND MESSAGE RECEPTION. *J. Acoust. Soc. Amer.*, Nov. 1959, 31(11), 1509-1515. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

13,265

The improvement in word intelligibility associated with successive presentations of a word in noise was examined with recorded and with independent samples of the speech and/or its background noise. The listener's criterion for termination of a trial was shown to be a crucial determinant of the gain of intelligibility with successive presentations. The improvement in intelligibility was greater for independent samples of speech and noise than for successive presentations of a single recorded sample. The observed improvement, however, was less than predicted for the ideal observer with perfect memory by the theory of signal detectability. Indexes of response discriminability and signal discriminability are briefly discussed.

R 13

13,266

Harris, C.M. RESIDUAL MASKING AT LOW FREQUENCIES. *J. Acoust. Soc. Amer.*, Aug. 1959, 31(8), 1110-1115. (Columbia University, New York, N.Y.).

13,266

To investigate "residual masking" (the temporary shift in the threshold of hearing following cessation of a masking source) as a function of loudness density vs. frequency, curves of residual masking vs. frequency were obtained for 250 cps. masking tones at sound pressure levels of 90 and 110 db. These masking patterns were obtained 150 and 200 milliseconds after cessation of the masking tone. Also, residual masking was measured as a function of intensity level of a "white noise" masking source. Plots of loudness density versus frequency were obtained from residual masking patterns, and loudness of the pure-tone masking source was evaluated.

T. G. I. R 14

13,267

Elmer, R.H. MASKING PATTERNS OF TONES. *J. Acoust. Soc. Amer.*, Aug. 1959, 31(8), 1115-1120. (USN Medical Research Lab., New London, Conn.).

13,267

To determine the relative effects of aural harmonics and cochlear spread of masking tone activity on the extension of masking to frequencies above the masking tone, monaural masking patterns were obtained from three listeners for pure tones (spaced by octaves) from 250-8000 cps. (at 20-100 db. above threshold). Results are discussed in terms of 1) the activity pattern of the masking tone in the cochlea, 2) beats between signal and masking tones, 3) aural harmonics, and 4) suppression of cochlear response to the signal.

G. R 18

13,268

Solomon, L.N. SEMANTIC REACTIONS TO SYSTEMATICALLY VARIED SOUNDS. *J. Acoust. Soc. Amer.*, July 1959, 31(7), 986-990. (USN Electronics Lab., San Diego, Calif.).

13,268

This is an attempt "to clarify the role of beat rate and accent, as they interact with spectrum, in the phenomenological clustering of passive sonar sounds in terms of psychological similarity." Artificially produced complex sounds were employed. These were varied systematically in spectrum, in amplitude modulation at several beat rates, and in terms of presence or absence of accent within a group of four beats. Every combination of all parameters (21 sounds) was rated by 20 naive subjects on the seven psychological dimensions of sound that had been previously isolated by factor analysis. Analysis of the resultant clusters of sounds indicated the influence of the three variables examined.

T. G. R 3

13,269

Wishart, D.M.G. A QUEUEING SYSTEM WITH SERVICE-TIME DISTRIBUTION OF MIXED CHI-SQUARED TYPE. Operat. Res., March-April 1959, 7(2), 174-179. (University of Birmingham, Birmingham, England).

13,269

This paper applies Kendall's technique of the embedded Markov chain to a queueing system with general independent input and a wide class of service-time distributions. First, the equilibrium distribution of waiting-times was derived, then the results applied to a queueing system of Bailey.

R 9

13,270

Roberts, J.O. (Chm.). MAKING THE AIRCRAFT EASIER TO SEE. Soc. exp. test Pilots, Winter 1959, III(2), 5-6. (North American Aviation, Inc., Los Angeles, Calif.).

13,270

This symposium on aircraft safety points up some of the factors which lead to mid-air collisions. One paper presents the statistics on this type of accident and proposes some systems for improving the situation. Another paper reviews some work in this area which involved primarily flight testing to determine fundamental design requirements for daytime conspicuity devices and for proximity warning devices. A third paper describes the advantages of the Minneapolis-Monseywell-Atkins Anti-Collision Light System. A few other short papers discussed the problem from the pilot's standpoint. A final paper discussed the airspace and air traffic control aspect of the problem.

I. R 5

13,271

Tymczyzyn, J.J. (Chm.). IMPROVING COCKPIT VISIBILITY FROM PRESENT AND PROPOSED AIRCRAFT. Soc. exp. test Pilots, Winter 1959, III(2), 52-53. (Civil Aeronautics Administration, Washington, D.C.).

13,271

This symposium session includes papers on the following topics, all relating to the air safety problem: 1) visibility aids to alleviate cockpit and human limitations, 2) the cockpit visibility problem in supersonic jet transport type aircraft, and 3) the optical quality of future aircraft transparent enclosures.

G. I. R 12

13,272

Young, H. (Chm.). INSURING VIGILANCE FROM PRESCRIBED CREW STATIONS. Soc. exp. test Pilots, Winter 1959, III(2), 95-98. (Douglas Aircraft Co., El Segundo, Calif.).

13,272

This symposium session deals with the subject of vigilance from crew stations, and points up ways in which crews may perform a better job. The papers include: 1) the human element in mid-air collisions, 2) the Navy's view on crew vigilance, 3) the pilot's view of cockpit vigilance, 4) the airline management's view of cockpit vigilance, and 5) the amount one can see assuming perfect vigilance.

G. I.

13,273

Kilgariff, T.G. THE TREND IN ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. Soc. exp. test Pilots, Summer 1959, I(1), 31-44.

13,273

This is an investigation of the history of escape from high performance aircraft in an effort to determine the controlling parameter for successful escape. The successful escape sequence is delineated and its relation to the design of the escape system and of the flight equipment is indicated. The recommendations which are set forth point out the need for basic research on the limits of human tolerance in this situation, and for well controlled laboratory and flight testing of the equipments.

G. R 19

13,274

Le Vier, T. PILOTS' VIEWPOINT ON EMERGENCY ESCAPE. Soc. exp. test Pilots, Spring 1959, III(3), 3-9. (Lockheed Aircraft Corporation, Burbank, Calif.).

13,274

This article emphasizes the need for adequate emergency escape systems for pilots of modern high performance aircraft. The large discrepancy between advances in aircraft and those in escape systems is elaborated and illustrated.

13,275

Holcomb, G.A. & Cahill, M.F. NORTH AMERICAN ZERO LEVEL ESCAPE SYSTEM. Soc. exp. test Pilots, Spring 1959, III(3), 10-18.

13,275

The North American complete flight envelope escape system is described and illustrated in detail. Some data from sled-simulated aircraft testing are included.

I.

13,276

Mohrlock, H.F. "THIS WAY OUT, PLEASE" (AN EJECTION SEAT FOR SUPERSONIC AND LOW ALTITUDE ESCAPE). Soc. exp. test Pilots, Spring 1959, III(3), 19-32. (Convair, San Diego, Calif.).

13,276

This report discusses the problems to be solved in designing a successful ejection seat for supersonic and low altitude escape. Some of these include: 1) the time element between ejection and ground contact, 2) the height of seat trajectory in order to allow sufficient time for parachute deployment and sufficient height for fin clearance, 3) the aerodynamic stability of the seat, and 4) the windblast encountered upon ejection. The seat that was designed is described and illustrated. Sled test data from the seat and human tolerance data are discussed in terms of successful escape requirements.

G. I.

13,277

Johnson, J.C. DRUGS AND THE FLYER. Soc. exp. test Pilots, Spring 1959, III(3), 38-40.

13,277

This is a brief account of some of the more common drugs which are used frequently in self-medication by pilots, and of the reasons they can be dangerous to the pilot. Included in this group are: 1) antihistamines, 2) antibiotics, 3) alcohol, 4) caffeine products, 5) barbiturates, and 6) tranquilizers.

13,278

Lovelace, W.R. II & Crossfield, A.S. BIOMEDICAL ASPECTS OF ORBITAL FLIGHT. Soc. exp. test Pilots, Spring 1959, III(3), 41-56. (Lovelace Foundation, Albuquerque, N.M. & North American Aviation, Inc., Los Angeles, Calif.).

13,278

This article discusses the biomedical aspects of the orbiting flight problem. The three types of manned orbital vehicles are described in terms of their potential use in biomedical research. Seven phases of orbit mission are delineated and the biomedical problem areas in each are examined. Four stages of performance degradation are indicated for use as guides to the tolerance that must be built in to obtain an adequate level of functioning of man in the respective phases.

T. I.

13,279

Hopkins, H.Z., Jr., Harer, R.J. & Hoskins, G.W. (Chms.). PROFESSIONAL PILOTS' SYMPOSIUM ON AIR SPACE SAFETY SUMMARY REPORT INTRODUCTORY REMARKS. Soc. exp. test Pilots, Fall 1958, III(1), 11-20.

13,279

This report summarizes the symposium sessions on air space safety. The following problems were investigated: 1) means of making the aircraft more visible, 2) means of improving cockpit visibility from present and proposed aircraft, 3) methods of improving vigilance from prescribed crew stations, and 4) means of modernizing airways. General recommendations were also presented.

13,280

Van Duzend, W.A. & Smith, E.E., Jr. IMPROVED HAND-WRITING. *PERCENT. MOT. SKILLS*, Dec. 1959, 2(4), 365-367. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

13,281

These two experiments were designed to test one's ability to write words when there is a delay between the act of writing and the appearance of the script. Subjects, after practicing with the system until they felt ready, wrote each of 17 words under the following delays: 0, 4, 8, 12, 16, 20, and 24 milliseconds. Time to complete word was one measure, automatic writing was the other. In the second experiment, the effect of speed-accuracy trade-off was determined (in the first, subjects were instructed simply to do their best), every thing else remained the same. The subjects were used. The same two measures of performance plus error scores were used. (There were no errors in Experiment 1.) The results are discussed briefly as they relate to visual-motor learning. T. G. I. R. 2

13,282

Evans, R.S. THE SURFACE ELECTRODERMAL (SED) CORRELATES SUBJECTIVE EFFORT. *PERCENT. MOT. SKILLS*, Dec. 1959, 2(4), 369-371. (USC Electronics Lab., San Diego, Calif.).

13,283

This study investigated the hypothesis that the surface EDC reflects the amount of effort required to maintain voluntarily a sustained contraction. Twelve male subjects participated. Four experimental conditions were tested: 1) with no visual or auditory information the subject attempted to hold effort constant, 2) while monitoring a meter that displayed EDC activity, subject attempted to hold constant the EDC from biceps, 3) same as 2) but EDC was from forearm flexor, and 4) while monitoring a meter which registered force subject attempted to hold it constant. In all cases, the subject was maintaining a 30-lb. pull on a dynamometer for a two-minute period. G. R. 2

13,284

Deutsch, J.A. THE FÄHRER-WALLACH THEORY AND THE AFTER-EFFECT OF SEEN MOVEMENT. *PERCENT. MOT. SKILLS*, Dec. 1959, 2(4), 373-374. (Oxford University, Oxford, England).

13,285

This brief note is a critique of H. H. Spitz's explanation of the after-effect of seen movement in terms of Kohler's theory of figural after-effects. R. 2

13,286

Schlossberg, H. & Kling, J.W. THE RELATIONSHIP BETWEEN "TENSION" AND EFFICIENCY. *PERCENT. MOT. SKILLS*, Dec. 1959, 2(4), 375-377. (Brown University, Providence, R.I.).

13,287

This brief report presents a summary of recent data on the relation between level of activation and efficiency of performance. Possible reasons for the discrepancy in results are noted. R. 5

13,288

Quinn, R.F. ACCURACY OF THE DIRECTION OF ANGULAR MOVEMENTS WITH CONTROL BEARS AS FUNCTIONS OF DIRECTION OF FORCE MOVEMENT AND NUMBER OF STIMULI. *PERCENT. MOT. SKILLS*, Fall 1959, 1(3), 67-68. (University of Rochester, Rochester, N.Y.).

13,289

This study investigated the accuracy of bisecting various angular extents by means of a control knob as a function of the direction of the final setting movement and the effect on accuracy of repeated bisections of the same angular extent. Twenty-six males participated. The experimental conditions were: final movement left, 60 degrees; 8-60 degrees; 1-60 degrees; 8-60 degrees; 1-120 degrees; 8-120 degrees. Fifty-two settings were made by each subject. Analysis of variance was performed; the main variables were directions, angles, and subjects. T. G. R. 5

13,290

Edgar, D.C. & Blair, M.C. IMPROVED RIFLE SIGHTS FOR HIGH AND LOW ILLUMINATION LEVELS. *PERCENT. MOT. SKILLS*, Fall 1959, 1(3), 71-74. (University of Rochester, Rochester, N.Y. & General Dynamics Corporation, Groton, Conn.).

13,291

Seven experimental sights were compared with the M1 rifle sights in order to determine which would produce the least error under both high and low illumination. Eighty subjects were tested under both 50 footcandles and one footcandle of illumination. The experimental design was a two by eight factorial with five subjects per cell. Aiming error was measured by the diagonal method. The data were analyzed by analysis of variance, sights and illumination being the main effects. T. R. 6

13,292

Black, G. & Proschan, F. ON OPTIMAL REDUNDANCY. *OPERAT. RES.*, Sept.-Oct. 1959, 7(5), 581-588. (Sylvania Electric Products, Inc., Mountain View, Calif.).

13,293

This paper develops a general mathematical solution to the problem in which a complex system is placed in the field for a fixed period, during which time only the spare parts initially provided may be used. The solution based on the assumption that component failures follow exponential distributions is in terms of the composition of a spare parts kit which maximizes assurance of continued operation during the fixed period. An illustration of this solution is included. In addition, the manner in which nonexponential life distributions may be computed is indicated. R. 14

13,294

Blackman, N. & Proschan, F. OPTIMUM SEARCH FOR OBJECTS HAVING UNKNOWN ARRIVAL TIMES. *OPERAT. RES.*, Sept.-Oct. 1959, 7(5), 625-638. (Sylvania Electric Products, Inc., Mountain View, Calif.).

13,295

In this paper the mathematical solution is developed for a search problem in which the arrival times for objects is in accordance with a Poisson distribution. Thus, the problem is to arrange the optimum pattern of search, taking into account: 1) the a priori probability of arrival in each region, 2) the probability of detection as a function of region, 3) the length of time required to scan each region, 4) the gain (or loss) after detection as a function of arrival time, etc. The range of application of the model thus developed extends from missile detection to checking of rapid-turnover personnel. Several cases are solved. R. 4

13,288

Brooks, S.E. A COMPARISON OF EXTREMUM-SEEKING METHODS. *Operat. Res.*, July-Aug. 1959, 7(4), 439-457. (General Analytics Corporation, Los Angeles, Calif.).

13,289

This paper compared several methods: factorial designs, steepest gradient procedures, methods of steepest ascent, and random experimentation, for making estimates of the optimal combination of factors. Experimental situations were specified by: response surface (four were used), experimental error, experimental region (nine were randomly selected from each surface), and number of trials (16 or 30). The achievement among methods is compared, achievement being the magnitude of response at the estimate.

T. G. I. R 12

13,290

Glass, R. AN OPTIMUM POLICY FOR DETECTING A FAULT IN A COMPLEX SYSTEM. *Operat. Res.*, July-Aug. 1959, 7(4), 468-477. (Armour Research Foundation of Illinois Institute of Technology, Chicago, Ill.).

13,291

For optimally detecting the breakdown in a complex system and then repairing it, two models are considered and their equations developed. This optimum policy minimizes the expected amount of time consumed or penalties paid. Model I assumes that overall tests of each module may be performed as well as individual item tests within modules; Model II that overall module tests are not possible and that penalty costs must be paid when search moves from one module to another. An example is worked out for Model I.

T. R 2

13,292

Michael, D.X. THE SOCIAL ENVIRONMENT. *Operat. Res.*, July-Aug. 1959, 7(4), 506-523. (Dunlap and Associates, Inc., Stamford, Conn.).

13,293

This paper discusses "the social environment and its implications where the role of humans is important for operations research and the related techniques of systems analysis and human engineering." Those processes and agencies of the social environment which determine what a man does with his abilities and how well or poorly he does it are presented in terms of the individual, the culture in which he lives, the social groups with which he is associated, and the "institutional" world. The manner in which the social environment operates in man-machine systems, traditional and advanced, is examined.

R 12

13,294

Clark, D.F. & Ackoff, R.L. A REPORT ON SOME ORGANIZATIONAL EXPERIMENTS. *Operat. Res.*, May-June 1959, 7(3), 279-293. (Case Institute of Technology, Cleveland, Ohio).

13,291

The ultimate objective of the research here reported is to develop mathematical theory for explaining the effect of organizational structure on the efficiency of organizational performance. The method developed uses an organizational analogy in the form of an operational game. Several experiments are described in which the following variables are examined: presence or absence of an executive, availability of communication channels, and cooperativeness or competitiveness of pay-offs.

I. R 7

13,292

Sauty, J.L. COEFFICIENT PERTURBATION OF A CONSTRAINED EXTREMUM. *Operat. Res.*, May-June 1959, 7(3), 294-302. (Rover, Allied Applied Research, Inc., Bethesda, Md.).

13,292

To minimize total cost a schedule is given for allocating labor to different tasks when labor is a variable function of time. The problem was cast in linear programming form, all coefficients parameterized. This method is illustrated and its uses and limitations discussed.

R 9

13,293

Checks, G.K. AN OPERATIONS-RESEARCH EVALUATION TECHNIQUE OF THE USE OF SALES-RESEARCH INFORMATION. *Operat. Res.*, May-June 1959, 7(3), 313-321. (Royal Metal Manufacturing Company, New York, N.Y.).

13,293

The information requirements of sales organizations are discussed. A working hypothesis about the use of such data in decision-making was found necessary in this problem of the optimum structure of information for a multi-plant, multi-product organization. Limitations in defining such a model are the paths from raw data to research information and from this to decision-making and finally to "change in sales." The benefit from this approach is already being felt at Royal Metal Manufacturing where the research is only in the raw data to research information phase.

P 4

13,294

Coe, J.C. TRAFFIC ANALYSIS OF SMALL TELEPHONE SWITCHBOARDS. *Operat. Res.*, May-June 1959, 7(3), 347-361. (USA Electronic Proving Ground, Sierra Vista, Ariz.).

13,294

Some fundamental traffic considerations of small telephone switchboards are examined. In particular, those with 12 subscribers or less, and with conversations of one to six minutes' duration were analyzed. A number of results were obtained which indicate: 1) load conditions under which a second operator improves service, 2) conditions under which operator or line is a limiting factor, 3) conditions under which subscribers receive poor service, etc. The determination of some traffic parameters are quantified.

T. G. I

13,295

Curtin, K.M. A 'MONTE CARLO' APPROACH TO EVALUATE MULTIMODED SYSTEM RELIABILITY. *Operat. Res.*, Nov.-Dec. 1959, 7(6), 721-727. (Arma Div., American Bosch Arma Corporation, Garden City, N.Y.).

13,295

A 'Monte Carlo' technique is used to predict and evaluate multimoded system reliability. The multimoded system is defined and an example detailed. The Monte Carlo method of analysis is then described and applied to the example.

T. R 2

13,296

Behnke, A.R., Guttentag, O.E. & Brodsky, C. QUANTIFICATION OF BODY WEIGHT AND CONFIGURATION FROM ANTHROPOMETRIC MEASUREMENTS. *Hum. Biol.*, Sept. 1959, 31(3), 213-234. (USN Radiological Defense Lab., San Francisco, Calif. & University of California Medical Center, San Francisco, Calif.).

13,296

In this study seven anthropometric measurements (bicep diameter, chest, biceps, forearm, buttocks, thigh and calf circumferences) obtained on 31 Navy men were summated for the calculation of body weights. Waist, ankle, wrist and knee circumferences also obtained from the group were used in partitioned anthropometric analyses. In addition body fat was estimated by the helium dilution chamber technique. Constants were then derived for estimating surface area of the body, as well as weight. Similar anthropometric data on women were compared to those of the men, and relationships are indicated. Data from other groups were also compared.

T. G. I. R 17

13,297
Clippmeyer, D. EFFECT OF DEGREE OF ILLUMINATION ON RATE OF AMBIGUOUS FIGURE REVERSAL. *Canad. J. Psychol.*, Sept. 1959, 13(3), 169-174.

13,297
This study investigated the effect of illumination on the rate of ambiguous figure reversal. Twelve naive subjects viewed a Necker cube for two minutes under dim, medium, and bright illumination conditions. The number of reversals was recorded for each ten-second period of the two-minute observation. Analyses of variance were carried out for the 30-, 60-, 90-, and 120-second performance periods. The findings are discussed in terms of both number and rate of reversals.
T. R 20

13,298
Bolles, R.C., Hulicka, Irene M. & Hanly, Barbara. COLOUR JUDGMENT AS A FUNCTION OF STIMULUS CONDITIONS AND MEMORY COLOUR. *Canad. J. Psychol.*, Sept. 1959, 13(3), 175-185. (University of Pennsylvania, Philadelphia, Penn. & University of Oklahoma, Norman, Okla.).

13,298
To demonstrate that an observer will make a color match, if permitted, regardless of possible memory color influences, 20 subjects learned the "color names" of six pairs of nonsense figures; half were the colors indicated and half were actually gray. The subjects then made color matches for each figure by successive presentation method. Variability of color judgments is indicated. In a second experiment, 32 naive subjects made color matches between several pairs of figures which differed in physical dimension and in implied memory color--leaf, square, donkey, nonsense figure--under match-possible and match-impossible conditions. Color-matching errors were subjected to an analysis of variance. The role of associative and sensory factors in perception of color is discussed. R 12

13,299
Scott, T.H., Bexton, W.H., Heron, W. & Doane, B.K. COGNITIVE EFFECTS OF PERCEPTUAL ISOLATION. *Canad. J. Psychol.*, Sept. 1959, 13(3), 200-209. (McGill University, Montreal, Canada).

13,299
This is a systematic investigation of the effects of perceptual isolation on cognitive function. Male subjects (29) were placed in isolation for as long as they would stay (three to four days). Before, during, and after isolation they were given two batteries of tests which consisted of arithmetic problems, number series completion, word making and anagrams, Koh's blocks, Wechsler digit-symbol, McGill Picture Anomaly test, etc. They were also subjected to propaganda during the isolation period. Control subjects (27), not isolated, were given the tests and propaganda material. Differences in the error scores between the experimental and control groups were analyzed and p-values determined. The effects of propaganda on the scores on attitude scales were assessed by t-tests. T. G. R 4

13,300
Doane, B.K., Mahatoo, W., Heron, W. & Scott, T.H. CHANGES IN PERCEPTUAL FUNCTION AFTER ISOLATION. *Canad. J. Psychol.*, Sept. 1959, 13(3), 210-219. (McGill University, Montreal, Canada).

13,300
This study investigated the changes in visual perception after four days of isolation. In addition, spatial orientation and somesthetic perception were studied. Male subjects (17) composed the experimental group; 13 were confined to a cubicle, 4 underwent only visual isolation. Visual, spatial and somesthetic tests were administered to the control group (20 subjects) at the same time intervals as for the experimental group: before testing, after 48 and 72 hours of isolation, and after the completed period of isolation. Visual perception tests included: critical flicker frequency, figural after-effect, size constancy, etc. Tests of somesthetic function were tactual form-discrimination and two-point limen. Spatial orientation was tested by requiring movements in certain directions without vision. T. R 10

13,302
Crawford, B.H. MEASUREMENT OF COLOR RENDERING TOLERANCES. *J. opt. Soc. Amer.*, Dec. 1959, 49(12), 1147-1156. (National Physical Laboratory, Teddington, Middlesex, England).

13,302
To determine the degree of variation which can be tolerated in different bands of the spectrum of an illuminant, color rendering tolerances were measured by direct experiment using several levels of illumination and a variety of test objects. The criterion was a "just noticeable difference from the standard when judged by memory only." The general procedure was the gradual, continuous alteration of the spectral composition of the illuminant until the observer judged the object as looking different than it did initially. Tolerances for six contiguous spectral bands of comparable weight in color rendering were measured for several types of illuminants with such objects as pictures, colored surfaces, etc. A method for the assessment of color-rendering properties is presented and discussed. T. G. R 2

13,303
MacAdam, D.L. SMALL-FIELD CHROMATICITY DISCRIMINATION. *J. opt. Soc. Amer.*, Dec. 1959, 49(12), 1143-1146. (Eastman Kodak Company, Rochester, N.Y.).

13,303
Color discrimination data for 11 chromaticities were determined by a single observer using a matching method which consisted of adjusting the luminance and chromaticity (amount of red, green, and blue) of one stimulus until it matched a standard stimulus of the same size. Two sizes of stimuli were tested: three minutes and 4.4 degrees. Thirty matches were made for each chromaticity at each size. The data (amounts of red, green, and blue) were subjected to an analysis of variance and metric coefficients were determined. The results are presented graphically as discrimination ellipses on CIE diagrams for the luminance values studied for both field sizes. The use of these data for evaluating the large chromaticity differences encountered in color graininess is discussed. T. G. R 11

13,304
Armington, J.C. CHROMATIC AND SHORT TERM DARK ADAPTATION OF THE HUMAN ELECTRORETINOGRAM. *J. opt. Soc. Amer.*, Dec. 1959, 49(12), 1169-1175. (USA Walter Reed Army Institute of Research, Washington, D.C.).

13,304
To study the spectral sensitivity of the human ERG as modified by chromatic adaptation, the ERG was elicited by test flashes that followed 2.5 sec. after the termination of a colored adaptation. Three colors of adaptation (red, blue, and purple) and test flashes from 400 to 700 mμ were used. The heights of the various components of the ERG were measured (one S, six repetitions of each flash and adaptation) and averaged; plots relating the amplitude of a component to test flash luminance were made. From these, the relative spectral sensitivities of response components were determined.
G. 1.

13,305
Knoll, H.A. RESEARCH TILTING HAPLOSCOPE. *J. opt. Soc. Amer.*, Dec. 1959, 49(12), 1176-1179. (Bausch & Lomb Optical Company, Rochester, N.Y.).

13,305
This article describes the design and construction of a tilting haploscope, including both optical and mechanical features. The method of positioning the observer's head is also detailed. Preliminary measurements of phorias and fusional convergence were made at several tilt and elevation angles on each of five observers.
I. R 5

13,306

Jones, R.C. QUANTUM EFFICIENCY OF HUMAN VISION. *J. opt. Soc. Amer.*, July 1959, 49(7), 645-653. (Polaroid Corporation, Cambridge, Mass.).

The detective quantum efficiency for foveal vision is computed from the flash perception data of Blackwell and McCree. The detective quantum efficiency is identical with the concept of quantum efficiency introduced by Rose in 1946, and is defined as the square of the ratio of the smallest possible threshold to the observed threshold, where the smallest possible threshold is set by the statistical fluctuations in the number of the background photons entering the eye. The computed values of the detective quantum efficiency Q are tabulated in Table V, and depend on the target diameter a , on the light pulse duration T , and on the background luminance B . The maximum values of Q (with the respect to variation of a and T) range from about 0.25% to about 1.0% over the range from 0.1 to 100 ft-L, with the maximum value occurring at about 1.5 ft-L. The computed values of Q are free of the questionable assumptions previously used by Rose and by Jones regarding integration time and threshold signal-to-noise ratio.

R 25

13,307

Boynton, R.M., Kandel, G. & Olney, Judith W. RAPID CHROMATIC ADAPTATION OF NORMAL AND DICHROMATIC OBSERVERS. *J. opt. Soc. Amer.*, July 1959, 49(7), 654-666. (University of Rochester, Rochester, N.Y.).

13,307

Forty spectral sensitivity curves were obtained on three observers--normal, deuteranope, protanope--for blue, green, red, and yellow adapting stimuli at brightnesses ranging from 0.8 to 80 millilamberts, thresholds being taken at 10 millimicron ($m\mu$) intervals from 400 to 700 $m\mu$. The test stimulus (one-degree diameter) and adapting stimulus (five degrees) appeared in the following manner: adapting stimulus (0.3 sec.)--darkness (0.05 sec.)--test stimulus (0.033 sec.)--darkness (1.7 sec.)--sequence repeated. Both 3- and 4- curve fits were made to the data, which were interpreted in terms of 3- vs. 4- receptor models of the underlying mechanisms in cone vision.

T. G. R 13

13,308

Sweeney, E.J. EFFECT OF THE TEST STIMULUS ON THE MEASUREMENT OF DARK ADAPTATION. *J. opt. Soc. Amer.*, July 1959, 49(7), 667-668. (USN Medical Research Lab., New London, Conn.).

13,308

The effect of intensity of the test stimulus on the course of dark adaptation was systematically explored so as to determine the allowable upper limit. A Hecht-Shlaer Adaptometer was used. The test stimulus, two degrees in diameter, was centered 10 degrees from fixation. A ten-degree flashing stimulus, one-fifth second in duration, concentric to test stimulus, was presented once a second for 90 seconds at a brightness ranging from 3.6 to 10.6 log micromicrolamberts. Forty minutes dark adaptation preceded testing of two observers. Thresholds were obtained for the entire course of dark adaptation, then the flashing stimulus procedure was instituted. Results are discussed in terms of sensitivity tolerance.

T. G. R 2

13,310

DeMott, D.W. DIRECT MEASURES OF THE RETINAL IMAGE. *J. opt. Soc. Amer.*, June 1959, 49(6), 571-579. (University of Rochester, Rochester, N.Y.).

13,310

Several experiments are described in which empirical data on the characteristics of the retinal image were obtained. The main apparatus consists of an eye holder with accessories, a microilluminometer, and acuity targets (3 seconds to 3.35 minutes). Details in the handling of the excised fresh steer eyes and in the experimental procedures are presented. The effects of pupil diameter and of chromatic aberration on the sharpness of the image were determined as well as the effect of acuity target-width. Other experiments studied the effects of: 1) the optical system, 2) the post mortem age of the eyes, and 3) the use of contact lens. The conflict between these and other data and theoretical calculations of the retinal image are discussed in terms of entoptic stray light and minimum resolvable black line. G. I. R 12

13,311

Jackson, J.E. SOME MULTIVARIATE STATISTICAL TECHNIQUES USED IN COLOR MATCHING DATA. *J. opt. Soc. Amer.*, June 1959, 49(6), 585-592. (Eastman-Kodak Company, Rochester, N.Y.).

13,311

This article summarizes some of the basic multivariate significance tests which have been used to evaluate color matching data. The need for multivariate-type analysis of these data is discussed. Several such tests are described and illustrated with actual color matching data: 1) sample means vs. hypothetical means, 2) two sample means, 3) k sample means, 4) sample covariance matrix vs. hypothetical covariance matrix, 5) two-sample covariance matrices, 6) homogeneity of variance for k groups, 7) test for shapes of covariance matrices of unequal volume.

T. G. R 26 approx.

13,312

Koomen, M.J. VISIBILITY OF STARS AT HIGH ALTITUDE IN DAYLIGHT. *J. opt. Soc. Amer.*, June 1959, 49(6), 626-629. (USN Research Lab., Washington; D.C.).

13,312

The distribution of luminance over the sky at 100,000 feet for solar elevations of 10, 40, and 80 degrees was calculated and the daylight visibility of stars under these conditions was predicted from visual threshold data. The calculations were based on 1) theoretical values obtained using the Raleigh law of light scattering which had been subject to empirically determined corrections and 2) photometric measurements made from a stratosphere balloon plus barometric pressure information. The determinations of star visibility were based on relation between background luminance and threshold intensity when search is not necessary. Further estimates of visibility using a ten-power telescope are included.

G. R 14

13,313

Sharp, H.C. EFFECT OF SUBLIMINAL CUES ON TEST RESULTS. *J. appl. Psychol.*, Dec. 1959, 43(6), 369-371. (Utah State University, Salt Lake City, Utah).

13,313

This study is concerned with the effect of subliminal cues on test results. The cues were correct answers or alternate correct and incorrect answers presented for 1/200 second at seven-second intervals such that each answer was superimposed upon its test item three times. The test was constructed from material in their elementary psychology tests. Sixty-two subjects took the test; one group was presented the correct cues, the other the alternate correct and incorrect cues. Mean scores for the two groups were compared. These are discussed in light of other related research and factors are suggested to account for them.

T. R 10

13,314
Rando, W.W. THE EFFECTS OF PARTIAL PAIRING ON SCALE VALUES DERIVED FROM THE METHOD OF PAIRED COMPARISONS. *J. appl. Psychol.*, Dec. 1959, 43(6), 379-381. (Oklahoma State University, Norman, Okla.).

13,314
The relationship between scale values computed from complete and partial pairings was determined when the rating task as well as the number of observations was permitted to vary with the reduction in the number of pairs. Sixty subjects were divided into six groups; each group received a different partial pairing schedule. The test materials were 30 nationality group names presented in pairs. The subject selected one of each pair according to a criterion. One complete and five partial pairing schedules were used. Pearson correlation coefficients provided an estimate of the degree of association between scale values for all pairing schedules. These were then compared by t tests.
T. R 5

13,315
Champion, J.M. & Turner, W.W. AN EXPERIMENTAL INVESTIGATION OF SUBLIMINAL PERCEPTION. *J. appl. Psychol.*, Dec. 1959, 43(6), 382-384. (Georgia State College of Business, Savannah, Ga. & General Motors Institute, Detroit, Mich.).

13,315
The influence of a subliminal visual stimulus on subsequent recognition of the stimulus and association with its name was studied. A 30-minute film was presented to two groups of subjects; one group was also presented the experimental stimulus (meaningful object with brand name) at .01 second duration at ten-second intervals throughout the experiment. The other group was presented the control stimulus (few nonsense lines on black background) in the same manner. Following the film, a questionnaire to determine the subliminal effects was given to the subjects. Chi-square technique was used to evaluate the difference in the questionnaire scores between the two groups.
T. R 2

13,316
Lykken, D.T. THE GSR IN THE DETECTION OF GUILT. *J. appl. Psychol.*, Dec. 1959, 43(6), 385-388. (University of Minnesota, Minneapolis, Minn.).

13,316
Forty-nine subjects were divided into four groups--one enacted a mock murder and theft crime, one enacted the murder, one enacted the theft, and the fourth was exposed to neither crime. All were given a guilty knowledge test composed of six standard questions relating to each of the two crimes. The galvanic skin response was used throughout. From these responses subjects were classified into their original four groups.
R 3

13,317
Simon, J.R. & Simon, Betty P. DURATION OF MOVEMENTS IN A DIAL SETTING TASK AS A FUNCTION OF THE PRECISION OF MANIPULATION. *J. appl. Psychol.*, Dec. 1959, 43(6), 389-394. (State University of Iowa, Iowa City, Iowa).

13,317
In this study the precision required to adjust each of two dials on a simplified control panel was systematically varied in order to gain information on human manual movements. Subjects (24) performed on each of four experimental conditions: 1) gross manipulation of both dials, 2) fine manipulation of left one, gross manipulation of right, 3) gross manipulation of left, fine manipulation of right, and 4) fine manipulation of both. Performance measures were: time for adjustment of each dial and travel time between dials. Analysis of variance was performed on these parts of the control movement for each experimental condition.
T. I. R 9

13,318
Rothe, H.F. & Nye, C.T. OUTPUT RATES AMONG MACHINE OPERATORS: II. CONSISTENCY RELATED TO METHODS OF PAY. *J. appl. Psychol.*, Dec. 1959, 43(6), 417-420. (Fairbanks, Morse and Company, Beloit, Wisc.).

13,318
This report presents and compares weekly output rates for machine operators paid according to an incentive system over a ten-week period. Both individual and group comparisons were made and some correlations were determined for successive week's output. These findings were discussed in terms of the effectiveness of the method of pay and related to findings obtained for other methods.
T. R 4

13,319
Whittenburg, J.A., Ross, S. & Andrews, T.G. EFFECTS OF ALTERING TASK COMPONENTS ON PERCEPTUAL-MOTOR TASK LEARNING. *J. appl. Psychol.*, Aug. 1959, 43(4), 226-234. (University of Maryland, Baltimore, Md.).

13,319
The effects of altering different display-control relationships of a compensatory tracking task on acquisition and retention of the task were determined. Three display-control characteristics were investigated: directional, rate of change and differential torque, at both early and later learning stages. There were 12 subjects for each of nine conditions: eight experimental--four early and four late learning--and one standard. The primary measure of performance was time on target. Analyses of covariance were performed. The findings were discussed as they relate to the operational characteristics of the task.
T. G. R 16

13,320
Byrne, D. THE EFFECT OF A SUBLIMINAL FOOD STIMULUS ON VERBAL RESPONSES. *J. appl. Psychol.*, Aug. 1959, 43(4), 249-252. (San Francisco State College, San Francisco, Calif.).

13,320
This is an attempt to isolate and study a few of the variables involved in behavior influenced by subliminal stimulation. The subliminal stimulus was a food word. One hundred and five subjects were divided into experimental and control groups. The experimental group saw a movie with the food word superimposed in flashes of 1/200 second every seven seconds; control group just saw the movie. A brief inventory was administered following the movie on which subjects rated their hunger, completed sentences, indicated time they last ate, etc. Analysis of variance and chi square techniques were employed to test the hypotheses.
T. R 15

13,321
Riggs, L.A. & Tulunay, S.U. VISUAL EFFECTS OF VARYING THE EXTENT OF COMPENSATION FOR EYE MOVEMENTS. *J. opt. Soc. Amer.*, Aug. 1959, 49(8), 741-745. (Hunter Laboratory of Psychology, Brown University, Providence, R.I.).

13,321
The relationship between the degree of stabilization of the retinal image and the extent of seeing a test object was studied. The test object, one degree in diameter, was a bipartite field of various luminance ratios 4.16, 2.00, 1.63, and 1.25. Two observers reported the time during which they were able to see the vertical line separating the semicircles of the target. Viewing periods were 39 seconds, rest periods, 21 seconds. The relative error of image stabilization was varied from -0.26 to 1.15 for each luminance ratio. These data provided information on the comparative effects of image motion and contrast on the maintenance of vision. The present data were related to previous work in terms of the physical characteristics of the retinal image and the physiological basis for seeing with image motion. T. G. I. R 10

13,322

Battersby, W.S. & Magman, I.H. NEURAL LIMITATIONS OF VISUAL EXCITABILITY. I. THE TIME COURSE OF MONOCULAR LIGHT ADAPTATION. *J. opt. Soc. Amer.*, Aug. 1959, 42(8), 752-759. (Mount Sinai Hospital, New York, N.Y.).

13,322

Investigation of the visual excitability changes during the course of light adaptation was aimed at distinguishing the role of neural activity from that of photochemical. The viewing situation consisted of: 1) 20-degree adapting field, 1 m. constant, 2) three-degree conditioning flash, 1, 10, or 100 m. for 5, 50, or 500 msec., and 3) 40-minute test flash, 5 msec. The conditioning and test stimuli were presented concentrically at seven degrees of arc in the temporal half-field. Intervals between these stimuli ranged from -200 msec. (test stimulus before) to +1500 msec. (test stimulus after). From the obtained thresholds of two trained observers an approximation of the photochemical contribution was made and the neural effect estimated. Some neural mechanisms are postulated. G. I.

13,323

Kelsey, Patricia A. & Schwartz, Ira. NATURE OF THE LIMIT OF THE COLOR ZONE IN PERIMETRY. *J. opt. Soc. Amer.*, Aug. 1959, 42(8), 764-769. (USN Medical Research Lab., New London, Conn.).

13,323

To "best" determine the shape of the gradient of the blue and yellow outer color zones, thresholds were measured by: 1) constant stimuli, 2) method of limits, and 3) clinical one-directional series. The stimulus, one degree presented for one sec., was placed in discrete steps at every two degrees along the lower vertical meridian. Four intensities of each stimulus were tested: blue, 2.35, 2.10, 2.04, and 2.00 ft-L; yellow, 11.25, 4.86, 2.92, and 2.32 ft-L. The surround was constant at 2.0 ft-L. Adaptation to the surround brightness (15 minutes) preceded each session (four subjects). The ranges and standard deviations of thresholds are indicated for each technique. Correlations between observers as well as between intensities for a given observer were computed. Technique reliability is discussed. T. G. R. 9.

13,324

Rawcliffe, R.D., Lichtenberger, M.W. & Krone, H.V. OPTICAL SIMULATION OF RADAR RESOLUTION. *J. opt. Soc. Amer.*, Sept. 1959, 42(9), 887-890. (University of Illinois, Urbana, Ill.).

13,324

This report presents a technique for simulating radar displays in order to evaluate simply and inexpensively the resolution required for target detectability on a given equipment. The optical system and masks used to degrade the simulated materials, aerial photographs, by known amounts are described and illustrated. Some important differences between these photographs and a radar photograph are noted. I. R. 2

13,325

Jameson, Dorothy & Hurvich, L.M. PERCEIVED COLOR AND ITS DEPENDENCE ON FOCAL, SURROUNDING, AND PRECEDING STIMULUS VARIABLES. *J. opt. Soc. Amer.*, Sept. 1959, 42(9), 890-898. (New York University, New York, N.Y.).

13,325

Alternative formal definitions of perceived color are presented and discussed in terms of overall predictive value. The importance of induction effects is thus established. An exploratory study is reported in which sensory scaling techniques were used to obtain quantitative estimates of color attribute functions and changes in these functions for the same test stimuli with different adaptation and surround conditions. Test stimuli were narrow spectral bands, two degrees by ten degrees or two degrees by one degree, presented for about one second in a 37 degree circular surround. Hue, saturation and brightness estimates were obtained. The neural and photochemical mechanisms are discussed. C. R. 24

13,326

Ogilvie, J.C. & Taylor, M.M. EFFECT OF LENGTH ON THE VISIBILITY OF A FINE LINE. *J. opt. Soc. Amer.*, Sept. 1959, 42(9), 898-900. (Defence Research Medical Labs., Toronto, Ontario, Canada).

13,326

The threshold visibility of a series of targets which ranged from a fine dark line to a square and which were presented in both a vertical and oblique orientation were determined. The viewing situation consisted of: 1) 1.25 degree circular area with luminance of 250 ft-L, 2) 1.25 degree annulus with luminance of 200 ft-L, 3) remaining visual field with luminance of 180 ft-L. Five subjects participated. Percentage visibility values found or some of the data were transformed to probits. The 50 per cent threshold values are plotted for angular area of test object as a function of angular width. T. G. R. 8

13,327

Nachias, J. TWO-DIMENSIONAL MOTION OF THE RETINAL IMAGE DURING MONOCULAR FIXATION. *J. opt. Soc. Amer.*, Sept. 1959, 42(9), 901-908. (Swarthmore College, Swarthmore, Penn.).

13,327

Two-dimensional relative motion of the retinal image along eight meridians was studied by means of trigonometric transformations of the vertical and horizontal components of eye movements. Recordings were obtained by a modification of the optical lever technique which provided simultaneous vertical and horizontal records that were independent and uncontaminated. Two subjects were used. Two types of movement were measured: 1) sudden shifts or saccades, and 2) drifts. Results are discussed in terms of: 1) relationship between saccadic and drift movement, 2) latency of saccades, 3) position of the eye during fixation and movement. T. G. I. R. 10

13,328

Newhall, S.M., Burnham, R.W. & Evans, R.M. INFLUENCE OF SHADOW QUALITY ON COLOR APPEARANCE. *J. opt. Soc. Amer.*, Sept. 1959, 42(9), 909-917. (Eastman Kodak Company, Rochester, N.Y.).

13,328

The effect of a shadow of zenith skylight quality upon the color appearance of various test samples was determined, and compared to that obtained under a daylight quality shadow. The test sample appeared in the left aperture and the colorimeter in the right. Four lighting conditions of the test sample were tested: 1) illuminated surround of 13.5 ft-L, 2) daylight shadow of 2.5 ft-L, 3) skylight shadow of 2.5 ft-L, and 4) half illuminated and half skylight shadow. Three observers participated. All color appearance matches are presented as Munsell rennotations. T. G. I. R. 4

13,329

Sperling, H.G. & Lewis, M.G. SOME COMPARISONS BETWEEN FOVEAL SPECTRAL SENSITIVITY DATA OBTAINED AT HIGH BRIGHTNESS AND ABSOLUTE THRESHOLD. *J. opt. Soc. Amer.*, Oct. 1959, 42(10), 983-989. (USN Medical Research Lab., New London, Conn.).

13,329

This study provides information on: 1) relationship between high brightness and threshold luminosity functions, 2) description of humps and dips in spectral sensitivity functions which will allow for a theoretical synthesis in terms of underlying functions, and 3) relationship between combined color mixture functions in luminance units and the luminosity function based on different methods of measurement. Foveal spectral sensitivity was measured at 28 wavelengths at ten mu intervals from 410 to 690 by: 1) absolute thresholds using 2-degree and 45-minute stimuli, 2) flicker photometry, and 3) heterochromatic brightness matching. Appropriate adaptation periods preceded testing. T. G. R. 19

13,330

Shurcliff, W.A. NEW VISUAL PHENOMENON: THE GREENISH-YELLOW BLOTCH. *J. opt. Soc. Amer.*, Nov. 1959, 49(11), 1041-1048. (Polaroid Corporation, Cambridge, Mass.).

13,330

This report describes a new phenomenon of color visions: an observer viewing a uniform physical field suddenly sees his perceptual field break up into areas, patterns, and background that are very different in color. The experimental findings presented are qualitative; they are descriptions of the spectral compositions of the fields, and classification of the patterns. The latter category includes findings on the range of sizes, shapes, colors, and durations of the patterns and exploration of time-delay, sequence, and repetition effects. From an analysis of these observations, a simple model of the proposed mechanisms is derived.

T. I. R. 1

13,331

Evans, R.M. FLUORESCENCE AND GRAY CONTENT OF SURFACE COLORS. *J. opt. Soc. Amer.*, Nov. 1959, 49(11), 1049-1059. (Eastman Kodak Company, Rochester, N.Y.).

13,331

This is an investigation of the colors in the Munsell SR plane using the ordinary surface colors and colors produced in a small aperture in a large white illuminated surround. With surface colors, four observers made four sets of observations each on white, gray, and black backgrounds by selecting samples according to each of four series: 1) constant chroma, 2) constant saturation, 3) constant contrast with the background, and 4) constant gray content. With aperture colors the observers made observations for four loci: 1) same gray content threshold, 2) zero gray or fluorescence threshold, 3) brightness match threshold, and 4) illuminant mode threshold. The results suggested several hypotheses which were further explored experimentally. T. G. I. R. 11

13,332

Hanes, R.M. & Rhoades, M.V. COLOR IDENTIFICATION AS A FUNCTION OF EXTENDED PRACTICE. *J. opt. Soc. Amer.*, Nov. 1959, 49(11), 1060-1064. (Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.).

13,332

To determine whether or not substantial improvement in color identification could be obtained with extended practice, one observer studied color chips in the Munsell 21-Chart Student Set for several hours each day for about five months, and underwent two-hour test sessions once a week during this period. The observer selected the method of study and the initial set of colors. Subsequently, the test session results were the basis for deleting hues as well as adding them. Upon completion of the five-month period, three additional test sessions were administered, one a week later, one a month later, and one about three and one-half months later. Number and kind of errors are presented. The results are discussed and compared to other recent findings on color memory. T. G. I. R. 2

13,333

Silverman, R.E. THE COMPARATIVE EFFECTIVENESS OF ANIMATED AND STATIC TRANSPARENCIES. *J. appl. Psychol.*, Feb. 1959, 43(1), 16-20. (New York University, New York, N.Y.).

13,333

To evaluate the relative training effectiveness of animated versus static transparencies, 150 male students were first trained with three devices each differing in the number of moving parts; then they were tested on three types of tests each differing in the amount of performance as compared to verbal components. The training devices were: pistol, carbine, and rifle. Means and standard deviations of the error scores were obtained for each of the three tests and analyses of variance were performed.

T. R. 2

13,334

Uhr, L. SEX AS A DETERMINANT OF DRIVING SKILLS: WOMEN DRIVERS. *J. appl. Psychol.*, Feb. 1959, 43(1), p. 35. (University of Michigan, Ann Arbor, Mich.).

13,334

This is a very brief statistical treatment by chi square technique of judgments of auto driver's behavior as dangerous or safe in 25 incidents. The major variable was sex of the subject.

T. R. 4

13,335

Karenetzky, J. CONTRAST AND CONVERGENCE EFFECTS IN RATINGS OF FOODS. *J. appl. Psychol.*, Feb. 1959, 43(1), 47-52. (USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill.).

13,335

Several assumptions were set forth as to the rating of foods as poor or good and predictions were then made as to how these ratings would be influenced by the order in which the foods were judged. Four groups of 40 subjects rated each of four samples, presented in one of four orders, on a nine-point scale. An analysis of variance of these preference ratings was performed for each of the four sets of data. The results are discussed in terms of convergence and contrast effects.

T. R. 2

13,336

Thomas, D.D. ELECTRONIC AIR TRAFFIC CONTROL. *Systems*, July-Aug. 1959, XXIII(4), 4-6. (Federal Aviation Agency, Washington, D.C.).

13,336

This brief article discusses the Federal Aviation Agency's first step in its program for establishing a nationwide network of computers that will aid in air traffic control. This step was the installation of the electronic computer in the high-density traffic routes of the Northeast. The major jobs performed by the computers are indicated.

I.

13,337

Graham, Elaine & Landis, C. EFFECTS OF STRIATED FIELDS ON CRITICAL FLICKER FREQUENCY. *J. opt. Soc. Amer.*, June 1959, 49(6), 580-585.

13,337

This is an attempt to study systematically the effect of striated fields upon the critical flicker frequency (cff). The test stimulus, 8.5 degrees on a side, contained gratings which subtended 0.63, 0.21, 0.07 and 0.025 degree. Retinal illuminance was varied over about six log trolands (5.02 to -0.48 log trolands). Two subjects were employed. Two sets of monocular cff thresholds were obtained with each grating for each brightness. The findings are compared to those obtained by other researchers, in terms of patterned versus unpatterned fields.

T. G. R. 20

13,338

Duncan, C.P. RECENT RESEARCH ON HUMAN PROBLEM SOLVING. *Psychol. Bull.*, Nov. 1959, 56(6), 397-429. (Northwestern University, Evanston, Ill.).

13,338

This review of most of the human problem solving studies published in the period 1946 through 1957 is composed of the following sections: definitions; independent variables that influence this behavior, e.g., transfer following different methods and amounts of training, variations within the problem itself, individual difference variables; problem solving processes; theory; and conclusions (representing the author's summary analysis of the literature).

R. 114

13,339

Mayo, S.T. TOWARD STRENGTHENING THE CONTINGENCY TABLE AS A STATISTICAL METHOD. *Psychol. Bull.*, Nov. 1959, 56(6), 461-470. (Loyola University, Chicago, Ill.).

13,339

This paper describes briefly some contingency techniques and demonstrates the manner in which they overcome problems which have limited the usefulness of the contingency method. The problems and their accompanying solutions which are considered here include small samples; indices of relationship; specification of hypotheses, higher-order interactions, and computational procedures. The benefits accrued from these techniques are cited for the present as well as future analyses.

R 45

13,340

Glanzer, M. & Glaser, R. TECHNIQUES FOR THE STUDY OF GROUP STRUCTURE AND BEHAVIOR: I. ANALYSIS OF STRUCTURE. *Psychol. Bull.*, Sept. 1959, 56(5), 317-332. (American Institute for Research, Pittsburgh, Penn. & University of Pittsburgh, Pittsburgh, Penn.).

13,340

This paper examines the work on structure of groups or teams with emphasis on communication structure. The following techniques for simplifying and analyzing the complex data generated by groups are presented: 1) indices for group and individual characteristics, e.g. index of concentration, hierarchy index, status index, 2) enumeration of structures, e.g. distribution of subgroup configurations, 3) comparison of groups, e.g. comparison of matrices using cell entries, 4) analysis of subgroups, e.g. diagonal maximization method, 5) assignment of individuals to subgroups, 6) other approaches: graph theory, logic of relations.

T. R 47

13,341

Myers, J.L. ON THE INTERACTION OF TWO SCALED VARIABLES. *Psychol. Bull.*, Sept. 1959, 56(5), 384-391. (University of Massachusetts, Amherst, Mass.).

13,341

This paper presents a "complete analysis of the (a-1)(b-1) degrees of freedom involved in the interaction of two independent, scaled variables, A and B." The aim is to extend present understanding of the interaction term and to introduce a method which will permit inferences about rate of change of slope and curvature coefficients. The analysis is carried out with data from a five by three factorial with four entries in each of 15 cells. This technique may be used to describe a number of relationships, some of which are cited.

T. R 3

13,342

Gaito, J. MULTIPLE COMPARISONS ON ANALYSIS OF VARIANCE. *Psychol. Bull.*, Sept. 1959, 56(5), 392-393. (Wilkes College, Wilkes-Barre, Penn.).

13,342

Several examples of partitioning the n-degrees of freedom for the main effect into n orthogonal components, each with one degree of freedom, are presented. This procedure enables one to make multiple comparisons in analysis of variance after rejection of the null hypothesis.

R 5

13,343

Iriandis, H.C. A CRITIQUE AND EXPERIMENTAL DESIGN FOR THE STUDY OF THE RELATIONSHIP BETWEEN PRODUCTIVITY AND JOB SATISFACTION. *Psychol. Bull.*, July 1959, 56(4), 309-312. (University of Illinois, Urbana, Ill.).

13,343

This paper points up the inadequacy of current methods for studying the relationship between output and job satisfaction via a brief analysis of the findings in the literature. A procedure for such a study is developed and described; it includes three phases: 1) obtaining norms for output and satisfaction for a given job, 2) showing each worker on the output-satisfaction graph to obtain group working at optimum, 3) comparing others against the optimum group.

G. R 11

13,344

Campbell, D.T. & Fiske, D.W. CONVERGENT AND DISCRIMINANT VALIDATION BY THE MULTITRAIT-MULTIMETHOD MATRIX. *Psychol. Bull.*, March 1959, 56(2), 81-105. (Northwestern University, Evanston, Ill. & University of Chicago, Chicago, Ill.).

13,344

A validation process is suggested which utilizes a matrix of intercorrelations among tests representing at least two traits, each measured by at least two methods. Those aspects of validity emphasized in the process include: 1) evidence of convergent validity by independent measurement procedures, 2) evidence of discriminant validity or minimum correlations with tests which are supposed to differ, 3) evidence of higher relations between independent measures of the same trait than between measures of different traits, 4) evidence of same pattern of trait interrelationship in all heterotrait triangles of mono- and heteromethod blocks of the matrix. Other multitrait-multimethod matrices are discussed in terms of the four criteria, and the problems in achieving these are considered. T. R 36

13,345

Haggard, E.A., Chapman, Jean P., Isaacs, K.S. & Dickman, K.W. INTRACLAS CORRELATION VS. FACTOR ANALYTIC TECHNIQUES FOR DETERMINING GROUPS OF PROFILES. *Psychol. Bull.*, Jan. 1959, 56(1), 48-57. (University of Illinois, Urbana, Ill.).

13,345

This study examined and compared several methods for determining profiles of groups, mainly for the condition when a criterion for grouping already exists. The data used here were 12 Minnesota Multiphasic Personality Inventory profiles obtained in a clinic setting. The procedure consisted of two distinct approaches: factor analytic and direct correlation. The findings thus obtained were considered under four topics: 1) what natural groupings exist among the profiles, 2) what aspects of the profiles should be considered in forming groups, 3) what types of criterion profiles may be used in forming groups, and 4) how can one determine the group membership of individual profiles.

T. R 6

13,346

Cliff, N. ADVERBS AS MULTIPLIERS. *Psychol. Rev.*, Jan. 1959, 66(1), 27-44. (Princeton University, Princeton, N.J.).

13,346

To determine whether the common adverbs of degree, e.g. very, slightly, quite, multiply the intensity of the adjectives they modify, three groups of subjects rated the combinations of nine intensive adverbs with 15 evaluative adjectives on an 11-point scale from most unfavorable through neutral to most favorable, and they also made paired comparison judgments on a sample of the same stimuli. The method of successive intervals was used to determine the scale values of each adverb-adjective combination. A matrix method was employed to analyze the data. The findings are discussed and compared to other relevant research, e.g. Stevens, Jones and Thurstone, Csgood. Directions for further research are indicated.

T. R 16

13,347

Wertheimer, M. ON DISCRIMINATION EXPERIMENTS. I. TWO LOGICAL STRUCTURES. *Psychol. Rev.*, July 1959, 66(4), 252-266. (New School for Social Research, New York, N.Y.).

13,347

Two different logical structures are set forth as a basis for understanding learning to respond correctly in discrimination experiments. The essential factors in the first one are the differences between each of the members of the test pair and each of the training stimuli, i.e. the correct response occurs on the basis of recognition of absolute qualities. The important factors in the second one are the relations within the test and training pair, i.e. the position in relational structures. The factors which favor absolute over relational reactions are discussed in terms of the two structures. Finally, the ability of the relational structure to handle also the absolute is considered.

I. R 6

13,349

Rindra, D. STIMULUS CHANGE, REACTION TO NOVELTY, AND RESPONSE DECREMENT. *Psychol. Rev.*, March 1959, 66(2), 96-103. (McGill University, Montreal, Canada).

13,349

This paper suggests how "novelty" in the test situation may determine response decrement and develops a basis for predicting the effects of a stimulus change by specifying the nature and determinants of "novelty" reactions. Essentially an additional proposition is proposed beyond Estes' and Bush and Mosteller's mathematical formulation of Guthrie's common-element model. This is "any change in stimulus elements from the training to the test situation produces response decrement because, and to the extent that, the novelty provided by the altered stimulus elements evokes interfering reactions-to-novelty." Three empirically testable implications of this formulation are worked out in detail.

R 20

13,350

Foley, P.J. THE FOREPERIOD AND SIMPLE REACTION TIME. *Canad. J. Psychol.*, March 1959, 13(1), 20-22. (Defence Research Medical Labs., Toronto, Ontario, Canada).

13,350

This experiment investigated the relation between the ready signal and the optimum duration of the foreperiod in simple reaction time. Eight subjects responded to the onset of the stimulus light by pressing a key. There were twenty presentations for each of nine conditions. The duration of the ready signal, the time between cessation of ready signal and onset of stimulus and the total time, i.e. the addition of these two intervals, were varied. The combinations of these values made up the nine conditions. Mean reaction times were obtained, and an analysis of variance was carried out.

T. R 3

13,351

Churchill, A.V. A COMPARISON OF TACTUAL AND VISUAL INTERPOLATION. *Canad. J. Psychol.*, March 1959, 13(1), 23-27. (Defence Research Medical Labs., Toronto, Ontario, Canada).

13,351

This experiment investigated the effect of the visual vs. tactual sense modality on scale interpolation. The scale consisted of 11 rods ranging from one-half to one and one-eighth inch in diameter, in one-sixteen inch increments. The one-half inch rod was "zero" and the one and one-eighth inch rod "ten"; they were 12 inches apart. Ten subjects estimated the unit position within the interval (nine intervals) represented by each of nine rods, each presented six times in a random series of 54 presentations. These judgments were made by both modalities, the equipment appropriately modified for each. Interpolation errors were scored in terms of magnitude and frequency. Chi square was used for analyzing the under- and overestimation categories.

G. R 1

13,352

Thornton, G.B. ENG CHANGES IN A RETROACTION EXPERIMENT USING A PERCEPTUAL MOTOR TASK. *Canad. J. Psychol.*, March 1959, 13(1), 49-58. (University of Toronto, Toronto, Ontario, Canada).

13,352

This investigation was aimed at determining whether muscle tension varies systematically with practice on a two-hand tracking task and with the successive acquisition of competing response tendencies. Fifty males, divided into five groups, performed the Two-Hand Coordinator motor task, each with different intervening activity between the original learning and relearning phase, e.g., rest, reversed task, additional trials on original task. Electromyograph was measured from the forearm during all practice periods, as well as time-on-target. Covariance analysis was performed on the between-groups differences of the time-on-target means, and on the mean electromyograph scores between original and relearning.

T. G. R 20

13,353

Powesland, P.F. THE EFFECT OF PRACTICE UPON THE PERCEPTION OF CAUSALITY. *Canad. J. Psychol.*, Sept. 1959, 13(3), 155-168. (Queen's University, Kingston, Ontario, Canada).

13,353

To study the effects of practice upon the perception of causality 40 subjects in eight groups judged the causality of a bar falling because a post was removed after practice with different intervals of delay between the above two events (0.0 to 1.0 seconds). These judgments were then made during a random series of delays, after each group received different kinds and amounts of interpolated practice, and again during a random series of delays. In a second experiment 43 subjects in five groups judged whether or not one object's movement caused the other's. Similar practice, test, interpolated treatments, and post-test procedures were used. In all cases temporal thresholds of causality were obtained. The Kruskal-Wallis One-Way Analysis of Variance, the Walsh Test, etc. were used to analyze the data. T. R 11

13,354

Bousfield, W.A., Berkowitz, H. & Whitmarsh, G.A. ASSOCIATIVE CLUSTERING IN THE RECALL OF MINIMALLY MEANINGFUL GEOMETRIC DESIGNS. *Canad. J. Psychol.*, Dec. 1959, 13(4), 281-287. (University of Connecticut, Storrs, Conn.).

13,354

The development of associative clustering was studied using four categories of minimally meaningful and simple geometric designs, a total of 24 designs. Twenty-five undergraduates participated. The subject drew each stimulus as it was presented; after the final item he began his first recall. There were five successive recall sequences. Seven types of scores were obtained, e.g., number of items correctly recalled, number of irrelevant intrusions. A split-plot design was used. The data were analyzed by analysis of variance technique. The applicability of this technique for studying concept formation was discussed.

T. I. R 6

13,355

Haire, M. PSYCHOLOGICAL PROBLEMS RELEVANT TO BUSINESS AND INDUSTRY. *Psychol. Bull.*, May 1959, 56(3), 169-194. (University of California, Los Angeles, Calif.).

13,355

The conceptual history of psychology in industry is discussed as seen within its three separate traditions: personnel, human engineering, and industrial social. Several major points are considered: in personnel, the problems of selection such as identification of multiple criteria and their combination and weighting; in human engineering, the problems associated with kinds and sources of error in man-machine systems; in industrial social, the problems of large group organization as well as the small group, and the basic problems of motivation and communication. In all areas, the directions for future research are discussed, e.g., training assessment, risk-taking and decision theory, organization theory, etc.

R 96 (approx.)

13,356

Maxwell, A.E. STATISTICAL METHODS IN FACTOR ANALYSIS. *Psychol. Bull.*, May 1959, 56(3), 228-235. (University of London, London, England).

13,356

This article reviews some large sample statistical methods which are of value to factor analysis. Included are: test for the significance of a correlation matrix, tests for the significance of a residual matrix, methods for estimating the standard errors of factor loadings. These tests are critically discussed and an approach in the search for psychologically meaningful factors is recommended.

I. R 44

13,357

Boward, E.W. THE EFFECTS OF SOCIAL STIMULI ON THE RESPONSE TO STRESS. *Psychol. Rev.*, Sept. 1959, 66(5), 267-277. (Montreal Neurological Institute, Montreal, Quebec, Canada).

13,357

This paper discusses the effects of present social experience on the response to stress. The literature concerning effects of stress (physiological and psychological) on the organism, especially as it relates to the pituitary-adrenal response was reviewed first. Studies suggesting that social stimuli dampen the response to stress were reviewed next. The usefulness of measures of activity of the sympathetic division as well as the pituitary-adrenal cortical response as an index of response to stress was pointed out. Implications of the hypothesis that social stimuli dampen response to stress for fields "as widely different as psychotherapy and interplanetary exploration" were pointed out.

R 43

13,358

Bourne, L.E., Jr. & Restle, F. MATHEMATICAL THEORY OF CONCEPT IDENTIFICATION. *Psychol. Rev.*, Sept. 1959, 66(5), 278-296. (University of Utah, Salt Lake City, Utah & Michigan State University, East Lansing, Mich.).

13,358

This paper reports an attempt to "extend a theory of discriminative learning so as to analyze the process of identifying concepts." This was accomplished by a) theoretical analysis of animal and human learning in simple discrimination problems, and b) use of the procedures of concept-identification. The theory employed states that "discrimination learning involves two processes—conditioning relevant cues and adapting irrelevant cues." In the experiments reported, such stimulus dimensions as color, size, shape, number, and position were varied. The theory was used next in mathematical form, and to mediate quantitative predictions.

T. G. R 15

13,359

Smith, A.A. THE GEOMETRY OF VISUAL SPACE. *Psychol. Rev.*, Sept. 1959, 66(5), 334-337. (Defence Research Medical Labs., Toronto, Ontario, Canada).

13,359

This brief paper gives an analysis of visual space perception in which "only stimuli consisting entirely of isolated point-sources in otherwise dark surroundings" were considered. The probability dispersion of points in the visual field was considered, and led to an expression for the uncertainty of the scale of measurement.

R 5

13,360

Rock, I. & Ebenholtz, S. THE RELATIONAL DETERMINATION OF PERCEIVED SIZE. *Psychol. Rev.*, Nov. 1959, 66(6), 387-401. (New School for Social Research, New York, N.Y.).

13,360

To test the hypothesis that perceptual qualities of ten are determined by relational rather than by absolute characteristics of the stimulus, a series of experiments were performed to investigate the extent to which phenomenal size is relationally determined, the role which distance plays, and the combined effects of these variables on size constancy.

I. R 9

13,361

Jerison, H.J. EFFECTS OF NOISE ON HUMAN PERFORMANCE. *J. Appl. Psychol.*, April 1959, 43(2), 96-101. (Antioch College, Yellow Springs, Ohio).

13,361

Three experiments were performed to determine the effects of noise on nonauditory performances: vigilance, mental counting, and time judgment tasks. Noise levels used were approximately 80 db. for "quiet" and 110 db. for "noise". Vigilance was measured via a clock-watching task, time judgments via estimation of the passage of ten-minute intervals, mental counting via keeping separate counts of three flashing lights. The findings were analyzed by analysis of variance or t-tests, and discussed in terms of psychological stress.

T. G. I. R 16

13,362

Torrance, E.P. AN EXPERIMENTAL EVALUATION OF "NO-PRESSURE" INFLUENCE. *J. Appl. Psychol.*, April 1959, 43(2), 109-113. (University of Minnesota, Minneapolis, Minn.).

13,362

This study was aimed at assessing the relative effectiveness of six degrees of pressure exerted by instructors in indoctrinating aircrewmembers for an emergency ration. One control and six experimental groups were formed; 427 men were assigned to these. The pressure ranged from none through information, group explanation to the greatest evaluation. Subjects were given the emergency ration for use during the simulated survival experience. Criteria of acceptance and measures of perceived instructor pressure were then obtained. Chi squares were performed on the data.

T. R 4

13,363

Wakeley, J.H. QUANTIFICATION OF THE TERM "OBJECTIONABLE" AS APPLIED TO COLORANTS IN NATURAL WATERWAYS. *J. Appl. Psychol.*, April 1959, 43(2), 137-140. (North Carolina State College, Raleigh, N.C.).

13,363

To determine a method for giving quantitative meaning to the term "objectionable" as it applies to colored wastes in streams, 20 subjects observed a simulated natural stream as it was gradually changed by the addition of each of six colorants: red, orange, yellow, green, blue, violet, and indicated when it became objectionable. A color-difference formula was used to obtain scores for each colorant. The distribution of these scores was determined and scores were determined which would be objectionable to fewer than five per cent of the population.

T. I. R 6

13,364

Groth, Hilde & Lyman, J. EFFECTS OF MASSED PRACTICE AND THICKNESS OF HANDCOVERINGS ON MANIPULATION WITH GLOVES. *J. Appl. Psychol.*, June 1959, 43(3), 154-161. (University of California, Los Angeles, Calif.).

13,364

This study examined the effects of thickness of selected handcovering materials on three criterion measures of manipulatory skill. Subjects were 24 male undergraduates divided into four groups. The task, a self-paced one, was placement of a cylinder in a recess on a control board which corresponded in location to a light in the display matrix. Prehension force, number of transports, and time per transport were recorded at three-minute intervals. Four handcovering conditions, one per group, cotton glove, leather glove, Arctic mitten, bare hand were tested. The data were analyzed by analyses of variance technique.

T. G. R 14

13,365

Winick, C. ART WORK VERSUS PHOTOGRAPHY: AN EXPERIMENTAL STUDY. *J. appl. Psychol.*, June 1959, 43(3), 180-182. (Columbia University, New York, N.Y.).

13,365

The effectiveness of art work vs. photography for advertising purposes was studied. Four paired advertisements, one a photograph and one using art work, were ranked on a four-point scale by a sample of 962 adults on the dimensions: most liked, believability, and recall. Chi square tests were performed on the combined ranks for each dimension.

R 5

13,366

Calvin, A.D. & Dollenmayer, Karen S. SUBLIMINAL PERCEPTION: SOME NEGATIVE FINDINGS. *J. appl. Psychol.*, June 1959, 43(3), 197-198. (Hollins College, Hollins, Va.; & Northwestern University, Evanston, Ill.).

13,366

To investigate subliminal perception, 60 female undergraduates were presented a two-word message at exposure speeds of .01, .02, and .03 second which, if perceived, would influence their choice of stimuli. Half of the subjects at each speed were given knowledge of results. An analysis of variance was conducted on the mean number of correct choices for each group.

T. R 3

13,367

Meadow, A. & Parnes, S.J. EVALUATION OF TRAINING IN CREATIVE PROBLEM SOLVING. *J. appl. Psychol.*, June 1959, 43(3), 189-194. (University of Buffalo, Buffalo, N.Y.).

13,367

To evaluate the effects of a creative problem-solving course on creative abilities and selected personality variables, pre- and post-measures were obtained on a group of 54 subjects taking a creative problem-solving course, and 54 subjects enrolled in other courses. These groups were matched very closely for age and Wechsler vocabulary score. The measures were: 1) two on quantity of ideas, 2) five on quality of ideas, 3) three on personality variables. To control for initial differences, analysis of covariance was used for the comparisons between experimental and control measures.

T. R 15

13,368

Baker, C.H. & Boyes, G.E. INCREASING PROBABILITY OF TARGET DETECTION WITH A MIRROR-IMAGE DISPLAY. *J. appl. Psychol.*, June 1959, 43(3), 195-198. (Defence Research Medical Labs., Toronto, Ontario, Canada).

13,368

This study was concerned with increasing the probability of detection of targets near locations representing maximum range on a radar-like display on which maximum range was presented by the center of the sweep line. Essentially the radar display was the B-scan type arranged as a "mirror-image" display. Two groups of subjects were tested on each of four conditions: conventional, horizontal, horizontal mirror-image, and vertical mirror-image; for one group the mirror-image display was twice the area of the others, for the other it had been equated. Targets were presented for one second at each of 13 locations. Target detections per display were compared by analysis of variance.

T. I. R 3

13,369

Bourassa, G.L. & Guion, R.M. A FACTORIAL STUDY OF DEXTERITY TESTS. *J. appl. Psychol.*, June 1959, 43(3), 199-204. (Allis Chalmers Manufacturing Company, Milwaukee, Wisc.; & Bowling Green State University, Bowling Green, Ohio).

13,369

A battery of dexterity and vision tests was factor analyzed to: 1) identify a "tweezer dexterity" factor and 2) determine the relationship between fine dexterities and visual skills, particularly depth perception. The battery was composed of tests constructed on the assumption of: 1) manual dexterity, 2) finger dexterity, 3) tweezer dexterity, 4) visual acuity, and 5) depth perception. Subjects were 100 female undergraduates. Thurstone's centroid method was used for the analysis, and five factors were extracted, three of these were identified.

T. R 11

13,370

Smith, E.E. & Kight, S.S. EFFECTS OF FEEDBACK ON INSIGHT AND PROBLEM SOLVING EFFICIENCY IN TRAINING GROUPS. *J. appl. Psychol.*, June 1959, 43(3), 209-211. (University of Delaware, Newark, N.J.).

13,370

This study was conducted in a field setting to determine whether 1) feedback will increase group productivity and self-insight, and 2) subgroup structure will result in increased group productivity and self-insight. Subjects were 54 male and 49 female foremen who were participating in a five-day management training course. There were subgroups with and without feedback and the control condition with no subgrouping. The task was a problem-solving type. Number of problems solved was compared for the feedback and group conditions by a non-parametric rank test.

T. R 5

13,371

Kay, B.R. THE USE OF CRITICAL INCIDENTS IN A FORCED-CHOICE SCALE. *J. appl. Psychol.*, Aug. 1959, 43(4), 259-270. (University of New Hampshire, Durham, N.H.).

13,371

This article illustrates the use of critical incidents in a forced-choice scale through the evaluation and analysis of the performance of foremen. The incidents were obtained through interviews with the personnel. These were then rated in terms of three levels of foremen performance for each foreman. The foremen were also rated independently by supervisors. These ratings were compared by correlation techniques.

T. R 5

13,372

Eilbert, L.R. & Glaser, R. DIFFERENCES BETWEEN WELL AND POORLY ADJUSTED GROUPS IN AN ISOLATED ENVIRONMENT. *J. appl. Psychol.*, Aug. 1959, 43(4), 271-274. (American Institute for Research, Pittsburgh, Penn.).

13,372

This study "is concerned with the identification of possible predictors of personal adjustment to conditions of Arctic isolation." Subjects were 648 enlisted personnel. They were first rated by supervisors as to well or poorly adjusted. Then several measures were used to compare the two groups: biographical inventory, self-appraisal blank, incomplete sentences test, anxiety scale, medical symptoms list, etc. Also, aptitude and job proficiency scores were obtained. Mean scores on the various instruments were compared statistically for the two groups. Further study is suggested.

R 12

13,373

Keehn, J.D. FACTOR ANALYSIS OF REPORTED MINOR PERSONAL MISHAPS. *J. appl. Psychol.*, Oct. 1959, 43(5), 311-314. (American University of Beirut, Beirut, Lebanon).

13,373

This study investigated the view that past accident records can be used to predict accident likelihood in a Near Eastern cultural setting. A questionnaire about accidents and minor mishaps was administered to 100 males, mostly Arab university students. A factor analysis was performed on the intercorrelations between the responses. One general and three group factors were found.

T. R 9

13,374

Klemmer, E.T. NUMERICAL ERROR CHECKING. *J. appl. Psychol.*, Oct. 1959, 43(5), 316-320. (IBM Research Center, Yorktown Heights, N.Y.).

13,374

This study investigated the speed and accuracy of numerical error checking as a function of the probability of randomly placed errors and horizontal grouping of digits. Three error probabilities, 0.1, .01, and .001 and ten horizontal groupings involving groups of one through ten digits were tested on 30 naive and four trained subjects. Sessions were about 40 minutes. The findings were interpreted in terms of information handling rates.

T. G.

13,376

Meadow, A., Parnes, S.J. & Reese, H. INFLUENCE OF BRAINSTORMING INSTRUCTIONS AND PROBLEM SEQUENCE ON A CREATIVE PROBLEM SOLVING TEST. *J. appl. Psychol.*, Dec. 1959, 43(6), 413-416. (University of Arizona, Tucson, Ariz. & University of Buffalo, Buffalo, N.Y.).

13,376

To study the effects on creative problem solving of brainstorming vs. nonbrainstorming instructions, 32 college students, divided into four groups, were given either the Hanger or the Broom problem under one of the above sets of instructions. (They were given the other problem under the other instructions in the second testing session.) The mean number of good solutions were compared for instructions, problems, test periods by analysis of variance technique.

T. R 11

13,377

Lattes, V.G. EFFECTS OF MEPROPAMATE ON FEAR AND PALMAR SWEATING. *J. abnorm. soc. Psychol.*, Sept. 1959, 59(2), 156-161. (Johns Hopkins University, Baltimore, Md.).

13,377

Palmar sweating and self-ratings of "fear" were studied under the effects of meproamate. Twenty subjects were given either placebo or the drug, went to a ferris wheel site, had initial palmar sweating measurements taken, rode a ferris wheel and made self-ratings of the amount of "fear" experienced after each revolution. A second palmar sweating determination of 15 minutes (including a 10-minute ferris wheel ride) was made 45 minutes after the first ride. A brief discussion of the results is presented.

T. G. R 11

13,378

Pouliot, S. & Misiak, H. THE MEASUREMENT OF NEGATIVE AFTER-IMAGES IN FIRST-GRADE BOYS AND GIRLS. *J. genet. Psychol.*, Sept. 1959, 95(First Half), 13-17. (Fordham University, New York, N.Y.).

13,378

In order to develop a procedure for measuring latency, duration, and reappearances of after-images of young children, 40 American-born, white, six-year old children of both sexes made after-image responses to a set of nine stimuli administered in two sessions, nine days apart. All children were tested for color blindness, color naming, and animal and bird identification. The effect of color and sex on latency, duration, and reappearances of after-images was calculated and subjected to t-test. Discussion concerns the effects of the two independent variables.

T. R 2

13,379

Botwinick, J., Brinley, J.F. & Robbin, J.S. MODULATION OF SPEED OF RESPONSE WITH AGE. *J. genet. Psychol.*, Sept. 1959, 95(First Half), 137-144.

13,379

To determine the effect of age on "adaptive" slow performance, when instructions required slow performance, 34 "young" subjects (18-32 years) and 29 "old" subjects (65-81 years) were required to write in normal fashion, "New Jersey Chamber of Commerce." Subjects then wrote the same phrase at optimum speed levels (slow-fast-slow). Writing time was measured as a function of age and education. Pearson product moment correlations were performed on results. Discussion is in terms of performance ranges as a function of age and motivational factors.

G. R 15

13,381

Rohrer, J.H. HUMAN ADJUSTMENT TO ANTARCTIC ISOLATION. *Naval Research Reviews*, June 1959, 1-6. (Georgetown University School of Medicine, Washington, D.C.).

13,381

The data reported here were collected for the purpose of providing better criteria for the Navy personnel assessment program. Reactions to isolation at stations in the Antarctic were discussed as these related to adjusting to other people in small as compared to larger stations, and in terms of duration of the isolation. Reactions of the men who were observed were discussed as these occurred over time, e.g., depressed and regressive behavior which occurred during winter, in terms of boredom, "problem" men, and characteristic reactions during final period of isolation.

13,384

Cocke, E.F. SOME EFFECTS OF INTERRUPTION FREQUENCY ON THE PERCEPTION OF DIRECT CURRENT PHOSPHENES. *Percept. Mot. Skills*, June 1959, 9(2), 183-189. (University of Washington, St. Louis, Mo.).

13,384

Contradictory findings reported in the literature regarding fusion for direct current stimulation were investigated in this study. A second goal of the investigation was to determine the effects of varying direct current pulse frequency on a phosphene threshold once this threshold had been obtained. One experienced subject served in three experimental sessions designed to investigate the first problem. Thirteen subjects were used to investigate the second question. Results were discussed as they related to previously reported findings regarding phosphene fusion.

T. R 4

13,385

Ammons, R.B. & Ammons, C.H. MOTOR SKILLS BIBLIOGRAPHY: XXVI. PSYCHOLOGICAL ABSTRACTS, 1955, VOLUME 29, FIRST HALF. *Percept. Mot. Skills*, June 1959, 9(2), 199-202. (Montana State University, Missoula, Mont.).

13,385

This bibliography of ninety-eight titles covers the first half of *Psychological Abstracts* for 1955. The abstract number is included, together with title of the article, author, and journal reference.

R 98

13,386

Zajac, J.L. DEPTH PERCEPTION OF STEREOSCOPIC IMAGES RESULTING FROM FUSION OF CROSSED AND UNCROSSED DOUBLE IMAGES. *Amor. J. Psychol.*, June 1959, LXXII(2), 163-183. (University of Edinburgh, Edinburgh, Scotland).

13,386

Two experiments studied depth perception and relief using a "natural stereoscope". In experiment I, a stationary rod, 6 mm. in diameter, was placed 41.4 cm. in front of the subject in his median plane. A farther rod (same size) was varied, in ten cm. steps, from 70 to 150 cm. A fixated rod was introduced between them at appropriate distances. In experiment II, the farther object was a cardboard strip 1.75 cm. wide moved from 80 to 157 cm. From the results the author develops a theory of stereoscopic vision based on three laws which are discussed.

T. G. I. R 9

13,387

Pomeroy, J.S., Wallach, H.A. & Coleman, E.L. THE IDENTIFICATION OF INCIDENT REGULARITY. *AMST. J. PSYCHOL.*, June 1959, LXXII(2), 280-289. (Harvard University, Cambridge, Mass. & University of Pennsylvania, Philadelphia, Penn.).

13,387

To examine sources of interference that prevent rapid, efficient identification of recurrent regularities in the environment, 92 subjects (in eight groups) predicted in which window (left or right) a light would appear. Prediction accuracy determined the amount of memory stored. Variations in procedure included: 1) degree of stimulus interference—introduction of the out-of-pattern stimuli; 2) degree of response interference—one group matched the light sequences (according to instructions) for the first three presentations; and 3) cost of error—knowledge of points earned for a correct response and lost for an incorrect. The results are related to problem-solving theory.
T. G. R 6

13,388

James, L.V. SOME INTRINSIC FINDINGS UNDER THE METHOD OF SUCCESSIVE INTERVALS. *AMST. J. PSYCHOL.*, June 1959, LXXII(2), 220-229. (University of North Carolina, Chapel Hill, N.C.).

13,388

This article discusses invariance of different scaling methods under various conditions. Specifically, invariance of the estimates of scale parameters obtained by the method of successive intervals is discussed. The invariance of equal interval scales is demonstrated under a number of conditions: 1) under changes in the number of categories and anchoring phrases used to define categories of a rating form; 2) when the assumptions of normality of subjective distribution is replaced by an assumption of normal error distribution of differences in subjective values obtained from repeated ratings; and 3) when the same scale form was used for rating of different sets of stimuli and was administered to distinct samples of respondents.
T. G. R 16

13,389

Rock, I. & Engelstein, P. A STUDY OF MEMORY FOR VISUAL FORM. *AMST. J. PSYCHOL.*, June 1959, LXXII(2), 221-229. (New School for Social Research, New York, N.Y.).

13,389

To determine whether the trace of a visual form changes in any way over time or stays unchanged, 160 subjects, in eight groups, were shown a form (closed rectangular) for 20 seconds and then dismissed. Upon recall (15 seconds, 1 day, 1 week, or 3 weeks) subjects: 1) reproduced the figure as accurately as possible, or 2) selected it from ten figures (ranging from identity to dissimilarity). A second experiment used a curvilinear figure and introduced some improvements in experimental design. Results are interpreted in line with various hypotheses of memory trace.
G. I. R 11

13,390

Saltzman, I.J. & Carterette, Teresa S. INCIDENTAL AND INTENTIONAL LEARNING OF ISOLATED AND CROWDED ITEMS. *AMST. J. PSYCHOL.*, June 1959, LXXII(2), 230-235. (Indiana University, Bloomington, Ind.).

13,390

To compare intentional and incidental learning of crowded and isolated material, two experiments were run: 1) 20 stimulus-items (i.e., nonsense syllables and ten three-digit numbers) were presented twice to each subject (60) for six seconds per item; and 2) a list of 14 two-digit numbers was presented to each subject (80) four times at the rate of six seconds per number. Both experiments used instructions to determine incidental and intentional learners. The relationship between isolation and ease of learning is discussed.
T. R 13

13,388

Gates, J. VISUAL DISCRIMINATION OF STRAIGHT AND CURVED LINES. *AMST. J. PSYCHOL.*, June 1959, LXXII(2), 281-282. (Wilkes College, Wilkes-Barre, Penn.).

13,391

To test several hypotheses regarding ease of discrimination of straight and curved lines, two experiments are presented: 1) three experienced subjects were presented randomly with two stimuli (a straight line and a curved line) in four positions (horizontal, vertical, 45 degrees left and right); and 2) eight subjects were presented with the two stimuli above plus two other straight-line figures, representing a triangle and a rectangle. Various theories are discussed relevant to the results.
T. I. R 11

13,392

Kraushopf, J. & Riggs, L.A. INTEROCULAR TRANSFER IN THE DISAPPEARANCE OF STIMULATED IMAGES. *AMST. J. PSYCHOL.*, June 1959, LXXII(2), 282-283. (Brown University, Providence, R.I.).

13,392

The possibility of interocular transfer of the phenomenon whereby a target imaged such that it remains fixed in position on the retina disappears with prolonged viewing was tested. By means of an optical arrangement utilizing among other things contact lenses with mirrors embedded in them, it was possible to present a target to the same spot on the retina of both eyes. The stimulus target was presented to one eye and the time required for it to disappear was recorded. The target was then presented to the same spot on the retina of the other eye and the time taken for it to disappear recorded. The data were treated by the Wilcoxon paired replicates test.
T. I. R 7

13,394

Jenkins, S. A RELATIONSHIP BETWEEN INCREMENTS OF DISTANCE AND ESTIMATES OF OBJECTIVE SIZE. *AMST. J. PSYCHOL.*, Sept. 1959, LXXII(3), 345-363. (The Training School at Vicksburg, N.J.).

13,394

To test the hypothesis that the apparent size of an object increases with increasing distance, 12 subjects in four experiments were required to match a series of squares ranging from 2-3/4 to 6 inches by steps of one-eighth inch with a four inch square which appeared at distances of 20, 40, 80, and 160 inches from the subjects and under two levels of illumination (26.5 and 11 foot candles). The results are analyzed by analysis of variance and are discussed in the light of several competing hypotheses.
T. G. R 18

13,395

Bergman, R. & Gibson, J.J. THE NEGATIVE AFTER-EFFECT OF THE PERCEPTION OF A SURFACE SLANTED IN THE THIRD DIMENSION. *AMST. J. PSYCHOL.*, Sept. 1959, LXXII(3), 364-374. (Cornell University, Ithaca, N.Y.).

13,395

Two experiments were performed to investigate negative after-effects and adaptation effects of prolonged viewing of a slanted surface monocularly and binocularly. First, six subjects viewed a slanted board through two tubes for four minutes. Six different degrees of slant were used: 15, 30, and 45 degrees forward and backward, from a plane perpendicular to the subject's line of sight. Adaptation was determined by subjective report. Negative after-effect was determined by having the subject attempt to set the board perpendicular to his line of sight. In the second experiment the subjects performed the same task only monocularly.
T. R 20

13,396

Dashiell, J.F. MONOCULAR POLYOPSIA INDUCED BY FATIGUE. *AMST. J. PSYCHOL.*, Sept. 1959, LXXII(3), 375-383. (Wake Forest College, Wake Forest, N.C.).

13,396

This article describes several cases of monocular polyopia induced by fatigue (ocular work) and presents hypotheses as to the physiological bases of the phenomenon.

13,400

Beecham, G., Dohle, Shirley I. & Cohen, R.D. VISUAL RECOGNITIVE THRESHOLDS FOLLOWING SENSORY DEPRIVATION. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 429-433. (Wayne State University, Detroit, Mich.).

13,401

Divergent results reported in the literature in the area of sensory deprivation may be due to variations in conditions of deprivation, or to differences in measures of behavioral efficiency employed, or both. This study compares the effects of two different conditions of sensory deprivation on perceptual functioning in vision. Recognition thresholds for five-digit numbers were obtained after periods of 0, 5, 15, and 30 minutes of total and of partial visual deprivation. Thirty-two subjects were divided into two equal groups, one subjected to total and one to partial visual deprivation. Results are discussed as they relate to findings reported in the literature, and to hypotheses regarding the effects of visual deprivation.
T. G. R 5

13,402

Winnick, Wilma A. & Wasserman, W.L. THE EFFECT UPON INCIDENTAL LEARNING OF VARYING THE INFORMATION ABOUT THE IRRELEVANT MATERIAL. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 439-442. (Queens College, Flushing, N.Y.).

13,401

Uncontrolled variation in strength of the set to learn incidental material could be a source of error in experiments on incidental learning. The present experiment attempted to vary the strength of the set to learn irrelevant material, and investigated the question whether, if incidental learning is affected, the efficiency of instructed also is affected. Fifty-four subjects were divided into three equal groups and given different instructions. Difference in scores were subjected to analysis of variance. Comparisons were made of both between group and within group differences.
T. R 4

13,402

Kappas, M.E. & Payne, M.C. PERFORMANCE DECREMENT AT AN OBSERVER-PACED TASK. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 443-446. (University of Illinois, Urbana, Ill. & Georgia Institute of Technology, Atlanta, Ga.).

13,402

The purpose of this study was to determine whether the rate of finding numbers changed significantly with long periods of observer-paced search. Sixty subjects, working in a group, searched test-booklets, pages of which each contained ninety pairs of two-digit numbers. After two practice periods, subjects worked uninterruptedly for seventy-five minutes on ten different pages. Subjects were instructed when to turn the pages. Performance was scored as the number of numbers found in each fifteen-minute period. The data were subjected to analysis of variance. The performance change over time was also presented in terms of mean number of numbers found in successive fifteen-minute periods.
T. R 8

13,403

Pedley, P.E. & Harper, R.S. PITCH AND THE VERTICAL LOCALIZATION OF SOUND. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 447-449. (Knox College, Galesburg, Ill.).

13,403

This experiment was designed to test two hypotheses regarding the relationship between pitch and vertical localization. 1) Each audible frequency has a particular height associated with it, implying a mechanism that discriminated on an absolute basis, or 2) tones are heard as high or low in pitch relative to some subjective standard. Twelve subjects were presented groups of low, intermediate, and high pitched tones, with two tones common to all groups. Results were discussed as they related to the hypotheses.
T. G. R 2

13,404

Soltz, D.F. & Wertheimer, M. THE RETENTION OF 'GOOD' AND 'BAD' FIGURES. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 450-452. (University of Colorado, Boulder, Colo.).

13,404

This study was designed to study whether contradictory results obtained from studies of form-perception designed to test a gestalt principle may have been due to differences in the kinds of figures used. The prediction was that "good" Gestalts should be more easily remembered than "bad" ones. Four "good" and four "bad" figures were presented to 60 subjects. Half of the subjects were tested for recognition immediately following exposure; the other half of the subjects were tested two weeks after original exposure. Results were discussed as they related to the Gestalt viewpoint.
R 11

13,405

Kaletsky, M.S. & Kalers, P.A. A MULTI-FIELD ELECTRONIC TACHISTOSCOPE. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), 456-459. (USAF Wright Air Development Center, Wright-Patterson AFB, Ohio).

13,405

This brief paper describes an electronic tachistoscope in detail which "permits precise control of duration, intensity, and sequence of many viewing fields." The present apparatus, extending the principle of the Dodge tachistoscope to several viewing fields, makes it possible to explore visual functions over a wider range.
I. R 2

13,406

Sands, D.J. & Smith, K.J. NEW METHOD OF RESPIRATORY RECORDING. *Amer. J. Psychol.*, Sept. 1959, LXXII(3), p. 460.

13,406

This note describes a method for respiratory recording which provides a method for circumventing such difficulties as have been encountered with such devices as the pneumograph (e.g., it is difficult to keep the rubber tube in place around the chest; it is easily damaged, and picks up nonrespiratory body movements).
I.

13,406

Green, B.F., Jr., Wolf, Alice K. & White, B.W. THE DETECTION OF STATISTICALLY DEFINED PATTERNS IN A MATRIX OF DOTS. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 503-520. (Lincoln Labs., Massachusetts Institute of Technology, Bedford, Mass.).

13,406

To investigate the ability of human observers to detect patterns in "noisy" visual displays, seven experiments are reported (utilizing five observers) on the detectability of statistically determined bar-patterns in dot-matrices. Thresholds of detection were determined as a function of: duration of response, average number of dots on display, the subtended visual angle, grain of display, number of bars of dots, random variations in numbers of bars, and multiple exposures. Threshold functions and statistical analysis of performance are provided. The discussion compares the human observer and the "ideal" mechanical detector. The effects of the main variables on signal detection are discussed and the techniques are considered as a tool for future research.
T. G. I. R 12

13,409

Gebhard, J.W. & Mowbray, G.H. ON DISCRIMINATING THE RATE OF VISUAL FLICKER AND AUDITORY FLUTTER. *Amer. J. Psychol.*, Dec. 1959, LXXII(4), 521-529. (Johns Hopkins University, Baltimore, Md.).

13,409

Four sets of measurements were made of the ability of a subject to match the rates of intermittent white light (flicker) and white noise (flutter). Difference limens (DL) for comparing flicker and flutter were measured (by the method of adjustment) to assess the nature of variables in cross sensory matching; simultaneous matching to fixed standard rates (two subjects made five matches at five frequencies: 5, 10, 20, 30, and 40 cps.); simultaneous matching to standard rates (same two subjects); and successive matching to fixed standard rates (16 matches at each of 13 frequencies). Results are plotted and analyzed. Cross-sensory matching is compared with intersensory matching and discussion includes optimum conditions for intersensory matching.
G. I. R 8

13,410

Holmes, H. & Rohles, F.H., Jr. A QUANTITATIVE STUDY OF REVERSAL OF CLASSICAL LIGHTNESS-CONTRAST. *Amer. J. Psychol.*, Dec. 1959, **LXXII**(4), 530-538. (University of Texas, Austin, Tex.).

13,410

In order to investigate the effects of reversal of "classical" lightness contrast, ten observers made 14 judgments of lighter-darker (on an 11-step scale) for each of four series of 14 gray, 7 by 11 inch cards. On one half of the card vertical white lines, 1 mm. in width; and on the other half, similar black lines were drawn. Distance or separation between the lines was varied (3 to 35 mm. in steps of 4 mm.). Each card was judged, on both halves, as to relative grayness. An analysis of variance of the lightness judgments was made and the significance of the difference between judgments of all separations was determined. Discussion is in terms of physiological correlates of contrast and association.

T. I. R 16

13,411

Dale, H.C.A. STRATEGIES OF SEARCHING IN TWO SIMPLE SYSTEMS. *Amer. J. Psychol.*, Dec. 1959, **LXXII**(4), 539-546. (Applied Psychology Research Unit, MRC, Cambridge, England.).

13,411

To examine the strategies in independent and in ordered searching, 117 subjects 1) located a faulty number in a row of independent items, and 2) located a fault in a simple flow system. Strategies of search were recorded by the experimenter and by the subjects and evaluated (by five judges). Search approaches are compared for different tasks and related to age and intelligence.

T. R 13

13,413

Held, R. & Schrank, M. ADAPTATION TO DISARRANGED EYE-HAND COORDINATION IN THE DISTANCE-DIMENSION. *Amer. J. Psychol.*, Dec. 1959, **LXXII**(4), 603-605. (Brandeis University, Waltham, Mass.).

13,413

To investigate adaptation to sensory-motor disarrangement (reduction of the errors of hand-eye coordination induced by a prism before the eye) 15 subjects were required to mark the location of targets under conditions of distorted vision. Hand movements were made under two conditions; self-produced movement and passive movement (the experimenter moved the subject's hand by means of a sliding board). Increases in accuracy of performance under both conditions, (passive and active movement) are measured and discussed.

I. R 6

13,414

Sherrick, C.E., Jr. SOME FACTORS AFFECTING AUDITORY DETECTION OF AMPLITUDE-MODULATION. *Amer. J. Psychol.*, Dec. 1959, **LXXII**(4), 606-608. (Washington University, St. Louis, Mo.).

13,414

To examine the effects of manipulation of rate of modulation and duration of intensity-increment (with the time of the incremental rise and fall constant) on difference limens (DL) of auditory signals, five trained subjects provided 20 DL's three times under modulation rates of 1, 2, 3, 4, 5 cps. combined with increment durations of 40-8000 msecs. The stimulus was a 1000 cps. pure tone at four db. intensity above threshold. Variations of the intensive DL are plotted as a function of rate and duration of the intensity increment. Results are discussed as to their application to audiometer design.

G. R 5

13,415

Wood, G. SATIATION THEORY AND THE MÜLLER-LYER ILLUSION. *Amer. J. Psychol.*, Dec. 1959, **LXXII**(4), 609-611. (Children's Seashore House, Atlantic City, N.J.).

13,415

To determine the effect of asymmetrical satiation, duration, and number of exposures on magnitude of the Müller-Lyer illusion, 60 paid female observers made equality settings of the segments of the illusion after fixed numbers of exposures (0, 5, 10, 15, 20, and 25, or 0, 10, 20, 30, 40, and 50 exposures). Magnitude of the illusion was measured and data were analyzed by means of Alexander's General Test for Trend. Results are discussed in terms of satiation theory.

T. R 4

13,416

Valis, L., Bartley, S.H. & Bourassa, C. FURTHER MANIPULATION OF BRIGHTNESS ENHANCEMENT. *J. Psychol.*, July 1959, **48**(First Half), 47-55. (Michigan State University, East Lansing, Mich.).

13,416

To determine whether brightness enhancement is increased as PCF (pulse-to-cycle fraction) of intermittent stimulation is decreased below 0.3, and whether using one eye for the reference target and the other for a comparison target is more effective than using the same eye for both, two observers were tested under three general experimental procedures. Results were presented in a table showing relations between intensity of the steady target and the relative effectiveness of the intermittent target for five different intensity levels, three different PCF's, and four different general conditions.

T. R 20

13,417

Roehrig, W.C. THE INFLUENCE OF THE PORTION OF THE RETINA STIMULATED ON THE CRITICAL FLICKER-FUSION THRESHOLD. *J. Psychol.*, July 1959, **48**(First Half), 57-63. (The Psychiatric Institute, New York, N.Y.).

13,417

To a) demonstrate that the total area of a foveally fixated test patch is not effective for critical flicker fusion threshold (CFF), b) determine how large a central portion of the test patch may be blocked out without affecting the CFF, and c) determine whether the "annulus-effect" is present over a wide range of test-patch diameters and frequencies, data were obtained from three observers. Results were presented graphically, showing mean difference in Log f_c between full-field-test-patcher and annuli.

G. I. R 6

13,418

Noble, C.E., Alcock, W.T. & Frye, R.L., Jr. THE JOINT INFLUENCE OF PRACTICE AND INSTRUCTION ON DISCRIMINATION REACTION TIME. *J. Psychol.*, July 1959, **48**(First Half), 125-130. (Montana State University, Missoula, Mont.).

13,418

To test the hypothesis that specificity of instructions is relevant to the acquisition of perceptual-motor skill, two groups of fifty-two subjects received 160 practice trials under instructions which varied in specificity. Differing instructions were designed to vary the number of competing responses in the task. Acquisition curves for the two groups were presented which showed mean reaction time as a function of practice under the two types of instruction. The learning device consisted of four units of the USAF Discrimination Reaction Time apparatus. The task was to snap the switch corresponding to the relative positions of the red light in any red-green stimulus pair.

G. I. R 6

13,419

Arnhoff, F.N. ADULT AGE DIFFERENCES IN PERFORMANCE ON A VISUAL-SPATIAL TASK OF STIMULUS GENERALIZATION. *J. educ. Psychol.*, Dec. 1959, **50**(6), 259-265. (Mental Health Research Unit, Syracuse, N.Y.).

13,419

To test the hypothesis that older subjects would have consistently fewer errors than younger subjects on a visual-spatial task of stimulus generalization, 60 practicing nurses and 54 members of a club for older persons were tested. Results were presented in terms of a) analysis of errors, b) reaction times, and c) reaction times and zero-error scores.

T. R 20

13,420
Cronbach, L.J. & Gleser, G.C. *INTERPRETATION OF RELIABILITY AND VALIDITY COEFFICIENTS: REMARKS ON A PAPER BY LORD. *J. educ. Psychol.*, Oct. 1959, 50(5), 230-237. (University of Illinois, Urbana, Ill.).

13,420
This paper considered a paper contributed by Lord on the usefulness of unreliable difference scores. The present authors "identified three risks which may be taken into account in fixing strategies for test interpretation and for evaluating the usefulness of a test interpreted by a particular strategy." They placed emphasis on the maximum risk of erroneous interpretation of test scores rather than on average risk. Tables are presented showing the utility of tests for classifying persons under two different conditions. Test designers and selectors of tests are cautioned to interpret these, and similar tables, in the light of their particular situations.
T. G. R 10

13,421
Mabb, W.B. & Schwartz, M. MEASUREMENT CHARACTERISTICS OF RECALL IN RELATION TO THE PRESENTATION OF INCREASINGLY LARGE AMOUNTS OF MATERIAL. *J. educ. Psychol.*, April 1959, 50(2), 63-65. (USN School of Aviation Medicine, Naval Air Station, Fla.).

13,421
This brief paper described an experiment to test "the relationship between the consistency of measurement of information obtained by individuals and the number of items of information presented the individuals" at one time. Subjects were 345 naval cadets who read six stories, then were tested by one of four different methods. The data were treated by analysis of variance.
T. R 2

13,424
Ryan, T.A. COMMENTS ON ORTHOGONAL COMPONENTS. *Psychol. Bull.*, Sept. 1959, 56(5), 394-396. (Cornell University, Ithaca, N.Y.).

13,424
In this brief paper the author raises several points of disagreement with the method of orthogonal components proposed by Gaito (*Psychol. Bull.* 1959, 56, 392-393) as additional to methods discussed by the present author in a previous paper. The author also pointed out an important area of agreement with Gaito's formulation.
T. R 4

13,425
Myers, J.L. THE STATISTICAL ANALYSIS OF SOME GROUP EXPERIMENTS. *J. gen. Psychol.*, Oct. 1959, 61(Second Half), 205-210. (University of Massachusetts, Amherst, Mass.).

13,425
This paper analyzed the following experimental designs involving the application of treatments (e.g., stress) to social groups: 1) Groups-Within-Treatments, 2) the situation where a variable is introduced within each group, and 3) measurements for each subject repeated over time. Tables were presented which showed for each method the sources of variance, sums of squares, and degrees of freedom. Appropriate F tests, and possible extensions of each design were considered.
T. R 2

13,427
Brown, W.L. & Overall, J.E. IMPLICATIONS OF RECENCY EFFECTS FOR PROBABILITY LEARNING THEORIES. *J. gen. Psychol.*, Oct. 1959, 61(Second Half), 243-251. (University of Texas, Austin, Tex.).

13,427
Stochastic models have been constructed around the phenomenon of "probability matching" and have been primarily used in the investigation of human choice behavior. This paper presents a critical appraisal of appropriateness of stochastic models when the development of "probability matching" is from a "positive recency principle" as compared with "negative recency" behavior. Results from three experiments were presented to illustrate the mechanism determining "probability matching" for human subjects.
G. R 22

13,428
Clausen, J. & Karner, R. PHOSPHORE THRESHOLD AS RELATED TO AGE AND SEX. *J. Psychol.*, April 1959, 47 (Second Half), 189-190. (Training School at Vineland, N.J.).

13,428
To investigate the relationship between phosphore threshold and age and sex, a total of 142 untrained subjects ranging in age from ten to sixty-eight years were tested. Phosphore thresholds were recorded for four different conditions (two stimulus frequencies and two light conditions). Results were reported in terms of a) reliability, b) age differences, c) sex differences, and d) intercorrelations between these.
T. G. R 11

13,429
Perry, D.J., Mount, G.E. & Hall, C.D. THE EFFECT OF VARYING INTRAMUSCULAR DOSAGES OF ATROPINE AND BANTHINE ON THE GALVANIC SKIN RESPONSE. *J. Psychol.*, April 1959, 47(Second Half), 219-222. (University of California, Los Angeles, Calif.).

13,429
To investigate the effects of certain anticholinergic drugs, administered intra-muscularly on the Galvanic Skin Response (GSR) ten subjects were tested. Results were compared with those from other studies, particularly with those in which the drug had been administered orally. The findings are discussed as they relate to the evaluation of the GSR technique for comparing dose response effects of different anticholinergic drugs.
T. G. R 6

13,430
Rath, R. MEASURE OF SIMILARITY IN WORK CURVES. *J. gen. Psychol.*, July 1959, 61(First Half), 39-44. (Ravenshaw College, Cuttack, Orissa, India).

13,430
The claim made by Philpott (*Fluctuations in Human Output*, Cambridge Univ. Press, 1932) that "work curves are based on elementary waves drawn from a 'pool of general purpose waves,' emergence of any particular wave being determined by factors other than of the task and the subjects", was tested, using 160 curves consisting of four different tasks taken from one individual. The curves were grouped into four categories, plus the grand total curve. Curves were tested using analysis of variance and correlation. Four conclusions were examined as they related to the "pool" theory.
R 2

13,431
Boardman, W.K., Aldrich, R.C., Reiner, M.L. & Goldstone, S. THE EFFECTS OF ANCHORS ON APPARENT LENGTH. *J. gen. Psychol.*, July 1959, 61(First Half), 45-49. (Baylor University College of Medicine, Waco, Tex. & Houston State Psychiatric Institute, Houston, Tex.).

13,431
To investigate the "accuracy and variability of absolute judgments of one inch, as well as the effects of stimulus anchors on these judgments," 61 subjects were asked to judge the length of a one inch line. Subjects were divided into three groups, receiving differing initial anchors. A method of limits technique was used. An anchor-reversed condition was also used, and changes in judgments of group with differing initial anchors were compared. The findings also were discussed in relation to analogous temporal judgments.
T. R 4

13,432
Woessner, Barbara L., Ross, S. & Andrews, T.G. EFFECTS OF SPEED-STRESS AND DISPLAY-CONTROL RELATIONSHIPS ON RESPONSE DISCRIMINATION. *J. gen. Psychol.*, July 1959, 61(First Half), 95-111. (University of Maryland, Baltimore, Md.).

13,432
To investigate the effects of certain display-control relationships and rates of signal presentation on performance accuracy and variability in a perceptual-motor task, thirty-six subjects were asked to respond to randomly presented signals by pressing one of five micro-switches. Performance on the task was continuous for each of three time periods, and for each of three rates. The data obtained were analyzed in terms of rate, signal position, controls, trials, and sex. Four conclusions were given which result from the data obtained.
T. G. I. R 21

13,433

Andreas, B.G., Finck, A., Green, R.F., Smith, S., et al. TWO-DIMENSIONAL COMPENSATORY TRACKING PERFORMANCE AS A FUNCTION OF CONTROL-DISPLAY MOVEMENT RELATIONSHIPS, POSITIONING VS. VELOCITY RELATIONSHIP, AND MINIATURE VS. LARGE STICK CONTROL. *J. Psychol.*, Oct. 1959, 48 (Second Half), 237-246. (University of Rochester, Rochester, N.Y.).

13,433

To determine how compensatory tracking performance at high level of skill varies as a function of a) varied control-display movement relations ("sensing"), b) position and velocity mode of control, and c) type of control, seven subjects performed a compensatory, two-dimensional tracking task. Subjects were trained to a stable (isymptotic) level of performance. Time on target scores were the principal measures of performance. Four principal findings were given, and efficiency of the experimental design was commented upon.
T. G. R 7

13,434

Spreng, S.D.S., Finck, A. & Smith, S. PERFORMANCE ON A TWO-DIMENSIONAL FOLLOWING TRACKING TASK WITH MINIATURE STICK CONTROL, AS A FUNCTION OF CONTROL-DISPLAY MOVEMENT RELATIONSHIPS. *J. Psychol.*, Oct. 1959, 48 (Second Half), 247-254. (University of Rochester, Rochester, N.Y.).

13,434

To determine the effects of control-display movement relationship on performance of a two-dimensional tracking task using a miniature control stick, 40 subjects performed a continuous two-dimensional following tracking task. Two different planes of control movement were used, and two different direction of movement relationships between control and display in the y-axis. Mean time on target scores are plotted for each experimental condition. Findings are related to those from other studies in the same laboratory.
T. G. R 7

13,435

Dillon, D. DIFFERENCES BETWEEN ASCENDING AND DESCENDING FLICKER-FUSION THRESHOLDS AMONG GROUPS OF HOSPITALIZED PSYCHIATRIC PATIENTS AND A GROUP OF NORMAL CONTROL PERSONS. *J. Psychol.*, Oct. 1959, 48 (Second Half), 255-262. (Columbia University, New York, N.Y.).

13,435

Flicker Fusion (FF) data obtained while investigating the effects of insulin and coma therapy were reanalyzed in view of findings which cast doubt on the validity of the use of the average of a series of ascending and descending determinations as the measurement of FF threshold. Data were regrouped to account for luminance, direction of stimulus presentation, session (before, during, or after therapy) and a patient-control grouping in terms of outcome of therapy. The data were treated both in terms of actual FF thresholds and in terms of the difference between ascending and descending thresholds. Two analyses of variance were carried out upon these data. Differences between ascending and descending thresholds were discussed as these were able to differentiate among patients and patients from controls. T. R 4

13,436

Collins, W.E. THE EFFECTS OF DEUTERANOMALY AND DEUTERANOMALIA UPON THE FOVEAL LUMINOSITY CURVE. *J. Psychol.*, Oct. 1959, 48 (Second Half), 285-297. (Fordham University, New York, N.Y.).

13,436

Three specific hypotheses were tested regarding the relationship among normal, deuteranomalous, and deuteranopic subjects with regard to spectral sensitivity of their dark adapted fovea. Radiometric measurements were made, using three normal, three deuteranomalous, and two deuteranopic subjects. For every session (six) and subject the average of five wedge readings per wavelength were obtained, and converted into a log-micro-watt value. Data were treated by the method of analysis of variance. Subjects within each color type were compared for variability in threshold requirements, and at the short wavelengths. Several possible explanations for causes of these color defects were advanced.
T. G. R 24

13,437

Henert, G.A. & Traxel, M. THE EFFECTS OF MEPROBAMATE AND ALCOHOL ON GALVANIC SKIN RESPONSE. *J. Psychol.*, Oct. 1959, 48 (Second Half), 329-334. (University of Marburg, Marburg-Lahn, Germany).

13,437

To test the hypothesis that meprobamate will decrease emotional reactivity in man, and to answer the question whether it acts as a neurosedative agent in the same way as alcohol, thirty clinically normal subjects were tested. Subjects were divided into three groups—meprobamate, ethyl-alcohol, and placebo. Affective reactions were produced by using two word association tests containing emotionally laden terms, used in pre-experiment and experimental sessions respectively. Median scores of each subject in both pre- and main experiment were compared.
T. G. R 18

13,438

Bartley, S.H. SOME COMPARISONS BETWEEN PRINT SIZE, OBJECT POSITION, AND OBJECT SIZE IN PRODUCING PHENOMENAL DISTANCE. *J. Psychol.*, Oct. 1959, 48 (Second Half), 347-351. (Michigan State University, East Lansing, Mich.).

13,438

To investigate the hypothesis that it is the visual angle subtended by the crucial target item at the eye that determines the apparent distance of the item, six observers each made ten readings for each of two general conditions. In five conditions, the comparison target was moved away and in the other five it was moved in the opposite direction. The size of the crucial item in a photographic print was manipulated either by simple enlargement of the print or by enlargement of the print to enlarge the item, but in connection with print cropping. Results were discussed as they relate to the law of the visual angle.
T. R 3

13,439

Riss, E. ARE HALLUCINATIONS ILLUSIONS? AN EXPERIMENTAL STUDY OF NON-VERIDICAL PERCEPTION. *J. Psychol.*, Oct. 1959, 48 (Second Half), 367-373. (Brooklyn College, Brooklyn, N.Y.).

13,439

The purpose of this investigation was to investigate the relationship of auditory hallucinations to sound stimuli. Seven psychotic patients were trained to report the beginnings and ends of auditory hallucinations. Subjects were tested in sound treated rooms; the single sound stimulus being produced by a pure-tone audiometer at 125 cps. Each subject was tested for auditory hallucination under three levels of sound intensity. Results were discussed as they relate to the usually held definition of hallucinations as perceptions in the absence of sensory stimuli.
T. R 29

14,000

Adams, J.A. SOME CONSIDERATIONS IN THE DESIGN AND USE OF DYNAMIC FLIGHT SIMULATORS. Proj. 7716, Task 57050, AFTRC TN 57 51, April 1957, 25pp. USAF Operator Lab., Randolph AFB, Tex.

14,000

This report presents a philosophy for flight-simulator design and utilization, particularly in reference to current and future manned air weapons. Two types of simulators (whole-task and part-task) are discussed along with the need for guiding principles for their design and use in training and proficiency measurement for modern, manned air weapons. Present-day simulators of both types were examined; and the experimental literature on transfer of training was surveyed and related to fidelity-of-simulation problems. Recommendations are included.
R 24

14,003

West, L.J. AN EXPERIMENTAL COMPARISON OF NONSENSE, WORD, AND SENTENCE MATERIALS IN EARLY TYPING TRAINING. AFPTC TR 57-108, Aug. 1957, 9pp. USAF Personnel and Training Research Center, Lackland AFB, Tex. (Reprinted from: J. Educ. Psychol., Dec. 1956, 47(8), 481-489).

14,003

This experiment evaluated four types of early keyboard learning practice materials in typewriting: single-finger nonsense sequences, short words, long words, and sentences. Each of these four types was used by a different group of learners for the first hour of practice. During the second and last hour, all learners used the same code and alphabetic sentence materials. Speed and error scores on the final tests using code and alphabetic sentences were analyzed for differences due to type of material originally used for practice. Factors that might account for the observed differences are discussed.

T. G. R 3

14,007

Willingham, W.W. PERFORMANCE DECREMENT FOLLOWING FAILURE. Special Rep. 58-9, May 1958, 5pp. USN School of Aviation Medicine, Naval Aviation Medical Center, Fla.

14,007

To investigate performance decrement after failure on a check flight as a function of interval between failure and subsequent performance, the flight records of 648 students whose first failure occurred on A-18, A-19, or B-17 during the latter half of 1956 were studied. Two grades were computed: average flight grade up to time of failure, and grade on extra time flight immediately following failure. Grade decrements as a function of days elapsing between failure and subsequent flight were analyzed for each of the three types of flight and for groupings of superior and inferior students. Recommendations are included.

G.

14,008

Khignesse, L.V. SELECTIVE SURVEY OF FRENCH DEVELOPMENTS IN FLIGHT SIMULATORS AND FLIGHT INSTRUMENTS. I. FLIGHT SIMULATORS. Contract AF 33(616) 3000, Proj. 6190 71573, WADC TN 57-378, June 1958, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois, Urbana, Ill.).

14,008

A selective survey of French developments in aircraft and missile simulation was conducted. The survey covered the characteristics of a flight simulator for a primary trainer of the conventional engine type, three types of helicopter simulators, and a simulator for an air-to-air or ground-to-ground missile. Each simulator is described and its salient characteristics delineated.

14,009

Thompson, M.E. RESPONSE GENERALIZATION AS A FACTOR IN THE ACQUISITION OF MILITARY SKILLS: RIFLE TARGET PRACTICE. (SECOND QUARTERLY REPORT). Contract HMRRO 650 021, 14pp. Institute of Science and Technology, University of Arkansas, Fayetteville, Ark.

14,009

This is a progress report of an investigation of the hypothesis that training for accuracy in rifle firing may be facilitated by application of principles derived from studies on response generalization. The primary variable studied is range of reinforcement—a buzzer is activated by shots of the required degree of accuracy. Subjects are assigned randomly to one of three groups and given 50 shots in blocks of five. Total, constant and variable errors will be analyzed for effect of area of reinforcement. This report presents results for 68 subjects.

T. G.

14,010

Thompson, M.E. RESPONSE GENERALIZATION AS A FACTOR IN THE ACQUISITION OF MILITARY SKILLS: RIFLE TARGET PRACTICE. (THIRD QUARTERLY REPORT). Contract HMRRO 650 021, Oct. 1954, 8pp. College of Arts and Sciences, University of Arkansas, Fayetteville, Ark.

14,010

This progress report presents some data gathered in the course of an investigation on rifle marksmanship (see 14,009). The results of 27 subjects who missed the target on one or more shots have been tabulated and various error scores calculated. Other data on 95 subjects are presented.

T. G.

14,016

Snodde, A.F., Bean, J.C. & Dunlap, J.W. MOTOR HABIT INTERFERENCE. A RESUME OF THE LITERATURE AND THE DEVELOPMENT OF PRINCIPLES FOR ITS MINIMIZATION IN TRAINING. Contract NMR 2515(00), Jan. 1959, 106pp. Dunlap and Associates, Inc., Stamford, Conn.

14,016

This report is concerned with the role of habit interference in perceptual-motor learning and performance, especially as it relates to operational training within the military environment. Three major sections are developed: 1) a technical review of the literature on habit interference with a brief non-technical summary, 2) the development of techniques and procedures for minimizing effects of interference in perceptual-motor learning, and 3) the development of categories of behavior which embrace the variety of motor-manipulative jobs for which military personnel are trained together with principles for minimizing habit interference in them.

R 148

14,020

Irion, A.L. & Briggs, L.J. LEARNING TASK AND MODE OF OPERATION VARIABLES IN USE OF THE SUBJECT-MATTER TRAINER. Contract AF 41(657) 13, Proj. 7709, Task 37302, AFPTC TR 57-8, Oct. 1957, 19pp. USAF Maintenance Lab., Lowry AFB, Colo.

14,020

Two studies are reported herein that were conducted as part of an experimental evaluation of the Subject-Matter Trainer, a device designed for potential use in Air Force technical training. One study deals with the comparative effectiveness of four modes of operation when each is employed solely throughout a 20-minute practice period for each of three kinds of learning tasks. The second study concerns the relative effectiveness of selected combinations of two or more of these modes of operation when used in sequence during different portions of the practice period. Retention test scores (immediate and after one week) were analyzed for differences due to mode of operation.

T. I. R 3

14,023

Briggs, L.J. & DuVall, W.E. DESIGN OF TWO FIRE CONTROL SYSTEM MAINTENANCE TRAINING DEVICES. Contract AF 41(657) 83, Proj. 7709, Task 37302, AFPTC TR 57-7, Sept. 1957, 13pp. USAF Maintenance Lab., Lowry AFB, Colo.

14,023

This report outlines early developments in fighter-interceptor fire control system maintenance trainers and describes two new training device designs which appear to have achieved many improvements over earlier devices. Job tasks descriptions for the MG-10 Fire Control System (Aircraft and Weapon Control System) maintenance training were developed to indicate the range of tasks needing practice. The two trainers developed were 1) a radar procedural trainer and 2) a computer checking, adjusting, and troubleshooting device. Recommendations for prototype devices are made.

R 2

14,024
Erickson, S.C. THE SPECIAL INSTRUCTIONAL PROBLEMS OF TEACHING AVIATION IN THE CLASSROOM. Contract NMR 2149 (01), Aug. 1958, 42pp. Vanderbilt University, Nashville Tenn.

14,024
This manual is a summary document which makes a direct attempt to synthesize transfer of training information for the possible improvement of the aviation training at the United States Naval Air Station, Pensacola, Florida. The purpose of this type of manual is to give the instructor a perspective, a better understanding of how a training program incorporates the major variables that control the learning process. The several sections include the role of the instructor in the ground school, the trainee and his schedule, kinds of learning that occur, transfer of training as the "pay-off", major factors in learning, and some classroom procedures to maximize transfer of learning.

14,025
Baker, R.A., MacCaslin, E.F., Kurtz, K.H. & Baerman, D.J. AN EVALUATION OF THE ON-THE-JOB PROFICIENCY OF TRAINED TANK CREWMEN. Special Rep. 14, June 1958, 57pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,025
To determine the on-the-job proficiency of trained tank crewmen, 256 highly experienced tank commanders, gunners, drivers, and loaders in combat-ready armor units were interviewed and given performance tests on the armor skills basic to each crew position. In addition, job interchangeability within the tank crew was measured by a pencil-and-paper test designed to measure knowledge about the four crew positions. This test was administered to 715 tank crewmen. Implications of the findings for improving tank crew proficiency are discussed.
T. G. R 6

14,026
Samuel, J.A. & Sell, R.G. SOME DESIGN CHARACTERISTICS OF HAND-OPERATED MASTER CONTROLLERS IN STEELWORKS. PE/N/12/55, Oct. 1955, 19pp. Plant Engineering Div., British Iron and Steel Research Association, London, England.

14,026
To establish optimum design characteristics of a hand-operated master controller, three characteristics were investigated: number of speed steps (6, 4, and 3 in both forward and reverse directions), arc of movement of controller handle (30, 35, and 20 degrees on either side of "off" position), and length of handle (9, 12, and 15 inches). The seat was adjusted to optimum operating conditions for each of three operators who performed settings under each of the 27 possible conditions. Order of settings were such as to eliminate effects of learning and subject differences. Subjects also rated each setting on a four-point scale of difficulty. Time and ease of setting were the criteria against which characteristics were measured.
T. G. I. R 5

14,027
Vernon, M.D. LEARNING FROM GRAPHICAL MATERIAL. MRC 47 375, APU 20, Aug. 1945, 5pp. Applied Psychology Research Unit, MRC, Cambridge, England.

14,027
To demonstrate to what extent and how accurately information set out in graphs and charts is likely to be understood by the general population, two sets of data were prepared in graphs, pictorial charts of the isotype variety, and, as a control, in tables of figures. One or the other of these sets, preceded by a short explanatory statement about the information they were intended to convey, was presented to groups of airmen, soldiers, and college students, numbering 231 persons in all. They were required to recall the information given immediately after studying it, either in their own words, or as answers to questions. Recommendations for the use of these graphic materials are included.

14,029
Drucker, A.J. LISTINGS AND ABSTRACTS OF PRB TECHNICAL RESEARCH REPORTS AND NOTES-FY 1957. PRB Tech. Res. Note 81, Sept. 1957, 47pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

14,029
This report identifies by publication serial number all research publications prepared by research scientists of the Personnel Research Branch and released in fiscal year 1957. The listing includes 12 Technical Research Reports; 19 Technical Research Notes, and 33 Research Memorandums. Abstracts are given for the Reports and Notes.
R 44

14,030
Gagne, R.M. & Belles, R.C. A REVIEW OF FACTORS IN LEARNING EFFICIENCY. AFOSR TN 58 924, Nov. 1958, 30pp. USAF Office of Scientific Research, ARDC, Washington, D.C. (Princeton University, Princeton, N.J. and University of Pennsylvania, Philadelphia, Penn.).

14,030
This report attempts to identify the manipulable conditions of learning which may be used to insure maximum transfer to tasks of the job. This is the meaning of "learning efficiency" as used here. Three kinds of tasks found in the Air Force for which learning is required are distinguished: identification, procedure following, and concept using. For these kinds of performance, the experimental evidence regarding training variables likely to lead to maximal learning efficiency are described and discussed.
R 58

14,031
Gustafson, H.W. RESEARCH ON METHODS OF EVALUATING MAINTENANCE PROFICIENCY. Proj. 7709, Task 37303, AFPMR TR 58 6, Jan. 1958, 9pp. USAF Maintenance Lab., Lowry AFB, Colo.

14,031
Four separate research and development efforts are reported which relate to the improvement of performance-testing techniques for maintenance personnel: 1) the preparation of a guidebook on performance evaluation for use by instructors in Air Force technical schools; 2) a statistical reanalysis of proficiency test data to relate trouble-shooting performance to specific kinds of aptitudes and basic knowledge and to determine types of errors committed in performing complex alignments and adjustments; 3) the development of two microfilm projection devices to aid in training; and 4) an investigation of effects of variations in performance-testing procedures.
R 5

14,041
McGuigan, F.J. A COMPARISON OF THE WHOLE AND PART METHODS OF MARKSMANSHIP TRAINING. July 1953, 17pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,041
To compare M1 marksmanship proficiency under two methods of instruction: 1) the currently used part method, and 2) a whole method in which the firing act is taught as an integrated practice unit, an experiment was carried out using identical procedures at two army installations. A single infantry basic training company was divided into four matched (rifle steadiness, intelligence) platoons and trained as follows: 1) part method, 2) whole-live-fire method, 3) whole dry-fire method, and 4) no training. The criterion of proficiency was the pit scores obtained during four days of firing on the known-distance range. These scores were analyzed for effect of part versus whole method, live versus dry firing, and high versus low intelligence.
T. G.

14,042

McGuigan, F.J. & MacCasilin, E.F. A COMPARISON OF WHOLE VERSUS PART METHODS OF MARKSMANSHIP TRAINING. May 1954, 36pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,042

To compare two methods of M1 rifle instruction (Army Training Program Step-by-Step and an experimental "whole" procedure), two separate groups of infantry trainees were tested at two military training centers. For each test four sub-groups were selected by matching on a test of rifle steadiness, then given appropriate training, and finally tested for firing ability immediately following training and two months later. The data were analyzed for immediate and long term differences between the two methods. Other analyses included a study of the relation of intelligence, and the effect of spacing of live fire (Whole Method) versus concentration in final period (Part Method).
T. G. I.

14,044

Mead, L.C. (Chm.). TRAINING RESEARCH. SCOPE, METHODOLOGY, AND CONTRIBUTIONS. HTD 200/2, April 1951, 36pp. US Department of Defense, Washington, D.C.

14,044

This report presents the papers and discussions of the symposium on Training Research. The central objective of the symposium was to clarify and discuss the purpose, methodology, and contributions which can be made by training research to the efficient utilization of human resources in furthering military objectives and utilizing modern war equipment.

14,047

Miller, E.E. TRANSFER EFFECTS OF SPECIAL TRAINING UPON PRE-SOLO FLIGHT TRAINING. Res. Proj. NM-16 01 11, Subtask 13, Rep. 1, Sept. 1958, 63pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,047

Analysis of the learning situation in naval pre-solo flight training resulted in the development of economical, simple, and administratively feasible training aids for the following areas: procedures, trimming, knowledge of local area, nose attitudes, and landing approaches. The techniques developed were applied to 72 pre-solo students according to a complex (factorial) experimental design, and the effects of the particular techniques were assessed independently. Criterion measures were pre-solo flight grades, flight instruction time, rankings by flight instructor, comments on questionnaires, and some secondary criteria. The findings are related to training theory and problems.
T. G. I. R 52

14,048

Miller, E.E. EVALUATION OF INSTRUMENT-TRANSITION VERSUS TRANSITION-INSTRUMENT SYLLABUS. Special Rep. 57-23, Sept. 1957, 11pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,048

To evaluate a recommendation that the sequence in flight instruction in the VS/VP Phase 1 syllabus be changed to offer instruction in basic instruments before transition, precision and acrobatics, 100 students from each of the two syllabus orderings were compared. Safety was analyzed by comparing the number of downs and warm-ups as recorded for transition, precision, acrobatics, and instruments; accident data were also studied. Other factors studied were training time, cost, flying skill, grades, attritions, and opinions of both students and instructors.
T. G. R 4

14,049

Miller, R.B. & Slebochnick, E.B. RESEARCH FOR EXPERIMENTAL INVESTIGATIONS OF TRANSFERABLE SKILLS IN ELECTRONIC MAINTENANCE. Contract AF-41(657) 71, Proj. 7729 (7709), Task 37300, AFTRC TR 56 2, Jan. 1958, 21pp. USAF Personnel and Training Research Center, Lackland AFB, Tex.

14,049

To determine the extent to which special training in generalized maintenance skills may lead to positive transfer in excess of that obtained from training in specific maintenance skills, two laboratory experiments were conducted. In the first, 24 high school students (males) performed two types of electronic maintenance, 1) after learning "what to search for" in the job environment, or 2) following study of "principles of trouble shooting." In the second, 36 subjects were scored on performance of specific trouble shooting problems after training in 1) trouble shooting principles, or 2) concepts of data flow only. The findings are discussed in relation to training programs for electronic trouble shooting.
T. R 4

14,063

USN Personnel Measurement Research Branch. ABSTRACTS OF RESEARCH REPORTS. March 1958, 84pp. USN Personnel Measurement Research Branch, Washington, D.C.

14,063

This publication contains abstracts of reports of studies conducted by the Bureau of Naval Personnel or by contract with Bureau funds. These abstracts are arranged in chronological order according to date of publication. Part I covers the period January 1951 through September 1957 in the area of selection and classification; other parts will be published later. A subject index is included.
R 128

14,071

Rulon, P.J. & Brooks, W.D. A COMPARISON OF TWO METHODS OF TEACHING MORSE CODE. Contract N 61339 294, ERC Proj. 49 7, Letter Order 7, Exp. Design Proj. 9 4074, July 1958, 68pp. Educational Research Corporation, Cambridge, Mass.

14,071

This report contains a description of two methods of teaching Morse Code: the current Navy method based upon the Code-Voice technique, and the Robins method based upon development of three skills (audio-perception, interpretation, typewriting). The design and rationale of an experiment for comparing the relative efficiency of these two methods is presented in some detail.
R 19

14,072

Rulon, P.J., Brooks, W.D. & Baldwin, W.W. A COMPARISON OF TWO METHODS OF TEACHING TYPEWRITING. Contract N 61339 294, Proj. 9 4074, ERC Proj. 49 7, Letter Order 7, July 1958, 17pp. Educational Research Corporation, Cambridge, Mass.

14,072

This report contains a description of the design of an experiment for comparing the current Bureau of Naval Personnel method of teaching typewriting to communications personnel with a method developed by Personnelman Robins. The two methods are described and compared for differences. The rationale for the experimental design is also presented.
R 20 (approx.)

14,073

Bulson, P.J., Langmuir, C.R. & Schweitzer, R. F. THE DEVELOPMENT OF A PERFORMANCE TEST OF TROUBLE-SHOOTING PROFICIENCY FOR AM/APQ-24 RADAR MECHANICS. VOLUME I. Contract AF 33(038) 14542, HRC Proj. 507 007 0001, HRC Proj. 25, July 1953, 74pp. Educational Research Corporation, Cambridge, Mass.

14,073

This report describes the development and the details of a performance test of a radar mechanic's ability to "shoot trouble" in an AM/APQ-24 airborne radar system. The test situation is a standardized performance exercise in which observations of performance are restricted to the mechanic's adaptations to a malfunctioning radar system. Evaluation of the test problems and the related equipment, administration and scoring procedures are discussed.

T. I.

14,074

Bulson, P.J., Langmuir, C.R. & Schweitzer, R. F. THE DEVELOPMENT OF A PERFORMANCE TEST OF TROUBLE-SHOOTING PROFICIENCY FOR AM/APQ-24 RADAR MECHANICS. VOLUME II. APPENDICES. Contract AF 33(038) 14542, HRC Proj. 507 007 0001, HRC Proj. 25, July 1953, 34pp. Educational Research Corporation, Cambridge, Mass.

14,074

This volume contains the appendices to a previous report "The Development of a Performance Test of Trouble-Shooting Proficiency for an AM/APQ-24 Radar Mechanic" (see 14,073). Appendix A contains the six final forms of the test; Appendix B contains the 1) key to control switches and problem numbers, 2) information and instructions for judges; 3) definition of problem classification symbols, and 4) a description of 114 problems; Appendix C contains the ratings of six judges on the 114 problems and tables of data reprinted from the text.

14,082

Smith, D.D. (Head). BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. SUPPLEMENT NO. 2: JULY 1957 - JULY 1958. USN Personnel and Training Branch, ONR, Washington, D.C.

14,082

This is the second supplement to the Bibliography of Unclassified Research Reports of the Personnel and Training Branch, Office of Naval Research. Listed are reports received from contractors during the period July 1957 to July 1958. Categories used to classify the reports are: basic traits, selection problems, billet classification, performance criteria, training and education.

R 34

14,088

Stiles, Helen J. & Demaree, R. G. MAINTENANCE PERSONNEL AND TRAINING RESEARCH: A BIBLIOGRAPHY. March 1958, 115pp. USA Air Defense Human Research Unit, Fort Bliss, Tex.

14,088

This bibliography includes reports only if their contents are substantially and specifically applicable to maintenance personnel. Unique contributions in the area of job requirements and maintenance job descriptions are included. The majority of the reports appeared in 1951 or later. Reports are arranged in subject matter sections with references listed alphabetically by senior author: maintenance research programs and their management, design of equipment and work situations for maintainability, job description and forecasting, selection, training, training equipment, proficiency measurement, job aids and handbooks, collected works, and bibliographies.

R 368

14,093

Zeidner, J., Martinek, M. & Anderson, A.A. EVALUATION OF EXPERIMENTAL PREDICTORS FOR SELECTING ARMY HELICOPTER PILOT TRAINEES-I. PRD Tech. Res. Note 99, Oct. 1958, 35pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

14,093

As part of a long-range research effort to improve selection of helicopter pilot trainees, scores on 41 experimental measures (4 background, 11 reference or control, 11 ability or aptitude type, and 15 personality and/or leadership type) were obtained for 310 trainees undergoing the helicopter pilot training course at Fort Rucker, Alabama. These scores were compared with three types of achievement indexes: flying proficiency, academic achievement, and leadership proficiency. The findings were used in determining the composition of a final experimental battery for the long-range study.

T. R 2:

14,094

Harvard School of Public Health. PUBLICATIONS IN THE FIELD OF HIGHWAY SAFETY. Jan. 1959, 2pp. Harvard School of Public Health, Boston, Mass.

14,094

This is a list of publications by Ross McFarland in the field of highway safety. The period covered is 1952 through 1958.

R 25

14,095

Upshaw, H.S. DEVELOPMENT OF PROTOTYPE PROFICIENCY TESTS FOR SAGE OPERATORS: INTERCEPT DIRECTOR. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, AFRC TM 58 58, Sept. 1958, 13pp. Educational Research Corporation, Cambridge, Mass.

14,095

The test battery for Intercept Director was administered to 41 persons. It was developed from a job analysis, and contained decision and diagnostic items. On the basis of the scores for these persons with varying amounts of experience, suggestions for revisions of the test are indicated in detail.

T

14,096

Upshaw, H.S. PROFICIENCY TEST RESULTS IN THE SAGE TECHNICAL TRAINING DEPARTMENT: INTERCEPT DIRECTOR. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, OAL TM 58 11, Sept. 1958, 5pp. Educational Research Corporation, Cambridge, Mass.

14,096

The Intercept Director test was administered to 15 instructors at the SAGE Technical Training Department, and to nine Intercept Directors at the Experimental SAGE Sector. The test areas are: 1) knowledge of correct procedures, actions and decisions, 2) knowledge of computer functioning, 3) ability to make efficient tactical decisions, 4) ability to read and interpret situation display, 5) ability to read and interpret digital display. The scores are obtained and compared for the two groups.

T

14,097

Upshaw, H.S. RESULTS OF PROFICIENCY TESTING AT ESS: INTERCEPT DIRECTOR. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, OAL TM 58 5, Sept. 1958, 5pp. Educational Research Corporation, Cambridge, Mass.

14,097

The test for Intercept Director was administered to 15 persons at the Experimental SAGE Sector and to 15 persons at the SAGE Technical Training Department. The test areas are: 1) knowledge of correct procedures, actions and decisions, 2) knowledge of computer functioning, 3) ability to make efficient tactical decisions, 4) ability to read and interpret the Situation Display, 5) ability to read and interpret the Digital Display. Scores were obtained and analyzed. Further test development is indicated.

T

14,098

Griswold, G.M. "PARACHUTE JUMPING FROM ARMY AIRCRAFT." FIFTH PARTIAL REPORT OF PROJECT NR AB 2354. DA Proj. 87 03 002, RDB Tech. Cbj. AL 12, June 1957, 16pp. USA Airborne and Electronics Board, Fort Bragg, N.C.

14,098

This is one of a series of reports from a study seeking to determine optimum exit methods, safe procedures, special equipment needed, and the suitability of various types of Army aircraft for parachute delivery of personnel. The results of tests on the U-1A Airplane are reported here. Tests of adaptability consisted of inspection, test flying, and review of technical data. Various procedures for parachute delivery were static tested and evaluated. Safe procedures were established.
I. R 7

14,099

Warren, N.D., Dossett, W.F. & Ford, J.S. A CORRELATIONAL ANALYSIS OF ACHIEVEMENT IN A GENERALIZED ELECTRONIC TROUBLESHOOTING COURSE. Contract AF 41(657) 44, Proj. 7709, Task 37301, AFPTIC TN 57 148, Dec. 1957, 34pp. USAF Maintenance Lab., Lowry AFB, Colo.

14,099

Previous research led to the development of the Generalized Electronic Troubleshooting Trainer (GETS) and a training curriculum. Attention was given in this study to the factorial structure of troubleshooting achievement measures and the estimates of achievement scores from standardized ability tests. Achievement measures were scores on a written test and on the GETS trainer. Sixteen standardized tests of special abilities were also given. Subjects were 90 high school males, 16-19 years old, with mental ages from 156-253 months. A factor analysis was conducted to reveal the underlying factors.
T. R 6

14,105

Zeidner, J., Martinek, H. & Klieger, W.A. ANALYSIS OF FLIGHT EVALUATIONS OF ARMY HELICOPTER PILOT TRAINEES. DA Proj. 29560000, PRB Tech. Res. Note 93, April 1958, 21pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

14,105

As part of a long-range research approach to the problem of high attrition in the Army Cargo Helicopter Pilot Course, this study was undertaken to provide insight into the various methods used to evaluate trainees. Relationships among training flight grades, final course grades, and the pass-fail decision of the review board pertaining to the Presolo stage of ACHPC were determined for 487 trainees at Fort Rucker, Alabama. The utilization of the findings in formulating the predictor research criterion is discussed.
T. R 1

14,107

Zeidner, J., Martinek, H. & Anderson, A.A. EVALUATION OF EXPERIMENTAL PREDICTORS FOR SELECTING ARMY HELICOPTER PILOT TRAINEES II. DA Proj. 29560000, PRB Tech. Res. Note 101, Dec. 1958, 34pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

14,107

As a part of a long-range research effort to improve selection of helicopter pilot trainees, scores on eight psychomotor ability/aptitude tests, eight paper and pencil ability/aptitude tests, ten personality-background tests, four background factors (age, education, rank, and previous flying experience) and the three leadership variables of the interim operational battery were compared with indexes of leadership ability, helicopter flying proficiency, and academic ability for 217 helicopter pilot trainees. The findings were used in determining the composition of the final experimental and for the 1959 operational battery of tests.
T. R 4

14,108

Peters, G.A. & Gardner, S. INDUCING CREATIVE PRODUCTIVITY IN INDUSTRIAL RESEARCH SCIENTISTS. Psychological Research Associates, Inc., Encino, Calif. & University of Southern California, Los Angeles, Calif.

14,108

The thesis of this paper is that there is a real and important crisis in American science - the apparent lack of scientific creativity and inability of the research scientist to function effectively in group research projects. Cognitive factors are discussed together with specific actions that could be taken by industrial management and by those in charge of academic training of scientists. Certain personal characteristics of scientists are pointed to as needing special remedial attention. Special creativity-induction training programs are discussed.

14,112

Peibin, Eunice. THE INFLUENCE OF INTERPOLATED RECALL UPON RECOGNITION. APU 136 50, 1950, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

14,112

To investigate the effect of interpolated activity (immediate recall) upon the recognition of an original experience, subjects (16) were shown a picture. One-half of the group were asked to recall it and were then given a recognition test; the other half were given only the recognition test after the same interval. A second experiment with a further group of 24 subjects was conducted along similar lines. Number of correct identifications of the picture were compared for the experimental and control groups. The findings are discussed in relation to factors which militate against identification after recall.
T. R 5

14,115

Meehan, J.P. & Jacobs, H.I. RELATION OF SEVERAL PHYSIOLOGICAL PARAMETERS TO POSITIVE G TOLERANCE. Contract AF 33(616) 2932, Proj. 7216, Task 71712, WADC TN 58 665, Jan. 1959, 11pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Physiology, School of Medicine, University of Southern California, Los Angeles, Calif.).

14,115

To study the relationship of several physiologic parameters to positive g-tolerance, a series of experiments were undertaken. Blood pressure, blood volume, and physical condition as measured by both the Harvard Step Test and a modified physical fitness test were the parameters and g-tolerance was measured as that acceleration which caused a loss of peripheral vision. Subjects were studied at the end of one month of enforced rest and again at the end of one month of supervised physical training.
T. G. R 4

14,116

Bloch, D.S. REVIEW OF QUALITATIVE PERSONNEL REQUIREMENTS FOR SAGE SYSTEM TECHNICAL COORDINATION CENTER. Contract AF 19(604) 2430, Proj. 1975, Task 76892, ERC Proj. 48, AFRC TN 58 53, April 1958, 156pp. Educational Research Corporation, Cambridge, Mass.

14,116

This report reviews available development information on critical job requirements for the positions in the Technical Coordination Center of the Semi-Automatic Ground Environment (SAGE) system and presents implications for training requirements and personnel plans. The general procedures were: 1) review the maintenance coordination concept for SAGE; 2) develop position definitions; 3) make a chart tracing data flow from specific displays back to input equipment, and emphasize available check and test points as an example of a proposed job support to aid in malfunction isolation; and 4) use job requirements to infer training requirements.
T. R 33

14,117

MacKey, D.R. (Chm.). INTERNATIONAL EDUCATIONAL TELEVISION SEMINAR. PARTIAL TRANSCRIPT OF PROCEEDINGS. Oct. 1957, 42pp. School of Public Relations and Communications, Boston University, Boston, Mass.

14,117

This report contains selected papers given at the first International Seminar on Educational Television. They are: address of welcome, J. Wendell Yeo (Boston University), "Television and Education—1957," John K. Weiss (Fund for the Advancement of Education), "The Hagerstown TV Project," T. Wilson Cahall (Maryland), "Television as a Means of Instruction for Credit in Pittsburgh," Charlie Mettlinger, "Television as a Means of Instruction for Credit in St. Louis," Earl Herdinghaus, "Television as a Means of Instruction for Credit in Chicago," John W. Taylor, and "Television as a Means of Instruction in the College Classroom," Thomas Clark Pollack (New York University).

T. R 7

14,119

Bredon, Ruth W. PROFICIENCY TEST RESULTS IN THE SAGE TECHNICAL TRAINING DEPARTMENT: IDENTIFICATION OFFICER. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, OAL TM 58 9, Sept. 1958, 7pp. Educational Research Corporation, Cambridge, Mass.

14,119

The Identification Officer Test was given to 15 examinees. The test contains four parts: 1) requires decisions similar to those required on the job; 2) and 3) provide diagnostic information on identification regulations, track and air movements data, etc.; and 4) requires the examinee to choose and operate switches when told what action to perform. The scores on each item are presented in tabular form and compared for the different groups of examinees. Further development of the test is indicated.

T

14,121

Bredon, Ruth W. RESULTS OF PROFICIENCY TESTING AT ESS: IDENTIFICATION TECHNICIAN. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, OAL TM 58-3, Sept. 1958, 7pp. Educational Research Corporation, Cambridge, Mass.

14,121

The Identification Technician Test, developed for evaluation and training, was administered to six examinees. It contains four parts: 1) items designed to test the examinee's ability to make decisions similar to those on the job; 2) those concerned with identification regulations; 3) those concerned with knowledge of symbology; 4) those concerned with switch actions. Types of errors and types of items missed were tabulated and discussed. Further test development is indicated.

T.

14,122

Broadbent, D.E. CLASSICAL CONDITIONING AND HUMAN WATCH-KEEPING. APU 175, 1953, 9pp. Applied Psychology Research Unit, IRL, Cambridge, England.

14,122

It is the main thesis of this paper that classical conditioning derives its chief interest and importance from the fact that it reduces learning to a much less central position than any other form of animal experiment. Two principles are derived from mathematical and experimental evidences: that only certain aspects of the total stimulus situation can initiate complex responses at one time; and stimuli possessing intensity, biological importance and novelty are most likely to be selected at any time. The Pavlovian situation and certain experiments on human beings, such as watch-keeping and the pacing of factory work, are interpreted in terms of these principles.

14,124

Brooks, W.D. DEVELOPMENT OF PROTOTYPE PROFICIENCY TESTS FOR SAGE OPERATORS: MANUAL DATA INPUTS PERSONNEL. ERC Proj. 46, Contract AF 41(657) 95, Proj. 1975, Task 76892, AFCRC TM 58 66, Sept. 1958, 14pp. Educational Research Corporation, Cambridge, Mass.

14,124

The jobs of SAGE Manual Data Inputs personnel and a test to measure the proficiency of these operators are described. The test was administered to personnel from the Experimental SAGE Sector, the New York Air Defense Sector and to instructors and students of a SAGE training group. The test aimed to simulate actual work conditions and to require the examinee to make realistic decisions. Test results were analyzed with respect to internal consistency, validity and reliability.

T

14,125

Brooks, W.D. RESULTS OF PROFICIENCY TESTING AT ESS: MANUAL DATA INPUTS PERSONNEL. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TM 58-6, Sept. 1958, 14pp. Educational Research Corporation, Cambridge, Mass.

14,125

The test results of 14 persons on prototype proficiency tests for Manual Data Inputs Personnel are summarized. The test, part of a program designed to develop off-the-job performance tests for system evaluation and training, contains five parts: one and two for the supervisor and three, four, and five for both supervisor and technician. Mean scores for each part are reported and grouped according to task. The results of the analysis of this information indicate that further test development should result in useful instruments for measuring proficiency.

T

14,126

Brown, W.F. & Trites, D.K. ADAPTABILITY SCREENING OF FLYING PERSONNEL. EARLY FLIGHT BEHAVIOR AS AN INDEX OF SUBSEQUENT ADAPTABILITY TO FLIGHT TRAINING. 57 114, Aug. 1957, 21pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,126

To devise an early criterion of adaptability to primary pilot training, instructors' comments on the daily grade slips for the first ten instructional flights in the PA-18 light plane were analyzed, and a scoring system developed for evaluating comments. The reliability of the procedure and its validity as a criterion measure were determined in a series of experimental studies. The practical uses of the method are discussed.

T. R 13

14,130

Caperton, R.C. & Channell, R.C. USE OF THE OPERATIONAL FLIGHT TRAINER. Contract DNR 1734(00), NAVTRADEVEN Proj. 20 L 6, NAVTRADEVEN TR 1734 00 1, May 1957, 65pp. USN Training Device Center, Port Washington, N.Y. (Dunlap and Associates, Inc., Stamford, Conn.).

14,130

Instructor activity in an operational flight trainer (OFT) was studied for the purpose of improving the training capabilities of these devices. The study was confined to the P2V-5 and F9F-5 OFT's in the training command and in fleet training. Visits for observation and recording of instructor activity were made to eight installations. Sample problems designed to test the maximum capabilities of the trainers were conducted at several installations. Based on these observations, human engineering principles were applied to the findings to indicate the present design of the instructor's station and to suggest design modifications, in particular, for use of the

T. I.

14,131
Chambers, E.G. TRANSFER OF TRAINING: A PRACTICAL PROBLEM. *Organ. Psychol.*, ca. 1956, 30(3), 165-168. APU 263/56 (Applied Psychology Unit, MRC, Cambridge, Eng.).

14,131
This paper discusses the need for more knowledge in the area of transfer of training which can be applied in practical situations such as 1) transfer of older people to different type jobs, 2) demands made by new machines, and 3) effects of automation. A list of references is included.
R 55

14,132
Meland, C.A. & Lembeck, M. ARMY AIRCRAFT MAINTENANCE WORKSTAND, LOW-LEVEL. FINAL REPORT. Proj. 9 38 01 000. House Task 12.61, May 1958, 25pp. USA Transportation Research and Engineering Command, Fort Eustis, Va.

14,132
This report covers the testing and evaluation of a low-level workstand designed for use in Army aircraft maintenance. Engineering tests were conducted in the field with applicable aircraft. Observations were made to determine whether the stand would increase ease of maintenance on certain aircraft and what modifications needed to be made to increase its efficiency. The workstand was compared with the present workstand used by the Army. Illustrations of its versatility in actual use are given and deficiencies are noted.
T. I.

14,134
Hesse, H. & Silverman, R. THE MANUAL TRACKING PROCESS IN THE PRESENCE OF COUNTERMEASURES. Contract AF 33(616) 3274, IAWR Rep. 58-4, July 1958, 55pp. Institute for Air Weapons Research, University of Chicago, Chicago, Ill.

14,134
The value of radar countermeasures depends upon how the radar operators respond to the degraded information provided them by radar. This report examines the response of the operators as limited by this information and by the time available for reaction. Among the concepts that are quantified is the efficient utilization of surveiller (operator) capability and decision processes for initiating and continuing interesting (penetrating) tracks and rejecting non-interesting (all other vehicles and countermeasures) tracks. A theory is developed for use as an evaluation tool in predicting the success of penetrator countermeasures to the defense radars.
T. I. R 1

14,135
Peters, R.W. MULTIDIMENSIONAL SCALING APPROACH TO THE DETERMINATION OF BASIC PSYCHOLOGICAL PARAMETERS FOR PURE TONES. Contract AF 33(616) 3644, Proj. 7231, Task 71701, WADC TR 59 201, April 1959, 34pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Mississippi Southern College, Hattiesburg, Miss.).

14,135
To evaluate the multidimensional scaling method of successive intervals for use in auditory areas where the dimensions are not well known, an investigation of the dimensionality of auditory perception of pure tones was made. The stimuli were 16 pure tones presented in all possible paired combinations to 39 observers who made judgments of similarity between the stimuli on a nine-point scale. Inter-stimuli distances were determined on the basis of the judgments and were analyzed mathematically to reveal the minimum number of dimensions necessary to account for the distances. The findings are discussed in relation to the validity of the method.
T. G. R 12

14,137
Crawford, M.P. (Dir.). WHAT HUMANS IS DOING. Res. Bull. 4, Dec. 1957, 52pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,137
This report is fourth in a series of Research Bulletins by the Human Resources Research Office (HMRO). It presents highlights of several studies in the fields of training, motivation, and leadership which were completed or current during the fiscal year ending 30 June 1957. A bibliography of HMRO reports published during this period is included (14 technical reports, 4 special reports, 1 research bulletin).
T. G. I. R-19

14,141
Cyr, C., Thure, L.E. & Erickson, S.C. STUDIES IN TRANSFER LEARNING: EFFECT OF METHODS OF INSTRUCTION ON OPERATOR PROFICIENCY. Contract NAF 2149(01), Tech. Rep. 1, Nov. 1957, 30pp. Department of Psychology, Vanderbilt University, Nashville, Tenn.

14,141
To determine the relative effectiveness of two contrasted methods of instruction on the learning, retention, and transfer of complex operator skills, standard automatic calculators (Friden and Marchant) were used as simulators for complex military equipment which requires technical operation. Four groups of 20 subjects were used as follows: 1) rote training (direct practice), 2) conceptual training (paper and pencil exercises stressing general principles of operation), 3) two control groups. Pre-training familiarization was given on both machines. Scores on proficiency test (immediately after training), retention test (following day) and transfer test (on Marchant) were analyzed for differences between the two methods.
T.

14,142
Daniel, R.S., Eason, R.G. & Dick, R.D. RELIABILITY OF THE MAP-MATCH METHOD FOR ASSESSMENT OF NAVIGATOR PERFORMANCE IN RADAR BOMBING. Contract AF 18(600) 1052, Proj. 7711, Task 47003, AFTRC TN 57 121, Oct. 1957, 12pp. USAF Operator Lab., Randolph AFB, Tex.

14,142
The map-match method for assessing navigator performance in radar bombing was examined experimentally for reliability. Scoring of 206 individual scope photographs from 27 bomb runs taken from a Strategic Air Command evaluation mission was completed by an experienced map-match operator. One week later, the same photographs were rematched. Evaluation of the degree of reproducibility was made by 1) correlating the two sets of scores in terms of azimuth and ranging components, and by 2) the method of absolute discrepancies between crosshair positioning between them. The second method was also applied to sets of scores obtained by different operators.
G. I. R 3

14,143
Denenberg, V.H. A PROCEDURE TO OBTAIN ACCURATE ML KNOWN-DISTANCE SCORES. USA Human Research Unit No. 1, Fort Knox, Ky.

14,143
A procedure is described which was developed to assist in obtaining unbiased known-distance scores when firing the M-1 rifle. The advantages of this method are discussed.
I.

14,144
Gordon, Mary A. INTERACTION OF EXPERIENCE AND APTITUDE IN PREDICTING SUCCESS IN TRAINING COURSES FOR AIRPLANE AND ENGINE MECHANICS. Proj. 7719, Task 17009, AFTRC TN 57 133, Nov. 1957, 11pp. USAF Personnel Lab., Lackland AFB, Tex.

14,144
This report presents the results of some studies exploring the effect of background factors on the prediction of success in Air Force training courses for Airplane and Engine Mechanics. Biographical measures of mechanical experience and cultural status of the home were tried out in combination with verbal and mechanical aptitude tests and years of education to predict final grades in mechanical training. Urban and rural groups were treated separately. The effect of background differences in mechanical experience was studied at successive stages in training. Implications of the findings for improved prediction are discussed.
T. R 5

14,149
Gardner, H. METHOD OF ALLOCATING MILITARY PERSONNEL BY WILL WITHIN THE AIR FIGHTING GROUP COMMAND. Working Paper 9. May 1957, 13pp. AFM Office of Operations Analysis, Eglin AFB, Fla.

14,149
This report describes a mathematical model for allocating military personnel in shortage skills within the Air Fighting Group Command (AFGC). Basic assumptions and methodology used in computing 1) United States Air Force relationship of precedence category and personnel priority designator (PPD) and 2) relationship between command PPD and average PPD for selected primary mission units in AFGC, are detailed. The technique used is intended to supplement other methods such as careful study, judgment, logic, and intimate familiarity with command functions, and the 12th.

14,150
Hanes, R.H. & Goldbeck, R.A. A STUDY OF HUMAN FACTORS IN THE OPERATION OF THE KITE AXON SYSTEM. PART I: TRACKING PROBLEMS AND MEASUREMENTS. PART II: THE "SHOOTING TEAM" RECOMMENDED OPERATING PROCEDURES. Task CLASSIC I, Tech. Rep. 34, Nov. 1956, 7pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,150
A critical need exists for the development of standardized tracking procedures and of proficiency measures for guided missile personnel. This report details the beginning phase of a program designed to meet this need—a survey of training problems and an analysis of Kite Axon team procedures. The survey was conducted through observations and discussions during a series of visits to various installations and defense areas. The analysis of team procedures was accomplished through the summarization and integration of operating procedures employed in Pittsburgh, New York, and Chicago areas. A new set of recommended procedures was developed.

14,151
Kirkade, R.G. & Kild, J.S. THE EFFECT OF PROCEDURAL VARIATIONS IN THE USE OF TARGET IDENTIFICATION AND AEROSCOPE POSITION INFORMATION EQUIPMENT ON THE PERFORMANCE OF A SIMULATED RADAR APPROACH CONTROL SYSTEM. Contract AF 33 (616) 3612, Proj. 7194, Task 71583, WADC TR 58 624, May 1959, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ariston Psychology Lab., Ohio State University & The Ohio State University Research Foundation, Columbus, Ohio).

14,151
To explore the interaction effects of an airborne position information (API) display with the display of target identification, two experimental steps were used with ten laboratory-trained controllers. Several variations in the procedures and system configurations (such as use of ground reference points and fixed approach paths) were also compared and evaluated. A variety of measures of system efficiency (delay time, fuel consumption, go-arounds, etc.) and of safety (separation errors) formed the data for analysis.

14,154
Drucker, A.J. ABSTRACTS OF FRB RESEARCH PUBLICATIONS FY 1958. FRB Tech. Res. Note 96, Sept. 1958, 28pp. USA Personnel Research Branch, Adjutant General's Office, Washington 25, D.C.

14,154
This report identifies both by publication serial number and by Research and Development Research Task all research publications prepared and released by the Personnel Research Branch of The Adjutant General's Office in fiscal year 1958. The listing includes four Technical Research Reports, 19 Technical Research Notes, 25 Research Memorandums, and two Research studies. Abstracts are given for the majority of the publications giving principal research findings.

14,155
Moffett, R. & Smith, W. DEVELOPMENT OF GLARE, PROTECTIVE, DIVERGENCE, ETC. Proj. 4 80 ON 013 02, ONL Rep. 2224, Oct. 1957, 54pp. Protective Development Div., USA Chemical Warfare Lab., Army Chemical Center, Md.

14,155
To develop an impermeable glove which would afford protection against toxicological agents and provide greater manual dexterity than the US neoprene glove now in use, a developmental program was carried out. Various commercially available polymers were tested and a method for compression molding the glove from the selected material (butyl rubber) was devised. The method then was tested for commercial feasibility, three pairs of compression molds were built, and factory runs of 1000 gloves were produced from each mold. Acceptability tests were then made.

14,159
Ester, H.D. ADAPTABILITY OF FLYING PERSONNEL. A LONGITUDINAL STUDY OF THE CONDUCTIVE IN MILITARY FLYING. 57 139, Nov. 1957, 33pp. AFM School of Aviation Medicine, Randolph AFB, Tex.

14,159
To investigate the relation of the somatotype to military flying achievement, a group of 1,666 Army Air Force cadets for whom somatotype data were obtained on entering primary pilot training in 1943 was followed up through military personnel record files during 1954. Follow-up data included 1) present military status, discharge information, 2) success or failure in flying training if undertaken, 3) reason for flying training failure, if applicable, 4) accidental death in aircraft and/or combat action, 5) prisoner-of-war status, 6) psychiatric disturbances during military service, and 7) psychiatric or bad conduct discharge. These data were studied in all possible combinations with the somatotype data.

14,160
Hopkisson, R.G. & Bradley, R.C. A STUDY OF GLARE FROM VERY LARGE SOURCES. A17/144/59, Note E 987, March 1959, 20pp. Bullington Research Station, Garston, England.

14,160
In view of the increasing tendency to the use of large sources in lighting practice a detailed study of the effect of very large sources on glare discomfort was undertaken. This report describes experimental conditions and procedures. Some first results are also presented. The source of luminance was such that it could be varied from apparent source size of 10^{-3} steradians up to full visual field and over a wide range of luminances. The experiments used small numbers of experienced subjects and were conducted by means of the Multiple Criterion Method with the subject in control. Equal glare curves are shown for various experimental conditions.

14,161
Fiedler, F.E. LEADER ATTITUDES AND GROUP EFFECTIVENESS. FINAL REPORT. Proj. IR 170 106, 16 ORI 07135, Aug. 1957, 69pp. University of Illinois Press, Urbana, Ill.

14,161
This monograph summarizes the findings of a six-year research program designed to identify psychological factors underlying group effectiveness. Its specific aim was the development of a theory regarding the part which interpersonal perception plays in making groups productive. The study is divided into three fairly distinct parts: 1) mathematical studies examining problems of measuring similarity between persons (both perceived and real), 2) development of interpersonal perception tests for group testing and rapid scoring, and 3) relating interpersonal perception measures to group performance criteria. The study was concerned with "natural" groups such as bomber crews and managements of consumer cooperatives.

14,163

Fleishman, E.A. & Friedman, M.P. THE DEVELOPMENT OF THE AIR FORCE AURAL CODE TEST. Proj. 7776, Task 27000, AFPC TR 57 131, Nov. 1957, 42pp. USAF Contract Lab., Lickland AFB, Tex.

14,163

Improvement of procedures for selecting airmen for radio operator training has been a persistent problem in the Air Force program. This report describes the background, rationale, development, and standardization of the Air Force Aural Code Test which is now operational and is weighted as two-thirds of the Radio Operator Aptitude Index. The test consists of two parts: discrimination of auditory rhythmic patterns, and learning three Morse Code letters. Successive revisions and the unique test construction problems involved are described in detail. Complete instructions to examiners and to examinees, and the conversion tables used operationally are provided.

T. G. R 11

14,167

Goffard, S.J. DEVELOPMENT OF A MEASURE OF SKILL AT RECEIVING INTERNATIONAL MORSE CODE. May 1957, 30pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,167

To establish a method for measuring skill at receiving International Morse Code which would have more flexibility and generality than is shown by percentage of correct responses at a given speed (the method now in use), a series of progress tests was constructed. A series of tables for use in determining "speed scores" from the raw scores (per cent correct) was constructed. A trial run of the raw progress tests and associated tables for them was made on students in the Army's High Speed Radio Operation (HSR) Course, Southeastern Signal School at Fort Gordon, Georgia. The resultant data were analyzed in terms of learning curves and factors affecting learning. Comparisons between the new and old methods are made.

T. G. R 7

14,169

Morawitz, M.W. & Wells, C.F. HUMAN FACTORS IN MAINTENANCE. PART I. AN INVESTIGATION OF MAINTENANCE PROBLEMS OF A REPRESENTATIVE TRAINING DEVICE. Contract M61339 74, Proj. 20 OS 23, NAVTRADEVEN-TR 20 OS 23 1, Jan. 1958, 33pp. USN Training Device Center, Fort Washington, N.Y.

14,169

This report presents the results of a two-week situational investigation to ascertain maintenance problems as they affect human factors. A representative training device (1506) was selected for investigation. A visit was made to a Naval Air Station to study the maintenance problems and obtain information pertaining to such factors as: down-time relative to utilization-time; areas and causes of breakdown, problems of maintenance personnel relative to maintenance work; distinctions among part failure, design failure, and human failure; and opinions of personnel on minimizing maintenance problems. Examination of records, questionnaires, observations, and consultations provided the data for analysis.

T.

14,172

Havron, M.D., Gorham, W.A., Nordlie, P.G. & Bradford, R.G. TACTICAL TRAINING OF THE INFANTRY RIFLE SQUAD. Task SQUADTRAIN, AMRO Subcontract 650 017, Tech. Rep. 18, June 1955, 116pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,172

To develop training methods and procedures to increase the effectiveness of infantry rifle squads, four methods of training were developed: 1) Control, 2) Group Participation, 3) Combat Fundamentals, and 4) Team Training. A different group of eight squads was trained by each method by Army instructors. Effectiveness of the different methods was evaluated using scores on performance tests given immediately following training and opinions of trainees, instructors, and research staff. The best elements of all methods were then combined into a Final Training Program and used to train 48 squads, 16 of which were trained by instructors with no previous experience with the project. Comparisons of performance were made with that of squads trained by Army methods. T. G. I. R 0

14,174

Myers, J. STUDY OF A PHOTOSYNTHETIC GAS EXCHANGER AS A METHOD OF PROVIDING FOR THE RESPIRATORY REQUIREMENTS OF THE HUMAN IN A SEALED CABIN. Rep. 98 117, Nov. 1958, 17pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Lab. of Algal Physiology, University of Texas, Austin, Tex.).

14,174

To study some of the basic problems of a photosynthetic gas exchanger as a method of providing the respiratory requirements of human occupants of a closed chamber, a small model gas exchanger utilizing Chlorella pyrenoidosa at 25 degrees Centigrade was developed. A series of experiments was conducted measuring the efficiency of the exchanger in producing oxygen and removing carbon dioxide during continuous operation over a period of seven to 15 days. Technical improvements in design are discussed.

T. G. I. R 10

14,176

Hick, W.E. "DISCONTINUITY AND THE HUMAN OPERATOR OF MACHINE CONTROLS". APU 67/67, June 1947, 16pp. Applied Psychology Research Unit, MRC, Cambridge, England.

14,176

This paper presents a tentative discussion of the problem of the continuity (or discontinuity) of human response. The main question is what aspects of the response are continuous and what are discontinuous, with the object being to arrive at an answer that will be of practical use in the design of machines, instruments, or vehicles to be controlled in this manner. The major topics of the paper are continuous time functions, input-output continuity, types of operator discontinuity, refractory phase, and intermittency in tracking.

T. I. R 6

14,177

Hick, W.E. AN EXPERIMENT ON RIFLE AIMING. APU 51/46, Aug. 1946, 12pp. Applied Psychology Research Unit, MRC, Cambridge, England.

14,177

A simple and economical photographic method of recording the movements of a rifle during aiming and trigger-pulling (without live rounds) is described. Recommendations for use and limitations of the equipment and method are made. Preliminary trials were made on a small number of subjects ranging in skill from complete beginners to experts. Certain tentative conclusions are drawn, and possible lines of further investigation are suggested. Some points of more general interest arising from the work are mentioned, such as the mode of operator functioning.

G. I. R 1

14,178

Holt, H.O.; (Chm.). REPORT OF CONFERENCE ON RIFLE MARKSMANSHIP TRAINING RESEARCH. 24-25 June 1953, 86pp. USA Office, Chief of Army Field Forces, Fort Monroe, Va.

14,178

In 1950 the Department of the Army established a survey and research project to determine where marksmanship and gunnery training could be improved and the expenditures of training ammunition curtailed through use of existing and new training devices. This document reports a conference of the research personnel and representatives of the agencies that plan, supervise, and execute rifle training. Included in full are reports on 1) comparison of whole and part methods of training, 2) obtaining accurate scores on the known distance range, 3) experimental evidence for improvements in training methods, and evaluation of a special live-firing trigger-squeeze exercise. Recommendations based upon the findings are included.

T. G. I. R 4

14,179
 Macbrook, A.M. (Dir.). AVIATION CRASH INJURY RESEARCH OF CORNELL UNIVERSITY. ANNUAL REPORT. AUGUST 15, 1957 THROUGH NOVEMBER 15, 1958. Contract MONR 401(21), 13pp. Aviation Crash Injury Research, Cornell University, Phoenix, Ariz.

14,179
 This report covers the first year of AV-CIR's (Aviation Crash Injury Research of Cornell University) operation in its new location in Phoenix, Arizona. AV-CIR objectives and tasks are listed and the general program of accident investigations, evaluations of aircraft and aircraft components, publications, meetings and conferences are reported.
 R 6

14,180
 Morowitz, M.W. & Wells, C.F. ANALYSIS OF COCKPIT MOTIONS NEEDED FOR OPERATIONAL FLIGHT TRAINERS. Contract N61339 294, Proj. 20 OS 51, ERC Proj. 39 4, Letter Order 4, Dec. 1958, 57pp. Educational Research Corporation, Cambridge, Mass.

14,180
 To evaluate motion platforms in Operational Flight Trainers (OFT) as training aids, the following methods were used: 1) a review of the literature was made on discrimination of motion, acceleration, gust, displacement, tilt, etc.; 2) visits were made to four facilities that were either doing research on or were using a motion platform in training; 3) informal opinion samples were taken of expert personnel at above facilities; and 4) a personal evaluation was made of the "flying characteristics" of two OFT's incorporating motion platforms. A list of relevant training tasks that can be adequately simulated is given; recommendations are included.
 R 96

14,181
 Kugris, Violette A. RESULTS OF PROFICIENCY TESTING AT ESS: INITIATION SUPERVISOR. Contract AF 41(657) 9, Proj. 1975; Task 76892, ERC Proj. 46, OAL TM 58 4, Sept. 1958, 11pp. Educational Research Corporation, Cambridge, Mass.

14,181
 The Initiation Supervisor Test was administered to eight persons at the Experimental SAGE Sector. The test contains three parts: 1) decision-making situations, switch actions and procedures, speed determination, 2) situations requiring priority of decisions and actions, 3) items on knowledge of symbology and selector switches. Scores were obtained and analyzed.
 T.

14,182
 Kugris, Violette A. DEVELOPMENT OF PROTOTYPE PROFICIENCY TESTS FOR SAGE OPERATORS: TRACK INITIATOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, AFRC TM 58 63, Sept. 1958, 21pp. Educational Research Corporation, Cambridge, Mass.

14,182
 A proficiency test for the Track Initiator was constructed that required the examinee to make decisions similar to those required on the job. This trial version was given to 68 persons. The results indicate the potential value of the instrument. Recommendations for refinement of the test are made.
 T. R 4

14,183
 Kugris, Violette A. DEVELOPMENT OF PROTOTYPE PROFICIENCY TESTS FOR SAGE OPERATORS: INITIATION SUPERVISOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, AFRC TM 58 65, Aug. 1958, 17pp. Educational Research Corporation, Cambridge, Mass.

14,183
 A proficiency test (for the Initiation Supervisor) was developed "to provide estimates of the operators' ability to solve typical problem situations by applying specific knowledge and procedures." The test was constructed following a detailed job analysis of this position. It was administered to 57 individuals—operators, instructors, and students in the SAGE program. The results are indicative of the potential value of a more refined test.
 T.

14,184
 Kugris, Violette A. DEVELOPMENT OF PROTOTYPE PROFICIENCY TESTS FOR SAGE OPERATORS: TRACK MONITOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, AFRC TM 58 64 & ERC Proj. 46, Aug. 1958, 17pp. Educational Research Corporation, Cambridge, Mass.

14,184
 A proficiency test was constructed for the position of Track Monitor at the Experimental SAGE Sector in order to provide estimates of operator's ability to solve typical problem situations by applying specific knowledge and procedures. The test items were of two types: 1) decision-making required by the job, and 2) areas of job knowledge essential to such decision-making. The test was administered to 80 individuals including both experienced operators and graduating students of the SAGE Training Department. An item analysis was made. Recommendations for further development were included.
 T. I. R 3

14,187
 Jones, E.R. & DiVall, R.M. FUNCTIONAL SUITABILITY TEST OF THE F-151/F-100A FIXED GUNNERY TRAINER. PHASE VI. AFTRC TN 57 96, July 1957, 113pp. USAF Operator Lab., Randolph AFB, Tex.

14,187
 The F-151 Fixed Aerial Gunnery Trainer is an attachment that provides a visual display for fighter-type flight simulators and is designed to teach pilots air-to-air and air-to-ground attacks. This report (1) describes the device's capabilities and limitations for training, (2) suggests training and proficiency measurement uses, and (3) recommends certain improvements and applications. A demonstration of the usefulness of the device was given by training both experienced and inexperienced F-100A pilots under close supervision. During its operational use, a systematic examination and evaluation of physical characteristics and accuracy of simulation were made.
 T. G. I. R 8

14,189
 Gaito, J., Hanna, T.D., Bowe, R. & Greco, S. ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS. PART 3. PERFORMANCE AND HABITABILITY ASPECTS OF EXTENDED CONFINEMENT. TED NAM AE 1403, NAMC ACEL 385, Sept. 1958, 52pp. USN Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Penn.

14,189
 To determine the effects upon performance of seven days of confinement in a small area with an oxygen concentration equivalent to 55 per cent at sea level, six men were studied under the above conditions. Tasks of three types (simple psychomotor, simple judgment, and complex psychological) were performed on schedule throughout the period; intellectual aptitude tests were given before and after the run; and a habitability questionnaire was filled out by each subject after the run. Performance data were analyzed for the effect of time spent in the confined area and the effect of type of function sampled. Recommendations are included.
 T. G. I. R 9

14,190
Kelley, C.R., Bowen, H.M., Ely, J.H. & Chennell, R.C. TRACKING TRAINING II: A CASE HISTORY. NAVTRADVCEN TR 1906 00 2, March 1958, 36pp. USN Training Device Center, Port Washington, N.Y.

14,190

To study the process of learning to track under different conditions, a representative tracking task (submarine depth control) was chosen. An analog computer was adopted to serve as a training device. The authors first trained themselves, observed their own learning processes and developed an actual training program. Three subjects were trained according to the program and three control subjects received equivalent periods of loosely supervised practice. Performance was observed and measured. The results provide general information about the problem of how to train men to track with specific procedures and devices for the task studied.

T. G. I. R 1

14,191
Kelley, G.J., Jr., Huesle, H.C. & Duston, A.G. ELECTRONICS TRAINING FOR OBSERVERS. Proj. XXII, May 1954, 31pp. USAF Senior Observer Section, Mather AFB, Calif.

14,191

To determine the amount and content of electronics training to be presented in graduate and undergraduate aircraft observer training, factors bearing on the problem (criteria for training, facts of present course content, assumptions basic to training, and definitions) were outlined. Information gathered included the history of electronics instruction in aircraft observer training, training requirements of operational using agencies, student opinions, field-grade aircraft observer opinions, observations at an Air Force base, future needs, and requirements for understanding current in-flight maintenance manuals. This information was analyzed and recommendations made.

T. R 10

14,194

Lyman, J. (Proj. Leader). ARM PROSTHESIS RESEARCH. Contract V1005M 2075, Rep. 59 44, July 1958 - June 1959, 28pp. Dept. of Engineering, University of California, Los Angeles, Calif.

14,194

This report summarizes: 1) a series of basic studies to establish body control sites for possible application to externally powered prostheses, e.g., evaluation of biceps cineplasty as a control source, 2) an analysis of bioelectrical phenomena for externally powered prostheses, 3) physiological investigations of amputee temperature regulation, 4) an evaluation of pertinent electronic data acquisition and handling equipment, 5) an evaluation of methods of measurement of stump pressure, and 6) some selected applications research studies. The project was a continuation of basic engineering studies of human body sensory mechanisms and motor control to establish more maximal prosthetic design criteria.

R 14

14,195

Lichtenstein, M. STUDIES IN HUMAN CONTROL DYNAMICS. NRL Rep. 805, Oct. 1957, 36pp. USN Electronics Lab., San Diego, Calif.

14,195

This study was conducted to obtain: 1) general observations on operator control characteristics, 2) a survey of operator performance in simulated control systems, and 3) evaluations of data analysis techniques. These were done in both compensatory and pursuit experimental tracking situations. Situations in which the error of the concept of "the" human operator transfer function is apparent are described. Inverse transfer-function performance, operator time instability, operator phase characteristics and frequency characteristics, operator error tolerance, and so forth are discussed in terms of control-display relationships. Conclusions and recommendations are set forth.

T. G. I. R some

14,196

Lyman, R.S. RELATIONSHIP BETWEEN FLAVOR AND PHYSICO-CHEMICAL PROPERTIES OF COMPOUNDS. Contract DA19 129 01 1141, Proj. 7 04 15 007, Prog. Rep. 1, May 1958 - April 1959, 7pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (Battelle Memorial Institute, Columbus, Ohio).

14,196

This is a progress report on a research program designed to discover physical and/or chemical properties of odorants which account for the psychological classification of odorants and to obtain psychological data on adaptation rate and cross-adaptation effects. Results on the following items are summarized: survey of literature, design of experiment, construction of apparatus, data on chemicals to be used, and estimated expenditures.

T. R 13

14,198

Lamson, R.G., Billings, Martha S. & Bennett, L.R. LATE EFFECTS OF TOTAL-BODY ROENTGEN IRRADIATION. LONGEVITY AND INCIDENCE OF NEPHROSCLEROSIS AS INFLUENCED BY PARTIAL-BODY SHIELDING. Rep. 59 33, May 1959, 14pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (School of Medicine, University of California, Los Angeles, Calif.).

14,198

Two hundred forty-two female Wistar rats were observed throughout their life span following 1000 roentgens hypoxic total-body or partial-body irradiation. Animals that died within 30 days of irradiation were excluded from the study of late radiation effects. Autopsies were performed after death. The observations and analyses include: 1) duration of survival after whole and partial body irradiation, 2) retardation of growth, 3) autopsy observations of disease, tissue changes, and the like.

T. G. R 7

14,200
Leonard, J.A., Clark, H.M. & Staats, S. FACTORS CONTRIBUTING TO GENERAL VERSUS SPECIFIC PERCEPTUAL LEARNING. J. exp. Psychol., May 1957, 53(5), 324-329. (Ohio State University, Columbus, Ohio.)

4 groups of 45 Ss each were used in an experiment to examine the effects of transfer between samples of the same class of material. It was shown that: a) The Ss transferring between different samples of the same class of material (Group I) showed transfer effects which increased from 60% to 87% from the first to the third post-transfer trial when compared with a nontransferring control group (Group II). b) Another group (IV) pretrained on the same task but using material of different kind from that of the control group showed improvements in transfer from 34% to 80% from the first to the third post-transfer trial. c) The performance of Groups II and IV differed significantly only on the first post-transfer trial. d) Part of the transfer effect shown by Group II could be accounted for by familiarity with the task rather than the class of material used. e) Pretraining on an identical sample of figures but on a different task (Group III) produced about the same transfer effects as pretraining on the same task but a different sample of figures (Group I).

R 8

14,201

Kugris, Violette A. RESULTS OF PROFICIENCY TESTING AT ESS TRACK MONITOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TN 58 8, Sept. 1958, 11pp. Educational Research Corporation, Cambridge, Mass.

14,201

The Track Monitor Test was administered to 23 persons at the Experimental SAGE Sector. The test consists of three parts: 1) decision-making situations and switch actions and procedures, 2) situations requiring priority of decisions and actions, 3) areas of knowledge such as symbology, reading of Georef, information obtained by use of various selection switches. Scores were obtained and analyzed.

T.

14,202

Kugris, Violette A. PROFICIENCY TEST RESULTS IN THE SAGE TECHNICAL TRAINING DEPARTMENT: INITIATION SUPERVISOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TN 58 10, Sept. 1958, 11pp. Educational Research Corporation, Cambridge, Mass.

14,202

The Initiation Supervisor Test was administered to 44 persons at the SAGE Technical Training Department. The test contains three parts: 1) items to test decision-making, correct switch actions and procedures and determination of the speed of a track, 2) not reported in this document, 3) items that test knowledge of symbology and switch selector information. Scores were obtained and analyzed.

14,203

Kugris, Violette A. PROFICIENCY TEST RESULTS IN THE SAGE TECHNICAL TRAINING DEPARTMENT: TRACK INITIATOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TN 58 13, Sept. 1958, 9pp. Educational Research Corporation, Cambridge, Mass.

14,203

The Track Initiator Test was administered to 33 persons at the SAGE Technical Training Department. The performance was analyzed on specific items and groups of items. The groups consisted of diagnostic items relating to specific knowledge areas in which the examinee should be competent in order to make the correct decisions. Other items measured specific skills and knowledge not related to decision-making. The results demonstrated possible areas for additional training.

T.

14,204

Kugris, Violette A. RESULTS OF PROFICIENCY TESTING AT ESS TRACK INITIATOR. Contract AF 41(657) 95, Proj. 1975, Task 76892, ERC Proj. 46, OAL TN 58 7, Sept. 1958, 18pp. Educational Research Corporation, Cambridge, Mass.

14,204

The Track Initiator Test was administered to 27 persons at the Experimental SAGE Sector. The test has four parts: 1) decision-making situations, switch actions and procedures, speed determination, symbology, 2) knowledge such as symbology, reading Georef, 3) picture of display scope containing items needing action, 4) items concerning the priorities of actions. Scores were obtained and the results analyzed. Several areas for further investigation are indicated.

T.

14,207

Landahl, H.D. & Williams, C.W. REPRESENTATION OF MODALITY IN CUTANEOUS SENSIBILITY. *Bull. Math. Biophysics*, 1958, 20, 309-315. AFOSR TN 58 313. (University of Chicago, Chicago, Ill. & University of Texas, Austin, Tex.).

14,207

This paper describes how the same free nerve terminals in the skin which subserve warmth and cold sensibility can also give rise to touch, prick, itch and sharp pain sensations when appropriately stimulated. The description is in terms of both discrete and continuous theories of neuron interaction. A simple network of McCulloch-Pitts neurons is constructed to illustrate how peripheral mechanisms could discriminate between thermal and mechanical stimuli.

I. R 7

14,208

Koyne, L.L., Padirni, D.T. & Fullington, R.W. RELATIVE HEARING LEVELS AND TYPES OF HEARING LOSS AMONG FOUR SELECTED GROUPS OF AIR FORCE PERSONNEL. Rep. 59 51, April 1959, 11pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

14,208

To investigate the relative hearing levels of right and left ears in four groups of Air Force personnel: 1) 25 non-noise-exposed Class A, 2) 25 noise-exposed Class A, 3) 50 noise-exposed Class B, 4) 25 noise-exposed Class C, pure tone air-conduction and bone-conduction tests were administered. Air-conduction thresholds were established at: 250, 500, 1000, 1500, 2000, 4000 and 6000 cps; bone-conduction thresholds at: 250, 500, 1000, 2000 and 4000 cps. A comprehensive history was obtained by interview. Data on awareness of a preferred or better ear also were obtained. Median and mean thresholds for right and left ears were calculated. Chi square and t-test were employed to study threshold differences. The data were analyzed also to establish the incidence of different types of hearing loss among Class B and C. T. G. R 9

14,209

Kraus, R.W. AN EVALUATION OF PATIENTS SUSPECTED OF HAVING NOISE-INDUCED HEARING LOSS. Review 4 59, June 1959, 16pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,209

This paper reports the evaluation of 77 U.S. Air Force flight-line personnel with defective hearing. For each person the following information was obtained: medical history, occupational history, family history, physical examination, hearing tests, estimate of actual noise exposure, and presbycusis. On the basis of the audiometric tests, these personnel were diagnosed as to type of defect. For that type now suspected of resulting from prolonged exposure to noise, detailed extracts of these audiograms are included. The difficulties in determining whether defective hearing in a specific patient is caused or aggravated by noise exposure are discussed.

T. G. R 17

14,210

Adams, O.S., Levine, R.B. & Chiles, W.D. RESEARCH TO INVESTIGATE FACTORS AFFECTING MULTIPLE-TASK PSYCHOMOTOR PERFORMANCE. Contract AF 33(616) 6050, Proj. 7184, Task 71582, WADC TR 59 120, March 1959, 37pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,210

To study 1) the 24-hour test-retest reliability and intercorrelation of a battery of seven performance tasks (four monitoring, arithmetic computation, tracking, and pattern perception) and of four psychophysiological variables (heart rate, breathing rate, skin resistance, and skin temperature), 2) the effects of performing simultaneously various combinations of physically compatible tasks, and 3) the relation of psychophysiological criterion measures to performance criteria and to conditions of task presentation, fifteen subjects were tested. The data were analyzed by correlational techniques.

T. G. R 25

14,211

Andrews, T.B. & Hackman, R. COMMUNICATIONS AND READABILITY. HBM 200/1 App. 13, June 1951, 11pp. US Research and Development Board, Department of Defense, Washington, D.C. (University of Maryland, College Park, Md.).

14,211

The problem of military communication is analyzed in terms of factors affecting efficient communications: (1) sensory channel used, (2) rate of handling by recipient, (3) training of recipient, (4) method of transmission and presentation, and (5) limiting conditions such as noise or irrelevant information. The critical problem is specification of adequate criteria of communicability. Suggestions for improvement of communication systems, aside from the mechanical characteristics of the system, are discussed. Readability and its relation to communications are discussed.

R 19

14,212

Anderson, C.D. THE CONSTANT-RATIO RULE AS A PREDICTOR OF CONFUSIONS AMONG VISUAL STIMULI OF BRIEF EXPOSURE DURATION. Contract AF 19(604) 1962, AFOSR TR 58 60, May 1959, 37pp. Hearing and Communication Lab., Indiana University, Bloomington, Ind.

14,212

To explore the generality of the constant-ratio rule (for a given stimulus, the ratios of response proportions are independent of the number of stimuli being discriminated), an experimental examination of the rule as a predictor of confusions among visual stimuli was made. Four highly practiced subjects were tested with two subsets of three monosyllabic five-letter words (master set was made up of all six words) presented under very brief visual exposure. Obtained responses were compared with predicted responses and discussed in relation to findings from applications of the rule to other sense modalities (auditory).

T. G. R 10

14,214

Pondy, L.R. SUMMARY REPORT ON AVAILABLE METHODS FOR EVALUATING MAN-MACHINE SYSTEMS. Sept. 1959, 47pp. Battelle Memorial Institute, Columbus, Ohio.

14,214

This report attempts to present a representative sample of the few existing unclassified quantitative methods applicable to the study of man-machine systems. This area of study is defined and distinguished from human engineering. Its methods of study are indicated--the experimental, procedural and theoretical techniques which permit the description, representation, simulation or investigation and subsequent evaluation of such systems in order that output may be related to the various independent variables. To discuss these methods within the context of problem solution, the main body of the report consists of abstracts of the papers which reported them. Comments and additional notes, in some cases, are appended.

I. R 34 (approx.)

14,215

Narisi, S.L. TIME OF FALL IN LOW ALTITUDE ESCAPE. OOO Proj. TS1 15, DA Proj. 502 06 001, FA Subproj. CIO1, Memo. Rep. 664, Dec. 1957, 10pp. Frankford Arsenal, Pitman-Dunn Laboratories Group, Philadelphia, Penn.

14,215

This study is aimed at investigating the time of free fall of a man ejected from a fast-moving airplane as a function of his initial position and initial vector velocity. From the statistics on survival as related to altitude, a theoretical curve showing survival probability as a function of time is presented. The main section is devoted to identifying and specifying the important parameters--air speed, angle of elevation, bank angle, catapult velocity and drag--as a function of time for some representative low altitudes. Each of these is developed mathematically and conclusions are set forth as to best theoretical conditions for survival.

I.

14,216

Berens, C. (Chm.). MINUTES AND PROCEEDINGS OF THE THIRTY-FOURTH MEETING OF THE ARMED FORCES-NRC VISION COMMITTEE. APRIL 1-2, 1954. Secretariat, Armed Forces-National Research Council Committee on Vision, Dept. of Physics, University of Florida, Gainesville, Fla.

14,216

These minutes and proceedings present in full 15 papers that deal with various aspects of visual research, four reports of working groups of the Committee (Armed Forces Vision Tester, visual standards, midshipman myopia, Armed Forces Visual Acuity Charts, visibility at high altitudes), and abstracts of 14 research studies produced during 1953.

T. G. I. R 100 (approx.)

14,217

Berens, C. (Chm.). MINUTES AND PROCEEDINGS OF THE THIRTY-FIFTH MEETING OF THE ARMED FORCES-NRC VISION COMMITTEE. NOVEMBER 3-5, 1954. Secretariat, Armed Forces-National Research Council Committee on Vision, Dept. of Physics, University of Florida, Gainesville, Fla.

14,217

These minutes and proceedings give a full account of some 17 papers and presentations covering the field of vision. Abstracts of 15 research reports produced in 1954 are included.

T. G. I. R 80 (approx.)

14,218

Beldan, E.M. A STUDY TO DETERMINE AN OPTIMUM ALTIMETER PRESENTATION. LAM 59/2, May 1959, 17pp. RCAF Institute of Aviation Medicine, Toronto, Ontario, Canada.

14,218

To carry out a laboratory evaluation of the IAM (Institute of Aviation Medicine, RCAF, Toronto) experimental altimeter dial, it was compared with the Kollsman Counter-Pointer dial. Twenty-four aircrew Flight Cadets made forty readings of each dial while carrying on a routine task. The dials were operating during the trials. The criteria were time to read and errors (number and magnitude). These data were analyzed for differences in performance on the two dials.

T. I. R 4

14,219

Bishop, E.W., Winterberg, R.P. & Channell, R.C. HUMAN ENGINEERING REVIEW OF THE RADAR SYSTEM AN/MPQ 29. Contract DA 36 039 SC 73253, Proj. 3 99 00 100, Task Order 153, May 1959, 16pp. Dunlap and Associates, Inc., Stamford, Conn.

14,219

The AN/MPQ-29 Radar System has been reviewed primarily as a system for tracking and plotting friendly aircraft making maximum use of an airborne beacon. Characteristics of the system which would affect its suitability as the radar tracking component of a drone control system were considered. Human factors involved in system operation were reviewed. Recommendations are made for improving the efficiency of the present unit and redesigning future units for more complex missions.

14,220

USN Office of Naval Research. PROGRAM FOR DEVELOPMENT OF INTEGRATED PRESENTATION OF FLIGHT INFORMATION. Jan. 1953, 32pp. USN Office of Naval Research, Washington, D.C.

14,220

This article outlines a project aimed at producing systems for simplified and more adequate presentation of data for high performance, supersonic and all weather flight. The two major phases of this project are: 1) feasibility studies and improvement of existing components and 2) long range study for greatly simplified displays integrated with automatic control equipment. These phases are dealt with in some detail. Further, the kind of organization to handle such a development program is indicated.

I.

14,221

Byrnes, V.A. (Chm.). MINUTES AND PROCEEDINGS OF THE THIRTY-THIRD MEETING OF THE ARMED FORCES-NRC VISION COMMITTEE. Nov. 1953, 208pp. Armed Forces-National Research Council Committee on Vision, University of Florida, Gainesville, Fla.

14,221

These minutes and proceedings present in full 19 papers that deal with various aspects of visual research, four reports of working groups of the Vision Committee, a bibliography of dark adaptation (417 references), and 13 abstracts of unclassified research reports produced during 1952-1953.

T. G. I. R 500 (approx.)

14,222

Holland, G.E. & Emmons, B.M. COMPARATIVE TESTS ON THREE DIMENSIONAL DISPLAYS. Rep. 1-50, July 1947, 14pp. USAF Air Materiel Command, Cambridge Field Station, Cambridge, Mass.

14,226

Cox, J.A. & Mullins, C.J. EVALUATION OF LIGHT PLANE TRAINING AMONG AFROTC STUDENT OFFICERS. Proj. 7719, Task 17109, WADC TR 59 43, July 1959, 6pp. USAF Personnel Lab., Lackland AFB, Tex.

14,222

This report describes tests made on four types of two dimensional static displays in order to determine which is preferred for presentation of three dimensional data; the third dimension being indicated by size of target, color of target, length of radial line or stereoscopic presentation. Fifty observers selected targets for a period of two minutes by marking the targets on a sheet in the ascending order of altitude. Number of correctly selected targets is indicated.

T. I.

14,226

To evaluate several aspects of the Air Force ROTC Flight Instruction Program (FIP) after the first year as an experimental program, cadets completing the program at 41 institutions were studied. Successful progress and completion confirmed by a series of progress check rides was used as a criterion of success in a study of the relation between FIP and pilot standing from AFQT (pilot aptitude test). A sample of 37 non-FIP trained were matched with a sample of FIP trained detachments and were compared as to proportions entering preflight training and proportions eliminated from primary pilot training.

T.

14,223

Chernikoff, R., Bowen, J.H. & Birmingham, H.P. A COMPARISON OF ZERO-ORDER AND FOURTH-ORDER AIDED COMPENSATORY SYSTEMS AS A FUNCTION OF COURSE FREQUENCY. NRL Prob. Y02 01, Proj. NR 401 000, Task NR 401 002, NRL Rep. 5262, Jan. 1959, 7pp. Applications Research Div., USN Research Lab., Washington, D.C.

14,227

Culbert, S. PHYSICAL CHARACTERISTICS OF LEAFLETS: A SURVEY OF THE LITERATURE. Contract AF 33(038) 27522, HRI "Project Revere," Res. Memo. 21, Jan. 1954, 17pp. USAF Human Resources Research Institute, Maxwell AFB, Ala. (Dept. of Psychology, University of Washington, Seattle, Wash.).

14,223

This study compared closed-loop man-machine control system performance between a zero-order system (no integrators in the loop) and an aided fourth-order system (four integrators in the loop), using complex course inputs over a wide range of frequencies. A compensatory tracking task, consisting of a cathode-ray tube (CRT) display and a handwheel control to move a marker dot along the horizontal coordinate of the CRT face to keep it in coincidence with a vertical reference line at center, was used. Six subjects served as trackers. Mean error scores were analyzed for effects of systems and frequencies. The findings are compared with deductions from servomechanism and human engineering theory.

T. G. R-3

14,227

This memorandum, dealing with desirable physical characteristics of the airborne leaflet used in psychological warfare operation, is based upon a survey of research literature. Topics covered are 1) factors and conditions in leaflet design and perception and 2) findings on physical characteristics of leaflets (paper and printing). Appendices contain 1) languages using the Latin alphabet, 2) relative visibilities of some 8-point type, 3) legibility of color combinations, and 4) the bibliography.

T. R 53

14,224

Hirsch, J.A. DEVELOPMENT OF AN IMPROVED AIR FORCE SINGLASS. Proj. 6332, Task 63609, WADC TR 58-278, Aug. 1958, 10pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,228

Pattishall, E.G., Banghart, F.W., Brown, G.E. & Hadley, R.P. BIBLIOGRAPHY OF DECOMPRESSION SICKNESS. Contract AF 18(600) 1792, ARDC TR 58 60, Dec. 1958, 65pp. Division of Educational Research, University of Virginia, Charlottesville, Va.

14,224

The factors which rendered the F-2 and G-2 sunglasses unacceptable are briefly discussed. The experimental sunglass, designed for service testing is described. Improvements resulting from field usage leading toward the ultimate standardization of a new sunglass, the HGU-4/P, are presented. A complete summary of improvements included in the new specification is given.

I.

14,228

This bibliography represents a thorough review of all the major medical and biological abstracting and indexing sources available from 1946 through August 1958. There also is a comprehensive subject listing which was derived almost entirely from titles.

R 875 (approx.)

14,225

Coleman, P.D. CORTICAL CORRELATES OF AUDITORY LOCALIZATION. Science, July 1959, 130, 39-40. (Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.).

14,229

Miller, J.W. & Ludvigh, E.J. TIME REQUIRED FOR DETECTION OF STATIONARY AND MOVING OBJECTS AS A FUNCTION OF SIZE IN HOMOGENEOUS AND PARTIALLY STRUCTURED VISUAL FIELDS. Contract NMR 568(CO), Proj. NR 142-023 & BuMedSurg Proj. NM 17 01 99, Subtask 2, Rep. 15, May 1959, 16pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,225

To test the validity of a place principle in auditory localization, responses were recorded simultaneously from a number of electrodes on the auditory cortex of one hemisphere of cats. Click stimuli were used, and changes in the magnitudes of the responses recorded from each of six electrode locations were explored as a function of stimulus changes in real location (moving the source in space) and apparent location (changing the binaural time interval while holding the binaural intensity ratio constant).

G. R 4

14,229

To determine the time necessary for detecting spherical targets subtending visual angles of 10.00, 12.34, 17.45, 29.73 and 59.13 minutes of arc in homogeneous and partially structured visual fields, three subjects were required to locate the target, when stationary, or locate and indicate the direction of the target, when moving. The latter procedure was employed in both unstructured and partially structured fields. Size and position of target and structure of visual field were randomized in the experimental sessions. Results are discussed in terms of the position sense of the eye and a method for determining probability of successful search (i.e. detection) is formulated.

G. I. R 13

14,230

Miller, A.E. & Replogle, E.H. DEVELOPMENT OF AN EMERGENCY PRESSURIZATION SYSTEM FOR AN ESCAPE CAPSULE. Contract AF 33(616) 5005, Proj. 6352, Task 63105, WADC TR 58 397, May 1959, 41pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Scott Aviation Corporation, Lancaster, N.Y.).

14,230

This is a design study of a self-contained emergency pressurization system for an escape capsule in which three prototypes were developed, built and tested. Primarily this report discusses the more controversial aspects of the design, the mistaken assumptions, changes found necessary, application of previously developed "Aneroid Motors", test results and knowledge gained that may be useful to future designers. Also included is some analytical design data.

G. I.

14,231

Eisen, L. & Zeigen, R.S. A SUPINE SEAT FOR HIGH-STRESS TESTING OF PRIMATES. Proj. 7222, Task 71749, WADC TR 59 165, April 1959, 18pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,231

This report summarizes the design rationale of a supine seat and restraint harness, with surrounding enclosure, for high stress bio-science experiments with primates. The equipment is intended for test under various abnormal stresses including high g centrifuge runs. Other uses for the equipment are suggested. A brief description of an earlier supine test seat and restraint harness for low-stress experiments using a squirrel monkey is included.

T. I.

14,232

Emanuel, I., Alexander, M., Churchill, E. & Truett, B. A HEIGHT-WEIGHT SIZING SYSTEM FOR FLIGHT CLOTHING. Proj. 7214, Task 71739, WADC TR 56 365, April 1959, 109pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

14,232

This report presents a height-weight-sizing system for use by designers and fitters of flight clothing. The observations and recommendations reported here are based on a re-analysis of the body size data of the 1950 Anthropometric Survey of Air Force flying personnel. Pairs of dimensions were correlated with other dimensions important to clothing design to find the pair yielding the highest correlation. Practical and statistical problems in developing a sizing system are discussed and tables of body dimensional data are presented for several basic size programs. The choice and application of the programs are discussed in detail.

T. I. R 18

14,233

Emanuel, I., Alexander, M. & Churchill, E. ANTHROPOMETRIC SIZING AND FIT-TEST OF THE MC-1 ORAL-NASAL OXYGEN MASK. Contract AF 33(616) 3641, Proj. 7214, Task 71728, WADC TR 58 505, March 1959, 23pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

14,233

A sizing program for oral-nasal-oxygen masks, based on total face length and lip length, has been developed through a re-analysis of the 1950 USAF Anthropometric Survey head and face data. Face forms, based on the sizing program, have been constructed for use in preparation of such masks. The MC-1 Oxygen Mask, an oral-nasal, pressure-demand type mask, has been fabricated in accordance with the sizing program and the face forms. Fit-tests on 150 subjects have been conducted. The theoretical and practical aspects of the sizing procedure are discussed in this report. Design limits and suggested procurement tariffs for each of the six proposed sizes are given.

T. I. R 6

14,234

Ernst, A.A. FEASIBILITY STUDY FOR A MAN-MACHINE SYSTEMS RESEARCH FACILITY. Delivery Order AF (33 616) 56 10, Proj. 7184, WADC TR 59 51, March 1959, 245pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,234

This report presents the results of a study of the feasibility, design, and cost of a large-scale laboratory facility for research on man-machine problems. Postulates of the study were 1) need for an optimal division of labor among men and machines in complex weapons systems, 2) orientation toward functional rather than physiological and psychological factors of the human environment, and 3) possibility of employing dynamic simulation of such systems. Feasibility was judged through designing, implementing, and operating a scale model of the desired facility. The characteristics required of the equipment, its cost, and conclusions as to how well the design objectives might be met are presented.

I.

14,235

Merenda, P.F. & Macaluso, C.J. A CRITICAL ANALYSIS OF THE FIRE CONTROLMAN - FIRE CONTROL TECHNICIAN MERGER IN THE U.S. NAVY. Tech. Rep. 30, Aug. 1956, 11pp. USN Examining Center, Great Lakes, Ill.

14,235

To investigate differences in basic and inherent qualities between two groups (Fire Controlman and Fire Control Technician ratings in the U.S. Navy) which have been merged into one (FI), random samples were drawn from the Navy-wide population of candidates for advancement in FI rating in the February 1956 series of examinations. The sample was then divided into 1) pure Fire Control Technicians and 2) integrated Fire Control Technicians (former Fire Controlmen). Examination standard scores and Navy standard scores on three tests (General Classification, Arithmetic, and Mechanical) were analyzed by multiple regression techniques for differences between the two groups. The findings are discussed in relation to the merging of these groups.

T. R 2

14,236

Evrard, E., Bergeret, P. & van Mulfften Palthe, P.M. (Eds.). MEDICAL ASPECTS OF FLIGHT. (THE UNEXPLAINED AIRCRAFT ACCIDENT). AGARDograph 30, 1959, 308pp. Pergamon Press, New York, N.Y.

14,236

The increasing performances of modern aircraft give to flight safety a more and more important role. Since the human element is still an essential feature in the operation of an aircraft and the origin of aircraft accidents, the Advisory Group for Aeronautical Research and Development (AGARD) Aeromedical Panel devoted two symposia to this subject. This book presents a selection of 30 reports under the following chapter headings: 1) Flight safety and aircraft accidents, 2) Unexplained aircraft accidents, 3) Use of pathology in crash injuries, 4) In-flight protection, and 5) Some special problems.

T. G. I. R 200 (approx.)

14,237

McCleary, R.A. THE NATURE OF THE GALVANIC SKIN RESPONSE. Psychol. Bull., March 1950, 47(2), 97-117. (Johns Hopkins University, Baltimore, Md.).

14,237

In this paper the problem of what physiological changes give rise to the galvanic skin response (GSR) is considered. After a brief discussion of methodology, the history of research on the nature of the GSR is reviewed. The period covered is primarily from 1932 to 1950, although significant papers prior to 1932 are included. Three points of view are presented and discussed critically: the vascular theory, the secretory theory, and the muscular theory.

R 84

14,238

USA Aviation Board. OPTIMUM PANEL ARRANGEMENT OF FLIGHT INSTRUMENTS FOR ARMY FIXED-WING AIRCRAFT. REPORT OF PROJECT MR AVN 1557.5. Proj. MR AVN 1557.5. Rep. AIDEV 6 432/4, Dec. 1958, 6pp. USA Aviation Board, Fort Rucker, Ala.

14,238

To determine for Army fixed-wing aircraft optimum panel arrangements for 1) basic flight instruments, 2) instruments currently in use, and 3) integrated instrument systems; an analytic study of the factors underlying the problem was made. After arriving at an arrangement of the basic instruments which satisfied all the factors, optimum arrangements for (2) and (3) were determined during flight tests under actual and simulated conditions. Optimum arrangements are recommended.

T. I. R 1

14,239

Thomson, R.M., Covner, B.J., Jacobs, H.M. & Orlansky, J. ARRANGEMENT OF GROUPS OF MEN AND MACHINES. CHAPTER VIII OF HUMAN ENGINEERING GUIDE TO EQUIPMENT DESIGN. Contract NMR 1798(00), ONR Rep. ACR 33, Dec. 1958, 127pp. USN Office of Naval Research, Washington, D.C. (Dunlap and Associates, Inc., Stamford, Conn.).

14,239

This report is a draft of a chapter to be incorporated in the Human Engineering Guide to Equipment under the direction of the Joint-Services Steering Committee. It is concerned with the layout of compartments (size and shape, grouping of personnel, traffic flow, and environmental conditions) and the arrangements of major equipment components (location of displays, location of controls, plotting and status boards, and location of maintenance spaces). The major concern is to provide information for the effective design and use of systems that require several (or many) pieces of equipment and two or more operators.

T. I. R 26

14,240

Trumbull, R. & Maag, C.H. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS. SUPPLEMENT NUMBER 5: JULY 1958 - JULY 1959. July 1959, 13pp. USN Physiological Psychology Branch, ONR, Washington, D.C.

14,240

This bibliography contains titles of specific research tasks and technical reports issued during the period July 1958 to July 1959. The items appear under the project headings: sensory mechanisms, perception and orientation, neural basis of behavior, response mechanisms and high intensity noise.

R 141 (approx.)

14,241

Tolles, W.E. & Carbery, W.J. A SYSTEM FOR MONITORING THE ELECTROCARDIOGRAM DURING BODY MOVEMENT. Contract AF 33(616) 5473, Proj. 7222, Task 71751, WADC TR 58 453, April 1959, 42pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Airborne Instruments Lab., Division of Cutler-Hammer, Inc., Mineola, N.Y.).

14,241

This investigation was undertaken to develop a system for monitoring the electrocardiogram during body movement. Two new lead systems were devised and tested; a new stainless-steel mesh electrode was designed and methods for placement investigated; and ways to eliminate interference from muscle potentials and base-line shift were worked out.

T. G. I.

14,242

Kidd, J.S. A COMPARISON OF ONE-, TWO-, AND THREE-MAN CONTROL UNITS UNDER VARIOUS CONDITIONS OF TRAFFIC INPUT RATE. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 104, June 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Ohio State University & The Ohio State University Research Foundation, Columbus, Ohio).

14,242

To determine effect of input load and team size upon performance of the particularly complex task of radar air traffic control, nine laboratory-trained controllers, operating as one-, two-, or three-man control units, guided returning aircraft arriving at intervals of 30, 60 or 90 seconds through the approach phase of flight from entry into the 50-mile radius control zone to Ground Control Approach turnover, ten miles from touchdown. A total of 54 problems were accomplished, six per session, each consisting of the arrival of 24 aircraft. The two measures of performance were system efficiency and safety. The results were analyzed by the Friedman two-way and the Kruskal-Wallis one-way analysis of variance. Predictions of two- and three-man team performance from individual scores were made. T. I. R 20

14,243

Karpovich, P.V. & Milkow, L.B. A STUDY OF THE HUMAN FOOT IN STANDING AND WALKING. Contract DA 49 007 MD 889, Dec. 1958, 36pp. Department of Physiology, Springfield College, Springfield, Mass.

14,243

This is a study of foot pronation and supination in standing and in walking. For the stationary foot: 1) the supinating effect of the functional and conventional insoles was compared, 2) the effects of distance between feet, body weight distribution and heel height upon angle C (angle between lower leg and calcaneus) were studied and 3) the validity of the manual goniometer for measuring angle C was tested. For the foot in walking an electrogoniometer was developed, angle C during natural walking was studied, also effect of speed and length of step and effect of toeing-in and toeing-out were tested.

T. I. R 10

14,244

Fyle, D.W., Fremming, B.D., Reid, J.B. & Elam, C.B. SOME EFFECTS OF CHLORPROMAZINE ON ACTIVITY. 58.150, April 1959, 5pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,244

To evaluate the activity level of the rhesus monkey after varying dosages of chlorpromazine, six normal male monkeys served as subjects. Three hours before observation, the animal was given an intramuscular injection of either a placebo or the drug (0.30, 0.55, 0.80, 1.05, and 1.65 milligrams per kilogram of body weight). Observation of activity began one minute after the animal was placed in a cage containing stimulus objects and an automatic feeding device for delivering food at five-minute intervals. Four types of activity were evaluated: manipulation, location shift, visual activity, oral activity. The findings are related to the clinical use of this drug.

T. G. R 4

14,245

Van Valkenburg, S. & Warman, H.J. ATLAS OF MEAN DAILY MINIMUM TEMPERATURES. Proj. Ref. 7-83 01 005, Tech. Rep. EP 110, May 1959, 32pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass. (Clark University, Worcester, Mass.).

14,245

This report contains isotherms of mean daily minimum temperature at intervals of nine degrees Fahrenheit (five degrees Centigrade) for January, April, July, and October on 24 maps representing each continent except Antarctica. The isotherms are based on data from land stations only.

G. R 5

14,246

Vogel, J. SUMMARIES OF RESEARCH REPORTED ON DURING CALENDAR YEAR 1958. Dec. 1958, 21pp. USN Medical Research Lab., Submarine Base, New London, Conn.

14,246

A summary of the research reports published during the calendar year 1958 in the Laboratory's regular chronological series is presented. Titles of reports issued in the memorandum series, articles published by members of the Laboratory staff in scientific journals, books, or proceedings of scientific societies are listed.
R 60

14,247

Wesserman, P. & Silander, F.S. DECISION-MAKING. AN ANNOTATED BIBLIOGRAPHY. 1958. Graduate School of Business and Public Administration, Cornell University, Ithaca, N.Y.

14,247

This volume is designed to provide a carefully selected and annotated list of books, articles, and documents which will serve as a general and broadly conceived introduction to the study of decision-making. The period covered is primarily that from 1947 through September 1957. Only English language publications are included. A complete author and title index is included. The major classifications are: the decision-making process (general and theoretical), values and ethical considerations, leadership as a factor, psychological factors, decision-making in small groups, community decision-making, communications and information handling, mathematics and statistics in decision-making.
R 325 (approx.)

14,249

Harrison, L.P. FINAL APPROACH VISIBILITY STUDIES. FISCAL YEAR 1952. PROGRESS REPORT. PART III. Proj. 4.14, DDT 21 6/1, Jan. 1954, 92pp. Weather Bureau, US Department of Commerce, Washington, D.C.

14,249

To explore the feasibility of using television for the determination of visibility in the instrument approach and landing zones of airports, a field experiment was conducted. On seven different occasions, each of six hours duration, a television camera was installed at the south end of the instrument landing runway and video signals were transmitted to a receiver in the Weather Bureau Airport Observatory. The visual range (V_R) as judged by an observer of the television picture was compared with V_R judgments of an end-of-runway observer, looking in the direction the nearby camera was oriented. A limited variety of meteorological conditions were experienced; both day and night tests were made.
T. G. I. R 90

14,250

Webb, P. & Klemm, F.K. DESIGN OF VENTILATED CLOTHING. Proj. 7164, Task 71831, WADC TR 58 608, March 1959, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,250

The purpose of ventilated clothing is reviewed and the functions of convective and evaporative cooling are described. These functions are achieved by applying certain principles that are discussed in detail. Various ventilating garments are described to illustrate the evolution of the principles and an ideal ventilating system is defined for pressure suit assemblies. Tests are detailed which demonstrate the validity of each design principle employed in the ideal system. The general subjects of low energy ventilating systems and of integration of ventilated clothing assemblies are discussed. Recommendations are made for the use and design of ventilating systems for protective clothing.
T. G. I. R 7

14,251

Hatch, H.G. Jr. EFFECTS OF WATER-LANDING IMPACT ON AN ORBITAL CAPSULE FROM THE STANDPOINT OF OCCUPANT PROTECTION. NASA TR D 39, Sept. 1959, 18pp. National Aeronautics and Space Administration, Washington, D.C. (Langley Research Center, Langley Field, Va.)

14,251

This investigation was aimed at determining the effects of water-landing on an orbital capsule, which has a conical-shaped body with a segment of a sphere as the landing surface, from the standpoint of human tolerance, in order to discuss the problem of protecting an occupant from the landing impact. The instrumented capsule contained five accelerometers, each measuring accelerations at various axes; also different attitudes (representing swaying of parachute) were simulated. Tracings of acceleration and superimposed vibration were made during flight. These findings plus human tolerance data are discussed.
G. I. R 3

14,252

Harcum, E.R. VISUAL DETECTION AND RECOGNITION OF TARGETS OF NON-UNIFORM LUMINANCE VIEWED AGAINST UNIFORM BACKGROUNDS. FINAL REPORT. Contract NOAS 57 623 D, UMRI Proj. 2643, Rep. 2643 2-F, Oct. 1958, 11pp. Research Institute, University of Michigan, Ann Arbor, Mich.

14,252

To determine the effect on target detection and recognition of dependencies among units of luminance microstructure within the targets when the targets are composed of black and white cells presented against uniform black or gray backgrounds, these thresholds were obtained by the ascending method of limits on two experienced and two inexperienced observers for eight target forms each with three degrees of internal dependence. Threshold differences as a function of the aforementioned variables are discussed as well as the importance of these factors as informational cues.
G. I. R 8

14,253

Williams, J. & Horvath, S.M. PULMONARY BLOOD VOLUME AND CIRCULATORY ALTERATIONS IN DOGS EXPOSED TO COMPENSATED HIGH INTRAPULMONARY PRESSURES. Contract AF 33(616) 5173, Proj. 7160, Task 71814, WADC TR 58 471, April 1959, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (State University of Iowa, Iowa City, Iowa)

14,253

To measure circulatory and pulmonary blood volume alterations that might occur if pressure breathing is compensated by adequate counterpressure, dogs were placed in full pressure suits and helmets and exposed to pressures from four to 230 millimeters mercury for periods ranging from two to 300 minutes. The data were studied for the effectiveness of the pressure suit for protection to the animal exposed to compensated high breathing pressures.
T. I. R 34

14,254

Wolfe, A.S. & O'Connell, M.H. SOURCES OF VARIABILITY AMONG ARTICULATION TESTS FOR NORMAL EARS WITH PB WORD LISTS. 58 123, March 1959, 6pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,254

To determine 1) the effects of sound pressure levels of 90, 100, 110 and 115 decibels on articulation test scores, 2) the effects of order of presentation of test forms on test scores, and 3) the reliability of tests performed at each presentation level, four forms of the Harvard Phonetically Balanced (PB) word test were arranged in an appropriate design. The subjects were 64 Air Force recruits ranging in age from 17 to 25 years and with normal hearing within the frequencies 500, 1000, and 2000 cps. The findings are discussed in relation to the use of the PB test lists as screening tests of speech perception efficiency.
T. R 12

14,255

Mercer, E.R. & Blackwell, H.R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. XI. IDENTIFICATION OF THE NUMBER OF BLACKENED CIRCLES. Proj. MICHIGAN, Rep. 2144 314 T, Dec. 1958, 24pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

14,255

This is one of a series of experiments investigating an observer's ability to identify targets composed of multiple elements having one of two possible forms (binary elements). A linear array of open and closed circles were presented tachistoscopically at four inclinations on the frontal plane of the visual field, with each array passing the observer's fixation point. The task was to estimate the number of closed (blackened) elements that appeared on either side of fixation. Error data from 20 observers were analyzed for meridians as a whole and for half-meridians.
T. G. I. R 9

14,256

Quedry, F.E. Jr. & Ceran, S.J. DERIVATION OF 'SUBJECTIVE VELOCITY' FROM ANGULAR DISPLACEMENT ESTIMATES MADE DURING PROLONGED ANGULAR ACCELERATIONS: ADAPTATION EFFECTS. Proj. 6 95 20 001, Task USAMRL T 4, NEDRA, Rep. 376, Feb. 1959, 21pp. USA Medical Research Lab., Fort Knox, Ky.

14,256

To describe the change in intensity of subjective reaction (magnitude of subjective velocity) during periods of prolonged constant angular accelerations varied in magnitude from one trial to next and to determine the nature of any response decline during the course of constant-magnitude stimulus, ten subjects made estimates of angular displacement by indicating direction of apparent rotation of a target light (in dark room) and signalling each time they apparently rotated through 45 degrees. Four angular velocities were used: 0.5, 1.5, and 2.0 degrees per second squared for 100, 10, 70, and 50 seconds respectively. The results are discussed in terms of predictability by Van Emmon's "torsion-pendulum" theory, adaptation effects, and so forth.
T. G. I. R 20

14,257

Farnsworth, D. PSYCHOLOGICAL STUDIES OF AGING IN ENGLAND. ONRL TR 54-59, June 1959, 9pp. USN Office of Naval Research, London, England.

14,257

This report describes studies which are being conducted in England on the problems of aging. The Nuffield Foundation sponsors exploratory studies on a wide front: the effect of educational facilities available to elderly people; pilot studies on their economic position; the possibilities of employment of older workers unable to carry on their normal work; aging performance in relation to complexity of task; the physiology of age; compensatory processes with age. Some of these studies are summarized briefly.
G.

14,258

Glassner, H.F. & Peters, G.A. EFFECTS OF MENTAL TASK DIFFICULTY ON PHYSIOLOGICAL RESPONSE. Engng. Paper 848, Aug. 1959, 24pp. Equipment and Safety Research, Douglas Aircraft Company, Inc., El Segundo, Calif.

14,258

To compare the measurements obtained on each of several physiological variables when level of intellectual difficulty of work tasks is systematically varied, such recordings were made on subjects performing problems drawn from the first, third and fifth difficulty levels of the Army General Classification Test. The physiological indices included respiratory, cardiac and skin resistance changes. A Latin square design was employed and therefore analysis of variance performed. Chi square also was used because of the nature of the assumptions necessary for the former technique. Discussion of these indicants and their potential for monitoring space crews, for determining operator loading factors, and so forth is included.
T. I. R 7

14,259

Gardner, R.E. & Carl, J.M. THE EFFECTS OF AMBIENT ILLUMINATION, CRT BIAS, AND NOISE UPON TARGET DETECTABILITY WITH A B-DISPLAY. Proj. NA 433 002 & NE 091 600 2, NRL Rep. 5264, Jan. 1959, 8pp. USN Research Lab., Washington, D.C.

14,259

To determine the effects of: a wide range of ambient illumination, receiver gain, and cathode-ray-tube bias on target detectability for a typical airborne-intercept radar B-display, four male subjects detected targets on such a display in a cockpit mock-up for several intensities, receiver noise values and target positions. Optimum values as a function of ambient illumination are indicated, and related to other findings in this area.
G. I. R 5

14,260

Frank, W.E. & Gibson, R.J. A NEW PRESSURE-SENSING INSTRUMENT. J. Franklin Inst., July 1954, 228(1), 21-30. (Bioengineering Section, Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

14,260

This report describes work done developing a system for measuring pressure exerted by the individual on his environment. The instrument had to function so accurate pressure contours could be drawn, particularly in the areas of bony prominences. The experiments included testing of different materials particularly for reducing hysteresis and instrumentation. Specific applications for this device are indicated.
G. I.

14,261

Dzendolet, E. & Rivley, J.F. MAN'S ABILITY TO APPLY CERTAIN TORQUES WHILE WEIGHTLESS. Proj. 7184, Task 71506, WADC TR 59-94, April 1959, 28pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,261

This study first reviews the anthropological literature to determine the torques a man can apply under normal conditions. Three experiments were performed in order to determine these torques under frictionless conditions: 1) maximum torque person can exert while trying to supinate his hand, 2) reaction force to a torque applied to a handhold (pushes and pulls) with handle varied through four positions and 3) qualitative observations on person performing two simple mechanical acts. The values obtained empirically were compared to calculated values and the validity of predictions so based was indicated. Suggestions concerning optimum body positions, use and location of handholds, design of handtools, and so forth are made.
T. G. I. R 8

14,262

Fryer, D.I. AIRCRAFT PASSENGER-SEAT DESIGN AND CRASH SURVIVAL. FPRC 1055, Aug. 1958, 17pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

14,262

This review of available information describes the forces likely to be encountered in an aircraft accident and the best means by which to minimize their various effects on passengers. The discussion of protective engineering includes the floor, seat anchorage, and seat orientation. Major attention is given to the arguments advanced for and against the adoption of backward facing seats.
T. R 46

14,263
Dunlap and Associates, Inc. INTEGRATED INSTRUMENTATION FOR AIRCRAFT. HUMAN ENGINEERING PHASE. Dec. 1954, 51pp. Dunlap and Associates, Inc. Stamford, Conn.

14,263
This is a summary of the findings of the first year studies in the program to improve and simplify aircraft instrument presentation. An analysis was made of the visual cues which provide information for flight control during contact flight. These were incorporated in a single display which appears adequate for presenting data related to orientation of the aircraft in space. A series of aircraft tests for evaluating this display and comparing it to a standard and an advanced display system are described. Plans for further development of this display concept are indicated.
I.

14,264
Gervey, W.D., Taylor, F.V. & Newlin, E.P. THE USE OF "ARTIFICIAL SIGNALS" TO ENHANCE MONITORING PERFORMANCE. NRL Prob. R05 19, Proj. NO: OIC 520, NRL Rep. 5269, Feb. 1959, 8pp. Applications Research Division, USN Research Lab., Washington, D.C.

14,264
To explore the behavior of human monitors searching over a two-hour period for signals that appear infrequently, five experiments were run using a multi-dial display. The variables were 1) use of artificial signals indistinguishable from the real signal, 2) use of artificial signals readily distinguished from real signal, 3) informative feedback (red light) and 4) motivational feedback (noise). The response times to the real signals were analyzed for effects of the variables on monitoring efficiency.
I. G. I. R 10

14,265
Cummings, E.G., Blevins, W.V., Greenland, C.M. & Craig, F.N. THE EFFECT OF PROTECTIVE MASKS ON THE SOLDIER'S ABILITY TO RUN A HALF MILE. Subproj. 4 08 02:023 01, OMLR Rep. 2254, Oct. 1958, 20pp. USA Chemical Warfare Lab., Army Chemical Center, Md.

14,265
To assess the effects of the E13 and M9 gas masks on the soldier's ability to perform intensive work demanded by assault maneuvers, half-mile speed running was performed by nine paratroopers. Each subject ran the half-mile single while wearing the E13 mask (with and without the filter), the M9 mask (with and without the filter), and with no mask. Each run was separated by 24 hours. Running times, per cent increase in running time (as based on the no mask condition), final heart rates, and the statistical analysis of the data are given. The effects of mask weight, distribution, inspiratory resistance, and visual field on running are discussed.
I. R 6

14,266
Hale, H.B., Ellis, J.P., Jr. & Kratochvil, C.H. CHANGES IN PLASMA CORTICOSTEROIDS AND BICARBONATE AS A RESULT OF PILOTING SUPERSONIC AIRCRAFT. 59 61, April 1959, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,266
The present study is concerned with hyperventilation in F-100 pilots. Plasma bicarbonate determinations provide a means of detecting in-flight hyperventilation, and, in theory, corticosteroid determinations might differentiate the susceptible from the tolerant ones. Such determinations were made immediately before and after relatively short flights. Comparison was made of instructors and students to ascertain whether the difference in flying is reflected by these parameters.
I. R 10

14,267
Hall, F.G. & Salzano, J. EFFECT OF BODY POSTURE ON MAXIMAL INSPIRATORY AND EXPIRATORY STROKE VOLUME. Contract AF 33(616) 3421, Proj. 7164, Task 71632, JADC TR 59 126, March 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Duke University Medical Center, Durham, N.C.).

14,267
To enable a close study of respiratory processes, a method for measurement of both inspiratory and expiratory stroke volumes is described. Tided maximal expiratory and inspiratory stroke volumes were measured, using the method described, in 18 normal young men ranging in age from 19 to 30 years. During these tests, subjects were placed in four postures: standing, supine, head up and body axis at 45 degrees from horizontal, and head down and body axis at 45 degrees from horizontal. The percentage of maximal stroke and flow rates were analyzed in relation to body posture.
I. G. I. R 3

14,268
Craggall, A.M. & Robinson, H.M. MEASURING AND PREDICTING THE GENERATION OF STATIC ELECTRICITY IN MILITARY CLOTHING. Proj. 7 93 18 019, Rep. 110, Sept. 1959, 67pp. USA Textile Division Laboratory Branch, ON Research & Engineering Center, Hattick, Mass.

14,268
This report contains: 1) a summary of an investigation on the problem of static electricity in clothing assemblies from the standpoint of hazard due to characteristics of the clothing components, 2) an analysis of the generation of static electricity and of specific atmospheric and other conditions under which the problem becomes acute, 3) data from on-the-individual tests of static electricity on men wearing cold-dry uniforms, 4) data from an evaluation of antistatic finishes for effectiveness and durability, 5) instrumental methods for predicting electrostatic propensity are reviewed, and 6) a new Quartermaster device for the aforementioned predictions is described and discussed.
I. G. I. R 44

14,269
Crockford, G.W., Mellon, R.F., Humphreys, P.W. & Lind, A.R. AIR-VENTILATED SUITS FOR WEAR IN VERY HOT ENVIRONMENTS. RNP 59/944, CES 439, CP 33, Jan. 1959, 18pp. Clothing Panel, Climatic Efficiency Sub-Committee, RNPAC, London, England.

14,269
The object of the research was to provide an air-ventilated suit which would enable a man to carry out light watch-keeping duties for one or two hours in an environmental condition of 180 degrees Fahrenheit dry-bulb temperature and 130 degrees Fahrenheit wet-bulb temperature. Tests, described in this report, were conducted to determine the optimum quantity and temperature of the ventilating area for the suit. Sixteen tests were carried out in an air temperature of 178 degrees Fahrenheit during which volunteer subjects wore the suit ventilated with dry air at given rates between ten and 25 c.f.m. (cubic feet minute) and at given temperatures between 86 and 100 degrees Fahrenheit with a constant humidity. Physiological measurements were made before, during, and after the tests. Recommendations are included. I. G. R 3

14,270
Melpar, Incorporated, Falls Church, Va. STUDY OF EVALUATORS FOR AIRCRAFT INSTRUMENTATION DISPLAY. FINAL REPORT. Contract NR DA 36-039 SC 75578, Proj. NR 11 00 0000, Task 11 57 0081, USAEPG SIG 950 41, June 1958, 58pp. USA Electronics Proving Ground, Fort Huachuca, Ariz.

14,270
To determine the feasibility of fabricating a flight simulator for testing developmental aircraft instrumentation; to determine its probable acceptability, value and cost; and to determine, if feasible, concepts and doctrines for employment, studies were made of the evaluation problem, the "pros" and "cons" of "in-flight" versus simulator testing, basic analog computer operations, and how simulator techniques could be used. A computer and associated laboratory facility are described in detail and the experimental techniques to perform instrument display evaluation are discussed. Comparative cost estimates of simulator testing and flight testing are presented.
I. G. I. R 17

14,271
Coffin, R.A. (Chm.). DESIGN ENGINEERING. A REVISION OF TRAINING IN VALUE ANALYSIS. SECTION OF ENGINEERING. NATIONAL BUREAU OF STANDARDS. DESIGNATION: TECHNICAL REPORT 1004. May 1954, 60pp. The American Society of Mechanical Engineers, New York, N.Y.

14,272
This bulletin contains eight papers and discussions from a Design Engineering Conference held in May, 1954, in conjunction with a Design Engineering Show. Four technical sessions were held: Value analysis in product design; How to get and train design engineers; Selecting materials and manufacturing problems; and Patents-consideration, reward and rights.
T. J.

14,272
Mahan, J.R. & Freyzer, Joseph. PHOTOMICROGRAPHIC MEASUREMENT OF RETINAL VESSEL BLOOD OXYGEN. VALUES IN NORMAL SUBJECTS, AND THE EFFECT OF CHANGE IN BODY POSITION AND IN THE IRRADIATION OF LOW AND HIGH OXYGEN RETINAE. 28 MAY, Feb. 1959, 12pp. CASE School of Aviation Medicine, Randolph AFB, Tex. (Cable University School of Medicine, Durham, N.C.).

14,272
A method is described for measuring by photographic means the percent oxygen saturation of retinal vessel blood. Results obtained from normal subjects under various conditions (breathing 10 and 100 percent oxygen, seated and recumbent positions) are presented and discussed.
T. G. I. R 6

14,273
Cohen, M. SOME PERCEPTUAL AND PHYSIOLOGICAL ASPECTS OF UNIFORM VISUAL STIMULATION. Contract DA 49-507 MD 866, Jan. 1959, 19pp. University of Buffalo, Buffalo, N.Y.

14,273
Three major problems were investigated: 1) the extent to which the accuracy of form recognition is dependent upon the structure of the visual field, the structure of the object, and prolonged exposure (90 seconds) to the visual field; 2) the dependence of spatial orientation on field structure, characteristics of the target, and subject's set; and 3) the effects of prolonged exposure (20 minutes) to the uniform field upon the "blank-out" (or "white-out") phenomenon which involve temporary loss of vision.
T. R 8

14,274
Hilburt, E.O. (Chm.). MINUTES AND PROCEEDINGS OF THE FIRST MEETING OF THE ARMY-NAVY-NBC VISION COMMITTEE. SUBCOMMITTEE ON VISIBILITY AND ATMOSPHERIC OPTICS. 26-27 JANUARY 1948. Armed-Forces-NBC Vision Committee, Washington, D.C.

14,274
This document reports the minutes and proceedings of a meeting of the Subcommittee on Visibility and Atmospheric Optics with a group of civilian scientists to consider the Navy's problems in visibility. Reports of five current research studies were under Penn State Atmospheric Optics Program, tests of atmospheric shimmer, meteorological research program of the Daniel Guggenheim Airship Institute, atmospheric polarization, and visual thresholds. Brief reports from various working groups are summarized.
G. I. R 20 (approx)

14,275
Burt, C.P. TRACKING PERFORMANCE AS A FUNCTION OF FEEDBACK SPECIFICITY. Proj. 7364, Task 7362, NRC TR 38 544, March 1958, 13pp. NRC Ann. Rept. 13, Wright-Patterson AFB, Ohio.

14,275
To provide knowledge concerning the relationship between human performance and the specificity of feedback information, four degrees of specificity and two levels of task difficulty were studied in terms of their effect on error and on control action in the performance of a one-dimensional compensatory tracking task using an acceleration control. Eight subjects were assigned randomly to each of eight combinations of task difficulty and feedback specificity and performed 30 90-second trials. Tracking error and control action scores were analyzed to find an optimum degree of specificity of feedback information.
T. G. I. R 8

14,276
Chapin, J.L. INFLUENCE OF ACCLIMATION ON RESPONSE TO ALTITUDE. Rep. 59 23, June 1959, 13pp. CASE School of Aviation Medicine, Randolph AFB, Tex. (Medical School of the University of Colorado, Denver, Colo.).

14,276
To determine how well individuals who had attained natural acclimation to altitude could maintain this by intermittent re-exposure to original altitude, 14 young healthy males were acclimated to altitude from 5200 to 14,160 feet for two and one-half to three weeks, then periodically re-exposed. Tests of acclimation used were closed- and open-circuit acute hypoxia test, exercise O₂ accumulation test, resting and exercise hypoxic threshold test. The physiological implications of the test results are discussed.
T. R 5

14,277
Jager, J.F. & Carhart, R.T. SOME RELATIONS BETWEEN NORMAL HEARING FOR PURE TONES AND FOR SPEECH. 59 43, April 1959, 12pp. CASE School of Aviation Medicine, Randolph AFB, Tex. (Northwestern University, Evanston, Ill.).

14,277
To determine the intensity difference between normal hearing for speech words and for a 1000 cycle per second pure tone, a preliminary investigation employed ten sophisticated subjects well acquainted with test materials and ten naive subjects initially not acquainted with tests. Thresholds were obtained by two methods (up-and-down and clinical) and compared for effect of sophistication on the two thresholds. The main experiment, employing 95 young adults with normal hearing, investigated five factors: type test method; order of test administration; sex, ear, and familiarity with test vocabulary. The data were analyzed for differences attributable to these factors and for average differences between the two types of thresholds.
T. I. R 14

14,278
Johansson, G., Backlund, F. & Bergstrom, S.-S. LUMINANCE CHANGES AND VISUAL ACUITY. Rep. 5, March 1959, 22pp. Psychological Lab., University of Umeå, Umeå, Sweden.

14,278
To study the time lag in visual acuity after luminance changes, a series of three experiments was conducted. The luminances ranged from one to 10,000 millilamberts, the visual acuity tests were of the checker-board type, and the subjects numbered five, seven, and five for the several experiments. The luminances were presented 1) serially, 2) in random order, and 3) with inserted glares (duration of three and six seconds). The time lag data were studied as a function of preadaptation luminances for the three conditions of presentation. The implications of the findings for the operator in machine systems are discussed.
T. G. I. R 9

14,279
Chapman, A. (Ed.). A REPORT OF RESEARCH UNDER CONTRACT WITH THE OFFICE OF NAVAL RESEARCH. Contract (SME) 344(25). Proj. Rep. 1. May 1959. 12pp. Psychological Laboratory, Institute for Cooperative Research, Johns Hopkins University, Baltimore, Md.

14,279
This report of general research under contract with the Office of Naval Research contains the following divisions: 1) change in contract description, 2) personnel, 3) visits and special activities, 4) research reports published since last report (five), 5) research reports to be published (three), 6) summaries of reports completed within last period (four), 7) current research projects (ten), 8) new research (two), and 9) bibliography of the last two years (edges).
R 8

14,280
Buckley, D.M. THE RELIABILITY OF SUBJECTIVE ESTIMATES OF TARGET DIFFICULTY. Proj. 7713, Task 7713C, CL DE 37 21, Mar. 1959. 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,280
As one phase of an investigation into methods of determining the difficulty of radar aiming points (AP), a study was made of the reliability of subjective estimates of target difficulty. Thirty subjects rated photographs of radar target presentations taken at four distances from the AP on radar bank maps. Separate estimates of difficulty on a seven-point scale were obtained for each of three associated areas on each photograph. The data were studied for reliability of estimates using analysis of variance techniques.
T. R 6

14,281
Bauer, J.M. (Ed.). TRANSMISSION AND VISIBILITY OF RADAR AND SONAR DISPLAYS. Proceedings of a Symposium Sponsored by the Armed Forces-NSC Committee on Vision. Publ. 595, 1958. 210pp. National Academy of Sciences - National Research Council, Washington, D.C.

14,281
This symposium was called to determine once again what is required of radar and sonar displays and how visual needs in particular are being met by the technical developments of recent years. The 28 papers given at the symposium are divided among four major topics: operational requirements for cathode-ray tubes and displays in relation to illumination problems; methods for controlling sufficient illuminations display requirements imposed by visual factors; and new techniques under development. In addition, remarks from three panel members on the presented papers, are reproduced here along with a glossary of terms.
T. G. I. R 28

14,282
Kidd, J.S. & Hooper, J.J. DIVISION OF RESPONSIBILITY BETWEEN TWO CONTROLLERS AND LOAD BALANCING FLEXIBILITY IN A RADAR APPROACH CONTROL TASK: A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33 (616) 3512, Proj. 7184, Task 71583, WDC TR 58 473, April 1959, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., Ohio State University & OSU Research Foundation, Columbus, Ohio).

14,282
The general problem of optimum division of duties between two or more men who are performing essentially the same functions in a complex man-machine system were investigated. In a simulated radar approach control system, six two-man pattern-feeder control teams were evaluated under three methods of assignment (sector, rotation, and destination control) and under two levels of restraint on the option of exchanging responsibility during the approach (partial and no restraint). Measures of performance were system efficiency (mean control time, fuel consumption, go-arounds), safety (separation error), intercontroller communication and job satisfaction (opinion inventory).
T. I. R 10

14,283
Klein, R.G. & Kline, J.S. THE EFFECT OF TEAM SIZE AND INTERPERSONAL COMMUNICATION ON DECISION-MAKING PERFORMANCE. Contract AF 33(616) 3412, Proj. 7184, Task 71584, WDC TR 58 474, April 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Aviation Psychology Lab., Ohio State University & OSU Research Foundation, Columbus, Ohio).

14,283
The performance of single individuals and two-man teams, with and without intercommunications, was compared in a complex decision-making task. The task was an operational "game" derived from radar approach control with 48 subjects participating once in each of the three experimental conditions. Time, output, and error scores were analyzed in a study of work unit productivity and individual efficiency as affected by the conditions. The implications of the findings for increasing productivity are discussed.
T. I. R 10

14,284
Kneaser, G.L. ATTENTION AND PERFORMANCE REQUIREMENTS FOR GUIDED MISSILE GROUND SUPPORT FUNCTIONS. Contract AF 33(616) 170, Proj. 7185, Task 71584, WDC TR 59 340, May 1959, 4pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (General Electric Company, Schenectady, N.Y.).

14,284
This report summarizes an investigation of the high skill level requirements found in missile systems employing automatic electronic test and checkout equipment. The study consisted of interviews, visits to factories, schools, and missile test centers; and studies of documents ranging from service records and class grades through production specifications to the latest versions of operational plans. An outline of the factors that must be considered in the design of a maintenance system is presented and discussed in detail. Further research is recommended in development of techniques for evaluating the design of test logic, maintenance operations, and manual tasks.
T. I. R 23

14,285
Katzick, J.L. QUARTERMASTER HUMAN ENGINEERING HANDBOOK SERIES: VI. SIZE LIMITS OF THE HEAD AND NECK AREA OF THE SOLDIER WEARING QUARTERMASTER HEADGEAR. Proj. Ref. 7 83 01 005, Tech. Rep. EP 127, March 1959, 71pp. USA Environmental Protection Research Div., ON Research & Engineering Center, Watik, Mass.

14,285
This report presents human engineering information on the size range of the head and neck area of the soldier wearing Quartermaster headgear. It should be used as a handbook by engineers and designers for establishing space allowances in the design and sizing of man-operated equipment. The data are concerned with the middle 90 per cent of the ranges of head sizes for the Army population. The information is presented in pictorial form with index scales so that dimensions can be measured on the pictures and referred to the index scale to establish actual size.
T. I.

14,286
Kremer, G.L. ATTENTION VALUE OF AUDIO AND VISUAL WARNING SIGNALS. Contract AF 33(616) 135, Proj. 7184, Task 71580, April 1959, 76pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Psychology, Washington University, St. Louis, Mo.).

14,286
A summary of a series of investigations on the "attention-demand" value of auditory and visual stimuli is given. Following a survey of the literature, a method was developed which was intended to provide a laboratory analogue of real tasks and which lent itself to measurements of stimulus-effectiveness in attracting the attention of the subject. Threshold and reaction time measures could be obtained. Comparison was made of the attention-demanding values of auditory stimuli differing in frequency, and of visual stimuli differing in wavelength under different conditions of background noise. The implications for designing systems of warning signals are discussed.
T. G. I. R 77

14,287

Kuempel, E.S. SHORT DURATION PHYSIOLOGICAL ANALYSIS OF EEG DATA. Contract AF 33(616) 5181, Proj. 7215, Task 71713, WDC TR 59 66, Feb. 1959, 12pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio. (The Franklin Institute, Philadelphia, Pa.).

14,287

To assess the applicability of certain communication engineering techniques to the analysis of electroencephalographic (EEG) data, amplitude spectra were computed from .20-second samples of EEG data obtained from bipolar electrodes positioned at the left parietal and left occipital locations. Differences were obtained between these spectra as a function of the state of consciousness of the subject. The implications of these differences for an electronic discrimination scheme are discussed.

T. G. I. R 1

14,288

Swadlow, J.A. THE POSITION OF THE FOOT IN A FOOT CONTROL. PE/3/5/54, Sept.-Oct. 1958, 28pp. The British Iron and Steel Research Association, London, England.

14,288

To investigate the position of a foot pedal in relation to the foot, a preliminary experiment was run to define the number of likely positions in which an optimum ankle position might lie. In the major experiment, seven subjects were required to move a pointer through a given distance to align it with a black pointer by operating a foot pedal in three different positions. Time taken to complete the task (a given number of runs) and the number of steps used during the runs were analyzed for differences among positions. Subjective reactions to this type of pedal and preferences for position were further analyzed. Optimum positions are given.

T. G. I. R 2

14,289

Brown, A.S. & Hodge, J. EVALUATION OF CONNECTED ELBOWS ADULT SIZE, ARTIFICIAL, EXTERNAL, ALTERNATING (OUTSIDE LOCKING ELBOW HINGE). Tech. Rep. 5801, Jan. 1958, 6pp. USAF Prosthetic Research Lab., Walter Reed Army Medical Center, Washington, D.C.

14,289

Commercially available, adult size, external elbows (outside-locking elbow hinge) were evaluated for compliance with the requirements set forth in the Tentative Standards as approved at the Prosthetics Research Board Clinic (1956). Two Sierra adult size elbows were subjected to various functional tests (degree and quality of flexion permitted, capability of locking mechanism to provide various stable positions, ease of controlling locking mechanism, and force required to operate), physical strength tests, design and construction tests, and appearance evaluation.

T. I.

14,290

Bredon, Ruth M. RESULTS OF PROFICIENCY TESTING AT ESS: IDENTIFICATION OFFICER. Contract AF 41(657) 95, EDC Proj. 46, CAL TX 58 2, Sept. 1958, 8pp. Educational Research Corporation, Cambridge, Mass.

14,290

The aim of this series (of which this report is one) is to develop off-the-job performance tests as prototype proficiency measures for SAGE operators. The present test, the Identification Officer Test, was administered to four examinees at the Experimental SAGE Sector. (This test is briefly described). The test results are presented in detail.

T.

14,291

McFar, M.E., Mamm, J.A. & Taylor, J.E. TRAINING IN: EXPERIMENTAL DEVELOPMENT OF TRAINING METHODS AND PROFICIENCY TESTS FOR IMPROVING THE EFFECTIVENESS OF COMBAT REFLEXES. March 1959, 126pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio.

14,291

To develop a practical basic course in rifle marksmanship instruction which will prepare the soldier to use his rifle effectively in combat and to develop proficiency tests based on combat criteria to measure the adequacy of training, comprehensive analyses of the situations confronting the rifleman in combat were made. The training course and two tests (marksmanship and target discrimination) were developed. Two groups of trainees were given the conventional basic training at different Army posts and a third was given the experimental course. The relative efficiency of the groups were then evaluated. Principles of effective use of the rifle are discussed.

T. I. R 31

14,292

Bradley, J.T. & Morris, R.A. SPACING OF ON-OFF CONTROLS. IIS: ENGINE SWITCHES. Contract AF 33(616) 3404, Proj. 7182, Task 7214, WDC TR 58 475, March 1959, 21pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio.

14,292

To investigate efficiency in the human operation of toggle switches as a function of the spacing between controls, 36 right-handed subjects performed a standardized control operation in which the center one of three closely spaced switches was operated while avoiding contact with adjacent switches. Variables were type of toggle switch, spacing, orientation of the linear array, and direction of thumb performance measures were reach-and-operation time, inadvertent touching and/or operation of adjacent switches. The data were analyzed and discussed in terms of optimal design of such controls. The findings are compared with data obtained in a previous similar experiment using push buttons.

T. I. R 2

14,293

Metz, J.K. & Ford, F.D. FEASIBILITY OF A METHOD FOR ESTIMATING SHORT-TERM AND LONG-TERM EFFECTS OF POLICY DECISIONS ON THE ARMY PERSONNEL SYSTEM. Proj. 7719, Task 17114, WDC TR 59 36, June 1959, 17pp. USAF Personnel Lab., Lackland AFB, Tex.

14,293

This report describes and indicates the utility of a model which simulates the flow of army personnel through the Air Force personnel system under a given set of policies. This model makes it possible to estimate, with as much accuracy as is available in the input information, the effects of that set of policies at future points in time. These effects may be gauged in terms of the future distribution of grade levels, career fields, or other pertinent information that may be built into the model.

T. I. R 1

14,294

Blackwell, H.R. THE EFFECT OF TARGET SIZE AND SHAPE ON VISUAL DETECTION IV SOME RELATIONS WITH PREVIOUS INVESTIGATION. Proj. MICHIGAN, Rep. 2144 335 T, Feb. 1959, 21pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

14,294

This report, the fourth in a series of investigations on the effects of target size and shape on visual detection, reanalyzes data from the earlier reports to facilitate comparison with data of earlier investigators. Points of both agreement and difference are shown. An explanatory hypothesis is offered to account for the difference found for large targets of extreme shape. An investigation is reported of the adequacy of the perimeter theory in predicting the data of the present series of studies.

G. R 12

14,295

Reddick, R.M. SENS AND HEMOGLOBIN IN HIGH-ALTITUDE FLIGHT OPERATIONS. Proj. 7160, Task 7.012, WADC TR 58 623, March 1959, 10pp. Wright-Patterson AFB, Ohio.

14,296

In order to validate the requirement for two hours of denitrogenation prior to long-range flight at high altitude, the literature on decompression sickness is reviewed and the various theories critically examined. Studies of the relative efficiency of denitrogenation in flight (by breathing oxidized oxygen) at intermediate cabin altitudes are summarized and some practical evidence accumulated incidentally from simulated flights in the low-pressure chamber is presented.
T. G. R 5

14,296

Blackwell, H.R. & Blackwell, C.M. STUDIES OF DARK ADAPTATION FOR NIGHT VISION. Part. MONITORING, Rep. 2144 3457, Jan. 1959, 13pp. Wright-Patterson AFB, Ohio.

14,296

The dark adaptation process for observers using normal binocular vision was measured in a series of experiments. An automatic recording dark adapter was used with a 0.25 degree test target of white, red, and blue light. Measurements were made following a 500-second exposure to a 1000 foot-lambert preadaptation field. The foveal and two peripheral locations (12 and 15 degrees) were studied. The ρ' were analyzed for differences in the dark adaptation function due to target color and retinal location. The known spectral response curves of rod and cone cells are used to identify the receptors involved in various phases of adaptation.
G. R 2

14,297

Bell Aircraft Corporation. IM-HEP (IDEAL MAX-HELICOPTER ENGINEERING PROJECT). Bell Doc. 999 G75 001, Jan. 1956, 24pp. Bell Aircraft Corporation, Fort Worth, Tex.

14,297

This brochure introduces the Ideal Max-Helicopter Engineering Project (IM-HEP), a research and development program to provide cockpit instrumentation that will allow the helicopter pilot to utilize fully the versatility of his machine. The historical background of the project, the needs, the program, the goals, and industry participation are discussed.
I.

14,298

Baile, B. & Mire, R.M. THE PRESENT STATUS OF PHYSICAL FITNESS IN THE AIR FORCE. Rep. 59 67, May 1959, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,298

To collect material for the standardization of physical performance capacity, work capacity (a sensitive and realistic measure of physical fitness) was determined on more than 500 military and civilian Air Force personnel. A treadmill test was devised for screening work capacity which permitted evaluation of results in terms of physical and physiological terms: test duration in minutes, metabolic requirements for the work (based on measurements of gas exchange), cardiovascular response (pulse rate, blood pressure), oxygen consumption, and pulmonary ventilation. Factors such as age, activity, weight, and personal habits were related to the results. An arbitrary rating scale of work capacity is suggested.
T. G. R 8

A,299

Madany, G.M. & Madany, R.V. ON THE REDUCTION OF CHOICE REACTION TIMES WITH PRACTICE. Reprint Series Rep. 476, April 1959, 8pp. Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.

14,299

To investigate the effect of practice upon choice reaction time, the performance of one practiced subject was recorded for two choices and four choices. The stimuli were lights positioned on a display panel in accordance with the arrangement of response buttons. Although there were ten stimulus and response positions, only the index and second finger positions were used. Each trial consisted of 3000 reaction times for the two conditions; there were 15 trials spaced over a period of five months. Mean choice reaction times for the two conditions were analyzed as a function of trials. The findings are discussed in relation to their use in information theory.
T. G. I. R 14

14,299

Mockler, F.A., Nymard, J.E., O'Reilly, L.J. & Williams, J.C., Jr. PSYCHOLOGICAL DEFICIENCIES IN THE DESIGN OF FLIGHT SIMULATORS FOR TRAINING. Contract AF 33(616) 2723, Proj. 7191, Task 7105, WADC TR 58 369, Jan. 1959, 132pp. Wright-Patterson AFB, Ohio.

14,300

This report surveys the general problems of simulator design (primarily flight and engine systems) with reference to factors of psychological stimulation that influence transfer of training. Present Air Force utilization of simulators is discussed; training research literature on flight trainers and simulators is evaluated; and a number of experimental programs are suggested. Several specific problem areas are examined with particular emphasis on possible empirical solutions. Motivational, instructional, and methodological variables are also considered. Finally, conventional theories of transfer of training are evaluated for predictive efficiency in this area.
G. I. R 156

14,301

McNee, J.C. NEUROPSYCHIATRY FOR THE FLIGHT SURGEON. Sept. 1956, 223pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,301

This textbook is an outgrowth of lectures and seminars on neuropsychiatry presented at the School of Aviation Medicine, USAF. It is assumed that the student has been exposed to basic psychiatry; therefore the text emphasizes an understanding of the complex interpersonal and social problems of the Air Force environment, and their impact upon the flyer and doctor alike. Certain topics have been amplified beyond their consideration in the "Flight Surgeon's Manual": Clinical diagnoses and psychosomatic problems, Adaptability ratings for military aeronautics, Neurological problems and psychological reactions to flying stress, Mental health and administrative psychiatry.
T. G. R 495

14,302

McBlair, M., Rumbaugh, D. & Forard, J. VENTILATION, TEMPERATURE, HUMIDITY. Contract NMR 1268(01), Nov. 1955, 87pp. San Diego State College Foundation, San Diego, Calif.

14,302

A review of available information about ventilation, temperature, and humidity effects on human performance is presented. The following are major subdivisions of this topic: temperature regulation in man, thermal changes in man under extreme thermal conditions, effects of extreme thermal conditions upon performance, optimal conditions (air control system requirements for comfort and efficiency, human reactions to specific atmospheric factors, and composite indices), and data for operating engineers (human factors, atmospheric conditions and regulation of air control systems).
T. G. I. R 34

14,300

Judd, R.A. (Ch.). **REPORTS AND PROCEEDINGS OF THE FIRST MEETING OF THE ARMED FORCES-NAVY VISION COMMITTEE, SUB-COMMITTEE ON COLOR VISION, 27 FEBRUARY 1948.** Navy Research, Washington, D.C.

14,303

This report gives details of the first meeting of the Subcommittee on Color Vision. The agenda consisted of two items: (1) the problem of the selection of color deficient men in the Naval service and plans for a follow-up study throughout the term of their enlistment, and (2) the validation and field testing of the Navy Color Testers. The discussion of these problems and accompanying recommendations are recorded.

14,304

Lacort, R.P. **ARCTIC WEATHER TEST 1954-57 OF RIFLE, MULTIPLE 12MM, SELF-PROPELLED, MCO. PART I. AUTOMATIC FIRE.** GDD Proj. TSD 1404, 251 CGO CG, CTR 00/600009, April 1957, 41pp. USA Development and Field Services, Aberdeen Proving Ground, Md. (USA Conference Test Activity, Yuma Test Sta., Ariz.).

14,304

To determine the suitability and durability of the Rifle, Multiple 12mm, Self-Propelled, MCO for operation under winter conditions, a production model was subjected to automotive tests during the winter season at Fort Churchill, Canada. Cold starting and warm-up of engine, functioning of personnel heater, crew comfort, mobility, and durability were studied during 1952 miles of operation on all types of terrain at temperatures to -42 degrees F. The results of these tests were summarized and used in making recommendations for design improvement.

T. G. I. R 8

14,305

Malick, C.M. & Beach, L.A. **FATIGUE PROTECTION AFFORDED BY STANDARD ENLISTED MEN'S BARRACKS.** Proj. NY 340 032, MIL. Prob. 104-15, March 1957, 21pp. USA Research Lab., Washington, D.C.

14,305

This report appraises the protection against radiation offered by existing Naval installations. The method of calculating radiation shielding is described. The effectiveness of present barracks is given, as well as discussion of possible improvements in shielding of barracks and the advisability of providing emergency basement shelter. Decontamination procedures are also discussed. Recommendations are given at the end of the report.

T. G. I. R 15

14,306

Parrish, J.A. **A STUDY OF TWO NON-LINEAR METHODS OF COMBINING PREDICTOR TESTS.** FEB Tech. Res. Note 102, May 1959, 21pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

14,306

The predictive efficiency of two relatively untried but promising methods of combining test scores were compared with that of the usual (multiple regression) method. Scores on four Army Classification Battery Tests and two experimental tests were obtained on 1000 enlisted infantrymen on their first tours of duty. The basic problem was to combine test scores by taking into account special population characteristics in such a way as to maximize prediction of rated combat efficiency. Both experimental methods used test scores for defining population characteristics: 1) interaction method made use of cross-products in prediction formula, and 2) configural method determined the best prediction for each score pattern.

T. R 15

14,307

Rimmer, R.S. **BOUNDARY-LAYER-INDUCED NOISE IN THE INTERIOR OF AIRCRAFT.** NACA Rep. 37, April 1936, 39pp. Institute of Aeronautics, University of Toronto, Ottawa, Canada.

14,307

At high speeds the turbulent boundary layer causing the airplane fuselage excites appreciable skin vibration, producing strong noise in the interior. The fluctuating exciting pressure distribution can be represented as a pattern of moving waves (Fourier integral). A moving ripple in the skin follows underneath each wave, and the noise is ultimately due to these ripples. The acoustical effects of the moving ripples are calculated from an infinite sheet; this is the main result of this investigation. The results are used to provide a tentative estimate of the noise generated at subsonic speeds in a practical fuselage. Some comparisons are made with experiment. Finally, no idea for noise alleviation is presented.

T. G. I. R 17

14,308

Fellack, I. **BIOMURAL COMMUNICATION SYSTEMS: PRELIMINARY EXAMINATION.** J. Acoust. Soc. Amer., Jan. 1959, 31(1), 61-62. (NSAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

14,308

This note reports the results of an exploratory study that examines binaural directional information in conjunction with methods of rejection filtering which have been found useful for enhancing the appreciation of spatiality and useful for enhancing multichannel listening. The approach is that of a communications system that purchases additional channels by shifting selective operations from equipments to human operators. Intelligibility test data are presented for one listener from three experimental conditions (experimental binaural, control monaural, and control binaural) and three filtering arrangements.

G. I. R 3

14,311

Shivers, A.J., Cohen, S.H., Zidman, G.D. & Vickery, L.L. **PSYCHOLOGICAL AND BIOMECHANICAL ASSESSMENT OF G-SUIT PROTECTION.** Proj. 7215, Task 21713, WADC TR 56-430, Oct. 1958, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,311

Subjective evidence in the form of anecdotal reports has been presented for the protective effects of anti-g suits against fatigue. In an attempt to demonstrate this phenomenon in the laboratory, performance of a psychomotor task (dual pursuit meter) and arousal of the organism (galvanic skin response, GSR) were assessed on six subjects who were centrifuged at three g for ten rides while protected and again unprotected by an anti-g suit. Performance (average time on target) and GSR findings are compared for the two conditions. Effects of previous experience in wearing the anti-g suit are discussed.

T. G. I. R 5

14,312

Rees, D.W. & Kama, W.N. **SIZE OF TABS: A FACTOR IN HANDLING OF GUIDES AND CHECK-LISTS.** Proj. 7184, Task 71586, WADC TR 59-158, March 1959, 17pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,312

To obtain information pertaining to the design of index tabs as used on checklists to facilitate handling, an experiment was performed in which subjects were required to pick up a check list from a thighboard, turn to a specified section of the list, then replace the list back on the thighboard. The experimental variables were 1) size of tabs, 2) encumbrance conditions (bare hands and work clothes, gloves, gloves and fully inflated MC-3 partial pressure suits), and 3) tab position (top, center, or side of list). Reaction times in using tabs to locate information were studied by analysis of variance methods for effect of the variables.

14,313

Riley, J.A. OCCUPANCY THEORY WITH APPLICATION TO MULTI-CHANNEL COMMUNICATION SYSTEMS. PART 1: THEORY. Contract AF 19(604) 1396, AFMTC IN 57 562, Scientific Rep. 5, June 1957, 49pp. Parks Mathematical Laboratories, Inc., Carlisle, Mass.

14,313

This report presents a generalized occupancy theory (study of problems concerned with the distribution of a given number of objects in a given number of cells or compartments) which includes the classical and restricted theories as special cases. Some of the basic problems in the general theory are formulated and discussed. The principle tool in the development is the Markov method from the theory of random flights. From a mathematical point of view, channels in a multichannel communication system are cells occupied or not by objects of a different color representing different kinds of communications. Thus the occupancy theory can be used to determine the probabilities of various events in the use of multichannel communication systems.

R 6

14,314

Riley, J.A. OCCUPANCY THEORY WITH APPLICATION TO MULTI-CHANNEL COMMUNICATION SYSTEMS. PART 2: APPLICATIONS. Contract AF 19(604) 1396, AFMTC IN 57 563, Scientific Rep. 6, Feb. 1958, 31pp. Parks Mathematical Laboratories, Inc., Carlisle, Mass.

14,314

This paper applies the Occupancy Theory (see 14,313) to some problems of multichannel communication systems. Basic assumptions for a model of a communication system are stated and the resultant model is then identified with the basic model of Occupancy Theory. Since an immediate consequence of the communication model is the possibility of self-interference (two or more stations overlap in their choice of transmitting channels), the results of the theory are applied to three self-interference problems. The solutions have not only intrinsic interest, but should serve as examples for other applications.

T. G.

14,315

Riley, J.A. OCCUPANCY THEORY WITH APPLICATION TO MULTI-CHANNEL COMMUNICATION SYSTEMS: A CONNECTION. Contract AF 19(604) 3471, AFMTC IN 59 371, Scientific Rep. 2, June 1959, 15pp. Parks Mathematical Laboratories, Inc., Carlisle, Mass.

14,315

This supplement to previous report (see 14,313) on Occupancy Theory remedies an omission in the derivation of the basic result. Thus it contains revised proof of the basic theorem presented there.

R 4

14,316

Riley, M.B. & Bernardini, A.T. ANIMAL AND HUMAN STUDIES OF THE EFFECTS OF LOW-FREQUENCY OSCILLATION COMBINED WITH TRANSVERSE ACCELERATION. Proj. 7222, Task 71748, WADC TN 59 92, March 1959, 8pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,316

This is a study of endurance to low-frequency oscillation during backward acceleration. Results are reported for animals subjected to a maximum oscillation-g pattern of 2.8 cycles per second through a 36 degree arc in a 12 g field. In addition, results are reported for human subjects subjected to a maximum oscillation-g pattern of 0.7 cycle per second through a 36 degree arc in an 8 g field.

T. G. I. R 9

14,317

Regillio, D.S., Jr., Beech, H.W., Gaston, E.M. & Carrier, H.M. OPERATIONAL TEST AND EVALUATION OF AIR TRAFFIC CONTROL CENTER AN/CSC-3 (XD-1) (WOLSCAM). Proj. 480171, AFMTC IN 59 21, May 1959, 124pp. USAF Air Traffic Control Center, Eglin AFB, Fla.

14,317

This test was conducted to determine the operational capability and functional reliability of the Air Traffic Control Center AN/CSC-3 (XD-1) (WOLSCAM) in an approach control environment. Emphasis was placed on WOLSCAM's effectiveness to control high-density air traffic. The major phases in the evaluation were: 1) missions were run using targets simulating aircraft to increase proficiency of personnel and to establish procedures; 2) missions were run using real aircraft with flight profiles designed to represent typical aircraft control situations. Specific operational, equipment, and maintenance recommendations are included.

T. G. I. R 12

14,318

Schmitz, R.A., Stark, E.A. & Willard, K., Jr. COMPARISON OF THE STEREOSCOPIC RANGE FINDER, RL2 AND THE COINCIDENCE RANGE FINDER, T43 AS USED IN RANGE DETERMINATION AT NIGHT. Task FIREPOWER I, Tech. Rep. 33, April 1959, 30pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,318

A comparison was made of the performance of highly skilled range finder operators using the stereoscopic range finder, RL2, and the coincidence range finder, T43, on targets likely to be encountered at night. The relationship between target illumination and the operation of the Internal Correction Systems of the two types of range finder in reducing bias was also studied. Rangings were made on tank targets set at varying distances from the line of observation, by daylight and at night with targets under two different conditions of illumination. Recommendations are included.

T. G. R 13

14,319

Schaefer, V.H., Link, H.J., Farrar, J.U. & Weiss, D. LETHALITY IN RATS AS A FUNCTION OF FREQUENCY IN CONSTANT-DISPLACEMENT VIBRATION. USAMRII Proj. 6 95 20 001, Task 5, Rep. 390, June 1959, 14pp. Psychology Division, USA Medical Research Lab., Fort Knox, Ky.

14,319

To study the relationship between frequency of constant-displacement whole-body vibration and lethal exposure time, 186 rats were studied. Except for control subjects, all were vibrated at some one frequency until death occurred or after 12 hours. The displacement (peak-to-peak or total amplitude) was constant at .25 inches, frequencies tested ranged from 10 to 45 cycles per second and acceleration increased as the square of frequency. Lethal exposure time was analyzed as a function of frequency and acceleration. Pathological effects of vibration were determined.

T. G. R 9

14,320

Schaefer, V.H., Ulmer, R.G. & Link, H.J. SOME BEHAVIORAL AND PHYSIOLOGICAL STUDIES IN VIBRATION. USAMRII Proj. 6 95 20 001, Task, Studies of Complex Behavioral Processes, Rep. 389, June 1959, 32pp. Psychology Division, USA Medical Research Lab., Fort Knox, Ky.

14,320

To obtain information on behavioral and physiological effects of whole-body vibration four studies were made using male rats as subjects. The variables studied were body weight, food intake, fecal output, water intake, urine output, open field activity, and elevated maze and straight-alley behavior. Pathological data were also obtained. The findings are discussed in terms of vibration as a stressor, transience of vibratory effects, adaptation, and pathology.

T. I. R 23

14,321

Scott, D.M. & McQueen, R.M. RADAR TARGET DETECTABILITY AT OUTER RANGES AS A FUNCTION OF DISPLAY SIZE USING GRID AND EXPANDED SCOPES. *IEEE Proj. 143, FCC Proj. 877 94 28 22, IEEE Rep. 143 18, R.M. 144, Jan. 1959, 9pp. Defence Research Medical Labs., Toronto, Ontario, Canada.*

14,321

To identify radar displays which would yield superior detection thresholds at the outer ranges (from seven-tenths to maximum), four methods of displaying targets on a noise-free Plan Position Indicator were evaluated. The four displays were: 1) a 2.5 inch radius scope, gated and expanded; 2) a 3.5 inch scope, gated and expanded; 3) a five-inch scope, gated and expanded; and 4) a five-inch scope, with normal display. Five detectability thresholds were obtained from each of four subjects at each of three ranges on each display. The data were analyzed for differences among the displays.

T. G. I. R 8

14,322

Scaris, L.V., Henderson, R.L. & McNeill, J.M. A PERISCOPE CAMERA INSTALLATION FOR AIRBORNE INTERCEPT RADARSCOPE PHOTOGRAPHY. *MIC TR 59 3, May 1959, 14pp. Naval Missile Center, Point Mugu, Calif.*

14,322

A prototype periscope camera installation for airborne intercept (AI) radarscope photography was being used at the Naval Missile Center, Point Mugu, California is described. The purpose of the installation is to supplement other forms of data recording during flight tests of missile systems to aid in the study of pilot proficiency factors. The requirements for radarscope photography and associated technical problems are discussed. An improved configuration designed for operational use and programmed for early manufacture is described.

I.

14,323

Siegel, A.I. & Wolf, J.J. TECHNIQUES FOR EVALUATING OPERATOR LOADING IN MAN-MACHINE SYSTEMS. APPLICATION OF A PREVIOUSLY DERIVED MODEL TO THE LAUNCHING OF AN AIR-TO-AIR MISSILE. *Contract NMR 2492(00), June 1959, 40pp. Applied Psychological Services, Wayne, Penn.*

14,323

A model was derived in a previous study in order to permit an improved analysis and prediction of the effectiveness of man-machine systems. It was applied to the pilot's task of landing an F4D aircraft aboard an aircraft carrier. In the present study, the model is applied to the pilot's task of firing an air-to-air missile in a lead collision attack. The predictions from the model are presented and evaluated. They appear to conform with reality and are generally reasonable. The usefulness of the model is discussed.

T. G. I. R 4

14,324

Conrad, R. PERFORMANCE OF TELEPHONE OPERATORS RELATIVE TO TRAFFIC LEVEL. *Nature, Dec. 1956, 178, 1400-1401. APV 276/56. (Applied Psychology Research Unit, MRC, Cambridge, England).*

14,324

To investigate the performance of telephone operators in relation to traffic level, the traffic load per operator (cordless auto-manual exchange) was varied experimentally over a four-week period. Operator waiting time was measured by a snap-reading method, and from it operator time per call was calculated. The data were analyzed to test the assumption that operator time per call is independent of traffic level.

G. R 3

14,325

Altman, I. & McGrath, J.E. A CONCEPTUAL FRAMEWORK FOR THE INTEGRATION OF SMALL GROUP RESEARCH INFORMATION. *Contract AF 49(638) 256, Supplemental Agreement 1(58 446), AFOSR TR 59 252, & HRL TR 59/1 CM, Feb. 1959, 115pp. Human Sciences Research, Inc., Arlington, Va.*

14,325

This is a report of the second phase of a research program designed to integrate existing research knowledge about small groups. The approach used is data-oriented, thus dealing with empirical research results in detail, and the classification system is based on the form or system of empirical data which permits a logically complete framework. The basic approach and resulting integrative framework are described; results of its application to a sample of small group research studies are presented; some major potential applications of the research to basic and operational problem areas are discussed. A reader instruction manual is appended.

T. G. I. R 7

14,325

Clark, R.R.M. DEVELOPMENT OF TYPE MS-2 AIRBORNE DATA RECORDER. *Contract AF 33(616) 3423, Proj. 7135, Task 71804, Phase IIA, WADC TR 57 603, Feb. 1958, 26pp. HNS Aero Medical Lab., Wright-Patterson AFB, Ohio. (Testing Div., Douglas Aircraft Company, Inc., Santa Monica, Calif.).*

14,326

The development of a small, direct-writing, 20 channel data recorder, designated Type MS-2, especially for airborne use, is described. Means of recording certain aircraft environmental conditions as well as physiological measurements of flight personnel are explained. The development of special transducers for measuring relative humidity and physiological temperatures is described. The influence of environmental changes on the accuracy of the recorder has been determined and is reported here. Operating, calibration, and maintenance instructions are included.

T. I. 2 18

14,327

Shelanski, M.V. & Gabriel, K.L. CUTANEOUS TOXICITY EVALUATION OF AIR FORCE DEVELOPMENT MATERIALS-XII. *Contract AF 33(616) 5595, Proj. 7145, Task 71536, WADC TR 59 124, June 1959, 9pp. HNS Aero Medical Lab., Wright-Patterson AFB, Ohio. (Industrial Ecology Research and Testing Lab., Inc., Philadelphia, Penn.).*

14,327

To establish the primary irritant and sensitization characteristics to the skin of Air Force development materials, prophetic testpatch studies were performed on laboratory animals and 300 volunteer human subjects. Three crystalline substituted phenyl ethers, three DOK flame-resistant cotton fabrics, one untreated cotton sateen fabric, and four fungicidal-treated (fluorinated diphenyl sulphide) cotton sateen fabrics were studied. Procedures for field testing are outlined.

T. R 6

14,328

Silvestro, A.W., Kelly, J.B. & Courtney, D. HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS. (SECOND INTERIM REPORT). PRELIMINARY ENGINEERING LAYOUTS. *Contract FAA/RND 04, Proj. P, Rep. 27, June 1959, 39pp. Courtney and Company, Philadelphia, Penn.*

14,328

This is the second interim report on work accomplished in giving human factors consideration to the design of airport traffic control quarters. It includes all the work of the first report plus work accomplished since its issue. Written recommendations and drawings are provided for the over-all space requirements and general layout of air traffic control quarters including the tower cab, Instrument Flight Regulations control room, controller ready room, training space, and visitors observation area. Such information is also supplied for layout of operating consoles, desks, and other furniture or furnishings for these areas.

T. R 1

14,329

Slone, C.W. BIBLIOGRAPHY OF CONTROL-DISPLAY RELATIONSHIPS. I. DIRECTION OF MOVEMENT. Ref. 4112.60/100, 1958, 14pp. Human Aircraft Command, Culver City, Calif.

14,329

The references listed here represent a preliminary effort to give reports that provide human factors information on direction of movement relationship among displays and controls. The period covered is from 1940 to 1958.
R 145

14,330

Slodota, R.F., Forrest, J., Carter, W.K. & Wade, E.A. COMFORT EVALUATION OF THE C-119 PILOT SEAT (AEROSEAT). ONE OF A SERIES OF STUDIES PERTAINING TO THE DESIGN EVALUATION OF PILOT AND CREW STATION EQUIPMENT. Contract AF 33(616) 3040, Proj. 7215, Task 71724, WADC TR 58 312, March 1959, 14pp. Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

14,330

To evaluate certain design characteristics of the C-119 Pilot Seat (Aeroseat) in terms of their adequacy for the maintenance of human comfort, subjective and behavioral laboratory tests were administered by means of hourly questionnaires to 17 subjects during a voluntary sitting period of seven hours maximum duration. The subjects were allowed to leave the seat only when discomfort feelings compelled them to do so. On the basis of average voluntary seating time, hourly ratings of overall and of specific body regions comfort, and evaluation of individual seat parts, recommendations for seat design improvement were made.
T. G. I. R 1

14,331

Colman, K.G. TARGET COLOURATION. ANC Exp. Proj. 55/6 78, Rep. 3041, Oct. 1958, 13pp. RCAF Air Armament Evaluation Detachment, CEPE, Cold Lake, Alberta, Canada.

14,331

To select the best possible color, or color combination for visual and photographic computation, ten color samples were prepared and compared visually, by means of black and white photography, and by means of color photography. A series of tests were made of the colors applied to ground targets under varied lighting conditions. From the results obtained the most obvious color combination was selected and applied to an M-3 Sweep Wing Target. This target was towed and photographed under varied lighting conditions. The results were assessed and compared to visual observations. Recommendations for an optimum color scheme are included.
T. I.

14,332

Sprague, M.E. & Ross, C.W. WORLD GUIDE TO FIELD CLOTHING REQUIREMENTS. Proj. Ref. 7 43 01 005, Tech. Rep. EP 115, July 1959, 40pp. USA Environmental Protection Research Div., ON Research & Engineering Center, Watich, Mass.

14,332

A rapid method for determining the type and amount of clothing required for seasonal wear in a given world area is presented in this guide. The world has been classified into nine types of field clothing requirement areas. It has been determined that four distinct ensembles are required to protect troops adequately against all types of natural environments encountered in these nine areas. Maps and tables are presented to 1) indicate the general amount of clothing required in all areas, 2) prescribe the assortment of field clothing in each place and in each season, and 3) designate camouflage requirements for the issue of hot weather assortments and over whites.
T. I. R 57

14,333

Sperling, M.G. & Lee, G.B. THE AREA-INTENSITY RELATIONSHIP AT THRESHOLD FOR THREE STIMULUS DURATIONS IN THE HUMAN FOVEA. Proj. NN 22 01 20, Subtask I, Rep. 1, USNML Rep. 287, May 1957, 6pp. USN Medical Research Lab., Submarine Base, New London, Conn.

14,333

The relationship of area and intensity functions for three stimulus durations (0.001, 0.040, 0.250 seconds) in the human fovea were re-determined and are reported in this paper. Seven circular stimuli were used ranging in visual substance from about one minute to one degree in diameter. Threshold data from two subjects (right eye monocular observation) obtained by the serial method of limits are reported for each stimulus area and each stimulus duration. The mathematical relationship describing the function was determined and discussed in relation to previous findings.
T. G. I. R 13

14,334

Conrad, R. & Mille, Barbara A. TELEPHONE OPERATORS' ADAPTATION TO TRAFFIC VARIATIONS. J. Inst. elect. Engrs. Jan. 1958, 4(New Series), 13-14. APU 282/58. (Applied Psychology Research Unit, NEC, Cambridge, England).

14,334

To test the assumption that the rate at which telephone calls enter an exchange does not affect the time taken by operators to deal with them, experiments were carried out at an auto-manual cordless telephone exchange over a period of four weeks. The main experimental variable (rate of work in terms of calls per operator per hour) was controlled by varying the number of operators on duty. A snap-reading method was used to measure the proportion of total time spent operating. The data were analyzed in terms of effect of traffic level on operator performance.
T. G. R 8

14,336

Tillmer, T.M. & Jerger, J.F. SOME FACTORS AFFECTING THE SPONDEE THRESHOLD IN NORMAL-HEARING SUBJECTS. Rep. 59 69, May 1959, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Audiology Lab., Northwestern University, Evanston, Ill.).

14,336

To investigate the effects of 1) knowledge of test vocabulary and 2) practice in responding to words at threshold intensity, three groups of ten normal hearing subjects each were formed. The spondee thresholds were obtained for each subject (List E of Auditory Test W-1) with exactly 18 spondee words. In group I, the initial threshold was obtained with words one through 18, the second with words 19 through 36. In the other two groups, both thresholds were obtained with the first 18 words; in the third group, however, the words were first read aloud to each subject. The data from the three groups were compared for effects of the two variables.
T. R 3

14,337

Westheimer, G. ACCOMMODATION LEVELS DURING NEAR CROSSED-CYLINDER TEST. Contract NMR 495(09), RF Proj. 654, Tech. Rep. 4, May 1959, 3pp. Ohio State University Research Foundation, Columbus, Ohio. (Reprinted from Amer. J. Optom. & Arch. Amer. Acad. Optom., Nov. 1958, Mono. 242, 1-6).

14,337

To investigate the validity of the crossed-cylinder test as a measure of near accommodation level, eight young subjects were tested. Accommodation levels were measured in each subject when presented with a visual configuration consisting of a set of three horizontal lines at one optical distance and a set of three vertical lines at a different optical distance. Responses to each set of lines separately and together were analyzed. A modification of the test is suggested.
T. R 2

- 14,338
Vickers, T.K. & Miller, R.S. SIMULATION STUDIES OF AIR TRAFFIC CONTROL PROBLEMS IN HIGH DENSITY AREAS. ca. 1958, 7pp. CMA Technical Development Center, Indianapolis Ind.
- 14,339
The CMA Technical Development Center (TDC) has used the dynamic air traffic control simulator as a tool in the study of various high-density areas such as Los Angeles and New York to improve the route structure in the en route and terminal areas and to study the effects of new airports and revised runway configurations. This paper describes the principal steps taken in such simulation studies including the preparations, the simulation itself, and the analysis of results.
T. R 2 1
- 14,339
United States Steel Corporation. MAINTENANCE APPRENTICESHIP PROGRAM. Business Administration and Economics Volume VI, Number 27, April 1959, 2pp. Public Relations Dept., United States Steel Corporation, New York, N.Y.
- 14,339
This paper describes briefly an apprentice training program at the Pittsburg, California Works, Columbia-Geneva Steel Division, United States Steel Corporation. The program is aimed toward the development of capable personnel for the various trades required for maintenance and operation of facilities throughout the Works.
I.
- 14,340
USN Research Lab. COMPARATIVE EVALUATION OF THREE APPROACHES TO HELICOPTER INSTRUMENTATION FOR HOVERING FLIGHT. Proj. NA 550 010, NRL Prob. Y02.11 & BuAer Prob. TED NRL AE 7047, May 1957, 31pp. USN Research Lab., Washington, D.C.
- 14,340
To compare three helicopter flight display systems (conventional, integrated, and quickened), a simulator was constructed consisting of cockpit system and pilot seating arrangement with an analog computer for solving the dynamics of motion. The operator's task was to minimize translational motion while the vehicle was subject to gust disturbances; in some conditions a secondary task (controlling heading) was added. Each of six subjects accumulated approximately 25 hours of simulator time. The error scores were analyzed for differences among the systems and for the effect of the stress of a secondary task on these differences.
I. R 4
- 14,341
Peters, G.A. & Semnara, J.L. ACADEMIC TRAINING NEEDS IN HUMAN FACTORS ENGINEERING. J. aeron. Educ., May 1959, 42(9), 799-805. (University of Southern California, Los Angeles, Calif. & Dover, N.J.).
- 14,341
This is a discussion of the academic training needs in the field of human factors engineering and represents an initial effort to clarify some of the major problems and offer some proposals for their solution. The problem areas were identified by modified job analyses with non-supervisory personnel in the field followed by interviews with various levels of supervisory personnel to determine what they considered current training deficiencies to be. A suggested core curriculum is presented to illustrate how a one-year graduate level program could be organized to cover the range of problems of greatest importance.
T. R 10
- 14,342
US Department of Agriculture Library. BIBLIOGRAPHY OF AGRICULTURE. ITEMS 63637-70468, Aug. 1959, 22(6), 209pp. US Department of Agriculture Library, Washington, D.C.
- 14,342
This is an index to the literature of agriculture and related sciences received in the library of the United States Department of Agriculture. Scientific and technical publications are as complete as possible, but only selected popular publications are indexed. Publications in the languages of Western Europe and Russia (or summaries, titles or abstracts in that language) are included. Subjects included are plant science, soils and fertilizers, forestry, animal industry, entomology, agricultural engineering, agricultural products (processing, distribution, statistics), agricultural economics, and food and nutrition. An author index is provided.
R 6900 (approx.)
- 14,344
Speckels, M.L. BIBLIOGRAPHY ON SHOCK ABSORPTION STUDIES. FOURTH REVISION. March 1957, 7pp. USN Ordnance Test Station, China Lake, Calif.
- 14,344
This report contains abstracts of 28 studies on the properties of cushioning materials for the design of cushions for packaging. Data are included for six groups of materials into which a total of 45 materials are divided: 1) cellulose, 2) felt, cotton, and wool, 3) wood fiber, 4) shredded paper and the corrugated fiberboards, 5) rubber, rubberized fiber and hair, 6) glass fiber. Tables describing all of the materials tested, their properties, and their design curves, where uniform, are included. An example of the use of the curves is given to illustrate their use.
T. G. R 37
- 14,345
Torrrey, Jane M. EVALUATION OF COLOR VISION TESTS. SUPPLEMENTARY TECHNICAL REPORT. Contract NOMP 996(03), June 1959, 7pp. Connecticut College, New London, Conn.
- 14,345
To test the hypothesis that blue-yellow discrimination requires a longer exposure period than red-green to achieve its minimum threshold, a pilot study was performed measuring the discrimination thresholds between points near a neutral center of the ICI Chromaticity Diagram along the two dimensions, red-green and blue-yellow. Each stimulus consisted of a pair of colors to be judged as to the position of the blue or green and was exposed for two different intervals: 1/5 and two seconds. Six observers were used. Thresholds of discrimination and ratios of blue-yellow to red-green thresholds for both exposure times were calculated from the data as a test of the hypothesis.
T. G. I. R 9
- 14,346
Tolhurst, G.C. THE EFFECTS OF SIGNAL-TO-NOISE RATIOS AND PEAK CLIPPING UPON A TIME ACCELERATED MULTIPLE-CHOICE INTELLIGIBILITY TEST. Joint Proj. NM 18 02 99, Subtask 1, Rep. 83, Jan. 1959, 15pp. USN School of Aviation Medicine, Naval Air Station, Fla.
- 14,346
In an attempt to construct an intelligibility test that could be used as a sufficiently sensitive measure for indicating subtle differences among stressor situations, a multiple-choice test in which one-half of the test items had a progressively accelerated presentation was constructed. This test was compared with a comparable test of regularly spaced items, and with the test as recorded by one or by three speakers. Various signal-to-noise ratios (from +4 to +16 decibels) and levels of peak clipping (from 0 to 30 decibels) were also tested. Mean percent reception scores were analyzed for the effect of these various conditions.
T. G. R 6

14,347

Tessendorf, J. BEATS IN COCHLEAR MODELS. *J. Acoust. Soc. Amer.*, May 1959, 31(5), 606-619. (University Hospitals, Iowa City, Iowa).

14,347

This paper describes the hydrodynamic phenomena observed in cochlear models when responding to beat signals. The effect of beats of imperfect unisons and of mistuned consonances upon the cochlear fluid motion and upon the traveling wave pattern were observed. Both continuous and stroboscopic illumination were used for observation and high-speed motion pictures were used for observing the displacement pattern of the membrane. These observations give evidence as to the mode of frequency analyses performed by the model in the case of complex stimulation.

G. I. R 18

14,348

Talman, M.G. SAFETY IN MINING. 1958, 2pp. Public Relations Department, United States Steel Corporation, New York, N.Y. (Reprinted from *Mining and Geology*, Feb. 1959, VI(30), 2pp.).

14,348

The injury experiences in mining (coal, metal and non-metal) for the years 1954 to 1957 and for the first ten months of 1958 are presented in tabular form. The safety accomplishments of 1958 are reviewed: cementation of stratified roof rock, hydraulically-moved canopy for use in loading machines, experiments to minimize mountain bumps, improvement in ventilation and dust control, use of A-C power for equipment, and education and job-training of employees.

I. I.

14,349

USAF Air Technical Intelligence Center. SELECTED ARTICLES BY VARIOUS AUTHORS FROM SOVIETSKAYA AVIATSIYA (SOVIET AVIATION). 26 JUNE THRU 3 JULY 1957. FTS 9299/III, July 1957, 53pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio.

14,349

This report contains selected articles that have been translated into English from *Soviet Aviation*. Titles included are: 1) Over long distance flight routes (Nikitin and Chkalov), 2) On the way toward an atomic aircraft (Pokrovskiy), 3) The nearest future of aviation automatics (Krasovskiy), 4) Engines without fuel (Kaganovich), 5) Five times faster than sound (Pyshnov), 6) Jet aircraft will not become tired (Serenson), 7) The aircraft "Ukraine" in Moscow, 8) The international geophysics year (Bardin), 9) Problems of science and technique: a laboratory beyond the reaches of the earth (Karpenko), 10) Yesterday at Vnukovo airfields, and 11) Among aircraft designers (Krestovskiy).

R 11

14,350

Peters, G.A. & Adams, B.B. FROM HUMAN-FACTORS STUDIES. THESE 3 CRITERIA FOR READABLE PANEL MARKINGS. *Prod. Engng.*, May 1959, 30(21), 55-57.

14,350

This paper provides some guides for readable panel markings such as labels, counters, legends, and identifying tags. Suggestions are made for selecting the best lettering for visibility, information content for rapid scanning, and best placement for lettering.

T. I.

14,351

Courtney, D., Colman, K.W., Silvestro, A.M. & Kelly, J.B. HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS. INTERIM REPORT. Contract FAA/BRD 89, Proj. P, Rep. 26, April 1959, 46pp. Courtney and Company, Philadelphia, Penn.

14,351

This report is the first of a series of human factor studies that are concerned with the design of air traffic control quarters. The nature of a human factors group and the problem of this study as perceived in human factors terms are discussed. A second and third section are devoted primarily to the tower cab, an analysis of the problems of information processing and living quarters, and a series of specific recommendations resulting from the analysis.

I. R 12

14,352

Dardano, J.F. & Mower, I. RELATIONSHIPS OF INTERMITTENT NOISE, INTER-SIGNAL INTERVAL AND SKIN CONDUCTANCE TO VIGILANCE BEHAVIOR. Proj. TBI 1000, Tech. Memo, 7 59, July 1959, 29pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

14,352

To investigate the relationships of intermittent, low intensity, ambient, white noise, inter-signal interval variability and basal skin conductance to prolonged observation, 36 observers, separately, monitored a cathode ray tube screen for a continuous three-hour period in an isolated environment. The task was to differentiate a total of 180 critical signals that differed from a periodically blinking background signal only by a larger amplitude. Performance was measured by reaction time. Skin resistance was at 15-second intervals throughout the session. Performance data were analyzed for effects of the experimental variables.

G. R 11

14,353

Medel, A.R. RADIOLOGICAL PROBLEMS OF MANNED SPACE FLIGHT. Rep. RM 5978P 36, July 1959, 12pp. Technical Military Planning Operation, General Electric Company, Santa Barbara, Calif.

14,353

An analysis of the problems of manned space flight produced by the existence of cosmic ray particles is presented. Recent findings based on the satellite explorations and lunar probes are analyzed and segments in space available to space flight by unprotected man are indicated. The biologic effects and exposure tolerance limits of primary and secondary cosmic radiation are discussed. Some possible protective measures are indicated and problems needing investigation are listed.

T. R 16

14,354

O'Connell, M.H. & Baccaro, P.M. MEASUREMENT OF AUDITORY THRESHOLD BY MANUAL AND SAM AUTOMATIC AUDIOMETRY. Rep. 58 131, March 1959, 10pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,354

To test the reliability of the test programming (a modified descent) technique used by the SAM automatic audiometer, threshold values obtained by this audiometer were compared with the results of two types of descending stimulus manual audiometry (single and triple descent). Two groups of unskilled listeners were tested: 24 with normal hearing and 24 with subnormal hearing. Each subject received two tests by each method separately for each ear at six frequencies: 500, 1000, 2000, 3000, 4000 and 6000 cycles. Threshold values were analyzed for comparability among methods and for test-retest reliability of each method.

T. R 10

14,355

Parry, J.B., Fokkema, S.D., Bray, C.W., Benoit, J., et al. AVIATION PSYCHOLOGY IN WESTERN EUROPE AND A REPORT ON STUDIES OF PILOT PROFICIENCY MEASUREMENT. Publ. 1, 1958, 64pp. Swets & Zeitlinger, Amsterdam, Holland.

14,355

This book presents 12 papers on aviation psychology in various countries of Western Europe: England, Belgium, Germany, France, Norway, Switzerland, Denmark, Sweden, and the Netherlands. The introductory paper is on the pilot proficiency measurement in the United States. The papers all give the areas of aviation psychology covered, the methods employed, and the validity of these methods with special reference to the nature of the criteria used. The major area dealt with in these papers is pilot proficiency measurement.

T.

14,356
Evvard, E. RESCUE OF AVIATORS BY MEANS OF EJECTION SEATS. AIC 305111 A, F TS 9115/III, 1956, 16pp. USAF Air Technical Intelligence Center, Wright-Patterson AFB, Ohio. (Belgian Air Force Medical Service, Belgium).

14,356
This report reviews 15 cases wherein ejection seats were used in the pursuit plane squadron of the Belgian Air Force during a period of five years (1952-1956). The circumstances surrounding the ejection where the consequences were fatal and those where the conditions under which the ejection took place were abnormal are described. Technical comments and practical suggestions resulting from the analysis of ejections are made under six points: 1) jettisoning the glass enclosure of the cabin, 2) position of feet before ejection, 3) minimum altitude for safe ejection, 4) the jump from high altitude, 5) the equipment of flight carried during ejection, and 6) aeromedical instruction of air personnel.
R 3

14,357
Finn, B.J. & Gaydos, H.F. THE RELATIONSHIP BETWEEN INDIVIDUAL PERSONALITY VARIABLES AND BODY TEMPERATURE RESPONSE PATTERNS IN THE COLD. Proj. 7-83 01 005, Tech. Rep. EP 106, March 1959, 11pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

14,357
To study relationships between certain psychological and physiological responses to stress (cold exposure), 57 male volunteer test subjects were studied. Each completed the Minnesota Multiphasic Personality Inventory, were measured for weight, height, and body fat, and were then exposed to successive climatic conditions of 1) 70 degrees F. (Fahrenheit), 50 per cent R.H. (relative humidity), no wind; 2) 50 degrees F., 50 per cent R.H., five miles per hour wind; and 3) 78 degrees F., 50 per cent R.H., no wind; for periods of 30, 75, and 115 minutes respectively. Skin and rectal temperatures were recorded during all periods; subjective response regarding feelings of warmth were obtained during cold exposure. Analysis was made of relationships between personality variables and body response patterns. T. R 17

14,358
Fried, C. & Ivey, Lois F. A HUMAN ENGINEERING EVALUATION OF SPOTTING ROUNDS WITH RESPECT TO FIRE DIRECTION CAPABILITIES. Proj. TBI-1000, Tech. Memo. 4 59, June 1959, 31pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

14,358
To evaluate spotting rounds with respect to fire direction capabilities, 12 enlisted men of the 82nd Airborne Division, Fort Bragg, North Carolina, made observations of spotting rounds randomly placed around the target. Four distances were used: 500, 1000, 1500, and 2000 yards. The subjects used standard Army M16 field type binoculars (7X magnification) and were required to make corrections in yards for azimuth and range from the position where the spotting round appeared to actual target position. The radial and range errors were analyzed as a function of distance. The feasibility of the technique for military use is discussed.
T. G. I.

14,359
Woodham, R.M. INSTRUMENT PANEL WARNING LIGHTS. Human Factors Bulletin 58 44, ca. 1958, 1p. Flight Safety Foundation Inc., Los Angeles, Calif. (Cornell-Guggenheim Aviation Safety Center, Ithaca, N.Y.).

14,359
This is a brief note concerning instrument panel warning lights. Several features of the illuminated legend panel warning lights used in the Lockheed Electra and Jet Star which are of interest from a human factors angle are enumerated.
I.

14,360
Fletcher, J.L. & Riopelle, A.J. THE PROTECTIVE EFFECT OF THE ACOUSTIC REFLEX FOR IMPULSIVE NOISES. Proj. 6 95 20 001, Task USAMRL T 1, MEDEA, Rep. 396, Sept. 1959, 11pp. USA Medical Research Lab., Fort Knox, Ky.

14,360
To determine the effect of acoustic reflex (AR) action upon temporary threshold shifts following exposure to repeated impulse noise, 24 human subjects were exposed to 100 rounds of machine gun fire (fired one round at a time) under two conditions: with the AR activated, with the AR inactive. Temporary threshold shifts resulting from the two conditions were compared and discussed in terms of the protective value provided by the acoustic reflex.
T. G. I. R 12

14,361
Fletcher, J.L. COMPARISON OF ATTENUATION CHARACTERISTICS OF THE ACOUSTIC REFLEX AND THE V-SIR EARPLUG. Proj. 6 95 20 001, Task USAMRL T 1, MEDEA, Rep. 397, Sept. 1959, 8pp. USA Medical Research Lab., Fort Knox, Ky.

14,361
To compare the attenuation characteristics of the acoustic reflex (AR) and the V-SIR ear plug, pre- and post-exposure thresholds were obtained for 13 subjects exposed under two conditions to 100 rounds of machine gun fire (fired one round at a time). In condition I the AR was activated to protect the listener and in condition II the V-SIR ear plug was used. Temporary threshold shifts were compared for the two conditions and the practical implications for noise protection discussed.
T. G. I. R 4

14,362
Grafman, A.J. SOUNDPROOFING MATERIALS AND THE INSTALLATION THEREOF IN AIRCRAFT. Contract AF 33(616) 2379, Proj. 1370, WADC TR 55 97, March 1955, 46pp. USAF Aircraft Lab., Wright-Patterson AFB, Ohio. (Frank Mayer Engineering Company, Los Angeles, Calif.).

14,362
To evaluate current materials and methods used in installation of soundproofing in military aircraft and to develop more suitable methods if possible, surveys of design, fabrication and installation were made of aircraft produced by six West Coast airframe manufacturers. Service and maintenance data were obtained from four United States Air Force bases. An approved evaluation procedure was used to determine characteristics desirable for inclusion in optimum blanket development. Optimum blankets were designed, fabricated, installed, and evaluated on a test panel simulating an aircraft fuselage. Recommendations are included together with procedures for installation.
T. I. R 11

14,363
Hopkins, R.E., Eyer, J.A., Miller, Norma & Fleischman, A.A. INVESTIGATION OF METHOD FOR EVALUATING QUALITY OF IMAGES FORMED BY PHOTOGRAPHIC OBJECTIVES. FIRST QUARTERLY PROGRESS REPORT. Contract DA36 039 SC 63097, Aug. 1954, 30pp. Institute of Optics, University of Rochester, Rochester, N.Y.

14,363
This is the first progress report on a research contract investigating methods for evaluating quality of images by photographic objectives. Previous research by this same laboratory is reviewed and the lines of the present investigation are based on the review. A summary of the first quarter work includes 1) an investigation of the relationship between resolving power and wavelength on a number of different films, and 2) lens testing. Plans for future work are given.
G. I. R 1

- 14,364
Nicks, S.A. THE MOTIVATIONAL EFFECTS OF REST PERIODS ON PERFORMANCE. OCO Proj. TBI 1000, Tech. Memo. 8 59, Aug. 1959, 16pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.
- 14,364
To investigate the effects of different rest schedules on the performance of a heavy rotary task, 40 subjects were tested under two schedules: 1) fixed interval-rest after a given amount of time, and 2) fixed ratio-rest after a given number of responses. Rate of response (total number) and work output (in foot-pounds) were analyzed for differential effects of the rest schedules.
T. G.
- 14,365
Hansen, O.K., Franks, P.E. & Modrick, J.A. NATURE AND USE OF THE MAC-2 (MALFUNCTION AND CIRCUITRY) TRAINER. Proj. 1710 71604, MACC TR 59 140, May 1959, 13pp. USAF Air Medical Lab., Wright-Patterson AFB, Ohio.
- 14,365
This report discusses the MAC-2 trainer, which simulates the data flow of the MA-7A bomb-nav system, and can be used for training and proficiency measurement in the use of data flow information and technical manuals by flight-line mechanics. A brief history, advantages and limitations, suggested modifications, research problems, and empirical basis for uses of the trainer are included.
I. R 10.
- 14,366
Hosken, Bobbie. ENGINEERING PSYCHOLOGY BRANCH BIBLIOGRAPHY. Aug. 1959, 20pp. USN Research Lab., Washington D.C.
- 14,366
This bibliography is a revision to date of the bibliography compiled by Daniel Fallon, July 1957. All unclassified reports issued by the Engineering Psychology Branch between its founding on October 1, 1945 and the present are listed in chronological order. An author index is included.
R 134
- 14,367
Jackson, K.F. THE MULTIPLE TRACKING TEST. FPFC 1072, Nov. 1958, 27pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).
- 14,367
The first part of this report deals with a description of the equipment and the methods of performance measurement of the Multiple Tracking Test. This test contains five separate control systems in each of which a pointer, subject to disturbances, can be controlled by turning a knob. The number of control systems in use and type of deviations may be varied at will. Over-all performance accuracy as well as some aspects of the skills involved can be measured. The second part of the report describes some experiments in which the test has been used: effect of hot environments and the effect of task characteristics, such as number of control systems and velocity of pointer disturbance.
T. G. I. R 20
- 14,368
Jackson, K.F. PERFORMANCE IN A SIMULATED HIGH-ALTITUDE EMERGENCY. FPFC 1058, Dec. 1958, 7pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).
- 14,368
To assess the chances of pilots, using pressure breathing equipment, to make a successful descent to safe altitudes, a high-altitude emergency situation was simulated in a decompression chamber. Performance was measured by a multiple tracking test which the subject worked at before, during, and after the emergency. The subjects had been trained in using the pressure breathing equipment which each wore throughout the work period. Error scores and number of control movements were analyzed for effects of the "emergency."
G. I. R 6

- 14,369
Kidd, J.S. RESEARCH ON HUMAN ENGINEERING ASPECTS OF AIR TRAFFIC CONTROL. Contract AF 33(616) 3612, Proj. 7184, R.F. Proj. 690, April 1959, 38pp. Ohio State University Research Foundation, Columbus, Ohio.
- 14,369
This final report of a long term research study of air traffic control in its human engineering aspects consists of brief summaries of 47 studies. These reports consist of major system studies which employed the Electronic Air-Traffic Control Simulator (designed and developed for the project) and technical support studies involving many research tools and equipment. A developmental trend from factors directly related to system equipments to procedural and organizational characteristics of the system appears in the major studies. The technical reports range from investigations of team work to work on lighting systems for radar centers with emphasis on ability of human operators to perceive and interpret input signals from their environment.
R 60
- 14,370
Matties, G.B., Weiss, E.C. & Holzen, D.E. AN EVALUATION OF MODE SELECTOR SWITCH ARRANGEMENTS. OCO Proj. TBI 1000, Tech. Memo. 10 59, Aug. 1959, 21pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.
- 14,370
A study was initiated to determine the optimum switching arrangement in terms of operator performance for the selection of the track, acquisition and search modes for a proposed Anti-Aircraft (AA) weapon system. Five switching arrangements were studied. One hundred subjects were trained in the task to error-free performance, then tested under a time stressor (stimulus presentation rate increase) until a breakdown point was reached when he could no longer respond. Errors of commission and of omission, breakdown rate, control handle movement, and subjective statements of preference were analyzed in terms of the different switching arrangements.
T. G. I.
- 14,371
Malraven, P.L. & Leebeck, H.J. RECOGNITION OF COLOR CODE BY NORMALS AND COLOR DEFECTIVES AT SEVERAL ILLUMINATION LEVELS. AN EVALUATION STUDY OF THE H.R.R.-PLATES. Rep. 12F 1959-9, June 1959, 18pp. Institute for Perception RVO-TNO, Soesterberg, Netherlands.
- 14,371
To establish the relationship between the ability of normals and color defectives to recognize the color code of resistors and their quantitative classification according to two tests of color deficiency (Hardy-Rand-Pitter and Ishihara plates), 69 resistors each with colored bands were presented to each of 81 subjects who identified the colors, using a list of possible names. The total number and kind of mistakes were compared with quantitative classification of each subject by the two tests. All tests were conducted with illuminant C, 500 lux. Further study of 40 subjects was conducted at lower illumination levels.
T. G. I. R 4
- 14,372
Zarricillo, J.J. IDIOPATHIC ORTHOSTATIC HYPOTENSION AND ITS RELATIONSHIP TO POSITIVE G TOLERANCE. Res. Proj. NM 11 01-11, Subtask 1, Rep. 13, May 1959, 10pp. USN School of Aviation Medicine, Naval Air Station, Fla.
- 14,372
This paper presents two cases that demonstrate decreased positive g tolerance as a consequence of orthostatic hypertension. Two student pilots, normal in all respects but demonstrating a definite fall in blood pressure on assuming the upright position, were subjected to human centrifugation. Their respective greyout, blackout, and unconscious threshold levels were determined and compared to 115 normal cases subjected to centrifugation in the same manner. The implications for diagnostic study as well as for the screening of naval air cadets are discussed.
T. R 12.

14,373

Marshall, J.F. & Marzocchi, R.E. THE COMPARISON OF SCOTCH AND PHOTOPH VISION IN RELATIONSHIP TO BLACKOUT THRESHOLD ON THE HUMAN CIRCULATORY. Proj. No. 11 02 12, Subtask 1, Rep. 2, April 1959, 7pp. USA School of Aviation Medicine, Naval Air Station, Pens.

14,373

To compare the blackout thresholds obtained under scotopic and photopic levels of intensity on the human circulatory, 20 subjects were tested. Each subject was dark adapted, the blackout threshold determined (light intensity 0.625 log units above absolute visual threshold while being centrifuged in a relaxed unprotected state) a second threshold measurement was made wearing an anti-blackout suit. Following ten minutes in full light the procedure was repeated using a target with a light intensity of 3.9 millilamberts. The data were analyzed for relationships between blackout thresholds for the two light conditions, protected and unprotected.

T. R 2

14,373

Van Bock, R.J. FLIGHT EXPERIENCES ABOUT HUMAN REACTION TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY THE WEIGHTLESS STATE. Proj. No. 11 02 12, Subtask 1, Rep. 2, April 1959, 7pp. USA School of Aviation Medicine, Naval Air Station, Pens.

14,373

Pre-weightlessness and post-weightlessness accelerations were simulated in jet aircraft. Records were made of accelerations, both of the aircraft and those experienced by the subjects; heart action (HR); galvanic skin resistance (GSR); subject's behavior (climatology); and subjective impressions of subject (voice recording). Records from 11 subjects were analyzed for effect of the experimental conditions on acceleration tolerance and efficiency of physiological recovery mechanisms. The implications for manned space flight are discussed.

G. I. R 22

14,375

White, C.T. & Gilliland, D.C. INTER REPORT OF PROJECT NO. CE 2056, "EVALUATION OF TELEPERCEPTORS" (A PROX UNKNOWN, EMB TECH GEN UNKNOWN). Proj. No. CE 2056, ACN CE 2056, May 1957, 18pp. USA Air Force and Electronics Board, Fort Rigg, N.Y.

14,375

To evaluate teleperceptors for use by the individual soldier to determine if they 1) improve his capability for collection of intelligence information in a combat surveillance role and 2) increase his night driving capability under low illumination levels, various tests were performed. The physical characteristics were determined and tested for ruggedness and ease of adjustment and handling under field conditions. The test items were used under conditions of natural night illumination for reconnaissance; as an aid for reading maps, aerial photos, dials, meters, and making notes and sketches; and for night driving. Recommendations are included.

T. I. R 1

14,377

Stokes, A.K. & Hughes, W.P. PHYSIOLOGICAL TRIALS OF HIGH BOOTS (P.V.C. UPPERS) AND ANKLE BOOTS (I.G.S.) WITH ANKLETS AND PUTTEES. (INCLUDING A COMPARISON BETWEEN JUNGLE BOOTS AND HIGH BOOTS WITH TERYLENE UPPERS). Rep. 82, Nov. 1957, 21pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

14,377

To compare some physiological aspects of five types of army boots (High Boots, Ankle Boots with web anklets, Ankle Boots with puttees, High Boots with Terylene uppers and Jungle Boots), experiments were designed to assess these footwear by the following criteria: thermal insulation as evidenced by foot and lower leg temperatures, water repellancy as indicated by measured water uptake, and sweat retention by weighing the sweat content of socks and boots. Trials were carried out in two phases: 1) dry shod to obtain foot temperatures and sweat retention after marching, and 2) wet shod to provide information on water repellancy.

T. I. R 21

14,379

Barrett, A.A. & Clement, C. THE COMPARISON OF ALTITUDE INDICATORS USING LIMITED FLIGHT SIMULATION. FRC 978, Dec. 1957, 4pp. British Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England & Royal Aircraft Establishment of the Ministry of Supply, London, England).

14,379

To evaluate the relative merits of several altitude indicators, limited though complex flight simulation was used. The experiment was further designed to yield data for developing future display evaluation techniques. Trained pilots, as subjects, were required to "fly" the simulated aircraft from a selection of suddenly displayed attitudes to "straight and level." The performance of this task (time to first response, errors in lateral movement direction, control errors, time to complete response) was recorded and analyzed. The results give some useful indications of both the dynamic characteristics of the displays and of the potentialities of the technique.

T. G. T. R 11

14,380

Conry, R.A., McFarland, R.A. & Chubbuck, R. THRESHOLD AND RATE OF DARK ADAPTATION AS FUNCTIONS OF AGE AND TIME. A DEPENDENT. ON 17th, 20pp. Harvard School of Public Health, Boston, Mass.

14,380

To present a mathematical derivation of a model for representing dark adaptation as a function of age and time, 30 subjects, drawn from each of eight decades ranging from the teen-age level through 89, were studied. Following pre-exposure (three minutes) of the right eye to a standard 1500 millilambert incandescent light source, a test flash was first presented within 59 seconds and readings were taken at stated intervals over a period of 40 minutes. The data on rate of adaptation were analyzed as a function of age and a mathematical model describing the form was derived.

T. G. R 2

14,381

Shultz, G.L. THE USE OF THE TEN 704 IN THE SIMULATION OF SPEECH RECOGNITION SYSTEMS. FINAL REPORT. 1 JULY 1956 TO 31 DECEMBER 1957. Contract NOB 2101 (00), NO 048 108, Res. Rep. 57, Jan. 1958, 20pp. Research Center, International Business Machines Corporation, Yorktown Heights, N.Y.

14,381

The first step in mechanical speech recognition involves the analysis of a large number of speech sounds to determine the characteristics by which these sounds may best be discriminated. To accomplish this analysis special advantage is taken of techniques made possible by the advent of the large scale digital computer. This paper describes the equipment required to both facilitate editing samples of sounds for analysis and convert these sounds to digital form suitable as computer inputs. A system of programs is presented and the feasibility of the computer as a research tool is illustrated.

G. I.

14,382

Savage, I.R. SURVEY OF NONPARAMETRIC STATISTICS. Contract NOB 2582(00), Task NO 042 200, Special Rep. 1, Nov. 1958, 6pp. School of Business Administration, University of Minnesota, Minneapolis, Minn.

14,382

This paper is concerned with a discussion of the range of applicability and modes of inference of nonparametric statistics. Limitations of these statistics are commented upon and alternative modes of inference are suggested as follows: nonparametric point estimation, nonparametric confidence intervals, hypothesis testing and decision making, and nonparametric tolerance intervals.

G. R 23

14,384
Krasling, J. THE TISSUE PRESSURES OF THE EXHIBITS DURING HIGH PRESSURE BREATHING. *SYM 927*, July 1955, *Rep. Phys. Research Institute, London, England*. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

14,385
To investigate the tissue pressures of the extremities during high pressure breathing, the pressure required to introduce small (0.45 cubic millimeter) quantities of fluid through a needle into the tissue under observation was determined for a subject breathing normally and again during high pressure breathing with trunk counterbalance. The subcutaneous of the forearm and thigh, the brachioradialis and triceps muscles of the upper limb and the vastus lateralis, gastrocnemius, soleus and anterior tibial muscles of the lower limb were investigated. The data were analyzed to assess the changes in vascular transmural pressures in these areas which occur with pressure breathing. Effects of digital compression and inflation of anti-g suit were studied.
T. G. I. 6

14,386
Baron, R.B. & Rake, A. VISUAL RECOGNITION ALONG VARIOUS DIRECTIONS OF THE VISUAL FIELD. VIII. PATTERN OF SILD CIRCLES AND CIRCLES. *SYM. 928*, Rep. 244 306 T. Dec. 1955, 4pp. *William Rake Lab., University of Michigan, Ann Arbor, Mich.*

14,387
To investigate visual recognition along various directions of the visual field, linear arrays of square and circular elements (through point of fixation at angles of 0, 45, 90, and 135 degrees to the horizontal) were presented at two exposure durations (0.2 and 0.1 second) to both practiced and unpracticed observers. The task was to reproduce the patterns presented. Reproduction accuracy was analyzed for effect of angle of array and effect of experience.
T. G. I. B 25

14,387
McFarland, R.A. HUMAN FACTORS IN VEHICULAR DESIGN AND OPERATION, WITH SPECIAL REFERENCE TO ACCIDENTS. Contract DA 49 007 MD 156, Feb. 1958, 4pp. Department of Industrial Hygiene, Harvard School of Public Health, Boston, Mass.

14,387
The application of human engineering principles and data to the design of vehicles in order to increase efficiency and safety has been emphasized in this project. An interdisciplinary team has carried out this series of "host-agent" studies, and also other investigations concerned with the influence of "host" factors and "host-environment" interactions in accidents. The results to date have been published in four monographs, three reports, and 25 articles in technical and professional journals. The work during 1957-58 has included additional literature search, a human factors analysis of the driver's work space in the automobile, development of apparatus and procedures of operator responses while driving, visual perception in relation to tinted windshields, and some accident studies. T. G. I. R 26

14,388
Tolhurst, G.C. SPEAKER INTELLIGIBILITY: A NOTE ON THE EFFECT OF MONAURALLY DELAYING AIRBORNE SIDE-TONE. Joint Proj. NK 18 02 99, Subtask 1, Rep. 84, Jan. 1959, 8pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,388
To study the effects of monaural air-conducted side-tone delay using speaker intelligibility scores as the criterion measures, 48 speakers experienced such a delay. For one-half of the speakers, the delay occurred in the right ear and for the other half in the left ear. Each speaker experienced ten different time delays during his reading of multiple-choice intelligibility lists. Listening panels (12-15 listeners per panel) responded to the multiple-choice items and the resultant intelligibility scores were tabulated to yield a mean score for each speaker at each of the ten delay times. The data were studied by analysis of variance techniques for differences due to delay period and the ear affected.
T. G. R 16

14,389
Carrill, R.C. & Wilsback, W.A. (Ches.). PROVING GROUND INSTRUMENTATION. PAPERS PRESENTED AT A TECHNICAL SYMPOSIUM HELD AT AIR FORCE MISSILE TEST CENTER, WAREHOUSING AIR FORCE BASE, CECIL, FLORIDA, APRIL 14 AND 15, 1955. June 1955, 147pp. American Ordnance Association, Washington, D.C.

14,389
This report contains 14 technical papers and four abstracts of papers presented at a symposium on proving ground instrumentation (defined as that apparatus used to evaluate materials and methods). Current instrumentation problems were covered in several broad areas (radar communications, fire control, statistical methods, and others) which are of general interest to all Services charged with the job of evaluating field equipments.
T. G. I. R 12

14,390
Stuller, D.S. THE APPLICATION OF STATISTICAL METHODS TO THE DESIGN AND ANALYSIS OF EXPERIMENTS. Proving Ground Instrumentation Symposium, June 1955, 11-17. American Ordnance Association, Washington, D.C. (Rams Corporation, Santa Monica, Calif.).

14,390
This paper provides a general survey of some topics in statistics and operations research applicable to experimental design and analysis. Three general topics are discussed: test criteria, test designs, and test analyses. Although discussed separately, these concepts should be simultaneous considerations.
T.

14,391
Duffett, J.B. EDUCATION OF MEASUREMENT PROCEDURES BY STATISTICAL CONSIDERATIONS. Proving Ground Instrumentation Symposium, June 1955, 30-36. American Ordnance Association, Washington, D.C. (USA White Sands Proving Ground, Las Cruces, N.M.).

14,391
The viewpoint of the user of data - especially the viewpoint that different uses may require different criteria in the choice of an adequate measurement instrument - is emphasized in this paper. Four such uses which can be made are described: estimation of the mean, estimation of the standard deviation, quantitative explanation of each item in terms of the sources contributing to it, and the acceptance or rejection of each item in a lot. The Simon-Grimbs method for evaluating precision of measurement errors associated with the data was discussed.

14,392
Dover, J.J. A CENTRALIZED DATA PROCESSING SYSTEM. Proving Ground Instrumentation Symposium, June 1955, 66-74. American Ordnance Association, Washington, D.C. (USAF Flight Test Center, Edwards AFB, Calif.).

14,392
This paper describes the need for and the different phases in the development of a centralized automatic data processing system at the Air Force Flight Test Center. The system consists of 1) a central ground processing facility, 2) an airborne magnetic tape data recording system for flight test, 3) a magnetic tape data acquisition system for use at the Experimental Rocket Engine Test Facility, 4) a data acquisition system for space time information at the Experimental High Speed Track Facility, and 5) a digital data acquisition system for a radar photodolite used in space positioning.
I.

14,393
Bartlett, N.R. & Bartlett, Susan C. SYNCHRONIZATION OF A MOTOR RESPONSE WITH AN ANTICIPATED SENSORY EVENT. *Psychol. Rev.*, July 1959, 66(4), 203-218. (University of Arizona, Tucson, Ariz.).

14,393
To investigate the ability to synchronize a motor response with a sensory event, a series of experiments was conducted. Both unpracticed and highly practiced subjects were studied as they attempted to press a button or throw a toggle switch in unison with one of a series of regularly spaced stimuli. Variables studied were motor mode of response (finger, hand, voice, toe), type of stimuli (auditory, visual, combination of both) and interval between stimuli (from 0.125 to 4.0 seconds). The data were comprised of errors—constant errors and standard deviations. The findings are related to the literature on reaction time. A simple theory is presented and discussed.
T. G. R 22

14,394
Babyswami, G.M. THEORETICAL AND EXPERIMENTAL RESEARCH IN COMMUNICATION THEORY AND APPLICATION. PROGRESS REPORT NO. 6. Contract DA 36-039 SC 64724, SC Part 1. 17 DEC 0, 3 99 12 822, March 1954, 14pp. Bureau of Engineering Research, Harvard University, New Haven-
wick, K.J.

14,395
This is a progress report of a research project in communication theory and application. Objectives for this quarter were 1) the partition of vocal and consonant sounds into two separate signals for proper parametric decomposition and tracking by the analyzer, and 2) means for the continuous analysis and synthesis of consonant sounds. The tasks accomplished during this period are discussed in the body of the report.
G. I.

14,396
Kenna, C.R. & Foreyth, D.M. FOREIGN CONCEPTIONS OF INTERMITTENT PERIODS OF ALTERNATING DIRECTION. Science, Feb. 1959, 129(3246), 390-391. (USAF Operational Applications Lab., Bolling AFB, Washington, D.C. & Department of Psychology, Johns Hopkins University, Baltimore, Md.).

14,397
To study visual flicker as affected by intermittent photic stimuli of unequal periods, observations were made by two subjects. Intermittent electric square waves composed of two alternating periods were used. Either of the two periods could be varied independently of the other. The test area subtended one-half degree of visual angle with a luminance of 1800 millilamberts. One period was set at a fixed value and the observer adjusted the other until a fusion point was obtained. In successive measurements the first period was increased by two millilamberts until no further fusion point was reached. The fusion data were analyzed as a function of the duration of alternate periods of stimulation.
G. I. R 4

14,398
Berkowitz, S.M. THE ROLE OF SIMULATION IN AIR TRAFFIC CONTROL. Presented at the IRE Annual Meeting in New York City, March 19, 1957. Dec. 1957, 3pp. Franklin Institute Laboratories for Research & Development, Philadelphia, Penn. (Philco Corporation, Philadelphia, Penn.).

14,399
This paper discusses real-time simulation in Air Traffic Control (ATC) as a way for the observers of an experimental operation to utilize their creative and intuitive insights into the problems. The present electro-mechanical dynamic simulator at the Civil Aeronautics Administration Technical Development Center in Indianapolis is described and its assets and limitations discussed. Plans for a new universal ATC simulator are discussed.
R 3

14,400
Beebe-Center, J.G. STANDARDS FOR USE OF THE GUST SCALE. J. Psychol., 1949, 28, 411-419. (Harvard University, Cambridge, Mass.).

14,401
A set of standards is described for the practical measurement of taste strength. The standards consist of nine concentrations of aqueous solutions of sucrose, quinine sulfate, tartaric acid, and sodium chloride representing nine levels of sensory intensity extending from one gust (subjective taste intensity of one per cent solution of sucrose) to 100 gusts in steps of one-fourth log gusts. The use of the standards, their reliability, and degree to which they represent the taste characteristics of all foodstuffs are discussed.
I. R 14

14,402
Barnaby, D.S. THE BACKGROUND OF AIR TRAFFIC CONTROL. J. Franklin Inst. Mon., May 1958, 5, 3-6. (The Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

14,403
This paper presents a brief, informal history of the development of air traffic, its problems and its control. The point is made that thus far the process has been for a problem to arise due to increased capabilities and numbers of aircraft and then a solution has to be provided. Many examples are given. The need for planning is pointed out.

14,404
Anderson, T.C. & Deane, R. MILITARY UTILIZATION OF PSYCHOLOGISTS DURING WORLD WAR II. Amer. Psychol., Dec. 1948, 3(12), 530-538. (University of Chicago, Chicago, Ill. & George Washington University, Washington, D.C.).

14,405
To investigate the manner in which psychologists' services were utilized during World War II, survey data were gathered from 1541 psychologists who were in military service or government work connected with the military during that period. The questions covered the following general areas: extent of use made of professional training and skills, factors related to utilization of such skills, factors related to entrance into each of the several branches of military service, present work status, and factors related to trends in occupational shifts. Recommendations are offered for better organization and utilization of professional psychologists in the event of another national emergency.
I.

14,406
Dunfield, C.E. INCIDENT FLIGHT IN HELICOPTERS, EVALUATION OF, REPORT # 1, NEXUS REPORT. Proj. TED FOR AE TM2.7, ST30 296, Aug. 1954, 13pp. (USAF Air Test Center, Naval Air Station, Md.).

14,407
This is an interim report of a project conducted to evaluate the current flight capabilities of later model helicopters under actual and simulated instrument conditions. Primary emphasis was placed on evaluating the standard equipment in the helicopters. Recommendations are included.
I. I. R 7

14,408
Alexander, I.E. & Githler, R.J. THE EFFECTS OF JET ENGINE NOISE ON THE COCHLEAR RESPONSE OF THE GUINEA PIG. J. Comp. Physiol. Psychol., Dec. 1947, 42(6), 517-525. (Princeton University, Princeton, N.J.).

14,409
To investigate possible auditory hazards involved in the operation and maintenance of jet aircraft engines, guinea pigs were exposed in groups to the noise generated by a jet engine for a period of 15 minutes. The overall noise level at cage distance was in excess of 140 decibels with the spectrum from 80 to 8000 cycles. Cochlear responses of the animals were tested at three time intervals: immediately, one week, and three weeks. Unexposed animals were tested to serve as controls. The data were analyzed for hearing impairment and for amount of recovery at the various periods. An additional test was conducted on the effect of protection. Tentative explanations of the results are offered and the practical implications are discussed.
G. R 6

14,410
Brockaw, L.D. SCHOOL AND JOB VALIDATION OF SELECTION MEASURES FOR AIR TRAFFIC CONTROL TRAINING. Proj. 7719, Task 17108, WADC TN 59 39, April 1959, 14pp. USAF Personnel Lab., Lackland AFB, Tex.

14,411
In a program to improve selection procedures for trainees in the CAA Air Traffic Control School, a large battery of tests was administered to all trainees entering in the summer of 1958. Instructor ratings and lecture grades were collected at the end of the course. Approximately one year after the men had graduated they were identified on the job to collect supervisory ratings of their proficiency, as well as data on recommendations for promotion. A battery of tests suitable as a screening device was selected on the basis of the training validation. These tests were further analyzed for validity on the job criteria.
I. R 1

14,412
Brockhurst, R.J. & Lion, K.S. ANALYSIS OF OCULAR MOVEMENTS BY MEANS OF AN ELECTRICAL METHOD. A.M.A. Arch. Ophthalmol., Sept. 1951, 46, 311-314. (Massachusetts Institute of Technology, Cambridge, Mass.).

14,413
To study the eye movements and the extrinsic ocular muscles during movement, an electrical method was used which gave a direct record of velocity and acceleration of the eyeball as well as permitting measurement of the forces exercised by the extrinsic ocular muscles. Some typical records are presented along with a brief discussion and summary of the findings.
I.

14,404

Briggs, G.E. DIMENSIONAL ANALYSIS OF SKILLED MOTOR PERFORMANCE. COMBINED REPORT. Contract AF 41(607) 70, Proj. 7777, R.F. Proj. 604, 3-12-52, March 1952, 2pp. Ohio State University Research Foundation, Columbus, Ohio.

14,404

This is a progress report on a research program concerned with investigating skilled motor performance. The major effort of the period was the preparation of the final report, "Skilled Performance." A list of reports, completed or in progress, is included. R 27

14,405

Brookley, M.E. & Davis, E. COMPARISONS OF TRAINING FOR SPEECH: WORD AND SENTENCE READING, REPEATER VS FIELD, AND REPEATER VS REPEATER LISTENING. LITERATURE. March 1949, 52(3), 236-250. (Control Institute for the Deaf, St. Louis, Mo.).

14,405

To compare the relative difficulty of two tests of the threshold of speech as well as the absolute values for normal ears under various conditions of listening, ten normal-hearing and ten hard-of-hearing subjects were tested. Auditory Tests Number Nine (speech words) and Number Twelve (sentences) of the Psycho-Acoustic Laboratory were administered monaurally and binaurally through headphones and for the "normals," binaurally from a loud-speaker. Threshold data for the two tests were compared for these conditions. Differences between "normal" and "hard-of-hearing" are discussed. T. 2 B

14,406

Bee, A. & Sell, R.G. ECONOMIC INVESTIGATIONS INTO THE DESIGN OF MASTER CONTROLLERS. PE/SE/82/58, Aug. 1956, 20pp. The British Iron & Steel Research Association, London, England.

14,406

This paper describes a series of laboratory experiments and work trials investigating the effects of certain design variables of hand- and foot-operated steelworks master controllers upon operating characteristics of the controllers. Basic procedure in each experiment was the use of a group of subjects to perform a series of standard tasks (aligning two pointers on a scale) using the controller. The variables were as follows: 1) foot controller--position of pivot relative to ankle, number of speed-steps, angle between extreme positions, and the operating torque; 2) hand controller--number of speed-steps, arc of movement of handle, length of handle, feel of controller, use of mechanical latch, etc. The findings are related to optimum combinations of design variables for most efficient work performance. T. I. R 9

14,40

Blackwell, H.R. EVALUATION OF THE NEURAL QUANTUM THEORY IN VISION. Amer. J. Psychol., July 1953, LXVI, 397-408. (University of Michigan, Ann Arbor, Mich.).

14,407

The neural quantum theory, which is concerned with the fundamental nature of sensory discrimination, is examined for its relevance in the field of vision. The postulates of the theory are discussed. The experimental task was to evaluate the extent to which actual threshold data conformed to the theoretical quantum curves. The data were gathered from four subjects by the method of constant stimuli. Each of 14-18 values of the luminance increment was presented 20 times. The 20 values of the same increment were presented consecutively. Two groups of 20 catch stimuli were presented in random order. The subject responded "yes" or "no" to each presentation. These conditions conformed to those required by the theory. T. G. R 7

14,408

Berliner, R.J., Young, R.P. & Hall, G.F. MAN-MACHINE FACTORS IN THE NUCLEAR REACTOR CONTROL SYSTEM. Proj. NE 401 000, Task 401 001, NRC Proj. Y12 03, NRC Rep. 5270, March 1959, 20pp. NRC Research Lab., Washington, D.C.

14,408

One important problem in the design of a research reactor is the allocation of control responsibility among man and automatic equipment so as to achieve the maximum in safety, flexibility, and continuous operation. This report presents the man-machine considerations which led to defining the operator's task in the control system of the nuclear reactor at the U.S. Naval Research Laboratory and how these considerations were implemented in the original design. T. I. R 1

14,409

Cal, E., Mastrilli, L. & Scavini, G. THE TRAINING OF RAILWAY PERSONNEL IN STEELWORKS. PE/SE/87, Jan./Feb. 1958, 7pp. The British Iron & Steel Research Association, London, England. (Societa Confindustria, Genoa, Italy).

14,409

This paper deals with the training of railway personnel in steelworks under the following points: 1) job analysis and job evaluation in the transport departments; 2) selection of candidates; 3) theoretical and practical trainings; 4) advancement and promotion. Several appendices are included: 1) example of job analysis; 2) example of a psycho-technical examination; 3) training of mobile personnel on Italian state railways and training of personnel for local operations; 4) safety regulations for narrow gauge rail transport; and 5) safety regulations for interval works transport. T. G. I.

14,410

Byram, G.M. & Jamison, G.M. SOME PRINCIPLES OF VISIBILITY AND THEIR APPLICATION TO FOREST FIRE DETECTION. Tech. Bull. 954, March 1948, 61pp. US Department of Agriculture, Washington, D.C. (Pacific Northwest Forest and Range Experiment Station, Portland, Ore.).

14,410

To develop ways of determining visual range, a measure useful in the efficient operation of forest fire detection systems, a series of long-range studies was undertaken. This report summarizes the findings of the studies under the following major topics: 1) visibility and the effect of haze upon it, 2) practical measurements of visibility distance (visibility meters, methods for estimating without instruments), and 3) application of findings to other fire detection problems (search methods, eye-test for lookouts, haze-penetrating filter, optical aids). The appendix contains the mathematical theory of visual range as well as additional information on the various devices. T. G. I. R 31

14,411

Brown, W.L. & McDowell, A.A. VISUAL ACUITY PERFORMANCE OF NORMAL AND CHRONIC IRRADIATED MONKEYS. Rep. 56 149, Nov. 1958, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex. ((University of Texas, Austin, Tex.).

14,411

To determine the persistence of visual acuity deficit following radiation exposure, the performance of monkeys was investigated approximately three years after exposure. Six normal (controls), ten low-dose, nine intermediate-dose, and four high-dose irradiated rhesus monkeys were tested to a criterion of 21 correct responses (24 trials a day) for two successive days on each of eight visual acuity problems presented in order of increasing difficulty. Each problem required a choice between 1) circles and 2) circles with breaks in order to procure a food reward. The mean errors to criterion were analyzed for differences among groups at each problem level. T. G. I. R 2

14,412

Brook, A.M. EVALUATION OF COMBINED ELBOW AND WRIST SIZE, ANTERIOR, LATERAL, STUMP-ADJUSTED (OUTSIDE ELBOW EDGE WITH STUMP-ADJUSTED 12.14. Tech. Rep. 5762, Dec. 1957, 7pp. USAF Human Research Lab., Walter Reed Army Medical Center, Washington, D.C.

14,413

Commercially available adult size external elbow (outside elbow flange) with stump-adjusted locking mechanism (A.S. Hixson Corporation, Santa Clara, California) were evaluated and tested for compliance with Tentative Standards. Functional tests, physical strength tests, design and construction evaluation, and appearance evaluation were made and the results reported.

14,413

Calhoun, L.S. THE EFFECT OF ELBOW ANGLE AND BACK-SUPPORT HEIGHT ON THE STRENGTH OF HORIZONTAL PUSH BY THE HAND. Proj. 6'95 20 001, Task USAMC T 3, NEMO, Rep. 378, March 1959, 21pp. USA Medical Research Lab., Fort Knox, Ky.

14,413

To determine the effect of the elbow angle on the force of the push movement by the hand, nine subjects were tested. The task was to push on the handle of a dynamometer with as much force as possible while in a seated position. The strength of the push movement was measured at five elbow angles (60, 85, 110, 135 and 160 degrees). At each angle measurements were made when there was no back support and with a back rest at 20, 40, 60 and 80 percent of the distance from seat to shoulder joint. The data were analyzed for the effects of angle, backrest, and their interactions. Consideration was given to the possible ways in which the arm might have produced the forces measured.

14,414

Carp, R.T., Jr. A TABLE FOR CONVERTING VOLTAGE TO SOUND PRESSURE LEVEL IN DECIBELS ($0.03 = 0.0002 \text{ VOLT} = 0.0002 \text{ INCH/CM}^2$). Proj. IN 18 02 11, Subtask 2, Rep. 1, Dec. 1958, 26pp. USAF School of Aviation Medicine, Naval Air Station, Fla.

14,414

The measurement of sound pressure level of noise with a microphone system and a voltmeter involves the conversion of the output voltage of a microphone system into sound pressure level. Such conversions are often accomplished by laborious computations or by graphic means. A table was computed to facilitate a direct accurate conversion of output voltage into sound pressure level without the usual computation or interpolation. Directions for use of the table are included in the report.

14,416

McLester, W. TRAINING OF PERSONNEL FOR RAIL TRANSPORT IN IRON AND STEEL WORKS. PE/H/63/57, Feb. 1958, 4pp. Plant Engineering & Energy Div., British Iron and Steel Research Association, London, Eng.

14,416

This paper gives a brief outline of some aspects of training in a steelworks traffic department. The internal and external traffic services needed to maintain production levels in the Corby Works of Stewarts and Lloyds, Ltd. are described and the system employed in this plant to train shunters, drivers and supervisors is discussed.

14,417

McCutchan, J.W. & Isherwood, J.D. PREDICTION OF THERMAL TOLERANCE WHEN USING AN MA-2 VENTILATING GARMENT WITH A MODIFIED MK-IV ANTI-EXPOSURE SUIT. Contract AF 33(616) 5402, Proj. 7164, Task 71830, WADC TR 59 326, June 19 59, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of California, Los Angeles, Calif.).

14,417

To provide a rational basis for the prediction of thermal tolerance when using an MA-2 ventilating garment with a modified MK-IV anti-exposure suit, physiological responses of human subjects were measured while wearing this combination and other garments comprising 2.15 clo of thermal resistance. Responses are shown graphically in terms of heat storage, heart rates, sweat rates, and composite indices of these variables. A nomograph presents the equation embodying the results which predicts the cooling power of the garment. Directions for its use in predicting human tolerances are given.

14,418

McDowell, A.A. & Brown, M.L. PERIPHERAL CUE LEARNING SET IN Rhesus MONKEYS. Rep. 59 4, Feb. 1959, 3pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

14,418

Four control and nine chronic whole-body irradiated rhesus monkeys were tested on six four-trial peripheral cue learning set problems per day for 39 days. These monkeys had had previous experience on standardized learning set problems and in the utilization of peripheral cues to procure food rewards. The experiment investigated the effects of this prior experience on their present acquisition of peripheral cue learning sets. The data (percent errors) were analyzed for differences between trials, training periods, and subjects (normal versus irradiated monkeys).

14,419

McDowell, A.A. & Brown, M.L. VISUAL ACUITY PERFORMANCE OF NORMAL AND CHRONIC FOCAL-HEAD IRRADIATED MONKEYS. Rep. 59 5, Dec. 1958, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

14,419

To investigate the visual acuity performance of chronic focal-head monkeys in an effort to determine whether the passive radiation doses to which they had been subjected two years prior had resulted in a visual acuity deficit, six such monkeys and nine control monkeys were tested on each of eight visual acuity problems presented in order of increasing difficulty. Mean errors per day per problem were analyzed for differences between groups. Differences within the experimental group of irradiation of the frontal and the posterior association areas were further analyzed.

14,420

Peters, G.A. & Adams, B.R. DESIGNING CONTROL CONSOLES. Prod. Engng., April 1959, 2pp. (Santa Monica, Calif.).

14,420

Guides that will help arrange instruments and controls for time-saving and error-free operation are presented in tabular form. The advice is based on recent human factors research and provides better conditions for the human operator for both standing and seated operation. Ten basic considerations for the designer to keep in mind when designing consoles are given.

14,421

National Defense Research Council, The Netherlands. THE INFLUENCE OF "ADAPTINOL" AND VITAMIN A ON NIGHT VISION. Tech. Rep. GNL 73 52, July, 1952, 6pp. USN Office of Naval Research, London, England.

14,421

A cooperative project, conducted by the Research Unit for Nutrition and the Research Unit for Observations, of the National Defense Research Council of The Netherlands, on the influence of "Adaptinol" and Vitamin A on night vision has been conducted and prepared for publication in the Dutch language. A summary in English, written by M.A. Bouman and others, is presented. Measurements were made for several weeks of the night vision capacity of three groups of 25 men aged between 19-22. The members of the three groups were given respectively "Adaptinol," cod liver oil containing 5000 I U Vitamin A, and salad oil. Measurements were made before, during, and after dosage.

14,422

George Washington University. BIBLIOGRAPHY OF REPORTS. ADDITIONS TO LIST FROM 30 JUNE 1958 TO 15 MARCH 1959. Human Resources Research Office, George Washington University, Washington, D.C.

14,422

This bibliography presents a list of reports from 30 June 1958 to March 1959. Part I contains annotated technical, special and research reports issued by the Director's Office; Part II lists reports from the various Divisions and Research Units.

14,423
George Washington University. BRIEF ON HUMAN RESEARCH
UNIT NO. 1. Apr. 1955. Typ. Human Resources Research
Office, George Washington University, Washington, D.C.

14,423

This brief report describes the mission, personnel,
research organization, and current program of Human Re-
search Unit No. 1, ONRAC, Fort Knox, Kentucky. The Unit
is concerned with research in Army training, particularly
in armor. The staff is composed of both military and
civilian personnel organized in various task forces pre-
sently concerned with research in effectiveness of tank
crew team, performance in tank gunnery, tank driving
and maintenance, and armor communications.

14,424

Zidema, J.D., Cohen, S.I. & Silverman, A.J. CLINICAL
EVALUATION OF LOW G TOLERANCE. Proj. 7216, Task 71712
& Proj. 7215, Task 71713, NADC TN 57 246, July 1958,
12pp. USAF Aero Medical Lab., Wright-Patterson AFB,
Ohio.

14,424

Twelve student pilots were referred to this labora-
tory for psychophysiological evaluation, following in-
flight blackout episodes. The patients were studied
by a team using cardiovascular, neuro-hormonal, bioelec-
tric, psychologic, and psychiatric techniques. Illustra-
tive case histories are given. The relationship of car-
diovascular and psychophysiological factors in tolerance
g forces is illustrated.
R 13

14,425

Swanson, A.M. NOTES ON SIMULATION INSTRUMENTATION
FOR MEASUREMENT OF PILOT PROFICIENCY. Proj. 7721,
Task 47025, OL TN 57 3, May 1957, 43pp. USAF
Operator Lab., Randolph AFB, Tex.

14,425

An investigation of the feasibility of obtaining
pilot proficiency measures from oscillograph records of
pilot performance in the B-52 Simulator (Type S-2) has
been initiated. This paper discusses the integration of
the recording equipment (Photron six-channel oscillograph)
with the flight simulator, and the development of a plan
for obtaining appropriate data to evaluate the utility
of the instrumentation for the purpose desired.
T. I.

14,426

Sitgreaves, Rosedith. PROBABILITY AND STATISTICS IN
ITEM ANALYSIS AND CLASSIFICATION PROBLEMS OPTIMAL TEST
DESIGN IN A SPECIAL TESTING SITUATION. Rep. 57 117,
Sept. 1957, 35pp. USAF School of Aviation Medicine,
Randolph AFB, Tex. (Columbia University, New York,
N.Y.).

14,426

To evaluate the usefulness of various tests of abili-
ties, such as those utilized in reaching decisions as
to personnel assignments, and particularly to aid in
the selection of items for such tests, a probability
model for the testing situation is developed in some
detail. The model examined here is based on an earlier
model.
G. R 5

14,427

Richey, Francis. A NOTE CONCERNING THE RADAR CON-
TRAST OF AIRPORT RUNWAYS. Contract AF 33(616) 1708,
Sci. Rep. 2, AFRC TN 57 198, Feb. 1957, 10pp.
Research Laboratories, Hughes Aircraft Company,
Oulver City, Calif.

14,427

The radar contrast of a perfectly absorbing gap sur-
rounded by reflecting semi-infinite half planes has been
derived as a special example of a theory giving the radar
contrast of any extended target complex. The radar con-
trast is defined in terms of the power received at the
antenna and does not take into account the effects of
noise. By comparing the contrast of an absorbing gap
with that obtained for two point sources of angular sepa-
ration equal to the width of the gap, an explanation is
given of the unexpectedly good results obtained by side-
looking reconnaissance radars in resolving airport run-
ways of angular widths four or five times smaller than a
half-power beamwidth.
G. I.

14,428

Van Gierke, H.E. & Mettsdorp, A.C. ACQUISITION CRI-
TERIA FOR WORK SPACES, LIVING QUARTERS, AND OTHER
AREAS ON AIR BASES. Contract AF 33(616) 3485, Proj.
7210, NADC TN 57 248, Nov. 1957, 16pp. USAF
Medical Lab., Wright-Patterson AFB, Ohio.

14,428

This report presents a summary of noise control cri-
teria recommended for use in air base planning. The
modifications of earlier criteria were necessitated by
recent research which is reflected in this summary.
Criteria are given for noise environments that allow safe
and a satisfactory performance of human functions in the
following classes of occupied areas: living quarters;
important communication centers; office areas; work and
shop areas; group meeting, study, and rest areas; and
hospitals. The criteria are described for each class.
T. G. R 11.

14,429

Peterson, R.O. & Jones, Edna, M. HUMAN FACTORS
SUPPORT IN THE DESIGN AND USE OF THE REDSTONE
FIRE UNIT PROFICIENCY ANALYZER. Contract D61339 69,
Tech. Rep. DATTACENTEN 69 2, 162pp. USAF Training
Device Center, Fort Washington, D.C. (American
Institute for Research, Pittsburgh, Penn.).

14,429

The Fire Unit Proficiency Analyzer, Device 3G15,
is a training device to be used with operational equip-
ment in training the Redstone missile firing battery.
This study provides human factors recommendations for
1) the design of training equipment, 2) the use of the
training equipment, and 3) a plan to field test the
training system. A brief statement of the methodology
used is also presented. Appendices present full data
and information on the various phases of the study.
T. I.

14,430

USA Aviation School Library. ARMY AVIATION. SPECIAL
BIBLIOGRAPHY NO. 1. (REVISED). April 1959, 16pp.
USA Aviation School, Fort Rucker, Ala.

14,430

This is a special bibliography on Army aviation.
The references are listed under the following general
headings: general, history, aircraft, maintenance,
training, operations, helicopter operations, and future.
Most of the references, with the exception of those in
history, cover the period from 1945 through 1958.
R 237

14,431

Guiguet, B. & Fieda, D. A PRELIMINARY STUDY OF
MECHANICAL EXCAVATOR CABS. PE/KE/94/57, Sept. 1957,
20pp. Plant Engineering Div., British Iron and Steel
Research Association, London, England.

14,431

A study was made of the cabs of mechanical excavators
in order to determine what design modifications could be
made to make the work less arduous and to increase pro-
ductivity. A brief survey of excavators and their dif-
ferent equipment was made. Accident records were ana-
lyzed to determine what factors were responsible. Impli-
cations for redesign of equipment and for training of
operators are discussed. A further study of training
schemes led to the formulation of two selection tests
based on the key demands of the task, to proposed train-
ing apparatus, and to comments of faulty design of cabs.
Suggestions are made for the consideration of manufac-
turers and an outline of needed research is given.
I. R 8

14,432

Canoga Corporation. NIKE INSTRUMENTATION RADAR SYSTEM.
AFAG TECHNICAL NOTE XVII-4. QUARTERLY PROGRESS RE-
PORT JULY, AUGUST, SEPTEMBER, 1956. Contract AF 33(616)
42, Canoga Rep. 7150 16, Oct. 1956, 18pp. Canoga
Corporation, Van Nuys, Calif.

14,432

Progress of work on a contract to perform certain
basic modifications to the NIKE radar system for the Air
Force is reported. This is part of an extended research
and development program in perfecting the most accurate
and complete instrumentation radar system available for
obtaining time-space-position ballistics data on bombs
dropped from very high altitudes. The existing NIKE
radar system is to be modified for this purpose. Specif-
ic details of the contract are given and the degree of
completion of the various tasks is discussed.

14,433

Flight Safety Foundation Inc. INSTRUMENT PANEL CALIBRATION. Human Factors Bull. 59 2H, 1p. Flight Safety Foundation Inc., New York, N.Y.

14,435

This bulletin demonstrates how the sudden deceleration of the skull against a rigid, firmly anchored instrument panel can produce pressures resulting in skull fracture, brain injury and death in an otherwise survivable accident. Methods of protecting the head from damage by suitable design are suggested.

I. R 3

14,434

Grubbs, R.S. SYSTEMS ENGINEERING-A CASE STUDY OF THE AIRCRAFT. J. Franklin Institute, May 1959, 13-27. (Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

14,434

This paper discusses briefly the task of the Airways Modernization Board (AMB) in its role as the leader in a systems engineering approach to the air traffic control program. Some of the basic conflicts which AMB must face are discussed, some of the first steps taken are questioned, and suggestions are offered for a positive workable program.

14,435

Griffin, D.R., Hubbard, Ruth & Kald, G. THE SENSITIVITY OF THE HUMAN EYE TO INFRARED RADIATION. J. Opt. Soc. Amer., July 1947, 37(7), 545-554. (Harvard University, Cambridge, Mass.).

14,435

To investigate the sensitivity of the eye to infra-red radiations, measurements were made in the near infra-red, in two areas of the dark adapted eye: the central fovea (cones) to 1000 millimicrons, and a peripheral area (primarily rods) to 1050 millimicrons. Determinations of the visual thresholds were made for radiation passing through a series of infra-red filters. Estimates of spectral sensitivity were derived from the data and sensitivity functions were chosen by successive approximation, which were consistent with the observed thresholds. Number of observers varied from 39 to 54.

T. G. I. R 21

14,436

Green, R.R. & Mickle, F.A. SPEED OF REACHING TO CRITICAL CONTROL AREAS IN A FIGHTER-TYPE COCKPIT. Contract AF 33(616) 54-1, Proj. 7164, WADC TR 58 687, June 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Macmillan Company, Baltimore, Md.).

14,436

To investigate basic speed of movement under optimum conditions to stimuli placed in various critical cockpit movement areas, ten subjects performed a positioning task. The subject, seated in a cockpit mock-up, was required to position his hands on the control stick, to extinguish a light by a toggle switch, and then to return his hand to the stick. The lights were located in nine critical control manipulation areas and placed symmetrically on right and left sides of cockpit. Response times in seconds were analyzed for effect of position of light and switch.

T. I. R 6

14,437

Grebe, R.M. (Ed.). HANDBOOK OF TOXICOLOGY. TRANQUILIZERS. VOLUME IV. Proj. 7165, Task 71836, WADC TR 55 16, March 1959, 120pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,437

This report presents data on physical, chemical, biological, and toxicological properties of 66 tranquilizers, compiled from extensive literature references. Wherever possible, data are presented on molecular formula and weight, structure, physical and chemical properties, pharmacology, clinical aspects, toxicity, and mode and site of action for each compound. The material is up-to-date at time of publication and has been carefully reviewed and authenticated by the contributors. Since the report is a survey, the values should be considered as "yardsticks" of activity rather than as absolute and definitive.

R 358

14,438

Mullman, W.H. THE UNBIASED ESTIMATE OF THE POPULATION VARIANCE AND STANDARD DEVIATION. J. Statist., Oct. 1950, 63(4), 615-617. (University of Texas, Austin, Tex.).

14,438

This note discusses the biased nature of the square root of the unbiased estimate of population variance for use as an estimate of the population standard deviation. A formula by which an unbiased estimate may be computed and also a table of correction factors to be used for various sample sizes from two to 30 are given.

T.

14,439

Graybiel, A. & Hipp, Dorothy. THE OCULO-GYRAL ILLUSION: A FORM OF APPARENT MOTION WHICH MAY BE OBSERVED FOLLOWING STIMULATION OF THE SEMICIRCULAR CANALS. Proj. X 145 (AF 75 3), Rep. Four, Nov. 1945, 26pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,439

The oculo-gyral illusion refers to a form of apparent motion resulting from the stimulation of the receptors in the semi-circular canals following angular accelerations. This study was undertaken to investigate some aspects of this illusion. Human subjects (four) were rotated in a modified Link Trainer, in a Barany chair, or on a human centrifuge and the illusory perceptions of motion were recorded. The chief variables concerned: 1) the nature or illumination of the fixation object, 2) the direction and strength of the stimulus, and 3) the position of the head of the subject. The importance of the findings for research and for night flying are discussed.

T. G. R 18

14,440

Graybiel, A. DISORIENTATION IN PILOTS. Nov. 1949, 10pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,440

The problem of disorientation in pilots is considered in this paper. A partial outline of possible etiologic factors is presented under three main headings: the aerial environment, the plane, and the pilot. The physiogenesis of aviator's vertigo is reviewed and man's limited ability to cope with this form of disorientation is emphasized. Two forms of visual illusion, autokinesis and the oculo-gyral illusion, are discussed briefly and their significance in aviation is commented upon.

T. R 12

14,441

Graybiel, A. & Clark, B. THE AUTOKINETIC ILLUSION AND ITS SIGNIFICANCE IN NIGHT FLYING. J. Aviat. Med., June 1945, 16(3), 111-151. (USAF School of Aviation Medicine, Randolph AFB, Tex.).

14,441

This report is concerned with the autokinetic illusion (apparent movement of an object in a visual field when other visual references are inadequate) and its significance in aviation. Experiments were carried out both in the laboratory and during formation flights at night. The chief characteristics of the autokinetic movement were determined on approximately 500 subjects. The effect of various factors in reducing the illusion was tested: size, shape, numbers, arrangement in planes and distances, and actual movement of subject and/or target in various combinations.

T. G. R 12

14,442

Gravendeel, D.W. & Plomp, R. MICRO-NOISE-TRAUMA? Rep. ICF 1959 1, 15pp. Institute for Perception RVO-TNO, Soesterberg, Netherlands.

14,442

To investigate the hearing damage that might be caused by the noise of light fire arms, audiograms were compared for three groups of young men: 1) 61 men who had been in shooting noise many times, 2) 48 recruits who had never been in shooting noise but had been exposed to industrial noise, and 3) 139 recruits who had never been exposed to either shooting or industrial noise. Maximal hearing loss and number of dips in the audiogram were analyzed for various frequency regions tested. The size, place, and form of the dips indicating hearing loss were examined carefully and an explanation proposed in terms of "micro-noise-trauma."

T. G. R 25

14,443
Grafstein, A., Clark, R., MacDonqudale, K. & Hay.
Dorothy I. ROLE OF VENTILATOR PATTERNS IN THE
VISUAL PERCEPTION OF A MOVING TARGET IN THE DARK.
Ann. N. Y. Acad. Sci., April 1945, 50(2), 259-266.
(USN School of Aviation Medicine, Naval Air Station,
Ft. Belvoir.)

14,443
This report is concerned with the illusory effects
produced by rotation during the visual perception of a
moving object. Six well-trained subjects reported their
perceptions both during and following rotation while ob-
serving a moving target in the dark and in a lighted
room. Rotation was at varying speeds (from 10 to 15 ro-
tations-per minute) both to the right and the left; the
target path was circular, two meters distant and 15 de-
grees above eye level. The qualitative descriptions of
the subjects are reported.

14,444
Goodnow, R.E., Beecher, H.K., Brazier, Mary A.B.,
Masteller, F., et al. PHYSIOLOGICAL PERFORMANCE
FOLLOWING A HYPNOTIC DOSE OF A BARBITURATE. J.
Pharm. & exper. Ther., May 1951, 102(1), 55-61.
(Anesthesia Lab., Massachusetts General Hospital,
Boston, Mass.).

14,444
To investigate the nature and duration of the neuro-
muscular effects of pentobarbital sodium (generally em-
ployed as a hypnotic agent), each of 30 young men was
studied in two test sessions. A battery of ten psycho-
logical tests, covering a range of functions from rela-
tively simple (reaction time, tapping) to higher mental
activities (memory) were employed. The first day of
each test session was used to standardize activities
prior to medication and for practice on the tests; 0.1
gram pentobarbital sodium or a lactose placebo were ad-
ministered; on the second day post-medication testing
started at 6:00 A.M. and continued at intervals until
11:00 P.M. Test data were analyzed for any effects due
to the drug.
T. R 14

14,445
Gottlieb, E. & Bitterman, M.E. THE MEASUREMENT
OF SHAPE-CONSTANCY. Amer. J. Psychol., July 1951,
64(3), 406-408. (University of Texas, Austin, Tex.).

14,445
An apparatus for measuring and demonstrating shape
constancy is described. Some results from a preliminary
trial are given.
I. R 5

14,446
Gordon, D.A. & Lee, G.B. MODEL SIMULATOR STUDIES-
VISIBILITY OF MILITARY TARGETS AS RELATED TO ILLUMI-
NANT POSITION. Prof. MICHIGAN, Rep. 2144 341 T, March
1959, 30pp. Willow Run Labs., University of Michigan;
Ann Arbor, Mich.

14,446
Experimental data are reported on detection and
identification (class and name) for military targets ob-
served in a small-scale model of an outdoor scene. The
effects on visibility of lighting the targets with sources
at various azimuths (elevation constant) and at var-
ious elevations through the median plane were determined.
These source positions are those which might be occupied
by searchlights or flares. Illumination was 0.02 and
2.0 foot-candles in separate experiments. The results
are explained in terms of the underlying contrast situ-
ations and pattern effects of ground and foliage shadows.
Suggestions are offered for applying the findings to
military illumination practices.
T. G. I. R 6

14,447
Guth, S.K. VISIBILITY. G-E Review, May 1952, 4pp.
(General Electric Co., Nela Park, Ohio.).

14,447
This paper describes a method for evaluating visibil-
ity on a definite numerical basis. The Luckiesh-Moss
visibility meter that relates visibility of any object
of visual task to a standard object is discussed and
its practical uses are illustrated. Visibility and il-
lumination level are discussed in some detail with a
table of foot-candle levels for typical visual tasks in-
cluded.
T. G. I.

14,445
Hatch, T.F. HUMAN ASPECTS OF ENGINEERING. Engg.
Engg., May 1949, 406-408. (Industrial Systems
Foundation, Mellon Institute, Pittsburgh, Penn.).

14,448
This paper considers criticisms that have been lev-
eled against the lack of social effectiveness and re-
sponsibility of the engineer. It is argued that the
scope and responsibility of the engineer should be
broadened to the extent that the social and human prob-
lems can be defined in quantitative terms and dealt with
in the ways of the engineer. Human engineering as a
legitimate branch of the profession is discussed.
R 4

14,449
de Ericson, A. & Legrand, P. THE MOTIVATIONS OF FLYING
PERSONNEL. No date, 2pp. Centre d'Etudes Psycholo-
giques de l'Armée de l'Air, Versailles, France.

14,449
An abstract of a study of the motivations of flying
personnel is given. It deals with results obtained from
personal history questionnaires and from inquiries into
hierarchical analyses of behavior of a sample of 500 pil-
ot candidates. Three types of motivation were dis-
tinguished: flight, military, and hunting. A factorial
analysis of quantified data was carried out.

14,450
Hamon, Surgeon General. ATTITUDES OF THE MILITARY
AUTHORITIES TOWARDS SCIENTIFIC PSYCHOLOGY. March 1957,
5pp. Medical Research Council, London, England.

14,450
The writer maintains that the military will, of
necessity, pay the greatest attention to whatever the
techniques of scientific psychology can contribute to-
wards the consolidation of the fighting value of the
armies. After discussing the changing social structure
of the military, permanent cadres versus numerous or
changing contingents, the conclusion is reached that
research in morale is greatly needed. Difficulties as
well as opportunities in research of this kind are dis-
cussed.

14,451
Holmes, W.J. CLINICAL APPLICATIONS OF NIGHT VISION
TESTS. Trans. Amer. Ophthal. Soc., 1951, XLVIII,
422-442.

14,451
Subjective and objective tests of scotopic vision
which are of clinical usefulness in ophthalmic practice
are indicated. The technique and clinical applications
of rod scotometry, as quantitative means of differenti-
ation in the diagnosis of various ocular, intracranial
and systemic diseases, are discussed. Several theories
regarding the basis of night-vision tests are suggested
and a list of conditions in which scotopic examinations
are of special value is appended.
G. R 99

14,452
Kryter, K.D. SOME HUMAN FACTORS IN NOISE CONTROL.
ca. 1957, 4pp. USAF Operational Applications Lab.,
Boiling AFB, Washington, D.C.

14,452
This paper describes briefly the manner in which re-
sults of experimental findings are applied by human en-
gineers in the solution of problems resulting from the
presence of noise in the environment of the human opera-
tor. The two problems dealt with are: 1) speech com-
munications and 2) annoyance.
R 7

14,453

Karwowski, J.F. & Weyner, M., Jr. STARS IN VISION: IV. THE INTERACTIONS OF REDS AND CONES IN AFTER-SENSATIONS. *J. gen. Psychol.*, 1951, 44, 215-233. (Dept. of Psychology, Dartmouth College, Hanover, N.H.).

14,453

To investigate further a phenomenon in the after-image series (bleaching effect) which is manifested as a whitish dazzle of striking intensity, a moving slit of light (36 centimeters displacement; 76.4 centimeters per second movement rate) was observed in a dark room by five subjects who maintained fixation on a centrally located point of light. Intensity, wave-length and dark adaptation were varied to produce characteristic transformations of the after-effects. These transformations are described and explained in terms of rod-cone participation.

I. R 12

14,454

Hodge, D.C. AN INVESTIGATION OF THE EFFECT OF VARIATION IN RIFLE SIGHTING RADIUS ON AIMING ERRORS UNDER TWO LEVELS OF ILLUMINATION. M.A. Thesis, 1959; 9pp. Texas Technological College, Lubbock, Tex.

14,454

To determine the effects of variations in rifle sighting radius (from 12 to 42 inches in six-inch increments) on aiming error at illumination levels of 50 and one foot-candle, 60 subjects were tested. The task was to align the mirror-image of a target with a set of rifle sights and to mark a score sheet when satisfied with the sight-target alignment. The standard M1 rifle sights were used with six different widths of front sight posts to maintain same apparent sizes of front sight and target. Ten trials of ten shots each were given. The variable and constant errors of aiming were analyzed for effect of sighting radius and illumination.

G. I. R 18

14,455

Hochberg, J.E. & Bitterman, M.E. FIGURAL AFTER-EFFECTS AS A FUNCTION OF THE RETINAL SIZE OF THE INSPECTION-FIGURE. *Amer. J. Psychol.*, Jan. 1951, LXIV, 99-102. (Cornell University, Ithaca, N.Y. & University of Texas, Austin, Tex.).

14,455

To demonstrate the relation between figural after-effects and the area of the retinal region that is stimulated, ten subjects were tested in their ability to adjust a variable disk to apparent equality with a standard disk. Four conditions of satiation were used: 1) and 2) the inspection figure was varied only in size (satiation period of three minutes); 2) and 3) inspection figure was varied only in distance so that apparent size was varied; and 4) no inspection figure was used. The mean constant errors for ten determinations under each condition were compared.

T. I. R 4

14,456

Hill, J.M.M. B.I.S.R.A. ACCIDENT RESEARCH. AN ACCOUNT OF WORK IN PROGRESS. PART I: INTRODUCTION AND COMMENTARY. CRS/112, Feb. 1957, 20pp. British Iron & Steel Research Association, London, England.

14,456

This report is an account of work in progress of industrial accidents along operational research lines. This approach considers accidents in their broadest aspects in relation to other personnel problems and with special reference to the human factor. The sample being studied includes all entrants to a certain steelworks in 1947. Their careers have been recorded over a period of four years. The data collected includes biographical records, previous employment records, all employment data from 1947-1951, dates and durations of all absences with reasons, and information on all accidents. The preliminary data is presented in a series of diagrams in Part II of this report (see 14,457).

T.

14,457

Hill, J.M.M. B.I.S.R.A. ACCIDENT RESEARCH. PART II: DIAGRAMS. CRS/112, 27pp. British Iron & Steel Research Association, London, England.

14,457

These diagrams illustrate some of the preliminary results of the analysis of data on a human factors study of accidents in a British Steelworks industry. Part I presents the explanatory material (see 14,456).

G.

14,458

Hertzman, A.B. & Ferguson, I.D. FAILURE IN TEMPERATURE REGULATION DURING PROGRESSIVE DEHYDRATION. Contract AF 33(616)3357, Proj. 7164, Task 7183D, WADC TR 59 398, July 1959, 27pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Physiology, St. Louis University School of Medicine, St. Louis, Mo.).

14,458

To observe in detail the sweating responses, changes in body temperature, and changes in the digital and cutaneous circulation during dehydration, measurements were made on 14 young men. The subjects were exposed to an ambient temperature of 43.3 degrees C. (110 degrees F.) without food or water for a period of 12 hours. Pre- and post-exposure weights were taken and, during various periods of the exposure, the following items were recorded: weight losses, skin and oral temperatures, regional sweating rates, electrocardiograms, volume pulses in finger and toe pads, and urine outputs. In some experiments tracheal blood pressures and flicker fusion frequencies were recorded. The data were analyzed as a function of time; theoretical implications are discussed.

I. G. R 44

14,459

Hecht, S., Hendley, C.D., Ross, S. & Richmond, P.H. THE EFFECT OF EXPOSURE TO SUNLIGHT ON NIGHT VISION. *Amer. J. Ophthalmol.*, Dec. 1948, 31(12), 1573-1580. (Columbia University, New York, N.Y. & Ohio State University, Columbus, Ohio).

14,459

To investigate the length of time onset of dark adaptation remains above normal after exposure to sunlight, and whether such effects accumulate when people are exposed day after day, a series of measurements was made. 1) Subjects looked at the sky (3000 to 12,000 millilamberts) for periods of from four minutes to an hour and the course of dark adaptation was measured. 2) Similar measurements were made with sky brightnesses ranging from 3,500 to 16,000 millilamberts. 3) The effect of prolonged exposure was measured on two groups of 51 young men. One group was exposed from four to six hours daily for four weeks while the others were kept indoors; the groups were then reversed for two weeks. Implications for night vision are discussed.

T. G. R 10

14,460

Hechter, H.H. THE RELATIONSHIP BETWEEN WEIGHT AND SOME ANTHROPOMETRIC MEASUREMENTS IN ADULT MALES. USNRDL TR 206 NS 080 001, Dec. 1957, 16pp. USN Radiological Defense Lab., San Francisco, Calif.

14,460

To derive a functional relationship between weight and a set of concomitant body measurements, an analysis of measurements made by previous investigators (Rehne and Guttentag, Benke and Sirl) on a sample of 31 male individuals was made. Using statistical regression analysis, equations were derived for predicting weight (either total or lean body). The relative importance of the anthropometric variables that were used are indicated.

T. R 8

14,461

Marcus, E.R. & Rabe, A. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD. III. PATTERNS OF BLACKENED CIRCLES IN AN EIGHT-CIRCLE TEMPLATE. Proj. MICHIGAN, Rep. 2144 294 I, Nov. 1958, 67pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

14,461

This is one of a series of studies investigating an observer's ability to identify targets composed of multiple elements having one of two possible forms (binary elements). Linear arrays of blackened or open circles were presented to the observers tachistoscopically at various locations in the visual field (0, 45, 90, or 135 degrees to the horizontal about the center of fixation in the frontal plane). The target was exposed for approximately 0.075 seconds and the observer attempted to reproduce the target pattern and position. Reproduction accuracy was analyzed for effect of target position along various meridians of the visual field.

T. G. I. R 31

14,462

Christensen, J.M. ENGINEERING FOR THE HUMAN. Psychology Branch, USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,462

This paper defines the area of work called "Human Engineering," discusses its origin, and sketches briefly its recent history. The integrating effect this effort is having on related disciplines is noted. Certain deficiencies in the early work are discussed, and what is being done and what is being planned to correct these deficiencies are described. Primary stress is here placed upon systems research. Some suggested human factors research areas are listed in a supplement.

14,463

Hale, H.B., Kratochvil, C.H. & Ellis, J.P., Jr. PLASMA CORTICOSTEROID LEVELS IN AIRCREWMEN AFTER LONG FLIGHTS. Rep. 59 15, Dec. 1958, 3pp. Dept. of Physiology and Biophysics, USAF School of Aviation Medicine, Randolph AFB, Tex.

14,463

To test the possibility that blood corticosteroid levels in aircrewmembers fatigued from prolonged flights become elevated, the fluorescence method of Sweat was used to determine hydrocortisone and a corticosterone fraction in blood. Pre- and post-flight venous blood samples were obtained from 44 men (members of nine crews) participating in training flights lasting 9 to 12 hours in B-52 aircraft. Values for the two samples were compared for differences.

T. R 9

14,464

Hooton, E.A. BODY BUILD IN A SAMPLE OF THE UNITED STATES ARMY. PART I: BODY BUILD IN RELATION TO MILITARY FUNCTION. PART II: MEASUREMENTS OF BODY BUILD. Contract W44 109 QM 1078 & W44 109 QM 2014, Tech. Rep. FP 102, Feb. 1959, 348pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass. (Harvard University, Cambridge, Mass.).

14,464

This report presents data from two exhaustive investigations into the body shape and size of Army personnel. The sample represents males accepted for military service. Part I covers: 1) the general distribution of body types classified into 18 groups; 2) the military utility of each of the several groups, as indicated by the extent to which the various body types tended to be concentrated in distinct units and specialties; and 3) the correlations of the body build groups with all sociological and other data such as age, months of service, etc. Part II deals with the more important measures gathered on individual soldiers as such measures apply to various body types, previously determined from the photographs.

T.

14,465

Ingram, M.T. ORIENTATION OF RESEARCH NEEDS ASSOCIATED WITH ENVIRONMENT OF CLOSED SPACES. Contract AF 18(603) 71, AFOSR TN 58 106, 21pp. USAF Office of Scientific Research, Baltimore, Md. (New York University, New York, N.Y.).

14,465

This paper presents an assessment and review of present knowledge of some problems involved in closed ecological systems and the techniques requisite to the handling, treatment and disposal or recycling of materials appearing as wastes and by-products of human occupancy of the closed space. Commentary and discussion of research needs are presented on the following topics: bodily wastes, waste handling and treatment—algae culture, CO₂-O₂ conversion, and closed air space.

T. R 18

14,466

Jerger, J.F., Shedd, Joyce L. & Harford, E. ON THE DETECTION OF EXTREMELY SMALL CHANGES IN SOUND INTENSITY. Rep. 58 127, Nov. 1958, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (Audiology Lab., Northwestern University, Evanston, Ill.).

14,466

A unique method for the clinical assessment of differential intensity discrimination of sound is described. Short (200 milliseconds) one decibel intensity increments are superimposed, at five-second intervals, on a pure tone of constant amplitude at a sensation level of 20 decibels. The patient responds to the momentary increase in loudness. The procedure is called SISI (short increment sensitivity index) and results are expressed in terms of the percentage of 20 increments to which a response is made. Data on selected cases are reported to illustrate the manner in which the score varies with different kinds of hearing loss.

T. G. R 26

14,467

Kahn, A. STEREOSCOPIC VISION-A FORM OF DEPTH PERCEPTION. Human Factors Data Bull. 36, March 1959, 3pp. Westinghouse Electric Corporation, Baltimore, Md.

14,467

The relationship between binocular disparity and the linear relationships that are required in stereoscopic pictures is demonstrated. The significance of the results for designing a three-dimensional radar display is discussed.

G. I. R 1

14,468

Kahn, A. THE "F" TEST. Human Factors Data Bull. 34, Jan. 1959, 4pp. Westinghouse Electric Corporation, Baltimore, Md.

14,468

This bulletin discusses the use of the "F" statistic for studying differences between the means of several groups. An illustrative example is given demonstrating that it is possible to perform either a simple or a complicated analysis with the same data if the experiment is properly planned.

T. R 3

14,469

Kahn, A. THE LIMITS OF DEPTH PERCEPTION. Human Factors Data Bull. 35, Feb. 1959, 3pp. Westinghouse Electric Corporation, Baltimore, Md.

14,469

The basic theory of three-dimensional sensing (depth perception) is discussed. The limits of disparity between which depth perception occurs and beyond which double images are obtained are shown as a function of the portion of the eye stimulated. It is suggested that these limits need to be considered in the construction of a three-dimensional display using the binocular disparity effect to display a coordinate.

G. I. R 2

14,470

Kahn, A. THE USE OF ARTIFICIAL SIGNALS FOR THE DETECTION OF RARELY OCCURRING SIGNALS. Human Factors Data Bull. 17, April 1958, 3pp. Wartime Electric Commission, Baltimore, Md.

14,471

This bulletin presents a brief summary of an experiment on human monitoring performance. To study ways in which such performance could be kept from deteriorating with time, artificial signals were introduced into a display panel of eight dials, the pointers of which all moved in a random fashion. Subjects were required to detect the movement of any one of the dial pointers into a crosshatched area on left of dial (real signal occurring 2-3 times in a two-hour watch) under two conditions: with an additional task of responding to movements of pointer to the right into a black area (artificial signal occurring every 75 seconds) and without this task. Performance was compared for these conditions. G. R. 1

14,472

Lauer, S. THEY "LEARN" NOT TO SAVE ACCIDENTS. Safety, Oct. 1958. (British Iron and Steel Research Association, London, England).

14,473

This paper discusses and gives examples of the kinds of analyses that can be made of accident records accumulated over a period of several years and points out the kinds of conclusions that can be drawn from them for accident prevention practices. The data used were records of new entrants into steel works as followed over a period of four years. The analyses show comparisons of accident rates for the first two years with those of the second two years in 1) types of accidents, 2) type of injuries, and 3) department in which they occurred. G.

14,474

Lauer, S. REASONS FOR EMPLOYEE RESISTANCE TO SAFETY EQUIPMENT. INTERIM REPORT ON PROTECTIVE FOOTWEAR. CE/19/57, Jan./Feb. 1958, 16pp. Operational Research Dept., British Iron & Steel Research Association, London, England.

14,475

This interim report contains the results of the first stage of an investigation concerned with factors which further or hinder the wearing of protective (steel toe-cap) boots and shoes in the steel industry. Details of protective footwear sales and of facilities that exist for selling such footwear on the work premises were obtained from 63 works. Facilities are classified as to size of the works: over 2000 employees and under 2000 employees. These facilities are then related to the sales figures. A selection of unsolicited remarks on some aspects of protective footwear is included in the report. I. G.

14,476

Kirkade, R.G. & Kidd, J.S. THE EFFECT OF DIFFERENT PROPORTIONS OF MONITORED ELEMENTS ON OPERATOR PERFORMANCE IN A SIMULATED RADAR AIR TRAFFIC CONTROL SYSTEM. Contract AF 33(616) 3612, Proj. 7184, Task 71583, 44DC IR 59 169, June 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

14,477

A simulated radar approach control system was used to evaluate the influence of different levels of monitoring on system performance. Monitoring level was varied by manipulating the proportion of aircraft in the system having airborne position information (API) equipment. The API-equipped aircraft did not require active control of their approach path as did those aircraft not so equipped. Four conditions were compared: 100, 63, 37, and zero per cent of aircraft with API equipment. Eight laboratory-trained controllers participated. Measures of system performance were safety (separation between aircraft) and efficiency (missed approaches, average number of planes processed, average delay, and average fuel consumption). Recommendations for the use of API equipment in terminal operations were made. I. G. R. 11

14,478

Keenleyside, G.F. & Lauer, S. SOME NOTES ON THE EFFECTS OF EXCESSIVE NOISE ON THE HEARING OF A GROUP OF WORKERS. Brit. J. Industr. Med., 1958, 15, 270-273. (Batterley Company Limited, Ropley, Dorset, England & British Iron and Steel Research Association, London, England).

14,479

To investigate the relationship between deterioration in hearing to prolonged exposure to intense intermittent noise, hearing assessment was made of all workers in three shops where riveting activities predominated. (Measurements of the noise and frequency analysis were also made.) The audiometric records of workers under the age of 40 years who had been exposed to the noise continuously for periods from one to seven years were analyzed. The results are discussed in relation to the use of protective devices. I. G. R. 1

14,480

Kennedy, A.P., Mills, R.J. & Raby, R.S. EMERGENCY ESCAPE CAPSULE STUDIES. PART I: PRELIMINARY DESCRIPTIVE EVALUATION STUDIES. Part I, 6325, Task 43710, WDC IR 59 247(1), June 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,481

Preliminary studies using aircraft canopy escape-type capsules as a primary survival vehicle are described. Design of capsule clothing, donning of clothing in confined space, storage of emergency survival items, air exchange requirements, filtration, inhabitation and communication studies were conducted as individual facets of the program. These studies were conducted with a test in which a human subject remained in a closed capsule for 72 hours. Findings from these studies are presented. I. G. R. 1

14,482

King, R.G. TIMES AVAILABLE FOR PROTECTIVE MEASURES IN EMERGENCIES AT HIGH ALTITUDE. April 1951, 10pp. Civil Aeronautics Administration, Washington, D.C.

14,483

The stresses that may act upon man in explosive or extremely rapid decompression are discussed under two categories: 1) the rapid or "instantaneous" stresses (air blast and gas expansion) and 2) the delayed stresses (anoxia, aerembolism, and cold). Charts of tolerances of man breathing air at various atmospheric pressures and altitudes are presented. The data for the charts were based on data from various sources. An explanation of some aspects of breathing is appended. I. G. I. R. 3

14,484

Swearingen, J.J. PROTECTION OF PASSENGERS AND AIR CREW FROM BLAST EFFECTS OF EXPLOSIVE DECOMPRESSION. April 1951, 4pp. Civil Aeronautics Administration, Oklahoma City, Okla.

14,485

This report presents a summary of results of some studies of the effects of the air blast of explosive decompression on "passengers" seated at various distances from windows of the same dimensions as those found in recent aircraft. Two possible methods of protection of seated passengers and aircrew were observed and are discussed. G.

14,478

Kawachi, T.F. & Lloyd, V.T. STUDIES IN VISUAL PERCEPTION. THE ROLE OF CHROMATIC ABERRATION IN DEPTH PERCEPTION. *J. Opt. Soc. Am.*, 1954, 44, 156-173. (Cornell University, Ithaca, New York, N.Y.).

14,479

To investigate the role of wave-length in perceiving depth, a series of experiments was performed. 1) Two spots of light of the same wave-length were viewed in a modified Howard-Graham apparatus and judgments were made as to which was the nearer. Yellow, red, green, and blue pairs of lights were judged in this manner. Accuracy of judgments as a function of spectral color was determined. 2) To test the hypothesis that the above judgments were due to chromatic aberration (perceived as bluriness), observations were made of blue lights with the naked eye and with glasses which focused the light on the retina. Also, neutralizing disks were used to obtain bluriness without color. Explanations of the results are discussed. T. L.

14,479

Lawson, R.M. SOME ISSUES IN SCHOOL VISUAL SCREENING. *Am. J. Optom. & Arch. Amer. Acad. Optom.*, Feb. 1954, 31(2), 87-96. (American Optical Company, Southbridge, Mass.).

14,479

This bulletin discusses the following major topics: the need for visual care in the school population, methods for providing more adequate visual care, errors in screening, characteristics of visual health programs of importance to the schools, the role of the ophthalmic practitioners, and the need for applied research in school visual screening. R. 4

14,480

Lawrence, Marie. RECENT INVESTIGATIONS OF SOUND CONDUCTION. PART I. THE NORMAL EAR. *Ann. Otor. Rhinol. Laryngol.*, Dec. 1950, 59(4), 1070-1087. (Princeton University, Princeton, N.J.).

14,480

This paper discusses the contribution made by recent investigations to the knowledge of the manner in which vibrational forces of the air are transferred to the fluids in the normal ear with a minimum of energy sacrifice. The experimental studies described are concerned with the middle ear and revolve around three basic functions: 1) the matching of the properties of air to those of the perilymph, 2) the transmission of periodic vibrations with a minimum of alteration in their form, and 3) the provision of a protective mechanism for the prevention of damage to the inner ear structures. G. R. 6

14,481

Neuer, E.G. RECENT INVESTIGATIONS OF SOUND CONDUCTION. PART II. THE EAR WITH CONDUCTIVE IMPAIRMENT. *Ann. Otor. Rhinol. Laryngol.*, Dec. 1950, 59(4), 18-42. (Princeton University, Princeton, N.J.).

14,481

This paper deals with the reception and transmission of aerial sounds in the ear with conductive impairment. Some of the common changes of the ear's conductive structure that result from accident, disease or deliberate surgical effort are discussed and suggestions are made how the general principles of sound conduction in the normal ear may apply. The following major topics are dealt with: 1) perforation and loss of the drum membrane, 2) interruption of the ossicular chain, 3) fixation of the ossicular chain, 4) the fenestration operation, 5) a physical theory of cochlear immobilization, 6) acoustic routes to the fenestrated ear, and 7) bone conduction in the otosclerotic ear. G. I. R. 20

14,482

Leary, R.G. & Williams, J.R. DIRECTIONALITY OF MANUAL MOVEMENTS IN ALIGNING AND IMPACTION LEVER CONTROL ADJUSTMENTS FOR HORIZONTAL AND VERTICAL POSITIONS. *CGO Proj. No. 1300*, Tech. Mem. 3 59, April 1959, 22pp. *US Army Research Office-Durham*, Durham, North Carolina, NC.

14,482

To determine population stereotypes or "natural" movements involved in levers designed to control elevation and azimuth movements and to determine in which plane (horizontal or vertical) levers should be placed to effect better control, US Army selected personnel were tested on two types of control panels (one vertical and one horizontal with an azimuth and elevation control on each). A missile model was moved right, left, up, or down by the controls. The subject was instructed as to the direction the missile was to be pointed. Responses for direction of control movement and speed of response were recorded and analyzed. Recommendations are included. T. L. R. 25

14,483

Lacey, S. THE HUMAN FACTOR. *Safety*, Feb. 1954, 2pp. CE/7/58 (British Iron and Steel Research Association, London, England).

14,483

This paper reviews an investigation of accidents at the Park Gate Iron and Steel Company, England. Only workers who joined the firm in 1947 were studied. The method used was to trace the workers' "lives" with the company from the day of entry onward. The number of accidents sustained over a four-year period was analyzed in terms of such factors as 1) length of employment, 2) six months or less employment versus more than six months, 3) number of "no reason" absences, and 4) contractors versus re-entrants. The significance of the findings for management practices is discussed. G.

14,484

Lacey, S. RECORDING AND PRESENTING ACCIDENT DATA AT COMPANY LEVEL. CE/11/57, Jan./Feb. 1958, 16pp. Operational Research Dept., British Iron & Steel Research Association, London, England.

14,484

This report presents two useful methods of presenting accident rates graphically. One, the monthly accident control chart, makes it possible to compare a department's accident rate month by month with its own record. The other, the yearly interdepartmental comparison chart, shows rates of different departments within the same company. Both charts are adaptations of quality control charting techniques making allowance both for scale effects (different sizes of departments) and for chance fluctuations in rates. Detailed instructions are given for plotting the charts. A type of record useful in determining the relative order of different causes for accidents is also given. T. G. R. 3

14,485

Melmo, R.B. CERTAIN PHYSIOLOGICAL CORRELATES OF PSYCHOMOTOR FUNCTIONING. Contract DA 49-007 MD 625 Jan. 1958, 16pp. USA Research and Development Div., Washington, D.C. (McGill University, Montreal, Quebec, Canada).

14,485

Experimental progress on three studies is reported: 1) physiological changes during tracking under conditions of sleep deprivation; 2) individual differences in patterning and level of physiological activity; and 3) electroencephalographic (EEG) reactions to strong auditory stimulation as a function of arousal level. In addition, progress is reported on the construction of a new tracking apparatus and a continuous amplitude/time analyzer for integrating EEG frequencies in the beta range. Publications supported in part by this contract are listed. R. 12

14,486
Lippert, S. A CENTURY HISTORY OF AIRCRAFT SEATING.
Paper No. 30 AT 21, Jan. 1959, App. The American
Society of Mechanical Engineers, New York, N.Y.
(Douglas Aircraft Company, Santa Monica, Calif.).

14,486
In the period 1930 to 1956 a number of advances in
aircraft seat design have taken place. These changes are
discussed by means of examples from Douglas built seats,
and attention is given to the changing requirements im-
posed in the last 22 years. Safety, economy in use of
materials, comfort and convenience are discussed.
G. I. R 3

14,487
Becke-Comer, J.G. & Maddell, D. A GENERAL
PSYCHOLOGICAL SCALE OF TASTE. J. Psychol., 1948,
26, 517-534. (Harvard University, Cambridge, Mass.).

14,487
This investigation deals with the problem of defining
a general psychological scale of taste strength on the
basis of the specific scales published by D.R. Lewis.
The first step established experimentally that cross
qualitative matches with respect to subjective strength
are possible in the field of taste. The next experiment
established that, for solutions of sucrose and sodium
chloride, pairs of hetero-qualitative solutions which
are g times as strong as a pair of empirically matching
solutions likewise match empirically. These results,
based on data from two observers, were used to construct
a general psychological scale of taste strength. The
scale unit is named a gust.
T. G. R 9

14,488
Lutz, C.C. DEVELOPMENT OF AN EMERGENCY PRESSURE SUIT
(COVERALLS, HIGH-ALTITUDE, TYPE CSU-4/P). Contract
AF 33(616) 3329, Proj. 6336, Task 63619, WADC TR 59
148, July 1959, 20pp. USAF Aero Medical Lab.,
Wright-Patterson AFB, Ohio

14,488
This report describes the various features evaluated
during the development of Coveralls, High-Altitude, Type
CSU-4/P. Each progressively improved prototype garment
is described and test results are reported. The final
model of the coverall is considered physiologically ade-
quate to meet the specified requirements. Comfort and
mobility features are compared to those of partial pres-
sure suits. Preliminary flight test results are reported
and an operational evaluation is recommended.
T. I. R 7

14,489
Cherniack, N.S., Hyde, A.S. & Zechman, F.W., Jr.
THE EFFECT OF TRANSVERSE ACCELERATION ON PULMONARY
FUNCTION. Proj. 7222, Task 71746, WADC TR 59 347,
June 1959, 10pp. USAF Aero Medical Lab., Wright-
Patterson AFB, Ohio.

14,489
The effect of forward acceleration of different
respiratory factors was tested in 15 subjects during
accelerations of two and three minute durations at three
and five g on the human centrifuge. Minute volume,
respiratory rate, tidal volume, maximum breathing capaci-
ty, 0.5 second timed vital capacity and total vital capa-
city were measured after acceleration.
T. G. R 10

14,490
Kugel, R., Jr. STATIC LINE, TYPE T-10 TROOP PERSONNEL
PARACHUTE-GENERAL, DYNAMIC, AND STATIC TESTS. Proj.
6071, WADC TR 59 364, Suppl. 1, Apr. 1957, 24pp.
USAF Aeronautical Laboratories Lab., Wright-Patterson
AFB, Ohio.

14,490
To determine the effects of trooper collision during
landing and the forces involved in the inadvertent open-
ing of the reserve parachute of a towed trooper, a
series of aerial tow tests was conducted. The towed
dummy was first subjected to the forces of the reserve
parachute. The collision forces were determined by
towing one dummy and then launching a second. Forces
were recorded at the static line aircraft attachment
point as well as on the dummy. Test results were sum-
marized and the implications for training procedures
discussed.
T. I. R 2

14,491
Frank, M.E. ENGINEERING RESEARCH ON PROBLEMS RESULTING
FROM SENSORY LOSS. Ann. N.Y. Acad. Sci., Sept. 1958,
24(1), 119-127. (Bioengineering Section, Franklin
Institute Labs., Philadelphia, Penn.).

14,491
This paper discusses the need and value of the ap-
plication of engineering effort to problems resulting
from sensory loss. The work of the engineer on the
guidance and communication problems of the blind is dis-
cussed in particular. Various guidance devices, such
as obstacle detectors of various kinds, are described.
Methods for converting printed material into speech
and improved techniques for producing raised-dot (Braille)
reading are discussed. The need for other devices and
for rehabilitation studies are mentioned.
R 16

14,492
Dykhuizen, R.F. SOME MEDICAL ASPECTS OF CONTROLLED
SUBMARINE ATMOSPHERIC CONDITIONS INCLUDING A METHOD
OF DETERMINING THE METABOLIC REQUIREMENTS OF SUB-
MARINE PERSONNEL. XII(5), NRL Rep. 220, Oct., 1959,
9pp. USN Medical Research Lab., Submarine Base, Conn.

14,492
Three tests were conducted on board the U.S.S. PERCH
(ASSP-313) which give information relative to prolonged
survival in a man-regulated atmosphere. The equipment
on this submarine for maintaining the carbon dioxide and
oxygen concentrations at fairly constant levels made
possible the study of effects in the field of (1) oxygen
lack at normal barometric pressure when the carbon diox-
ide concentration is maintained at a constant but ele-
vated level for varying lengths of time, and (2) carbon
dioxide excess at normal barometric pressures when the
oxygen content is maintained at 18 per cent or above
for varying lengths of time. A method for determining
the average caloric requirements of submarine personnel
is included.
R 2

14,493
Lewis, D.R. PSYCHOLOGICAL SCALES OF TASTE: I.
Psychol., 1948, 26, 437-446. (Dept. of Psychology,
Harvard University, Cambridge, Mass.).

14,493
To establish psychological scales of taste intensity,
four substances (in solution) were investigated: sodium
chloride, sucrose, quinine sulphate, and tartaric acid.
The procedure in each case was that of fractionation
with observers selecting by taste, from a set of com-
parison concentrations, the one most nearly representing
one-half the subjective strength of a standard concen-
tration. This procedure was repeated at several levels
of concentration for each of the four types of solution.
From these data, scales for each type of solution were
generated, both by algebraic and geometric procedures,
relating psychological intensity in arbitrary units to
physical concentration of the solution.
T. G. R 14

14,474
Gillinsky, Alberta S. PERCEIVED SIZE AND DISTANCE IN VISUAL SPACE. Psych. Rev., Nov. 1951, 52(6), 440-452.

14,474
A general unifying law of visual space perception is shown to be capable of rational derivation and quantitative formulation. Functions relating visually perceived size and distance to true size and distance are derived mathematically and then tested by application to recorded data of antecedent experiments and to new observations of perceived size and distance. The observed values are compared to those calculated from the basic formulas.

I. G. R 19

14,475
Carlisle, R. MODEL TECHNIQUES FOR COMMUNICATION SYSTEMS. DEVELOPMENT OF A MODEL TO SIMULATE MILITARY COMMUNICATION SYSTEMS. FIRST SEMI-ANNUAL REPORT 1 JULY 1956 TO 1 JANUARY 1957. Contract DA-36 039 SC 67847, ESD 57 401, 39pp. Bradley Research and Development, Washington, D.C.

14,476
Work accomplished during the half-year ending 1 January 1957 on a research contract concerning model techniques for communications system is discussed. There are two major sections of the report: 1) a summary of the literature search, of the individual thinking, and of group discussions leading to problem definition; and 2) a report of experience with a preliminary model, progress with a more complete model, and plans for the future.

I.

14,496
Farnsworth, D. STUDIES OF THE VISUAL PIGMENTS IN THE VISUAL RESEARCH DIVISION OF THE OPHTHALMOLOGICAL RESEARCH UNIT. ORNL TR 44 59, May 1959, 11pp. USN Office of Naval Research, London, England.

14,496
The history of the Visual Research Division of the Ophthalmological Research Unit in England is set forth briefly with a more detailed account of the research now being done on the role of visual pigments as mediators of vision. Physiological means being used are: 1) bleaching of visual pigments in solution and in suspension, and 2) reflection techniques in the living eye. The spectral transmission of the living human lens has been measured on subjects ranging in age from four to 63 years. A psychophysical study of pigments in color defectives is underway.

G.

14,497
Ferrest, J. & Bennett, E.M. ESTHETICS RESEARCH IN HUMAN DESIGN. Sept. 1957, 11pp. Bio-Mechanics Lab., Tufts University, Medford, Mass.

14,497
In an attempt to evaluate the esthetic qualities of a major design modification of the telephone (American Telephone and Telegraph Company), 25 men and 25 women, most of whom use the telephone regularly for both business and pleasure, were questioned on their feelings with respect to the old model, the new model, and the ideal telephone. A multiple forced-choice procedure (polydiagnostic), consisting of 45 descriptive adjectives was used for obtaining judgments. Means and variances were calculated from the data and were compared for the three conditions: old, new, and ideal telephone. The assessment method was described in some detail.

T. G. I. R 3

14,478
Elliott, R.T. STATISTICAL ANALYSIS, ACCIDENT PREVENTION TRANSPORT AND WORKS OPERATIONS IN INDUSTRY. Metal Treatment and Data Forming, Nov. 1954, 11(10), 541-544.

14,478
This article discusses the work of the Operational Research section of B.I.S.E.A. (British Iron and Steel Research Association). The primary responsibility is to investigate the organization of operations in industry - the employment of resources and any relevant scientific techniques are applied in order to bring about higher efficiency. Certain aspects of work undertaken in various categories are discussed, with examples: 1) mechanizing research (computers), 2) accident studies, 3) transport and traffic, and 4) works operations.

14,479
Flanagan, J.C. (Dir.). IMPROVING PERFORMANCE IN LOADING OPERATIONS. RESEARCH NOTES No. 15, May 1959, 4pp. American Institute for Research, Pittsburgh, Penn.

14,499
This note described research procedures used to discover why loading of heavy equipment into transport vehicles in a military organization took so much time. The major effort was to compile and analyze systematic records of the activities of each crew member. The measures taken for improvement consisted of: 1) development of working principles as a basis for task reorganization, 2) preparation of an activity chart, and 3) preparation of a supervisory control sheet. The result of field tests were described. The applicability of these methods to other problems of management were discussed.

I.

14,501
Finkelstein, Beatrice & McGhee, Bernice. LIQUID DIETS FOR USE IN HIGH-ALTITUDE, HIGH-PERFORMANCE VEHICLES. Proj. 7164, Task 71833, WADC TR 59 32, March 1959, 20pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,501
In a search for significant life sciences information which will enable crews of high-altitude, high-performance vehicles to function efficiently, an evaluation of a liquid diet was made. A preliminary phase consisted of studies of 15 males who lived five days on a liquid diet, approximately 2600 calories and 115 grams of protein, while performing their usual laboratory duties. Criteria used to evaluate the diet included food consumption records, acceptability data, physiological effects, and psychological changes. The findings are discussed in relation to the utility of such a diet for extended periods of time.

T. R 4

14,502
Farnsworth, D. INTERNATIONAL SYMPOSIUM ON THE FUNDAMENTAL MECHANISMS OF THE CHROMATIC DISCRIMINATION IN ANIMALS AND MAN. ORNL TR C 1 59, Jan. 1959, 15pp. USN Office of Naval Research, London, England.

14,502
The purpose of the Symposium was to gather leading scientists from all the fields of research in color vision and attempt to acquaint them with the status of each other's activities. The program was organized around two general topics: color vision of insects and of other animals; neurophysiology of the retina, of the pathways and centers, and hypotheses, including the trichromatic and opponent-color schemes. This report abstracts the items and arguments which may be new to workers outside of specialized research fields.

I.

14,503

Estock, R. THE CHARACTERISTICS OF THE HUMAN OPERATOR AS AN ELEMENT IN A MONITORED CONTROL SYSTEM. A DESCRIPTION OF MODIFIED TEST EQUIPMENT (1957). SAU Rep. 1/56, RML 51. Oct. 1958, 11pp. Technical Information and Library Services, Ministry of Supply, London, England. (Electrical Engineering Branch, Royal Military College of Science, London, England).

14,503

Experimental equipment is described which was constructed for research into the characteristics of the human operator as an element in a monitored control system. It was designed to train and test the operator in a displacement-displacement tracking task. Block diagrams of the equipment are given.
I. R 1

14,504

Dimmock, F.L. & Farnsworth, D. VISUAL ACUITY TASKS IN A SUBMARINE. Proj. RM 003 041.14.01, MEL Rep. 178, Oct. 1951, 14pp. USN Medical Research Lab., Naval Submarine Base, Conn.

14,504

To estimate the visual acuity required by submarine personnel below decks, a survey was made of the visual factors involved in all interior submarine tasks that an enlisted man may be required to perform. A complete measurement of every instrument that serves as a visual indicator for the performance of some task, together with range of distances and positions from which the cue must be read, the illumination, contrast ratios, shapes, etc. were obtained. The data were analyzed and discussed in relation to various visual standards.
I. R 1

14,505

Gibbs, C.B. DEVICES AND DEVELOPMENTS IN ENGINEERING PSYCHOLOGY. J. Iron Steel Inst., Oct. 1958, 190, 201-204. (Applied Psychology Research Unit, MRC, Cambridge, Eng.).

14,505

This short paper on engineering psychology presents a brief history of this specialty and then proceeds to a discussion of the work done on visual indicators and signals. Examples of redesigned manual indicators are given. This is followed by a general discussion of the psychological basis for the design of manual controls. The practical implications of psychological findings are discussed in relation to design of controllers.
I.

14,506

Forterre, M. RECRUITMENT AND TRAINING OF INTERNAL TRANSPORT AND HANDLING PERSONNEL AT THE THIONVILLE WORKS. PE/H/80/57, Jan./Feb. 1958, 7pp. British Iron & Steel Research Association, London, England.

14,506

This paper discusses recruitment, selection, training, improvement, and promotion of personnel for the internal transport and handling departments of the particular steelworks (Thionville, France). The management of each of these areas is given in some detail with specific reference to crane drivers, shunters, drivers (electric, diesel-electric and steam locomotives) pointsmen, and motor vehicle drivers.

14,507

Galanter, E.H. & Milson, V. THE RELATION BETWEEN SCALES OF LOUDNESS AND THE DIFFERENCE LIVEN FOR AMPLITUDE DISCRIMINATION. PART 22. TED MUR EL 52004. HUMAN ENGINEERING INVESTIGATION OF THE INTERIOR LIGHTING OF NAVAL AIRCRAFT. Contract N55 33766, NAC ACN 372, Tech. Rep. 3, Feb. 1959, 25pp. USN Air Material Center, Philadelphia, Penn. (Dept. of Psychology, University of Pennsylvania, Philadelphia, Penn.).

14,507

This report is one of a series concerned with parameters relevant to the intelligibility of auditory stimuli for aircraft signal indicators. The results of three experiments are summarized: 1) a comparison of loudness functions derived from magnitude estimations with those derived from magnitude production, 2) the inter- and intra-individual reliability in producing loudness functions; and 3) the feasibility of predicting the slope parameter of the loudness function from individual difference threshold determinations. The results are used to frame recommendations for auditory warning signal devices in terms of their psychological effect on the operator.
T. G. R 15

14,508

Galsen, L., Levine, R.A. & McGlothlin, M.H. BASELOGS-A BASE LOGISTICS MANAGEMENT GAME. RM 2086, Jan. 1958, 17pp. Rand Corporation, Santa Monica, Calif.

14,508

This paper describes a game, Baselogs, which demonstrates the interactions between logistics and operations on a fighter-interceptor air base of the ADC (Air Defense Command) type. The player assumes the composite role of: 1) director of finance at USAF and command level, and 2) director of base-level operations, supply, and maintenance at a simulated ADC-type base. The game may be used as a demonstration tool; it may also be valuable in the development of large-scale simulations for research on maintenance operations interactions.
I. R 7

14,509

Fregly, H.J. & Iampietro, P.F. DIETARY POTASSIUM SUPPLEMENTATION AND PERFORMANCE IN THE DESERT. Proj. Ref. 7 83-01 005B, Tech. Rep. EP 109, April 1959, 16pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Haverhill, Mass. (College of Medicine, University of Florida, Gainesville, Fla.).

14,509

To investigate the feasibility of enhancing operational capabilities by adding extra potassium to the soldier's diet when he is operating in a hot environment, 15 healthy male volunteers were studied for a period of five weeks. The first week was used for control measurements, following which two groups were formed--one being given a capsule containing supplementary potassium, the other a placebo each day in addition to a diet containing a normal amount of potassium. Performance ability was assessed by measurement of heart rates after a 4.5-mile hike in two hours, scores on the Harvard Step Test, electrocardiograms, and morning rectal temperatures. The sequence of physiological changes in the hot environment is discussed.
T. G. R 15

14,510

Moskowitz, W., Dylla, H. & Schoman, C.M., Jr. SUBMARINE GALLEY IMPROVEMENT BASED UPON INDUSTRIAL ENGINEERING STUDIES AND TECHNIQUES. Proj. NT002047, Subproj. CR 29 (3)F, April 1958, 33pp. USN Supply Research & Development Facility, Bureau of Supplies & Accounts, Bayonne, N.J.

14,510

An industrial engineering study of food preparation in a mock-up submarine galley was made utilizing time, flow, and motion study techniques. The operations of a qualified submarine commissaryman in preparing food during a 16-day menu period were charted. The relationship of items of equipment to each other, distances moved by commissaryman, and the percentage of work time spent at each piece of equipment were analyzed. This analysis provides a guide for a more efficient equipment arrangement. A new galley, occupying the same space, but requiring 30 per cent less movement to operate, was proposed.
T. I. R 6

14,511

Goldsmith, C.T. THE DETERMINATION OF THE DEGREE OF INTERACTION BETWEEN AUDITORY AND VISUAL SENSE. PERCEIVEDS. Contract DA 36 069 ORD 1758, RMO Proj. 1634/427842, June 1958, 48pp. NSA Office of Conference Research, Washington, D.C. (Fordham University, New York, N.Y.).

14,511

To determine the extent of concomitant variability between visual and auditory channels when near-threshold signals are presented simultaneously, separate visual and auditory thresholds of five subjects were obtained ten times. Energy points representing each subject's average performance were selected and entered on a five by five matrix, such that subjects could be stimulated simultaneously with both types of signals with predictable probability of detection. Twenty sessions of the combined stimulus were given and performance compared to that for separately presented signals. These results were analyzed in terms of predictions from a model set up to test the hypothesis of independent variability of the two kinds of thresholds over time.

T. G. I. R 14

14,512

Gentry, G., Brown, W.L. & Overall, J.E. THE EFFECTS OF IONIZING RADIATION UPON THE TRANSPOSITION OF DISCRIMINATION HABITS OF RHESUS MONKEYS. Rep. 58 142, Nov. 1958, 5pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

14,512

To determine the effect of ionizing radiation upon relational learning, 33 rhesus monkeys (representing five radiation dose levels) were trained on intermediate-size discrimination problems. A test of transposition was employed to determine the extent to which subjects of the different dose groups utilized relationships between stimuli as a basis for problem solution.

T. G. R 17

14,513

Gaylor, R.H. & Goldbeck, R.A. HUMAN ENGINEERING DESIGN RECOMMENDATIONS FOR MINIATURIZED EQUIPMENT. QUARTERLY REPORT NO. 1, 20 APRIL 1958 TO 1 AUGUST 1958. Contract DA 36 039 SC 75054-SCL 1904, Oct. 1957, 4pp. American Institute for Research, Washington, D.C.

14,513

This is a summary of progress of an investigation for the purpose of developing human factors engineering recommendations for designing miniaturized signal corps equipment. No data are included. The problem of changed human factors requirement with miniaturization is discussed, particularly as to maintenance access, maintenance labeling, labeling legibility, lower limits of spacings for operability, need for special components appropriate to reduction in size and special effects of reduced component size.

14,514

Uffholz, L.M. THE MOTION PICTURE CAMERA IN INDUSTRY. From the Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 3pp. Industrial Management Society, Chicago, Ill. (American Greeting Corporation, Cleveland, Ohio).

14,514

This paper discusses the use of the motion picture camera as a working tool in the field of management. Some of the ways in which the camera has been used in a specific industry are discussed: a control medium for setting standards, new equipment purchase or development, operator training, exchange of knowledge and techniques, public relations, and employee relations. The equipment required for such purposes is discussed.

14,515

Kadler, G. CRITICAL ANALYSIS OF MOTION-TIME SYSTEMS. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., 1952, Nov. 5-7, 9pp. Industrial Management Society, Chicago, Ill. (Washington University, St. Louis, Mo.).

14,515

This paper presents a critical analysis of all predetermined motion-time systems. The assumption that each qualitative basic unit of work can be assigned a time value for rate-setting is shown to have inherent errors that do not appear to be capable of improvement. Evidence from experimental research, systems studies, and industrial applications are presented in evidence. Procedures for accurate and consistent standards are discussed.

G. I.

14,516

Turney, C. LIMITATIONS AND USES OF JOB EVALUATION. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 6pp. Industrial Management Society, Chicago, Ill. (A.T. Kearney & Company, Chicago, Ill.).

14,516

Job evaluation is defined here as a systematic method for determining the relative value of jobs within an organization. Five aspects of this technique that are considered as limiting factors are discussed: 1) the tool must be applied to jobs, not the individual worker, 2) the tool is systematic, not scientific, 3) jobs need to be rated in relationship to each other, 4) jobs are to be compared within a company or an organization, and 5) it is a long-range and continuing problem.

14,517

Middleswart, F.F. THE APPLICATION OF TIME STUDY AND METHODS TO MAINTENANCE. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 5pp. Industrial Management Society, Chicago, Ill. (E.I. du Pont de Nemours & Company, Wilmington, Del.).

14,517

This report describes factors leading to increased cost of maintenance work in recent years. It is argued here that the techniques of time study and methods can be applied to reduce this cost. The following six controls necessary for developing proper methods are discussed with examples from industrial application: 1) planning the job, 2) scheduling the job, 3) control of material, 4) control of tools, 5) preventive maintenance, and 6) maintenance cost analysis. The use of measurement is discussed in the following steps: 1) development of basic data, 2) development of application standards, 3) means of applying measurement, and 4) response of personnel.

T.

14,518

Oakley, G. & Fecht, S.J. HOW TO TAKE INDUSTRIAL MOTION PICTURES. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 19pp. Industrial Management Society, Chicago, Ill. (Bell & Howell Company, Chicago, Ill. & S.J. Fecht & Associates, Chicago, Ill.).

14,518

This discussion covers the uses of motion picture photography in industry, their advantages and disadvantages. The equipment required to take industrial motion pictures is listed and discussed, and a rough procedure for taking the pictures is described. This discussion was presented to introduce the subject to a group of industrial engineers; therefore the questions from the floor and the answers cover many practical aspects of the use of this tool in industrial work.

I.

14,519

Morrissey, J. BASIC TIME STUDY PROGRAM AND TRACKING. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 7pp. Industrial Management Society, Chicago, Ill. (Zenith Radio Corporation, Chicago, Ill. & U.S. Steel Corporation, Gary, Ind.).

14,519

The in-plant training program for Time Study Engineers at Zenith Radio Corporation is described in detail. The program is all-inclusive, beginning at the point of hiring and lasting during the whole period that the employee is in the Industrial Engineering Department. The need for such a program, its objectives, and a final evaluation of its worth are discussed.
G. I.

14,520

Whaley, R.L. THE APPLICATION OF ELEMENTAL TIME STANDARDS. Proceedings of the Sixteenth Annual National Time and Motion Study and Management Clinic, Chicago, Ill., Nov. 5-7, 1952, 4pp. Industrial Management Society, Chicago, Ill. (Western Electric Company, Kearny, N.J.).

14,520

This paper discusses the applications of elemental time standards (a work measurement system of predetermined time values applicable to motion elements of manual work) in industry, with specific application to Western Electric Company plants. Their most frequent application is for establishing incentive rates; other uses are manufacturing planning, maintenance changes, evaluating labor savings in employee suggestions, and the like. The limitations of these standards are also pointed out.

14,521

Landes, R.H. (Chm.). SIXTEENTH ANNUAL NATIONAL TIME AND MOTION STUDY AND MANAGEMENT CLINIC PROCEEDINGS, CHICAGO, ILL., NOV. 5-7, 1952. 1953, 162pp. Industrial Management Society, Chicago, Ill.

14,521

These proceedings contain the papers given and subsequent discussions at a three-day Time and Motion Study and Management Clinic. The topics treated include new techniques and methods and new applications of others. Some demonstrations and panel discussions are included.
T. G. I. R 28

14,522

Barnes, G.H. DATA REDUCTION EQUIPMENT FOR THE ANALYSIS OF HUMAN TRACKING. Contract AF 33(616) 270, Final Rep. F 2333, May 1953, 35pp. Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.

14,522

In the study of feedback systems a linear component is normally characterized by its transfer function (the ratio of output to input signal as a function of frequency). The characterization for a non-linear component, say the pilot of an airplane, is much more difficult and requires new techniques. Such a new technique is the Data Reduction System described in this report. Spectra and cross-spectra in human tracking experiments can be determined and descriptive functions for human trackers found. The equipment has been subjected to tests of validity and it is to be used in conjunction with a flight simulator for analyzing pilot tracking.
I. R 11

14,523

Besore, R.L. & Davis, L.W. SURVEY: NOISE-PERTURBED FEEDBACK IN COMMUNICATIONS. Contract AF 33(602) 1890, Proj. 4519, Task 45541, GR 1 1304, RADC TN 58 295, Aug. 1956, 12pp. The Diamond Corporation, Albuquerque, N.M.

14,523

This Technical Note issues from a research project concerned with the applications of information theory in certain areas. A summary is presented of the status of one specific area: performance of a communication link with a noise-perturbed feedback link. Accounts in the literature are discussed which show that feedback can be used to reduce the final probability of error in the decision process taking place at the receiver. The manner in which this is accomplished is discussed and recommendations for further study are made.
G. R 4

14,524

Berlin, N.I. MILITARY ASPECTS OF THE BIOLOGICAL EFFECTS OF RADIATION. Rep. AFMFP 611, Nov. 1956, 54pp. US Armed Forces Special Weapons Project, Washington, D.C.

14,524

This document reviews mammalian radiobiology as applicable to man and from the standpoint of military medicine. Particular attention is paid to the dosimetric considerations and the quantitation of biological effect. Wherever possible, areas of controversy are reviewed and evaluated. The major sections of the document are: 1) introduction; sources of data, types of hazards, sources of radiation; 2) external radiation; 3) concept of relative biological effectiveness; 4) acute radiation sickness; 5) long term (late) effects; 6) genetic effects; 7) effects of fractionation and protraction; 8) internal contamination; 9) combined injuries; and 10) tolerance.
T. G. R 67

14,525

Bittini, M. ON THE FUSION CONDITIONS OF A COLORED FLICKERING FIELD. Atti Della Fondazione Giorgio Ronchi, Sept. - Oct. 1958, XIII(5), 442-448. AFOSR TN 59 121.

14,525

To determine the luminance at which fusion occurs when the frequency of interruption of the stimulus is varied between six and sixty pulses per second, for a one degree test-field (green, red, and blue), fusion thresholds were measured at the fovea and at ten degrees in the periphery. Both a sequence of rectangular and a sequence of saw-toothed stimuli were used. The data were analyzed to show the effect of color and light-pulse shape on critical luminance.
G. I. R 10

14,527

Botsch, F.W., Powers, J.J. & Koch, A.A. ENVIRONMENTAL PROTECTION RESEARCH BY MEANS OF RADIO TELEMETRY I. TELEMETRIC INSTRUMENTATION AND EXAMPLES OF FIELD USE IN STUDYING THE MAN-CLOTHING-ENVIRONMENT SYSTEM. Proj. 7 83 01 006, Tech. Rep. EP 119, Oct. 1959, 26pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

14,527

This report describes a frequency-type radio telemeter and automatic data reduction equipment designed to sense, transmit, and reduce biophysical data obtained from soldiers performing military-type activities during field exercises. The telemeter permits remote recording of temperature, pressure, relative humidity, air movement, heart rate, and breathing rate with provision for converting transmitted data into analog or digitized read-out or into a form adaptable to International Business Machines computation. Telemetered temperature-time variations are presented to show the nature of the data that has been collected.
G. I. R 27

14,528

Burkhardt, K. CONTRIBUTION TO THE THEORY OF OBLIQUE VISION. (BEITRAG ZUR THEORIE DER SCHRAEGESICHT). *Zeitschrift für Psychologie*, 1958, 111/1, 406-7, Dec. 1958, 9pp. Technical Information and Library Services, Ministry of Supply, London, England.

14,528

An exact formula is developed to replace the graphical determination of visual range in inhomogeneous conditions. A further method of finding the range of oblique or spatial vision graphically or by calculation is described. Two examples are fully calculated. By means of infinitesimal boundary transition the connection with L. Foitzik's approximate vision formula is established. Finally, a correction term is determined for various target angles.
T. G.

14,529

USA Aviation Board. EVALUATION OF THE GRIMES TYPE-COCKPIT LIGHT MODEL D-6810A-2 (AMBER AND RED LENSES). REPORT OF PROJECT MR AVN 2358. Sept. 1958, 5pp. USA Aviation Board, Fort Rucker, Ala.

14,529

To determine the suitability of the Grimes Cockpit Light, Model D-6810A-2, for Army use, the light was installed in the cockpit of an aircraft. Informal evaluations were made during night flights (approximately 40 hours). Four different light beams are provided by the light (flood or spot, red or amber). Recommendations are included.

14,530

Carmichael, L. READING AND VISUAL FATIGUE. *Proc. Amer. Phil. Soc.*, March 1948, 92(1), 41-42. (Smithsonian Institute, Washington, D.C.).

14,530

This is a summary of an experimental study of visual fatigue, in which 20 high school and 20 college subjects read for each of two six-hour periods. Half of each group read from books and the other half from microfilm projections of the same books. Illumination level on the pages of the books was approximately 16 candles. Multiple-choice tests on content were answered at the end of every 25 pages of reading. Continuous records were made of all eye movements. The visual acuity and stereoscopic acuity of each subject were measured before and after each period and subjective comments were recorded. All records were analyzed for work decrements due to the prolonged reading.
R 1

14,531

Chase, R.A., Sutton, S. & First, Daphne. BIBLIOGRAPHY: DELAYED AUDITORY FEEDBACK. Dec. 1958, 13pp. Communications Lab., Department of Biometrics Research, New York State Department of Mental Hygiene, N.Y.

14,531

This bibliography consists of 101 items on the area of delayed auditory feedback and 46 related papers. The first set of items represents a systematic review of published literature for the period 1950-1958; the second set comprises items felt to be pertinent to questions raised by research in the area, but does not represent a systematic search.
R 147

14,532

Chase, R.A. EFFECT OF DELAYED AUDITORY FEEDBACK ON THE REPEITION OF SPEECH SOUNDS. *J. Speech Dis.*, Nov. 1956, 23(5), 583-593. (College of Physicians and Surgeons, Columbia University, New York, N.Y.).

14,532

The idea that the condition of delayed auditory feedback facilitates the circulation and recirculation of speech units in the speech-auditory feedback loop (thus accounting for the observed increase in phonation time) suggested that it is possible to repeat the speech sound (b) more times in a five-second period under delayed feedback than under normal conditions. This hypothesis was tested experimentally with 20 subjects. Possible mechanisms accounting for the observed effects and applications of the research to the study of stuttering are indicated.
T. G. I. R 14

14,533

Chase, R.A., Harvey, S., Standfast, Susan, Rapin, Isabelle, et al. A COMPARISON OF THE EFFECTS OF DELAYED AUDITORY FEEDBACK ON SPEECH AND KEY TAPPING. Dec. 1958, 5pp. Communications Lab., Department of Biometrics Research, New York State Department of Mental Hygiene, N.Y.

14,533

To compare the effects of delayed auditory feedback on speech and on non-vocal tasks, each of 14 subjects was asked to repeat the speech sound h as in "hook" in groups of three. Vocal output was first amplified and returned without delay; a delay of 244 milliseconds was then introduced. Vocal performance was recorded and analyzed for effects of the delay. Each subject was then required to tap a key that hit a strip of spring steel with a strain gauge mounted on it; auditory feedback was handled as above. Records of time and pressure characteristics of key-tapping performance were analyzed for effects of delay and compared with results of vocal performance.
R 3

14,534

Chauncey, H.H. & Shannon, I.L. PAROTID GLAND SECRETION RATE AS A METHOD FOR MEASURING RESPONSE TO GUSTATORY AND MASTICATORY STIMULI IN HUMANS. Rep. 59 66, May 1959, 7pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,534

To develop a new approach to the quantitative determination of the effect of gustatory and masticatory stimuli, parotid gland secretion rate was employed to measure response elicited. Four gustatory stimuli (citric acid, sodium chloride, sucrose, and quinine sulphate) and three masticatory stimuli (gum base, paraffin, and rubber bands) were used with 216 male subjects. A plot of secretory response against its corresponding affecter intensity—bolus volume (masticatory), or application rate (gustatory)—was constructed; the relationship was expressed mathematically and the maximal response and reflex equilibrium constant for the different stimuli were calculated.
T. G. R 5

14,535

Christensen, K.K. & Johnson, L.L. STUDY TO DETERMINE METHODS OF SIMULATING G EFFECTS. Contract AF 33(600) 37276, WADC TN 58 314, Oct. 1958, 108pp. USAF Aeronautical Accessories Research Lab., Wright-Patterson AFB Ohio. (Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill.).

14,535

To determine methods of simulating acceleration and deceleration sensations in aircraft flight simulators (without actually producing them), the following steps were taken. A literature survey was made to ascertain the significant sensations and studies were conducted of methods for mechanically inducing heaviness and immobility sensations, chemically inducing physiological effects, psychologically inducing effects of acceleration, and controlling the various simulated effects. Several devices that may indirectly induce acceleration effects were investigated. Recommendations as to the feasibility of simulation are made.
T. G. I. R 115

14,535

Curran, H.T. Jr. & Gochwind, R.T. EVALUATION OF SIGHTING DEVICES FOR A SMALL HAND-HELD ROCKET LAUNCHER. Tech. Memo. 659, Sept. 1959, 15pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

14,536

The degree of difference in accuracy due to aiming error among three types of experimental sighting devices was investigated. The sights were: 1) an iron sight with a 20-inch sight radius utilizing a plexiglass plate upon which a reticle was etched for the front post, 2) a unity-power optic using singlet lenses, and 3) a unity-power optic using doublet lenses. Twenty-eight Infantry men were used as subjects. Both qualitative and quantitative disparities among the sights were ascertained. Possible effects of low illumination sighting are discussed.

T. I. R 6

14,537

Dodson, H.L. COCKPIT VISIBILITY, MEASUREMENT OF. FINAL REPORT. Proj. TED PIR SI 5002, ST33 82, Rep. 1, April 1958, 14pp. USN Air Test Center, Naval Air Station, Md.

14,537

Measurements of the cockpit downward visual cut-offs of several late model Naval airplanes were made. For these tests, the airplanes were jacked to pitch angles approximating that of the power approach condition, and measurements were made with the pilot's head both in the design normal eye position and as far to the left as would be safe and comfortable to maintain in flight. The data are presented in tabular form as angles of depression from the horizontal. Pilot responses concerning internal fogging and effect of rain on visibility from cockpit are also reported.

T.

14,538

Du Mas, F.M. CATINUA, CATEMENSIONS, CATESCALES. J. clin. Psychol., April 1951, VII(2), 112-117. (University of Texas, Austin, Tex.).

14,538

This paper introduces several new concepts and indicates their utility for science in general and clinical and office psychology in particular. A rational analysis of certain concepts and their associated phenomena is presented. The major objective is to lay out a guide for the construction of information files (case histories, biographical data sheets, interview forms, etc.) that systematize and order these data so that a more coherent picture of the individual is obtained and also quantify sub-domains of information. Definitions and illustrations of the following concepts are given: catinuum, catemension, and catescale.

T.

14,539

Elam, J.O. & Greene, D.G. (Princ. Investigators). STUDIES ON RESUSCITATION AND ARTIFICIAL RESPIRATION. Contracts DA 49 007 MD 507 & DA 49 007 MD 209, Prog. Rep. 1, Feb. 1958 - Nov. 1958, 31pp. USA Research & Development Div., Office of the Surgeon General, Washington, D.C.

14,539

Five studies on resuscitation and artificial respiration are reported. 1) Physiological management of ventilation during anesthesia: measurements of arterial pH and expired CO₂ were correlated with intervals of mild hyperventilation alternating with mild hypoventilation produced by a servo ventilator in 48 surgical patients anesthetized with common agents. Clinical advantages of mechanical ventilation were reported. 2) Training requirements in resuscitation: evaluation of several methods in progress. 3) Evaluation of Edgewood Resuscitator: this tidal-volume device was used on 118 patients; results were given. 4) Mask-to-mask resuscitator: two innovations were described. 5) Resuscitation studies: a new tracheal pickup device was constructed, and a documentary film was made. T. G. I. R 11

14,540

Elkin, E.H. EFFECTS OF SCALE SHAPE, EXPOSURE TIME, AND DISPLAY-RESPONSE COMPLEXITY ON SCALE READING EFFICIENCY. Contract AF 33(616) 3612, Proj. 7184, WADC TR 58 472, Feb. 1959, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

14,540

Three scale-reading variables were examined in both quantitative and qualitative reading tasks. The variables were: three scale shapes (circular, vertical, and open-window); four exposure conditions (120, 360, 1080 milliseconds, and termination by subject's response); two degrees of display complexity (100 and 20 intervals); and three of response complexity (reading to nearest five, to nearest 1, and high, low or OK). The scales were exposed tachistoscopically and the subject's oral response time was measured; error scores were also recorded. The data were analyzed in terms of the relative merits of each variable and how it interacts with the others.

T. I. R 13

14,541

Eldemiller, R.L. EXPERIMENTAL DESIGNS AND USEFUL TECHNIQUES OF ANALYSIS. NOTS Tech. Publ. 2186, NAVORD Rep. 6466, April 1959, 60pp. USN Ordnance Test Station, China Lake, Calif.

14,541

The planning and conducting of statistically designed experiments and the selection of actual designs are discussed. Several techniques useful in the analysis of experimental data are: 1) an International Business Machines 704 program for computation and analysis, 2) two methods for estimating missing values, 3) Tukey's method for individual mean comparisons, 4) attribute analysis techniques including Fisher's "Exact Method," and Batson's proposed "Factorial Chi-Square Analysis," and 5) Box's technique for optimizing a response surface. The appendices contain many fractional factorial designs ready for use and a direct entry table for Fisher's exact method for analyzing a two by two contingency table.

T. G.

14,542

Farnsworth, D. VISUAL RESEARCH IN SCOTLAND. Tech. Rep. ONRL 12-59, Feb. 1959, 11pp. USN Office of Naval Research, London, England.

14,542

This is a review of present-day research in vision in the universities of Scotland. Included are the studies of R.W. Pickford in color blindness and abnormal psychology at Glasgow; of E.D. Fraser, J.R. Symons, and R.L. Reid in various perceptual problems, including intrasensory facilitation, at Aberdeen; several studies at Edinburgh; and the new studies on the effect of age on color discrimination by R. Lakowski at the Applied Psychology Unit, Edinburgh.

T. G. I.

14,543

Faulds, B. THE PERCEPTION OF PITCH IN MUSIC. Contract MONR 1858 (15), Proj. NR 150-088, National Science Foundation Grant G 642, May 1959, 87pp. Psychology Department, Princeton University, Princeton, N.J.

14,543

This study examines the sense of pitch in a variety of situations, some musical and others not, with the object of deciding how best to predict success in musical studies. A battery of 14 auditory tests was devised and given to two groups of subjects: 67 freshmen from a college of music and 35 freshmen from a liberal arts college. The scores were studied by factor analysis techniques to identify underlying factors in the tests. Factor scores were then computed for the subjects and used as predictors of the college of any given subject. The main contributions of this study for testing musical aptitudes are discussed.

T. R 35

14,544

Felton, W.M. BACKGROUND OF AIR TRAFFIC CONTROL SYSTEMS ENGINEERING. 1. Franklin Institute Mon., May 1958, 2. 7-12.

14,544

A brief review of systems engineering in the development of a control system for air navigation and traffic control is presented. Examples are given of progress in developing and using the steps and tools of systems engineering: 1) operations analysis, 2) problem formulation, 3) system invention, 4) systems research, 5) interior system design and component fabrication, and 6) field test and experimentation.

14,545

Frazer, J.W. & Reeves, Elizabeth. ADAPTATION TO POSITIVE ACCELERATION. WADC DA 5918, Proj. DA 11 01 12.3, Rep. 4, Dec. 1958, 16pp. USN Air Development Center, Johnsville, Penn.

14,545

To determine whether or not animals would show increased tolerance to acceleration (as measured by survival time) if conditioned to lower levels of acceleration, 150 rats were subjected to acceleration. One group (50) was preconditioned by exposure to 2 g, a second group to 12 g, and third to cage-stressing one-half hour a day for six weeks. At the end of the conditioning period all animals were subjected to 20 g and their survival time was measured by means of a transistor amplifier (heart rate). Statistical correction was made for rats preconditioned at 12 g before comparing survival times for evidences of adaptation.
T. G. I. R 3

14,546

Furchtgott, E. EFFECT OF HUNGER AND SATIETY ON ODOR SENSITIVITY. PROGRESS REPORT. Contract DA 19 129 QM 844, DA Proj. 7 84 15 007, Rep. 9, Aug. 1958, 8pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (University of Tennessee, Knoxville, Tenn.).

14,546

Progress is reported on the study of the effects of withheld lunch on gustatory (sucrose) and olfactory (iso-amyl acetate) thresholds for the periods 12:00 to 1:00 p.m. and 4:00 to 5:00 p.m. Data are presented for 136 subjects.
T.

14,547

Finnie, A.W. & Kenchington, K.W.L. GLOVES FOR AMMUNITION EXAMINERS. CSEE Rep. 89, Dec. 1958, 33pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

14,547

To investigate the use of gloves for the finer manipulative tasks associated with ammunition examination under moderately cold sheltered conditions, a designed trial, in three parts, involving 36 subjects was conducted. The existing Glove, Leather, Light Duty, was examined against the Glove, Chamois, and an experimental glove. Assessments were made by laboratory dexterity tests at 60 and 28 degrees Fahrenheit. Thermal insulation tests were carried out at 28 degrees Fahrenheit. Small scale user trials took place at two Central Ammunition Depots, in which subjects were timed in actual tasks when wearing each type of glove. Subjective assessments were obtained by questionnaire. Recommendations are included.
T. G. I. R 2

14,548

Gallup, H.F. RECEPTOR CONTRIBUTION TO THE CRITICAL FLICKER FREQUENCY CURVE. Rep. NANC ACCL 341, Aug. 1957, 29pp. USN Air Crew Equipment Lab., Naval Air Materiel Center, Penn.

14,548

To study receptor contributions to the off (critical flicker frequency) curve, data from previous research were reviewed and their interpretations closely examined. To check certain discrepancies, to fill a gap in the data, to provide an experimental test between predictions from the concept of inhibition of rod effects by cone effects and those from the concept of declining receptor contribution, and to identify the slopes of rod and cone curves with the size of their respective populations, off-log intensity curves were determined for two subjects. Light-time fractions (.50, .80, and .90) were used at each of three retinal locations (0, 5, and 18 degrees temporal from fovea) chosen for their different ratios of rods to cones. Forms of the obtained curves are discussed relative to the stated purposes. T. G. I. R 27

14,549

Gaskill, H.S. SURVEY OF PERSONAL AND INTERPERSONAL FACTORS IN DRIVING. Contract DA 49 007 MD 502, Ann. Rep. for period 1 March 1958 to 28 February 1959, 11pp. USA Research & Development Div., Office of the Surgeon General, Washington, D.C.

14,549

This report discusses a research program dealing with the relationship of personal characteristics to motor vehicle accident/violation experiences. During the initial phases (1953-1956), a coordinated series of studies of matched accident-repeater and accident-free airmen (drivers) demonstrated that specific personality, temperament, and attitude characteristics distinguished these groups more reliably than psychophysiological, intellectual, or skill attributes. Subsequently, a large scale study of 6706 teen-age pre-drivers was initiated to determine whether specific personality factors associated with accident/violation driving could be used to identify subsequent safe drivers. A final analysis of the data will be made when these drivers have 36-months driving experience. G. R 3

14,550

Goldsmith, C.T. STATE-OF-THE-ART EVALUATION OF TRANSPARENT PHOSPHOR CATHODE RAY TUBES. Rep. HF 123 59 310, Aug. 1958, 12pp. Grumman Aircraft Engineering Corporation, Bethpage, N.Y.

14,550

The current state of the art in Evaporated Phosphor Cathode-Ray Tubes was investigated with regard to their possible application to high-ambient light level display situations. The contrast ratio necessary to produce accurate display viewing was used to determine the brightness requirement for conventional tubes, with and without filtering, and for evaporated phosphor tubes. The possibilities of the latter tubes meeting or surpassing the conventional phosphors are discussed.
T. G. R 2

14,551

Gebel, R.K.H. A MILITARY COLOR TELEVISION SYSTEM. Proj. 7072, Task 70827, WADC TN 58 114, Apr. 1958, 8pp. USAF Aeronautical Research Lab., Wright Patterson AFB, Ohio.

14,551

The need for a good practical military color television system is emphasized. A discussion of the technical possibilities and limitations is presented with the more important types of color systems. Emphasis is placed on motion-detection limitation. A superior system for general military application, with or without optical amplification, is described.

I.

14,552

George, L.S. HEAT RESISTANT CLOTHING TRIALS AT THE PARK GATE IRON AND STEEL CO. LTD. SM/A/79/53, Rep. Ref. 53/35, 1953, 4pp. The British Iron & Steel Research Association, London, England.

14,552

This report summarizes a demonstration of a heat resistant ensemble worn in the blast furnace and open-hearth furnace departments of a steel works. The material of the equipment was composed of aluminum metal adhering to a fire-proofed textile base and consisted of a hood covering the entire head and neck (with glass window), a long-sleeved coat, gauntlets, and leggings with boot top cover. The ensemble was evaluated for degree of protection from heat, fire-proof qualities, durability, and attitude of workers towards wearing it. Recommendations are included.

14,553

Goldman, A. SENSORY INTERACTION AND RESPONSE CAPACITY. Tech. Rep. NAVTRADEVEN 789 11 1, June 1959, 52pp. USN Training Device Center, Port Washington, N.Y.

14,553

To determine whether the operator in a man-machine system with very high rates can perform more efficiently when the sensory inputs are through one sense modality or divided between two sense modalities, four groups (32 subjects) were required to track a target under one of four conditions. 1) Display was presented visually and was tracked with joystick control. 2) With the same display, a linear control was used with one hand tracking horizontal and the other vertical movements. 3) Horizontal movement of target was displayed visually and vertical movement by audio signal with joystick control. 4) Same as preceding with a linear control. Each group performed three similar, but increasingly difficult tasks. Time-off-target scores were analyzed for effect of the four conditions and task difficulty. T. I. R 21

14,554

Grubmeyer, R.S. "A NEW LOOK AT REQUIREMENTS FOR ELECTRONIC SYSTEMS IN AIR TRAFFIC CONTROL." IRE Convention Record, 1956, Part 8, 4pp. (Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.)

14,554

This paper reviews the requirements for electronic systems in two areas of air traffic control: display and automatic computing equipment. The problems considered are: 1) a large radar display usable under conditions of ambient lighting suitable for normal reading and writing; 2) practical and economical means for handling multiple input and output requirements of an air traffic control computing system; 3) determination of optimum parameters for a computer to handle confliction search and solution of problems with attention to storage and search requirements; and 4) data processing and computing equipment and techniques satisfying joint requirements of reliability, accuracy, and fail-safe features.

14,555

Hannigan, J.F. FINAL REPORT ON CAMOUFLAGE OF ARMY AIRCRAFT. Proj. 8 31 01 400, Tech. Rep. 1559, Dec. 1958, 82pp. USA Engineer Research and Development Lab., Fort Belvoir, Va.

14,555

This report covers those Army aircraft camouflage measures that are appropriate for and compatible with concepts of future warfare in any geographical area. Appropriate camouflage-paint schemes with the minimum logistical burden are prescribed herein for temperate, arctic, desert, and tropical terrain. Details of initial investigations under this project are reported in USAERDL-1508-TR, Interim Report on Camouflage of Army Aircraft. T. G. I. R 17

14,556

Hayes, K.J. WAVE ANALYSES OF TISSUE NOISE AND MUSCLE ACTION POTENTIALS. NM 17 01 13 1, Rep. NAMC ACEL 404, June 1959, 11pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn.

14,556

This report is one in a series concerned with the measurement of stress and its relationship to performance as it may affect the design of information displays and personal safety equipment for the naval aviator. The present report deals with the physical and physiological factors involved in the measurement of muscle action potentials using surface electrodes. Special attention is given to problems associated with minimal muscular activity. This information is intended as a guide for those involved in research using surface electromyography.

G. R 5

14,557

Hawkes, G.R. & Warm, J.S. COMMUNICATION BY ELECTRICAL STIMULATION OF THE SKIN II. THE STIMULUS INTENSITY RANGE. Proj. 6 95 20 001, Task USAMRL T 5, WDEA, Rep. 401, Sept. 1959, 15pp. USA Medical Research Lab., Fort Knox, Ky.

14,557

Alternating current was applied to the finger tip over a broad range of frequencies. Absolute thresholds for vibration and for pain, as well as tolerance limits for alternating current stimulation were recorded. Subjects were able to report tolerance limits (terminal limits) as reliably as absolute thresholds for vibration and pain. No undue emotional reactions were occasioned by the use of stimulus intensities up to the tolerance limits of the subjects.

T. G. R 8

14,558

Hertzberg, H.T.E., Dupertuis, C.W. & Emanuel, I. STEREOPHOTOGRAMMETRY AS AN ANTHROPOMETRIC TOOL. Proj. 7214 & Proj. 6333, Task 71728, WADC TR 58 67, Feb. 1958, 6pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,558

This paper reviews briefly previous biological applications of stereophotogrammetry and outlines with illustrations the present procedures used to draw human body contours at one-half inch intervals. It compares dimensions derived from plotted profiles with those taken by hand on the subjects themselves. It discusses the utility of stereo data for special anthropometric purposes and mentions further applications for other biological sciences.

T. G. I. R 11

14,559

Hickey, A.E., Jr. & Blair, W.C. ENGINEERING CONTROL I. MULTIPLE DISPLAY MONITORING. Contract NMR 2512(00), PS9 004, Electric Boat Tech. Rep. SP059 002, Jan. 1959, 14pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn.

14,559

To determine how operators voluntarily distribute their visual work load while monitoring three displays for signals, two experiments were performed. In one the signals persisted until they were detected and reset by the operator; in the other the signals were transient and were only detected. In each experiment three groups of six subjects were each given one half-hour session per day for eight days. Signals were varied in number for each display but were presented randomly. Subjects had to push one set of buttons to light and observe the displays and another set to report detections and reset signals. Only one display could be observed at a time. Both the frequency and duration of observing were measured and analyzed.

T. G. I. R 4

14,560

Humphries, M. & Shephard, A.H. AGE AND TRAINING IN THE DEVELOPMENT OF A PERCEPTUAL-MOTOR SKILL. Percept. Mot. Skills, March 1959, 2, 3-11. (University of Toronto, Toronto, Ontario, Canada).

14,560

This paper is one of a series dealing with the general problem of the relationship between chronological age, training, maturation, and performance. In this experiment three groups of children, ages 5-1/2, 7-1/2, and 9-1/2 years, received training on the reversed task of the Toronto Complex Coordinator in three sessions; each session was separated by six months. In each session, training was given in two five-minute periods; each period was separated by a 20-minute rest period. Performance (matches and errors) was analyzed for relationships with age. Brief rest periods and intervals of six months were also examined in relation to age, amount of training, and age at which training started.

T. G. R 5

14,561

Imus, H.A. RESEARCH IN VISUAL PHYSIOLOGY. Rep. OURL 7 52, Jan. 1952, 7pp. USN Office of Naval Research, London, England.

14,561

At the December meeting of the Physiological Society which was held at Bedford College, Regent's Park, London, on 14-15 December 1951, three papers in visual physiology were presented. F.C. Rodger, University of Durham, showed that the integrity of the visual path can be affected deleteriously by thiamin deficiency. M.H. Pirenne and E.G. Denton of Marischal College, Aberdeen presented two papers. One was on spatial summation at the absolute threshold of peripheral vision; the other was on retinal pigments.

R 3

14,562

Jarl, V.C., Gerhardt, R. & Riis, E. APPROACHES TO THE PROBLEM OF FLYING SAFETY. 5pp. Norwegian Armed Forces, Oslo, Norway.

14,562

This paper discusses various approaches to the improvement of flying safety. Present methods are reviewed critically, especially the analysis of aircraft accidents. It is suggested that what constitutes an accident needs to be redefined. A tentative guide is presented for facilitating the reporting as well as the logical and psychological analysis of predisposing and precipitating factors leading up to the accident. The gathering and use of near-accident data is discussed. It is further suggested that new leads for research may come from the general care-of-the-flyer program. An example is given in the case of lateral dominance as associated with malfunctioning of the pilot.

i:

14,563

Jerison, H.J. EXPERIMENTS ON VIGILANCE: THE EMPIRICAL MODEL FOR HUMAN VIGILANCE. FIFTH IN A SERIES. Contract AF 33(616) 6095, Proj. 7184, Task 71581, WADC TR 58 52*, Jan. 1959, 25pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

14,563

A model of human vigilance is presented which is an integrated summary of empirical studies. Vigilance is defined as a probability of detecting rare and near-threshold events (signals). In the model this probability is described as a function of the combined effects of signal frequency, response frequency, signal detectability under ideal observing conditions, time at work, complexity of the monitored display, and various subject variables. A deductive theory of vigilance should have this function as one of its consequences.

G. I. R 34

14,564

Jerison, H.J. EXPERIMENTS ON VIGILANCE: DURATION OF VIGIL AND THE DECREMENT FUNCTION. FOURTH IN A SERIES. Contract AF 33(616) 3404, Proj. 7184, Task 71581, WADC TR 58 369, Dec. 1958, 15pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Antioch College, Yellow Springs, Ohio).

14,564

Results of previous experiments on vigilance were re-analyzed for data on human performance during short (half-hour) and long (two-hour) vigils. The data permitted performance comparisons of different groups of naive subjects on short and long vigils and of naive subjects on short vigils with that of the same subjects on subsequent longer vigils. The analysis was made in terms of initial and final levels of performance and the shape of the decrement function as affected by length of vigil. An explanation of the findings is offered which is consistent with an expectancy theory of vigilance; implications for lengths of monitoring tasks are discussed.

T. G. R 5

14,565

Johnson, E.P. FLUCTUATIONS IN NIGHT VISUAL ACUITY. SECOND PROGRESS REPORT. Contract DA 49 007 MD 871, Jan. 1959, 10pp. Colby College, Waterville, Me.

14,565

This is a report of research in progress which is intended to reveal the character and extent of fluctuations in night visual acuity. Fifty male subjects are being given instructions in the use of the eyes at night and practice in viewing targets at scotopic levels of illumination. Following training each subject undergoes one or more two-hour periods of testing (making manual adjustive movements in response to visually perceived movement of target) during which the level of visual performance is continuously measured.

I.

14,566

Karpovich, P.V., Keeney, C.E. & Alexander, A.A. PHYSIOLOGICAL AND KINESIOLOGICAL METHODS FOR TESTING FOOTGEAR. Contract DA 19 129 QM 309, Proj. Ref. 7 79-10 001C, Rep. 13, Jan. 1959, 95pp. USA Textile, Clothing & Footwear Div., QM Research & Engineering Center, Natick, Mass. (Dept. of Physiology, Springfield College, Springfield, Mass.).

14,566

To develop physiological and kinesiological methods for the evaluation of the effect of military footwear upon the function of the soldier, several types of American, British, and Canadian footwear were compared. The methods used were 1) measuring energy cost of walking, 2) measuring bone alignment of the foot and lower leg, 3) determining the speed of sprinting 30 yards, the time of running a zig-zag course, and the height of vertical jumping, 4) measuring the pressure exerted on selected areas of the soles of the feet. Several auxiliary devices and techniques were developed.

T. G. I.

14,567

Kenchington, K.W.L. THE REGIONAL COOLING OF THE GLOVED HAND UNDER SIMULATED MOTORCYCLING CONDITIONS. Rep. 83, Nov. 1957, 11pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

14,567

To minimize bulk in motorcyclist's handwear by the use of graded insulation in accordance with regional requirements, a study was made of hand skin cooling when wearing the Gauntlet, M.T. under simulated motoring conditions. Chamber experiments were carried out at 32 degrees Fahrenheit, in a constant wind of 38 miles per hour, with top military subjects. Skin temperatures were taken at 12 points on the hand over a period of 30 minutes. Cooling curves were constructed. The results are discussed with reference to hand position when driving and suggestions are made for the design of an improved gauntlet.

T. G. I.

14,548
Kushnir, D.R. & Wade, J.P. NEURAL CORRELATES OF
THERMAL SENSATION. Contract DA 49-007 MD 687, Prop.
Rep. 1, Jan. 1958, 24pp. USA Research and Development
Training, Office of the Surgeon General, Arlington,
D.C. (Florida State University, Tallahassee, Fla.).

14,549
Liu, A. DETERMINATION OF THRESHOLDS AS A
FUNCTION OF BINOCULAR DIFFERENCES OF RETINAL ILLUMI-
NANCE AT COMPOSITE AND DIFFERENT LEVELS. Ann. Exp.
Psychol., Aug. 1959, 48(2), 242-252. (Yale Research
Lab., University of Michigan, Ann Arbor, Mich.).

14,548
This progress report includes data from two articles
that have been prepared for publication. "Thresholds of
thermal sensation as a function of the pre-adapting tem-
peratures" and "Low level investigation and threshold shift
in the visual receptors." A third article, dealing with
the thermal sensitivity of the cornea, is being prepared
and data from this investigation are also included. Fur-
ther investigations are discussed.
G. R 13

14,572
To determine the effects of unequal binocular retinal
illumination on the perception of depth discrimination, equal-
distance (equality) settings were made using a two-end
test apparatus including real depth cues by two trained
observers. Two variables were studied: 1) the level of
equal retinal illumination presented to the two eyes, and
2) the difference in the level of illumination presented
to the two eyes. Illuminance levels ranged from low com-
patible to high photopic levels. The significance of the
results for visual theory is discussed.
T. G. R 8

14,549
Kocher, R. & Calver, E.B. THE ACQUISITION AND
DISTRIBUTION OF INFORMATION IN PERIODIC SEQUENCES AND
TESTING. Information and Control, Sept. 1958,
1(3), 267-298. IBM Research Center, Yorktown
Heights, N.Y. & University of Pennsylvania, Phila-
delphia, Penn.).

14,573
Liu, A. THE MEASUREMENT OF THE PERIPHERAL VISION
THRESHOLD AS A FUNCTION OF TARGET VELOCITY. Percept. Mot.
Sci., Sep. 1959, 9(2), 1-10. Willow Run
Lab., University of Michigan, Ann Arbor, Mich.

14,563
Some of the logical consequences of drawing a dis-
tinction between the following two aspects of problem-
solving behavior are explored: 1) actions directed toward
the acquisition of information to guide future actions
toward valuable goals, and 2) actions directed toward the
utilization of accumulated information to attain a valua-
ble goal. An experimental paradigm accomplishing this
separation is described for the case of an environment
of periodic sequences of binary events. A general way of
describing behavioral strategies is developed. The
structure of the binary environmental sequences and of
the behavioral strategies and their interrelations are
described. Predictions from an experiment are compared
with data from studies of human subjects.
T. G. R 24

14,573
To investigate a localization error that arises when
a transversely moving target is binocularly observed un-
der conditions of unequal binocular retinal illumination
(Pulfrich stereophenomenon), means of the near and far
displacements of a black vertical rod were made (two
practiced observers) for a wide range of target veloci-
ties under each of several conditions of unequal binocu-
lar retinal illumination. The data were analyzed as func-
tions of target velocity for difference levels of differ-
ence in binocular illumination. An explanatory theory
was offered to account for the results. Implications for
problems of military surveillance are pointed out.
T. G. R 13

14,570
Law, C.T. & DeValois, R.L. THE USE OF THE OCULAR
RESTING POTENTIAL (ORP) AS A MEASURE OF SMALL EYE
MOVEMENTS. Proj. REPORT, Rep. 2144-337 T, Dec. 1958,
19pp. Willow Run Lab., University of Michigan,
Ann Arbor, Mich.

14,574
Ludwig, E. & Miller, J.M. STUDY OF VISUAL ACUITY
DURING THE OCULAR PERIOD OF MOVING TEST OBJECTS. I.
INTRODUCTION. Ann. Exp. Psychol., Nov. 1958, 48(1),
199-202. (Kresge Eye Institute, Detroit, Mich. &
USC School of Aviation Medicine, Naval Air Station,
Ft. Belvoir, Ill.).

14,570
A bioelectric phenomenon, designated the ocular rest-
ing potential (ORP), was utilized to measure small eye
movements. The ORP is recorded by placing pairs of elec-
trodes on the skin of the face around the eyeball. This
phenomenon depends upon the existence of a polarity dif-
ference between the front (cornea) and the back (retina)
of the eyeball, the well-known corneal-retinal potential.
The success with which the ORP can measure small move-
ments is discussed. An oscilloscope display of complex
eye movements as recorded from the ORP is described and
its possible uses for research pointed out.
G. I. R 25

14,574
To determine the manner in which visual acuity is af-
fected when observed during the voluntary ocular pursuit
of moving test objects (dynamic visual acuity), apparent
movement was produced by rotating a mirror in the desired
plane of pursuit. The range of angular velocities uti-
lized was 10 to 170 degrees per second at the nodal point
of the tested eye; the test objects were Landolt rings.
Dynamic visual acuity thresholds were determined for en-
listed naval personnel ranging in age from 17 to 33 years
having a static visual acuity of 20/20 or better. The
acuity data were analyzed as a function of velocity.
Possible causes for the findings are discussed.
T. G. I. R 13

14,571
Lennex, Margaret A. STUDY OF THE ORGANIZATION OF THE
VISUAL SYSTEM IN RESPECT TO COLOR. Contract AF 61
(514) 1194, AFOSR TR 59-34, Dec. 1958, 9pp. USAF
Office of Scientific Research, AFOSR, Washington, D.C.

14,575
Marrindale, R.L. & Lowe, M.F. USE OF TELEVISION FOR
REMOTE CONTROL: A PRELIMINARY STUDY. Proj. REPORT,
AFOSR TR 58-12, Aug. 1958, 10pp. USAF Special Weapons
Center, Kirtland AFB, N.M.

14,571
A summary of work accomplished during the year 1958
on a study of the organization of the visual system in
respect to color is reported. A correlation of color re-
sponsiveness with conduction velocity along the nerve
fibers in monkeys was made. Flashes of five different
colors at equal intensity were delivered to the eye and
the response to single cortical cells recorded. The re-
sponse of the same cells to stimulation of the optic
nerve was then sought. Implications of the results on
future work are discussed.

14,575
Closed circuit television is expected to have a vari-
ety of military applications requiring remote control.
This test was performed to determine optimum monitoring
arrangements. Fifteen Air Force officers performed a
simple remote control task under five monitoring condi-
tions and the accuracy of their performance was measured.
The data were analyzed for effects of displacement of the
visual field from normal line of sight and for different
camera positions. Some remedial actions were discussed
such as repositioning the monitor to compensate for
camera angle.
T. R 1

14,575

Kucwalski, A.A. & Brown, K.L. THE EFFECTS OF MONITORING RESPONSES ON THE BEHAVIOR OF THE MONITOR. MONITOR, Rep. 55-58, April 1958, 4pp. MONITOR, University of Texas, Austin, Tex.

14,576

To determine the effects of nuclear radiation exposure on the behavior of the monkey, ten male rhesus monkeys were exposed to nuclear radiation. Systematic observations of the free cage behavior of the experimental and nine control (non-exposed) animals were made for ten days preceding and on alternate days for as long as he survived through 28 days following exposure. The four behavioral categories were 1) nondirected visual activity, 2) nondirected locomotor activity, 3) object-directed activity, and 4) self-directed activity. The behavioral syndrome was compared to that known to be produced by laboratory exposure to radiation.

G. R. 5

14,577

Parker, K.F. ACTIVE EAR DEFENDER SYSTEMS: OCCUPANT INTERRELATIONS AND THEORY. Contract AF 33(616) 3051, Proj. 7210, Task 71700, MOD 12 57 568(Part 1), Sept. 1958, 4pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Radio Corporation of America, Camden, N.J.).

14,577

The potentialities of the noise cancelling principle in ear protectors were investigated. The basic theory, discussed in an appendix, has been applied to 1) a non-feedback cavity ear muff system, wherein noise picked up by a microphone outside the muff and adjusted for phase and amplitude was transmitted through earphones under the muff, 2) a feedback ear muff system, similar to the first, yet employing negative feedback with the pick-up microphone located inside the muff, and 3) a free-field loudspeaker system. Based upon the examples studied and the transducer problems involved, objectives for developmental noise reducing systems are suggested.

T. G. I. R. 12

14,578

Schmitz, M.A. THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE VIBRATION ON HUMAN PERFORMANCE. PROGRESS REPORT NO. 2A JANUARY 31, 1958 TO JANUARY 31, 1959. Contract DA 49 007 MD 797, Rep. 128, Jan. 1959, 5pp. Research Laboratories, Milwaukee, Wisc.

14,578

To determine whether relatively low frequency and high amplitude vertical vibration (of the type found in work vehicles) affects human psychomotor performance, 18 subjects were exposed to vibrations of 2.5 and 3.5 cps at two displacements for 90 minute periods. Subjects were seated on a wooden chair on a mechanical shaketable. Pre- and post-control measures were taken before and after each test session. Performance during vibration was compared to a no-vibration condition on the following tests: 1) hand tremor, 2) visual acuity, 3) compensatory tracking, 4) foot pressure constancy, 5) foot reaction time, and 6) body equilibrium. The effects of exposure time and vibration conditions were analyzed.

T. G. I. R. 25

14,579

Schweigert, B.S. & Doty, D.M. CHEMISTRY OF COLOR, FLAVOR AND ODOR CHANGES IN IRRADIATING MEAT. FINAL REPORT. Contract DA 19 129 GM 512, Proj. 7 84 01 002, File S-507, Rep. 13, June 1958, 113pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (American Meat Institute Foundation, Chicago, Ill.).

14,579

This is a final report on studies concerned with reactions of meat and meat products which take place during ionizing radiation: odor, flavor, and color changes. The bulk of the work reported here used beef for investigation purposes. Chemical changes that occur in irradiated meat are reported along with the methods developed for determining the changes. Effects of aging and storing on chemical changes are also reported.

I. G. R. 49

14,580

Smiley, G.L. THE USE OF THE IBM 704 IN THE SIMULATION OF SPEECH RECOGNITION SYSTEMS. Res. Rep. RC 37, Dec. 1957, 20pp. International Business Machines Corporation, Poughkeepsie, N.Y.

14,580

The first step in mechanical speech recognition involves the analysis of a large number of speech sounds to determine the characteristics by which these sounds may best be discriminated. To accomplish this analysis special advantage is taken of techniques made possible by the advent of the large scale digital computer. This paper describes the equipment required to both facilitate editing samples of sounds for analysis and convert these sounds to digital form suitable as computer inputs. A system of programs is presented and the feasibility of the computer as a research tool is illustrated.

14,581

Silvestro, A.A., Kelly, J.B. & Connors, D. HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF AIRPORT TRAFFIC CONTROL QUARTERS (SECOND INTERIM REPORT) PRELIMINARY ENGINEERING LAYOUT. Contract FAA/ED 89, Proj. P, Rep. 77, June 1959, 37pp. Quincy and Company, Philadelphia, Penn.

14,581

This report contains recommendations and drawings for the design of air traffic control quarters in which human factors considerations are of prime interest. A modular design is basic to all recommendations. Section I is concerned with the general layout of the tower building and Section II with airport traffic control quarters: tower cab level, cab access level, equipment room level, Instrument Flight Regulations room level, controller ready room level, training room level, and administrative level.

I. R. 1

14,582

Sinalko, H.M. & Cartwright, G.P. CAREFUL: A PILOT STUDY OF THE EFFECTS OF HEAVY TARGET LOAD ON HUMAN AND AUTOMATIC DECISION MAKERS. Contract DA 36 039 SC 56695, D/A Subtask 3 99 01 002, Rep. R 115, Sept. 1959, 43pp. Coordinated Science Lab., University of Illinois, Urbana, Ill.

14,582

A brief experiment was done to test the hypothesis that very heavy target loads would adversely affect a human tactical decision-maker while the same number of targets would not degrade the performance of an automatic system. A series of air defense exercises was used in three modes: 1) fully automatic, 2) CIC officer could override decisions of the automatic system or make his own if he so chose, and 3) the officer made all the decisions and assignment of interceptors. Two scripts differing in numbers of targets (37 and 60) were used. Data (target penetrations, kills, assignments) from 24 runs were analyzed in terms of the effectiveness of the mode under each load condition. Implications of the findings for designers of automatic decision-making machines are discussed.

T. G. I. R. 7

14,583

Sleight, R.B., Cook, K.G. & Beazley, R.M. DESIGN STANDARDS FOR MAN-MACHINE TASKS IN SIGNAL CORPS SYSTEMS. FIRST QUARTERLY PROGRESS REPORT 1 JUNE 1959 - 1 SEPTEMBER 1959. Contract DA 36 039 SC 78328, DA Proj. 3 99 00 110, Sept. 1959, 38pp. Applied Psychology Corporation, Arlington, Va.

14,583

The results of the first work performed in specifying design standards for man-machine tasks are presented. Initial work consists of 1) interviews with persons having extensive experience and knowledge of Signal Corps equipment on the subject of the human functions utilized in the present equipment; 2) observations of equipment in operation; 3) the development of a list of human functions in Signal Corps man-machine operations; and 4) a search for basic terms. Future stages of the work are discussed.

I. I.

14,584
Snyder, J.F. DIVE REACTION SCALE STUDY. Proj. NS185
005, Subtask 5, Test 10, Res. Rep. 558, March 1958.
12pp. USN Experimental Division Unit, Naval Gun Factory,
Washington, D.C.

14,584
To develop a scale for measuring symptoms of decompression sickness which will improve the precision of experimental work in diving, a sample of 60 cases covering a wide range of seriousness in post-dive symptoms was selected. Six judges, medical officers with considerable experience in experimental diving, ranked and scored the cases in terms of seriousness. The responses were examined for agreement of judgments. Ratings and scores were analyzed and, together with descriptive judgments, used as a basis for a zero-ten psychometric scale.
T. G.

14,585
Tanner, W.P., Jr. A RE-EVALUATION OF WEBER'S LAW AS APPLIED TO PURE TONES. Contract DA 36 039 SC 63203, DA Proj. 3 99 04 042, SC Proj. 1943, Rep. 2262 185 I, Tech. Rep. 55, Aug. 1958, 26pp. Dept. of Electrical Engineering, University of Michigan Research Institute, Ann Arbor, Mich.

14,585
The hypothesis that Weber's law as applied to intensity discrimination of pure tones reflects a condition of the environment rather than the hearing mechanism was investigated. An inventory of the various possible noise sources which may exist was made and an equation derived for the way in which these noise sources may be expected to affect the detectability of a signal. Data for three observers over four levels were obtained and analyzed in terms of the equation.
G. I. R 4

14,586
Tanner, W.P. Jr. & Jones, R.C. THE IDEAL SENSOR SYSTEM AS APPROACHED THROUGH STATISTICAL DECISION THEORY AND THE THEORY OF SIGNAL DETECTABILITY. 1959, 19pp. University of Michigan Research Institute, Ann Arbor, Mich. & Polaroid Corporation, Cambridge, Mass.

14,586
An analysis is presented of sensory experiments in which the relevant variables are identified and those conditions in the environment are analyzed which place limits on performance in visual experiments. A general model of an ideal observer, one who performs to the limits of his environment, is described. The model is a purely mathematical concept describing the maximum possible correlation between observable events in very simple detection experiments. The analysis of the limits of environment is based on the statistical properties of photons. Necessary terms are defined, and a theorem for employing the model in descriptive ways is presented and illustrated.
G. I. R 10

14,587
Taylor, F.V. THE HUMAN AS AN ENGINEERING COMPONENT. A.M.A. Arch. Industr. Hyth., March 1959, 19, 278-282. (USN Research Lab., Washington, D.C.).

14,587
It is argued that, in designing man-operated machines, it is useful to consider the man as an engineering component, to determine his system-relevant properties, and to take as many as possible of these into account in structuring the mechanical portions of the system. The use of the human engineering principle of quickening is given to demonstrate the argument.
I. R 5

14,588
Klein, R.M., Twyford, L.C., O'Hara, J.G. & Goldaan, A. GREEN LIGHT RATER. Tech. Rep. NAVTRADEVEN 20 US 3 1, Dec. 1958, 5pp. USN Training Device Center, Port Washington, N.Y.

14,588
The Green Light Rater is a teach-test device designed to provide teaching and practice to supplement more formal classroom instruction. The human engineering requirements for such a device are discussed. The validity of the Green Light Rater is presented in terms of the psychological principles of learning embodied and of a field evaluation. A brief description is included.
I. R 1

14,589
Case Institute of Technology. COMMUNICATIONS IN THE PRESENCE OF AN INTELLIGENT NOISE SOURCE. Contract AF 33 /602/ 1947. Tech. Note 2, Jan. 1959, 20pp. Operations Research Group, Case Institute of Technology, Cleveland, Ohio.

14,589
This note develops the analysis of three models of a communicator and jammer situation that were previously discussed in note Number One (see 5196). A new model is also described, based on a game theoretic view of communication.
T. G.

14,590
USN Aviation Safety Center. INTERIM REPORT OF EJECTIONS FOR PERIOD OF 1 JANUARY TO 30 JUNE 1958. June 1958, 12pp. USN Aviation Safety Center, Naval Air Station, Va.

14,590
Ejections from U.S. Navy aircraft for the period 1 January to 30 June 1958 are reported in tabular and graphic form. The data are analyzed as to ejection rate per 10,000 hours, fatality rate per 10,000 hours, altitude effects, speed effects, attitude effects, and injuries. There is no discussion.
T. G.

14,591
Van Horn, W.H. PROTECTION OF ENGINEER-HEAVY EQUIPMENT OPERATORS IN RADIOLOGICALLY CONTAMINATED AREAS. Subproj. 8 12 95 400, Tech. Rep. 1555, Feb. 1959, 58pp. USA Engineer Research & Development Labs., Fort Belvoir, Va.

14,591
This report covers engineering tests made to determine the shielding characteristics of standard and developmental engineer heavy equipment (items that could be used for decontamination work) and to ascertain methods for increasing the inherent shielding. Lead shielding for the cab was designed and a prototype lead cab was field tested in radiologically contaminated areas.
T. G. I. R 4

14,592
Kochen, W. A MATHEMATICAL FORMULATION OF INFLUENCE DISTRIBUTIONS IN DECISION-MAKING GROUPS. J. Soc. Indust. Appl. Math., Sept. 1958, 6(3), 199-208.

14,592
This article represents a mathematical approach to the description of distributions of influence which is unrelated to game theory. The results obtained provide means of studying the structure of groups with respect to the influence upon decision making that the voters exert upon each other.
R 5

14,593

Milne, G.G. & Eyer, J.A. THE PROBLEM OF ACHIEVING IMPROVED SPECTRAL PHOTOMETRY. FINAL REPORT. Contract NCR 1799(10), Dec. 1958, 27pp. Institute of Optics, University of Rochester, Rochester, N.Y.

14,593

The performance of a spectrograph employing a photographic emulsion as image receptor can be described in terms of threshold sensitivity, or of the amount of exposure required to record a definite amount of information, or of the total information which the system can record. The effects of developer choice upon these various measures of system performance are examined for a particular emulsion. The results of changing development conditions are also examined briefly. The usefulness of the philosophy employed for comparing the effectiveness of various spectrographic systems when used to make photometric measurements is pointed out.
I. G. R 5

14,594

Moller, F.D. HIGH ALTITUDE, PARTIAL PRESSURE SUITS DESIGNED WITH DOUBLE CAPSTANS, VENTILATION LAYERS, AND PARTIAL PRESSURE AND FULL PRESSURE SOCKS. Contract AF 33(616) 3904, Proj. 6336, Task 63619, WADC TR 59 246, June 1959, 12pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (The Berger Brothers Company, New Haven, Conn.).

14,594

This report deals with the resizing of the Type MC-4 suit (partial pressure, high-altitude, with g-bladder protection) to meet fitting requirements when selection is made by "Stature-Weight" selection charts. The resized suit is known as Type MC-4A. The design and construction of three prototypes of partial pressure suits having various features in them requiring evaluation are discussed. The development of pneumatic socks (both partial pressure and full pressure) for pressurizing the feet is also discussed.
I. I.

14,595

Morris, A. & Hood, J.M. Jr. VISIBILITY OF SIGNAL FLAGS. MEL/Rep. 864, Oct. 1958, 10pp. USN Electronics Lab., San Diego, Calif.

14,595

To provide information as to visibility ranges of standard signal flags as seen by the eye and through standard optical devices under various atmospheric conditions, a study was undertaken consisting of two phases: 1) a field survey of ships operating in the San Diego area, to determine facts about operational uses of flags and optical devices aboard the various ships, and 2) a pilot study to measure ranges of a few sample flags observed under one atmospheric condition, with the unaided eye and one typical optical aid (binoculars). Recommendations are included.
I.

14,596

Murnin, J.A. THE DEVELOPMENT AND EVALUATION OF A LOW-COST CLOSED-CIRCUIT INSTRUCTIONAL TELEVISION SYSTEM: THE ONE-CAMERA TELEVISION CHAIN. Contract N61339-22, Tech. Rep. NAVTRADEVEN 5 11.1, Dec. 1958, 90pp. USN Training Device Center, Port Washington, N.Y. (Pennsylvania State University, State College, Penn.).

14,596

To develop and evaluate a low-cost closed-circuit educational television system for use in mass military training, a low-cost television originating and receiving system that required minimal training for its operation and minimal maintenance was assembled from "off-the-shelf" components. The system was installed at Naval Training Center, Bainbridge, Maryland, and techniques were developed for presenting instructional materials for Indoctrination Curriculum. Instruction was given to recruits over a three-month period and the program was evaluated in terms of growth, learning, and personal attitudes toward televised instruction.
I. R 2

14,597

Peckham, R.H. & Hart, W.M. RETINAL SENSITIVITY DURING PHOTOPIC ADAPTATION. Contract NCR 2750(00), Tech. Rep. 1, Oct. 1959, 18pp. The Eye Research Foundation, Bethesda, Md.

14,597

To investigate factors that may affect the response of the eye to sudden changes in luminance, a psychometric method was employed. This entails determining the probability of response of each subject to a series of stimuli in a liminal range, presented in an order that appears random to the subject. The stimuli were repetitive short alternations of equal durations above and below a constant background luminance. The response was called "scintillation." A series of eight experiments was performed on: 1) effect of contrast and range, 2) summation, 3) reliability of data, 4) retinal sensitivity to low luminance, 5) effect of adaptation to excessive brightness and to dimness, and 6) effect of age.
I. G. I. R 8

14,598

Peters, G.A. & Hussman, J.A. HUMAN FACTORS IN SYSTEMS RELIABILITY. Human Factors, April 1959, 1(2), 38-42. (Psychological Research Associates, Inc., Encino, Calif.).

14,598

A general introduction is given to the basic concepts involved in engineering for systems reliability. The problems of performing human factors research that will be of maximum usefulness to those doing engineering design and management decisions regarding the human element in systems reliability are discussed. The need for specifying task variables in quantitative units that are compatible with other engineering formulations is stressed. It is urged that greater emphasis be placed on operational analysis under realistic environmental conditions. An idealized methodological approach to human factors research is described.
R 3

14,599

Reichlen, F. PERSONAL PROTECTIVE EQUIPMENT FOR MISSILE ROCKET FUEL HANDLERS. APGC Proj. 976HS01, APGC TH-59 8, March 1959, 20pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

14,599

This report resulted from studies made in conjunction with an analysis of the environmental health hazards associated with the RASCAL and BOMARC missiles. Discussions of the personal protective clothing used by the handlers of these missiles and of new developments by the Air Force and Army in protective clothing are included. The adequacy of protection against the toxic chemicals is pointed out in contrast to the degree of discomfort in the clothing. Since the amount of precaution used by the handler is felt to be highly related to comfort, recommendations are made for certain features necessary for this type of clothing. Three different types of clothing sets are recommended, each designed for a specific type of operation.
I.

14,600

Riggs, L.A., Krauskopf, J. & Chapman, R. PROGRESS REPORT ON SPECTRAL SENSITIVITY OF SMALL RETINAL AREAS. JULY 1958 TO MARCH 1959. Contract DA 49.007 MD 979, 7pp. Brown University, Providence, R.I.

14,600

Progress on a series of experiments is reported. 1) Single unit potentials were recorded from the bull frog retina with microelectrodes. Techniques for isolating and identifying single unit responses are described. The primary concern was with variations in the response of these units with stimuli of varying wavelength. Film records are now being analyzed. 2) The effectiveness of very small spots of monochromatic light on the human eye is being explored by measurement of the increment thresholds for monochromatic light and the calculation of spectral sensitivity curves for repeated stimulation of the same area. Further experiments are described.

14,601

Rockway, M.R. & Franks, P.E. EFFECTS OF VARIATIONS IN CONTROL BACKLASH AND GAIN ON TRACKING PERFORMANCE. Proj. 7197, Task 71635, WADC TR 58 553, Jan. 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,601

This report is one of a series concerned with the effects of discontinuous control system nonlinearities on tracking performance. Six subjects performed a simulated aircraft tracking task using each of 12 control conditions resulting from combining four levels of control backlash (0, 0.2, 0.6, and 1.8 degrees of stick deflection in total extent) and three levels of gain (0.5:1, 1.5:1, and 5.0:1). Integrated error scores and a limited number of graphic records of display error and control position were obtained. The error scores were subjected to analysis of variance for effects of backlash, gain, and their interactions on system performance. The implications for design of manual control systems were discussed briefly. T. G. I. R 7

14,603

Lakeside Laboratories, Inc. CATRON HCl INVESTIGATOR'S BROCHURE. April 1959, 31pp. Lakeside Laboratories, Inc., Milwaukee, Wisc.

14,603

This investigator's brochure is concerned with an experimental drug, CATRON (phenylisopropylhydrazine), that has been found to be a potent enzyme monoamine oxidase (MAO) inhibitor with marked selectivity for brain tissue at dosage levels having little or no effect on the liver. Its effect in raising the levels of brain serotonin and norepinephrine has been the subject of extensive biochemical and pharmacological investigations. Clinical studies in the treatment of depressions, behavior and emotional problems of children, hypertension, angina pectoris, and rheumatoid arthritis have been conducted. T. G. R 62

14,604

USN Group Psychology Branch. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS IN GROUP PSYCHOLOGY. Rep. ACR 22, Sept. 1957, 41pp. USN Group Psychology Branch, OIR, Washington, D.C.

14,604

This bibliography lists technical reports submitted to the Office of Naval Research in the field of group psychology as of 1 January 1957. The primary areas covered are: 1) the structure and function of the group as a whole, 2) the behavior of the individual as a group member, 3) and a combination of (1) and (2) with emphasis on motivation. Other reports concern: disturbed psychological states which are of interest to the Navy; psychological warfare; and fatigue and related states. R 700 (approx.)

14,605

Chapanis, A. (Dir.). A REPORT OF RESEARCH UNDER CONTRACT WITH THE OFFICE OF NAVAL RESEARCH. PROGRESS REPORT NO. 2, 1 NOVEMBER 1959. Contract (NOR) 248(55), Nov. 1959, 14pp. Institute for Cooperative Research, Johns Hopkins University, Baltimore, Md.

14,605

This report outlines progress on a general research contract concerning psychophysiological aspects of sensory perception and discrimination relating to design characteristics, human utilization and evaluation of man-machine systems. A list of the personnel and their visits and special activities is given; the research reports published since the last report (four) and those awaiting publication (three) are listed; summaries are given for reports completed since the last report (four); and current and proposed research projects (twelve) are described. A bibliography of reports (twelve) published in the last two years is included. R 19

14,606

Jones, M.B. & Goodson, J.E. THE EFFECT OF BOREDOM ON SUGGESTIBILITY. Proj. NM 16 01.11, Subtask 16, Rep. 1, July 1959, 10pp. US School of Aviation Medicine, Naval Air Station, Fla.

14,606

To investigate the relationships between suggestibility and boredom, two groups of naval aviation cadets were deprived of all social contact for a period approximating eight hours. Immediately following isolation the cadets were tested individually for suggestibility, and an equal number of control subjects were also tested. The Hall body-sway technique was used to test for suggestion of postural sway and of arm levitation. Responses of the two groups were compared. T. R 12

14,607

Crook, M.N., Gray, Florence E., Hanson, J.A. & Weisz, A. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: FAMILIAR FORMS VIEWED AGAINST COMPLEX BACKGROUNDS IN FACSIMILE COPY. Contract DA 49 007 MD 536, Interim Rep. 3, May 1955, 9pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,607

To measure the effect of noise degradation on recognizability of form as seen against several types of background, test forms from an earlier experiment were grouped into four difficulty categories. The background arrangements were referred to as 1) plain, 2) ten percent small, 3) 50 percent small, and 4) 20 percent large. Each combination of forms and backgrounds was presented at four signal/noise levels. Subjects wrote on prepared record sheets the names of the forms they thought they could identify. Recognition scores were analyzed for recognition-noise functions for the several types of background. G. I.

14,608

Boardman, L.J. SOME CHARACTERISTICS OF THE EYE AFFECTING PHOTOMETRIC MEASUREMENTS. NRL Rep. 5296, May 1959, 19pp. USN Research Lab., Washington, D.C.

14,608

A series of measurements were made to determine how some of the luminosity characteristics of the eye change in the mesopic and scotopic regions of vision and how these changes affect photometric measurements. Two interdependent studies were made. 1) The variation of achromatic sensitivity over the retina of a fully dark-adapted eye was measured using five observers (for the temporal side), level of illuminance 2.1 effective microlamberts, and angular distances ranging from two to sixty degrees from foveal center. Measurements were extended on one subject for the nasal region, for luminances up to 30 effective microlamberts, and for various colors. 2) The effect of equivalent luminance due to size, shape, and color of the photometric field was measured on five subjects. T. G. I. R 6

14,609

Bryan, G.L., Rigney, J.W., Bond, N.A., Jr., LaPorte, H.R., Jr., et al. THE ROLE OF HUMANS IN COMPLEX COMPUTER SYSTEMS: A DESCRIPTION OF THE STUDY. Contract NOR 228(02), Proj. NR 153-093, Tech. Rep. 24, Jan. 1959, 57pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

14,609

The background, rationale, and procedures used to study personnel problems connected with programming and maintaining general purpose digital computers are described. Fifty computer locations were visited, and interview, observational, and questionnaire data were collected. Brief descriptions of the various data-collection techniques are given. This report is the first of a series of four; substantive findings will be presented in following reports. T. I. R 4

14,610

Baker, C.A., Morris, D.F. & Steedman, W.C. TARGET RECOGNITION ON COMPLEX DISPLAYS. Proj. 7184, Task 71580 WADC TR 59 418, Aug. 1959, 21pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

14,610

To determine the speed and accuracy of form recognition in a search task similar to that in air-to-ground radar and infra-red sensing systems, subjects (24) were first shown a reference photograph of a target and instructed to locate that target on a display containing numerous other forms. The stimulus forms were generated by filling in, on a statistical basis, some of the cells of a 90,000-cell matrix. Variables were: 1) four degrees of distortion between reference form and target, 2) four sizes of display with proportional increase in number of irrelevant forms, and 3) the stimulus properties of the forms (single cell or group of interconnected cells). Criterion measures (search time and errors) were analyzed for effect of these variables.
T. G. I. R 4

14,611

Baker, C.H. THREE MINOR STUDIES OF VIGILANCE. PCC Proj. D77 94 20 42, DRML Proj. 234, Rep. 234-2, H.R. 178, April 1959, 15pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

14,611

The three experiments reported were undertaken to test inferences made from an expectancy theory of vigilance. The first demonstrates the expectancy concept in a reaction time experiment. The second was undertaken to examine the hypothesis that vigilance decrement is a function of inter-signal regularity. The third investigates the way in which knowledge of results operates in a vigilance setting. An appended note presents data on the ability of human subjects to generate a series of signals characterized by temporal regularity.
T. G. R 11

14,612

Arens, Beverly E. & David, H.A. OPTIMAL SPACING IN REGRESSION ANALYSIS (PRELIMINARY REPORT). ca. 1958, 31pp. Virginia Polytechnic Institute, Blacksburg, Va.

14,612

Experimenters frequently measure a response (or dependent) variable y for a set of values of an independent variable x . In this analysis, the assumption is made that x can be measured without error but that y possibly differs from its unknown true value $f(x)$ by a random term z which may represent experimental error, individual random departure from the true law or both. Polynomial approximations to $f(x)$ provide a convenient approach to these problems. The situation in which the levels of x are at the choice of the experimenter is dealt with in terms of how the n values of x should be spaced in order to minimize the error of the approximating polynomial. Cases of negligible random error and a straight-line approximating function are considered. (See also 14,615) T. G. R 4

14,613

David Clark Co., Inc., Worcester, Mass. INTEGRATION OF PERSONAL EQUIPMENT. Contract AF 33(616) 3329, Proj. 6325, WADC TR 59 382, Aug. 1959, 28pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,613

This report covers the efforts, methods of approach, and solutions to some of the problems of integrating items of aircrew personal equipment. The major problem of integration is the combining of various individual items that have specific functions with each other without complicating these combinations beyond their effective limits. Practical solutions were achieved in some areas, but additional work is required in others.
I.

14,614

Graham, C.H. & Haia, Y. SOME VISUAL FUNCTIONS OF A UNILATERALLY DICHROMATIC SUBJECT. Proceedings of a Symposium held at the National Physical Laboratory on Sept. 22, 24 & 25, 1957, Paper 11, 280-295. National Physical Laboratory, London, England.

14,614

This paper presents a report on the visual functions of a subject giving color blind discriminations with the left eye and normal discriminations with the right eye. Luminosity curves, flicker curves, brightness matches, color-mixture data, hue discrimination data, and binocular color matching data are presented and discussed. The implications of the findings for visual theory are indicated.
G. R 13

14,615

David, H.A. & Arens, Beverly E. OPTIMAL SPACING IN REGRESSION ANALYSIS. ca. 1958, 13pp. Virginia Polytechnic Institute, Blacksburg, Va.

14,615

This report is the final version of a study of optimal spacing in regression analysis. See abstract for 14,612.
T. G. R 6

14,616

Case Institute of Technology. COMMUNICATIONS IN THE PRESENCE OF AN INTELLIGENT NOISE SOURCE. Contract AF 30/602/ 1847, WADC TR 59 68, Tech. Note 3, 1959, 9pp. Operations Research Group, Engng. Administration Dept., Case Institute of Technology, Cleveland, Ohio.

14,616

Strategies for a communicator to use during interference by an enemy jammer have been discussed in previous notes. The objective of these strategies was to enable the communicator to maximize either his average unjammed message time or his average channel capacity. This note discusses a system of coding to be used for keeping errors within reasonable bounds when the receiver and transmitter cannot know at which points in time they are communicating without interference. The suggested system is not considered to be optimal but is an improvement over mere repetition.

14,617

Parker, J.F., Jr. A REPORT ON RESEARCH CONCERNING A METHOD FOR OPTIMIZING THE EFFICIENCY OF TRAINING PROGRAMS. ANNUAL REPORT. Contract NONR 2489(00), Dec. 1958, 13pp. Psychological Research Associates, Inc., Arlington, Va.

14,617

This note describes the basic nature of a research plan that aims to determine the extent to which effectiveness of training can be increased by using instructional procedures based on the changing patterns of ability which have been found to underlie each proficiency stage of learning. A tracking task is to be used. The plan of procedure, performance measures, and the training program are outlined and discussed.
G. R 1

14,618
Perez, S.H. IMPLICATIONS OF RANGER TRAINING FOR
FIGHTER PREDICTION. Proj. 29560000, Comb Sel b-02,
Tech. Rep. 116, Oct. 1959, 39pp. USA Personnel Re-
search Branch, Adjutant General's Office, Washington,
D.C.

14,618
To continue current research efforts to identify men
with fighter potential, a field situation is needed in
which combat trainees can demonstrate their tactical
competence in the face of combat-like pressures. The
rigorous Ranger Training course of the US Army Infantry
School provides a close approximation to the type of
field situation desired. As a first step in translating
Ranger activities into situations where the individual's
competence might be assessed, a civilian research psy-
chologist enrolled in the eight-week Ranger training
course. On the basis of his records and observations a
preliminary blue-print of patrol-patterned situations
was drawn up and is presented herein.
I.

14,619
Neely, K.K. & House, P.M. THE INTELLIGIBILITY OF
VERBAL SYMBOLS: II. TWO-, THREE-, AND FOUR-WORD
PHRASES OF VERBAL COLOUR SYMBOLS. PCC Proj. D77 94
40 07, DRUM Proj. 118, Rep. 118-3, March 1959, 18pp.
Defence Research Medical Labs., Toronto, Ontario,
Canada.

14,619
To evaluate the effects of adverse noise conditions
(-12 decibels signal-to-noise ratio) on the intelligi-
bility of 26 verbal color symbols used in radiotelephony,
test lists were recorded in which each word appeared
twice in each position of a two-, three-, and four-word
phrase. Trained listeners (69) responded to the record-
ed test lists by writing down the word they heard. The
data were analyzed for differences in intelligibility
among the symbols, for differences with respect to po-
sition in the phrase, and for differences due to the use
or omission of a carrier phrase.
T. R 5

14,620
Miller, E.F., II. EFFECT OF EXPOSURE TIME UPON THE
ABILITY TO PERCEIVE A MOVING TARGET. Proj. NM 17 01
11, Subtask 2, Rep. 2, Jan. 1959, 11pp. USN School of
Aviation Medicine, Naval Air Station, Fla.

14,620
To determine the effect of duration of observation
upon the ability to perceive a moving target, 66 naval
aviation cadets were tested on a target moving at 110
degrees/second angular velocity. Seven exposure times
were used: 200, 300, 400, 500, 600, 660, and 820 milli-
seconds; the moving targets were Landolt rings. Thresh-
old measurements were made for each exposure time by re-
ducing the size of the ring until a point was reached
when 50 percent correct judgments of the position of the
opening were made after each target excursion. Individ-
ual differences are discussed.
T. G. R 6

14,621
Creen, B.F. Jr. (Leader). PSYCHOLOGY GROUP 58
QUARTERLY PROGRESS REPORT. Contract AF 19(604) 5200,
Rep. 58 B 1, Sept. 1959, 9pp. Lincoln Lab., Massachu-
setts Institute of Technology, Lexington, Mass.

14,621
This is a report of work accomplished or in progress
on a research program in psychology. The major program
is aimed at the development of more effective means for
men to communicate with machines. Five aspects are be-
ing developed: automatic speech recognition, syllable
segmentation, speech synthesis, information processing
language, and information retrieval. Human information
processing such as auditory encoding, visual psycho-
physics, prediction of complex judgments, remembering
and rote learning are also under investigation. Sev-
eral methodological problems are discussed.
G. R 6

14,622
Loeb, M. & Riopelle, A.J. THE INFLUENCE OF LOUD
CONTRALATERAL STIMULATION ON THE THRESHOLD FOR
LOWER FREQUENCY TONES. Proj. 6:95 20 001, Task 01,
Rep. 404, Nov. 1959, 11pp. USA Medical Research
Lab., Fort Knox, Ky.

14,622
To measure the attenuation due to the acoustic re-
flex for sounds near threshold, two experiments were
performed using different psychophysical procedures.
In the first, subjects tracked the threshold for 100,
500, and 1000 cps tones continuously by a procedure sim-
ilar to Bekesy audiometry; in the second, thresholds
were determined by the method of limits for brief 125,
500, and 1000 cps test tones. In both experiments a
contralateral tone (100 decibel, 2000 cps or 105 deci-
bel, 2200 cps) was introduced to activate a reflex and
the resultant shift for a test tone was noted. Possible
significance of the results is discussed.
T. G. I. R 8

14,623
Schutz, H.G., Overbeck, R.C. & Laymon, R.S. RELA-
TIONSHIP BETWEEN FLAVOR AND PHYSICO-CHEMICAL PROPER-
TIES OF COMPOUNDS. FINAL REPORT. Contract DA19
129 QM 1141, Proj. 7 84 15 007, P 1115, Rep. 3, Oct.
1958, 40pp. USA Quartermaster Food and Container
Institute for the Armed Forces, Chicago, Ill. (Bat-
telle Memorial Institute, Columbus, Ohio).

14,623
Work is reported on the following: 1) an experiment
on adaptation and cross-adaptation in which ten subjects
rated the intensity of 30 diverse odorants (on a nine-
point scale) at supra-threshold levels for a ten-minute
period, at which time they rated a second odorant to
yield cross-adaptation information; 2) physico-chemical
data collection on the 30 odorants; 3) computation of
rank-order correlations among the physico-chemical vari-
ables, the nine factors obtained in a factor analysis of
the 30 odorants in a previous study, rate of adaptation;
and intensity; 4) a discussion and interpretation of the
results in light of current olfactory theory and recent
experimental evidence.
T. G. R 21

14,624
Karask, B.S. & Zucker, F.J. (Eds.). THE MCGILL
SYMPOSIUM ON MICROWAVE OPTICS. PART II DIFFRACTION
AND SCATTERING. AFRC TR 59 118(II), April 1959,
369pp. USAF Electronics Research Directorate, AFRC,
Bedford, Mass.

14,624
This volume presents 39 papers dealing with various
problems in diffraction theory. The objective of the
symposium at which they were presented was to make an
appraisal of the status of the field and indicate future
lines of work. Some of the major topics dealt with are:
electromagnetic theory, general techniques, the geomet-
ric optics limit, asymptotic developments, diffraction
by apertures, scattering by specific bodies, radiation
patterns by antennas, and experimental studies.
T. G. I. R 175 (approx.)

14,625
Kopra, L.L., Pedrini, D.T. & Fullington, R.W.
DAY-TO-DAY STABILITY OF THE AUDITORY THRESHOLD IN
NOISE-EXPOSED AND NON-NOISE-EXPOSED AIR FORCE
PERSONNEL. Rep. 59 83, Aug. 1959, 10pp. USAF
School of Aviation Medicine, Brooks AFB, Tex.

14,625
To investigate short-term cumulative temporary
threshold shift in noise-exposed Air Force personnel,
daily pure-tone audiometric tests were administered on
five consecutive mornings to three groups of men: 1) 27
flight-line men exposed to job noise, 2) 24 flight-line
men not exposed to job noise during the test week, and
3) 52 non-flight men. The audiometric data were ana-
lyzed for day-to-day variability and for changes occur-
ring during the test week.
T. G. R 8

14,626

Kraus, R.H. DISORIENTATION: AN EVALUATION OF THE ETIOLOGIC FACTORS. Rep. 59 90, Aug. 1959, 8pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

14,626

A brief history of the development of instrument flight and a review of the physiologic mechanisms involved in maintaining aerial orientation were presented. To investigate the hypothesis that anything requiring the pilot to divert his vision from his orienting reference could lead to disorientation, each of three pilot subjects flying in F-100F jet aircraft was required to 1) make transition from visual flight reference to instrument flight reference upon sudden lowering of the hood and 2) attempt to maintain straight and level flight with eyes closed. The time to make transition and for the plane to attain a dangerous altitude was measured. The findings are discussed in relation to disorientation accidents.

G. R 13

14,627

Klein, S.J., Mendelson, E.S., & Gallagher, T.J. THE EFFECTS OF HYPOXIA ON AUDITORY SENSITIVITY: II. THRESHOLD SHIFTS IN A QUIET ENVIRONMENT. Proj. TED NAM AE-5112, Rep. NAMC-ACEL-411, Nov. 1959, 15pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn.

14,627

To investigate the effect of hypoxia on auditory threshold shifts, seven male adults with normal hearing inspired a nitrogen-oxygen mixture of 9.6 per cent oxygen by volume for an average of 16 minutes. Auditory threshold shifts from the pre-hypoxic level were recorded during the reduced oxygen intake phase and for 40 minutes (ten-minute intervals) after return to normal breathing. Bone and air thresholds were determined for frequencies ranging from 226 to 4096 cps. in one octave increments in a quiet environment. Threshold shifts were analyzed as a function of frequency.

T. G. R 11

14,628

Kidd, J.S. A COMPARISON OF TWO METHODS OF CONTROLLER TRAINING IN SIMULATED AIR TRAFFIC CONTROL TASK. A STUDY IN HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC CONTROL. Contract AF 33(616)-3612, Proj. 7184, Task 71583, WADC TR 58 449, Jan. 1959, 21pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Laboratory of Aviation Psychology, Ohio State University, Columbus, Ohio).

14,628

Improvement in performance in a complex task of radar air traffic control was compared for two conditions of training: 1) a constant high input load and 2) a graduated input load. Relative input load was defined as the number of aircraft under the control of a single pattern-feeder. Sixteen novice controllers were divided into two matched groups and were given ten training trials under one condition. Performances on trial ten were compared on several criteria of efficiency and safety for the two training conditions.

T. G. R 16

14,629

Helm, C.E. A MULTIDIMENSIONAL RATIO SCALING ANALYSIS OF COLOR RELATIONS. A TECHNICAL REPORT. Contract NMR-2214(00), Proj. NR 151-174, Ph.D. Dissertation, June 1959, 70pp. Dept. of Psychology, Princeton University, Princeton, N.J.

14,629

This study was designed to provide information relevant to the development of a uniform color scale and also to investigate the relations between two different multidimensional scales. Following an analysis of color models and uniform color scales and the problem of providing suitable data by multidimensional scaling procedures, a multidimensional triads ratio judgment experiment was carried out on a set of color chips using ten normal and four color defective subjects. The data were compared with those from two previous multidimensional successive intervals experiments. The findings are discussed for their relevance to the problem of scaling color relations for a uniform color scale.

T. G. I. R 58

14,630

Hickson, R.H., Scott, D.M., & Boyes, G.E. DETECTABILITY ON CATHODE RAY TUBE SCREENS: COMPARISON OF PPI, INSIDE-OUT PPI, AND B-SCAN UNDER NOISE AND NOISE-FREE CONDITIONS. PCC Proj. D77 94-20-22, DRML Proj. 163, Rep. 163-15, H.R. 156, June 1959, 16pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

14,630

To compare target detection performance of operators on three types of displays, an experimental radar indicator (developed by the National Research Council of Canada) was used. This equipment will present any of three displays on the same CRT (cathode ray tube): 1) a normal Plan Position Indicator (PPI), 2) an 'Inside-out' PPI, and 3) a B-scan. In one experiment the scope was noise-free; in the other a background of receiver-generated noise was present. Detectability thresholds were obtained for a wide range of target locations and compared for effect of type of display, target range, and noise conditions.

T. G. I. R 11

14,631

Hickson, R.H. VISIBILITY ON RADAR SCREENS: THE EFFECT OF SCOPE BRIGHTNESS AND RANGE. PCC Proj. D77-94-20-22, DRML Proj. 163, Rep. 163-17, H.R. 173, June 1959, 6pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

14,631

To investigate visibility thresholds for radar screens as a function of both scope brightness and range, two subjects made threshold judgments of target visibility on a 12-DPA plan position indicator cathode ray tube (CRT) for five screen brightnesses and nine ranges. Range was in tenths of the radius of a five-inch sweep-line and scope brightnesses (expressed as CRT bias voltage) were 45, 46, 47 (optimum), 48, and 49. The task was to report a target as soon as it became visible in a designated half-inch square. Mean threshold values were analyzed for effect of CRT bias, range, and test days.

R 8

14,632

Hawkes, G.R., & Warm, J.S. COMMUNICATION BY ELECTRICAL STIMULATION OF THE SKIN. I. ABSOLUTE IDENTIFICATION OF STIMULUS INTENSITY LEVEL. Proj. 6 95 20-001, Task USAMRL T-5, MEDEA, Rep. 400, Sept. 1959, 18pp. USA Medical Research Lab., Fort Knox, Ky.

14,632

The usefulness of current intensity level as a cue for signalling purposes was investigated. Four sets of stimuli of two, three, four, and five intensity levels each were selected for absolute identification. The levels selected ranged from 114 to 197 percent of the absolute threshold and were equally spaced in terms of equal subjective increments of sensation. Each of 24 subjects was tested on each stimulus series, with one series per session. The data (percent correct identifications) were analyzed for the amount of information transmitted (in bits) as a function of number of intensity levels. The results are discussed in terms of a communication system using this type of sensory input.

T. G. I. R 14

14,633

Gibson, Eleanor J., Gibson, J.J., Smith, O.W., & Flock, H. MOTION PARALLAX AS A DETERMINANT OF PERCEIVED DEPTH. J. exp. Psychol., July 1959, 58(1), 40-51. (Cornell University, Ithaca, N.Y.).

14,633

To investigate the common assertion that motion parallax is a cue for depth perception, the optics of differential velocities of the elements in a field of view were examined and two cases were distinguished: that of two velocities in the field and that of a gradient of velocities. Two-velocity experiments were conducted with 1) two spots and 2) two superimposed textures to carry motion; velocity difference was taken to be the essential cue to depth judgments. Reports were obtained for a large and a small velocity difference and for a motionless field. With new groups of subjects the experiment was repeated with verbal instructions about depth. The case of a flow of velocities (or flow-gradient) was also investigated.

T. I. R 15

14,634
Graham, C.H. & Heia, Y. STUDIES OF COLOR BLINDNESS: A UNILATERALLY DICHROMATIC SUBJECT. Proc. Nat. Acad. Sci., Jan. 1959, 45(1), 96-99. (Columbia University, New York, N.Y.).

14,639
Schorbach, P. COGNITION, MOTIVATION, AND TIME PERCEPTION. Contract N801R-66216, Tech. Rep. 2, Nov. 1958, 18pp. Laboratory for Research in Social Relations, University of Minnesota, Minneapolis, Minn.

14,634
This paper presents some visual discrimination measurements made on a unilaterally dichromatic subject. The results of these measurements--color mixture, spectral sensitivity, and binocular color matches--are discussed in relation to visual theory.
G. R 9

14,635
Graham, C.H. COLOR THEORY. Reprinted from Psychology: A study of a science. Study 1: Conceptual and systematic. Volume 1. Sensory, perceptual, and physiological formulations, 1959, 145-287. McGraw-Hill Book Co., Inc., N.Y. (Columbia University, N.Y.).

14,635
The account of color vision and color theory given here adheres to the following outline. 1) An account is given of certain discriminations that are especially significant for color theory: hue discrimination; luminosity, saturation, complementary colors, the two-color threshold, and color mixture. 2) A discussion is presented of the Young-Helmholtz and Herring color theories with accounts of variations or expansions of them. 3) A final section presents some analytic and methodological aspects of the general topic of color theory.
T. G. R 209

14,637
Rand Corporation. A SELECTED LIST OF UNCLASSIFIED PUBLICATIONS OF THE SOCIAL SCIENCE DIVISION THE RAND CORPORATION 1948-1959. Proj. RAND, Res. Memo. 1403 4, May 1959, 36pp. The Rand Corporation, Santa Monica, Calif.

14,637
This document contains a revised list of unclassified Reports, Research Memoranda, and Papers that have been issued by the Social Science Division of the RAND Corporation from its inception to May 15, 1959.
R 250 (approx.)

14,638
Shearer, J.W., Peterson, D.A. & Slebodnick, E.B. TECHNIQUES FOR HUMAN FACTORS EVALUATION OF PROTOTYPE SPECIAL WEAPONS AND ASSOCIATED EQUIPMENT. Contract AF 29(601)-513, Proj. 7800, AIR 259 59 FR-198, AFSC TR 59 14, April 1959, 132pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Washington, D.C.).

14,638
A method for systematic evaluation of human factors aspects of prototype special weapons equipment was developed. From available related studies and military specifications a source data, a number of human factors guides were constructed and tried out during standard weapon system evaluations. From these preliminary guides three were developed and further refined during evaluations of both bomb-type and missile warhead special missions. The final techniques include: 1) a guide to evaluation of preliminary manuals or instruction pamphlets, 2) a guide to static evaluation of equipment, and 3) an observational record form used in functional tryouts of equipment for noting operational requirements for personnel, time, and training.
I. R 4

14,639
On the basis of an exploratory study of social isolation, two hypotheses were suggested: 1) the force acting on a person in a barrier situation to reach a goal is an increasing function of the person's need for the goal; 2) the greater the relevance of this person's ideation with respect to goals, and 2) the greater within limits the magnitude of the force, the greater will be the person's estimate of the time spent in the barrier situation. These hypotheses were tested with female subjects in an experiment on "food tasting" in which deprivation of food, thinking about food, and the desire to eat corresponded to the concepts of need, relevance of ideation, and force.
T. R 15

14,640
Schaefer, V.H. & Ulmer, R.G. A REPRESENTATIVE BIBLIOGRAPHY OF RESEARCH IN LOW-FREQUENCY MECHANICAL VIBRATION. Proj. 6 95 20 001 05, Task 13, Rep. 405, Nov. 1959, 27pp. USA Medical Research Lab., Fort Knox, Ky.

14,640
The literature was surveyed for studies concerning the effects of low-frequency mechanical whole-body vibration. A few of the studies in each of the major areas--pathology and lethality, physiology, behavior, and theory and measurement--are discussed briefly. A number of the publications were selected for inclusion in a representative bibliography.
R 188

14,641
Tetley, W.H. THE CYBERNETIC THEORY OF LOGISTICS. Rep. M58 74, April 1958, 41pp. Industrial College of the Armed Forces, Washington, D.C.

14,641
The aim of this thesis is to evolve a Generalized Logistics Model and to express its parameters in terms of Information Theory. Part I deals with the basic principles necessary to construct such a model. Part II introduces the concept of an error-prone channel and discusses a Fundamental Theorem that can quite easily form the basis for a mathematical theory of logistics.
G. I. R 9

14,642
Stevens, S.S., Carton, A.S. & Shickman, G.M. A SCALE OF APPARENT INTENSITY OF ELECTRIC SHOCK. J. exp. Psychol., Oct. 1958, 56(4), 328-334. (Harvard University, Cambridge, Mass.).

14,642
By the method of magnitude estimation, subjects having no previous experience in judging electric shock made numerical estimations of the apparent intensity of an electric current applied through salt-water electrodes to the fingers of one hand. A ratio scale of subjective intensity was constructed and compared with a category scale that was determined by having subjects judge various currents on a scale from one to seven.
G. R 11

14,643
Sperling, P.I. BIBLIOGRAPHY OF RESEARCH REPORTS IN
PSYCHOPHYSIOLOGICAL STUDIES 1955-1958. Proj. 6 95.
20 001, MEDH MR, Rep. 359, March 1959, 15pp.
USA Medical Research Lab., Fort Knox, Ky.

14,643
The titles of research reports in psychophysiology
that have been sponsored by the U.S. Army Medical Serv-
ice are listed alphabetically by author. The period
covered is from 1955-1958. The various areas under
which the research was performed are: 1) sound and hear-
ing, 2) vision and perception, 3) complex behavioral
processes, 4) coordination and balance, and 5) somatic
influences. A subject-matter grouping of report numbers
is included.
R 143

14,644
Tolhurst, G.C. SYSTEMS TESTING: FURTHER APPROACHES
TO MICROPHONE EVALUATION. Contract N60NR 25525, ONR
Proj. NR 145 993, BuMedSurg Proj. NM 18 02 99, Subtask
1, Rep. 85, Jan. 1959, 8pp. USN School of Aviation
Medicine, Naval Air Station, Fla.

14,644
To explore procedures that might be used in evalu-
ating microphones and to set standards for evaluating
system components, two questions were investigated: 1)
Does bandwidth beyond that readily attainable contribute
to speech reception? and 2) Does restricting the dynamic
range of a system by various amounts of peak clipping
contribute to message reception? Multiple-choice tests
were recorded in noise by one voice using two different
microphones. One experimental series presented the signals
full-band and low-pass filtered in noise and quiet;
the other presented full-band recorded tests at six lev-
els of peak clipping with a plus six signal-to-ratio
white noise. There were 92 listeners.
T. G. R 5

14,646
Waldron, D.L. A PRELIMINARY STUDY OF THE EFFICIENCY
OF LIMITED FREQUENCY MONITORING AUDIOMETRY IN THE
AIR FORCE HEARING CONSERVATION PROGRAM. Rep. 59 89,
Aug. 1959, 4pp. USAF School of Aviation Medicine,
Brooks AFB, Tex.

14,646
The Rudmose audiograms of 879 aircraft and engine
maintenance men were examined in such a way as to answer
two questions: 1) The poorest threshold level of hearing
would have been identified in what percentage of this
sample if tested only at 4000 cps? and 2) What percentage
of those with a 15 decibel or higher hearing level, at
any of the frequencies from 500 through 4000 cps, would
have been picked up for more extensive testing if they
had been screened at 15 decibels for 4000 cps only? The
efficiency of using limited frequency audiometry that
employs 4000 cps as the test tone is discussed in the
light of the analyses.
T. R 5

14,647
Winterberg, R.P. & Channell, R.C. HUMAN FACTORS RE-
VIEW OF RADIO SET AN/GRC-50. Contract DA 36 039 SC
73253, DA Proj. 3 99 00 100, Task Order 18, July
1959, 16pp. Dunlap and Associates, Inc. Stamford,
Conn.

14,647
The AN/GRC Radio Set is reviewed in terms of the hu-
man factors involved in its operation. Possible opera-
tional difficulties are described, many of these being
associated with the present control arrangement and de-
sign. Recommendations are made for design changes that
should minimize operational problems.
I.

14,649
Lyman, J., Groth, Hilde, Ziedman, K., Fink, Carolyn J.,
et al. STUDIES OF EFFECTIVENESS OF ELIMINATION OF DIS-
PLAYED INFORMATION WITH OBSERVER PRACTICE INCREASE.
ANNUAL SUMMARY REPORT NOVEMBER 1958- SEPTEMBER 1959.
Contract N6NR 233(49), Rep. 58 62, Oct. 1959, 15pp.
Dept. of Engineering, University of California,
Los Angeles, Calif.

14,649
This report presents a review of research accomplish-
ments during the year 1958-1959. Activities in three
categories are described: 1) Development and check-out of
an electronically controlled display and control panel
with the necessary recording apparatus for the study of
specified display variables in a perceptual-motor task;
2) Development of methodology and actual construction of
a versatile paper-and-pencil test for the evaluation of
redundancy in dial reading tasks; 3) Initial experimental
investigations and subsequent statistical evaluation of
a) probability distribution and performance effects of
additional cues in the task; and b) performance effects
of type and amount of redundancy on a simulated dial
reading task.
T. G. I.

14,650
Westbrook, C.B. THE PILOT'S ROLE IN SPACE FLIGHT.
Proj. 1365, Task 13554, MADC TN 59 31, Feb. 1959,
16pp. USAF Flight Control Lab., Wright-Patterson
AFB, Ohio.

14,650
Man's basic capabilities as a control element—as an
actuator, sensor, computer, and as part of a complete
control system—are discussed and some conclusions drawn
as to his strong and weak points. Several factors that
contribute to a change in thinking regarding flight con-
trol in space missions are reviewed, e.g., reliability,
changed dynamic characteristics of the vehicles, and the
new control systems required. The phases of a lunar soft
landing mission are then reviewed to determine what func-
tions should or must be done automatically and what
should be done by man. Some conclusions are drawn as to
man's role in a space vehicle.
G. I.

14,651
Berbert, J.H. VISUAL ACUITY AS A FUNCTION OF INTENSITY
FOR DIFFERENT HUES. Proj. NR 442 000, Task NR 442
003, NRL Prob. 503.03, NRL Rep. 5104, May 1953,
21pp. USN Research Lab., Washington, D.C.

14,651
To determine the influence of luminous intensity and
hue on the resolution of fine detail, where the fine de-
tail is two points of light matched in intensity and
chromaticity on a dark background, threshold settings
were made by two subjects. The task was to adjust one
point of light (approach or recede) to an apparent "just-
touching" position; the angular subtense at the eye was
called the threshold angular subtense. Six colors were
used: white and five others having dominant wavelengths
near 400, 500, 550, 600, and 650 millimicrons. For
each color a range of intensities was used. The data
were analyzed to find the optimum hue and intensity range
for such settings.
T. G. I. R 12

14,652
Bushnell, D. MAJOR ACHIEVEMENTS IN BIODYNAMICS:
ESCAPE PHYSIOLOGY AT THE AIR FORCE MISSILE DEVEL-
OPMENT CENTER HOLLAMAN AIR FORCE BASE, NEW MEXICO
1953 - 1958. 1958, 56pp. USAF Missile Development
Center, Holloman AFB, N.M.

14,652
This monograph documents the contributions of Hol-
loman's Aeromedical Field Laboratory to the understanding
of the punishing effects of windblast and the tremendous
forces of abrupt deceleration encountered during emer-
gency escape from high-mach aircraft. The application
of this experimentation to the effects of the magnitude
and relatively long duration of g-loading experienced
during sustained acceleration of multi-stage space ve-
hicles is also discussed. A final section is devoted
to conflicting views on escape: seats versus capsules.
I. R 68

14,653
Chorafas, D.N. OPERATIONS RESEARCH FOR INDUSTRIAL MANAGEMENT. 1958, 303pp. Reinhold Publishing Corporation, N.Y.

14,653
This book presents a detailed explanation of some of the most recently developed analytic techniques used for managerial decision-making. The first chapters include the fundamentals of experimental model making, of game theory, of business simulation methods, and of strategic gaming. The later chapters are devoted primarily to modern allocation methods: linear programming, transportation and flow, matrix analyses for production scheduling and inventory control. A case study in strategic gaming and a mathematical model for simulated industrial competition are included.
T. G. I.

14,654
Crook, M.N., Hanson, J.A. & Weisz, A. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: FAMILIAR FORMS VIEWED AGAINST PLAIN BACKGROUNDS IN FACSIMILE COPY. Contract DA 49 007 MD 536, Interim Rep. 2, March 1955, 10pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,654
An experiment is described in which the effect of Gaussian noise on the recognizability of familiar forms against plain backgrounds is measured for forms of several levels of difficulty and for two printing definitions. Curves showing percent recognition as a function of signal/noise ratio are presented for the various combinations of conditions.
G. I.

14,655
Flight Safety Foundation Inc. ACADEMIC TRAINING NEEDS IN HUMAN FACTORS ENGINEERING. Human Factors Bull. 59 5H, 1959, 1p. Flight Safety Foundation Inc., N.Y.

14,655
The suggested core curriculum presented in this paper represents an attempt to illustrate how a one-year graduate level program could be organized which would cover the range of topics thought to be of greatest importance by those now working in the field. Students with varied undergraduate preparation and work experience could be included providing they have an adequate background in the biological and physical sciences, mathematics through calculus, and probability statistics through the analysis of variance.
R I

14,657
Goldman, S. INFORMATION THEORY AND RADAR. Research Reviews, Jan. 1959, NAVEXOS P 510, 8-11. (Syracuse University, Syracuse, N.Y.).

14,657
This paper discusses the application of information theory to the analysis of radar problems. Some of the contributions made by such an approach, such as the use of long radar-transmitted signal waveshapes in place of short pulses, are discussed.
I. R 2

14,658
Gordon, D.A. VISUAL DETECTION AND IDENTIFICATION: MILITARY APPLICATIONS. Proj. MICHIGAN, Memo Rep. 2144 397 R, April 1959, 23pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

14,658
This paper discusses the problems that arise in attempting a scientific approach to measures of visibility in a military setting. Questions of definition and of specific application are considered in problems of detection and identification. A final section is devoted to the solution of military visibility problems.
T. G. I. R 11

14,659
Hale, F.C. & O'Hara, J.J. AN ENGINEERING ANALYSIS OF CARGO HANDLING - X-ENERGY EXPENDITURE OF LONGSHOREMEN. Contract N00N 233(07), Rep. 59 20, June 1959, 49pp. Dept. of Engineering, University of California, Los Angeles, Calif.

14,659
To explore the energy cost and physiological cost of the longshoring task, a systems engineering study was carried out in the Los Angeles and Long Beach harbors. Energy cost was assessed by the indirect methods of oxygen consumption, heart rate, and ventilatory response; activity measurements were made by systematic work sampling techniques. The energy expenditure data obtained for a variety of longshoring task was compared with known data from other industrial tasks. The percentage of work-cycle spent working was compared with earlier studies. Correlations between the two types of data were computed. It is suggested that current work-rest relationships be reviewed in light of the findings of this study.
T. G. I. R 59

14,660
Held, R. & White, B. SENSORY DEPRIVATION AND VISUAL SPEED: AN ANALYSIS. Science, Oct. 1959, 130(3379), 860-861. (Brandeis University, Waltham, Mass.).

14,660
To investigate changes in judgment of visual speed as a consequence of sensory deprivation, a series of experiments was conducted. The task was to observe a black bar sweep, like the second hand of a clock, through 90 degrees from a horizontal to a vertical position at a rate of 60 degrees per second; at the vertical the bar disappeared and a judgment was required as when the hidden bar would reach a fixed marker ten degrees beyond. Performance before and after the following conditions was analyzed: 1) eight hours patternless visual stimulation; 2) one-half hour of the same; 3) randomized visual stimulation (extrinsic noise); 4) hyper-stable stimulation (exposure to a fixed pattern); and 5) dark exposure field.
T. I. R 4

14,661
Hubbard, H.H. & Maglieri, D.J. AN INVESTIGATION OF SOME PHENOMENA RELATING TO AURAL DETECTION OF AIRPLANES. Tech. Note 4337, Sept. 1958, 49pp. National Advisory Committee for Aeronautics, Washington, D.C. (Langley Aeronautical Lab., Langley Field, Va.).

14,661
An investigation was conducted to evaluate the significance of the external noise level of an airplane with regard to its detection by ground observers. Modifications were made in the propulsion system of a single-engine airplane to reduce its external noise. Conventional noise level measurements consisting of broad-band and narrow-band frequency analyses were made in static ground tests. Listening data were obtained with the aid of ground observers for cruise flights as well as take-offs, landings, and power-off glides for the modified and for an unmodified airplane.
T. G. I. R 11

14,662
Iseley, C.W. & Carl, J.M. CRT TARGET DETECTABILITY WITH TRANSPARENT AND OPAQUE PHOSPHORS. Proj. NA 433 003 & NE 096 600 2, NRL Prob. R05 20, NRL Rep. 5413, Oct. 1959, 7pp. USN Research Lab., Washington, D.C.

14,662
As part of a program of research on visual factors in cathode-ray tube (crt) display systems, problems arising from environmental illumination are being investigated. An investigation was made of the target detectability characteristics of a transparent and an opaque phosphor under moderate illumination conditions. A radar B-scope presentation was simulated; independent variables were crt grid bias, receiver noise, and type of phosphor; nine subjects participated in target detection tests. Detectability thresholds were analyzed for the effects of the independent variables and their interactions.
T. R 8

14,662

Jones, G.M. DISORIENTATION IN FLIGHT. FFRC/Memo 96, Sept. 1958, 14pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

14,663

The main sources of information about orientation, normally available to man (visual sensation and those special sensations responding to linear and angular movements) are related to problems of disorientation during flight. Attention is drawn to the unreliability of the sensing mechanisms other than the eyes during flight and evidence is given, drawn from experimental investigations, to show that even the eyes may feed misleading information to the brain. Implications for the aircraft designer are discussed.
G. I. R 5-

14,666

Krendel, E.S. THE SPECTRAL DENSITY APPROACH TO A PERCEPTUAL-MOTOR TASK. Albion Electronics, 1952, 2pp. (Franklin Institute Laboratories, Philadelphia, Penn.).

14,666

To study the human operator's frequency response, a method was selected in which the spectral density of the output was compared to the spectral density of the input, using a random signal as the input on a simple compensatory tracking device. The question of linearity of the operator's response was examined by comparing the amplitude frequency response for two subjects when tracking a distribution whose mean absolute amplitude was one centimeter, and another of two centimeters. The effect of practice was examined by comparing the output when the subjects were naive and when highly trained. The effect of instructions to track for accuracy and for speed was also examined. The suitability of the method for further research is discussed.

14,667

Lawrence, M. THE EFFECT OF OVERSTIMULATION AND INTERNAL FACTORS ON THE FUNCTION OF THE INNER EAR. Contract DA 49 007 MD 634, Prog. Rep. 9, Jan. 1958, 5pp. University of Michigan, Ann Arbor, Mich. & Kresge Medical Research Building, Ann Arbor, Mich.

14,667

This paper reports progress on a research contract in which some of the phenomena known, through electrical and histological studies, to occur within the cochlea are examined by audiometric means. The ultimate goal is to establish audiometric measures that can serve as a diagnostic tool to pinpoint the cause of altered hearing. Specifically, the dynamic range, as determined by measurements of the threshold of aural harmonics, has been investigated. Also the physiology and morphology of the cochlea in the normal condition as well as under the influence of various agents, particularly loud sounds, are being studied. Six studies concerned with the above topics are reviewed briefly.
R 6

14,668

Peterson, G.M., Evans, J.L. & Weldon, R.J. ACCURACY IN CALCULATING ARITHMETICAL PROBLEMS OF VARYING COMPLEXITY. Engng. Res. Rep. SC 3896(TR), Oct. 1956, 103pp. Sandia Corporation, Albuquerque, N.M. (University of New Mexico, Albuquerque, N.M.).

14,668

To determine methods of solving arithmetical problems which would reduce the number of errors when human computers perform the work, college students in mathematics were used to test 11 different methods. These methods were of three types: partnership, worksheet, and self-check. The problems, simple to complex, involved the operations of addition, subtraction, multiplication, division, use of logarithms, single and double interpolations, and cross references to data in tables and graphs. Problems were analyzed to find all computational errors and analyzed for effect of method used, for factors contributing significantly to the scores, and for error types.
T. G. I. R 48

14,669

Rosba, J. & Martin, P. AN EXPLORATORY STUDY INTO THE EFFECTS OF LOW BLAST PRESSURE ON BEHAVIOR IN RHESUS MONKEYS. OOD Proj. TBI 1000, Rep. Tech. Memo. 11-59, Oct. 1959, 23pp. USA Ordnance Human Engineering Lab., Aberdeen Proving Ground, Md.

14,669

To provide information on animal behavioral phenomena under conditions of low level (five to seven pounds per square inch) blast pressure stimulations, four psychological-test-sophisticated Rhesus monkeys were administered the following tests before, during, and after blast exposures: object discrimination; delayed response; motor coordination; and locomotor activity. Changes in performance were observed and analyzed.
G. I. R 24

14,670

Schaefer, V.H., Ulmer, R.G., Link, H.J. & Yost, D.H. SOME BEHAVIORAL AND PHYSIOLOGICAL STUDIES IN VIBRATION. Proj. 6 95 20 001, Task USAMRL T-5, MEDEA, Rep. 389, June 1959, 31pp. USA Medical Research Lab., Fort Knox, Ky.

14,670

Four experiments designed to explore basic effects of whole-body vibration were studied. The variables studied were body weight, food intake, fecal output, water intake, urine output, open field activity, and elevated maze and straight-alley behavior. Pathological data were also obtained. Rats were used as subjects. The vibration frequency was at 25 cps; the motion was sinusoidal, and the displacement was 0.25 inch. The various experiments used varied schedules of food deprivation, vibration, and type of behavior test. The results are discussed in terms of behavioral and physiological functioning, evidence of adaptation, vibration as a stressor, and histopathological changes.
T. I. R 23

14,671

Schärf, B. LOUDNESS OF COMPLEX SOUNDS AS A FUNCTION OF THE NUMBER OF COMPONENTS. J. Acoust. Soc. Amer., June 1959, 31(6), 783-785. (Northeastern University, Boston, Mass.).

14,671

To investigate the effect on loudness of complex sounds of varying the number of components within the sound, complexes of two, three, four, and eight tones, and a band of white noise were matched in loudness to a 1500 cycle tone. The overall spacing, ΔF , between the lowest and highest components of the stimuli were held constant at either 175, 1600, or 3400 cps. With the complexes centered around a given frequency, four loudness levels were tested (25, 50, 75, and 90 decibels Sound Pressure Level). The data were analyzed as a function of the number of components. An explanation of the findings is suggested.
T. I. R 7

14,672

Stern, J.A. PHYSIOLOGICAL STRESS AND FOOD CONSUMPTION. PROGRESS REPORT. Contract DA19 129 QM 802, Proj. 7 84 15 007, Rep. 6(Progress), Aug. 1958, 24pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. (Washington University, St. Louis, Mo.).

14,672

The relationship between physical stress and a self-selection diet of rats was investigated. The physical stresses were food deprivation, forced activity, and cold exposure. The self-selection diet consisted of casein, sugar, fat, and salt. Pre-, post-, and during-stress measurements were taken of the rats' weight and their intake of water and different nutrients.
G. R 17

14,673

Stevens, S.S. ON THE VALIDITY OF THE LUMINOUS SCALE. *J. Acoust. Soc. Amer.*, July 1959, 31(7), 990-1000. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

14,673

This paper tries to answer certain objections relating to the validity of the sone scale (loudness scale). It is argued that the form of the sone scale can be verified by cross-modality matchings. Instead of working with numerical estimates of magnitudes or ratios, these new procedures allow observers to equate apparent intensity of stimuli in two different sense modalities. Results of these experiments are offered as evidence for the validity of the sone scale. An explanation of the subjective intensity function is offered.

G. 28

14,674

Stevens, S.S. (Dir.). PERIODIC STATUS REPORT XXCVI PERIOD COVERED: 15 MAY - 15 NOVEMBER 1959. Contract N00011-59-1001, Proj. N0142 201, & National Science Foundation Grant G 2649, PHS 85, Nov. 1959, 19pp. Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

14,674

This report presents the status of work accomplished in the field of psychoacoustics by members of the Harvard Psychoacoustic Laboratory. Summaries are given for ten completed studies and for ten studies in progress.

R 28

14,675

Stevens, S.S. THE QUANTIFICATION OF SENSATION. *Psychologia*, Fall 1959, 3(4), 606-621. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

14,675

The problem of the measurement of sensation (reactions, verbal or otherwise, made by organisms in response to stimuli) is discussed in the light of recent research. The various types of scales that could be used for measurement are discussed and the ratio scale singled out for its use in quantifying the magnitude of sensation. The power law as shown in measurements of the relation of psychological magnitude to stimulus magnitude for several sensory modalities is discussed, and some experiments in cross-modality validation are reported.

R 13

14,676

Sutro, F.J., Ward, H.O. & Townsend, C.A. HUMAN VISUAL CAPACITIES AS A BASIS FOR THE SAFER DESIGN OF VEHICLES. FINAL REPORT. Contract AF33(616) 61 01 604, June 1958, 28pp. Medical Research Lab., CAA, Columbus, Ohio.

14,676

To complete the description of man's limits of fixation and total behavioral field of vision for a sedentary task (no body motion), final results are presented on the effects of combined movements of both head and eyes on foveal and peripheral visual fields. Both maximum and moderate extents of head and eye movement are treated, with the latter taken as 45 percent of maximum. These results are based on data in the 1958 Annual Report. The results are discussed with regard to applications. Measurements are reported on the visual occlusion due to the obstruction of the subject's own body, with effects on visual field computed. In addition, some field tests on the use of fluorescent paint to make a vehicle more conspicuous are reported.

T. 1.

14,677

Isabelle di Francia, G. (Supervisor). BASIC RESEARCH IN THE FIELD OF VISION. FINAL REPORT. Contract AF 33(616) 61 01 604, June 1958, 28pp. Istituto Nazionale di Fisica, Accademia-Firenze, Italy.

14,677

The general object of the research, summarized in this paper, was to investigate some specific effects of contrast and of interaction which arise due to a variation of the light stimulus with time. Three topics were studied: 1) the role of eye movements in vision, 2) the mutual interaction of the two eyes, and 3) the influence of the time variation of the luminance on fusion conditions and on electroretinal response. Practical application to light signals is discussed.

T. G. 1. R 26

14,678

Armed Forces-National Research Council Committee on Hearing and Ear-Acoustics. PROBLEMS IN MILITARY AUDIOLOGY: A CHAIR SYMPOSIUM. 6. AUTOMATIC AUDIOLOGY. PD 06403, NE 121303 1 (REV. 12-1), Dec. 1957, 28pp. USN Electronics Lab., San Diego, Calif. (Reprinted from: *J. Speech Dis.*, Dec. 1957, 22(3), 729-736).

14,678

This symposium was concerned with problems facing the Armed Forces in establishing programs to test more accurately the hearing of candidates for military service. Because of the importance of adequate testing programs in the services, the relevant material from the symposium is presented here. The following aspects of the program are included: Veteran's compensation for hearing loss (Kenneth O. Johnson); Diagnostic audiometry (Gordon Hoople); A classification of hearing tests (Ira J. Hirsh); Review of the report by the working group on audiometry (Raymond Carhart); Automatic audiometry (John C. Webster); Practical limitations in military audiometry (Arne Glorig); and Audiometry in the armed forces (The CHAMA Council).

14,679

USN Research Lab. AN AIR TRAFFIC CONTROL COLOR DISPLAY. Proj. NR 416 000, Task NR416 002, & NE 010 234 2, BUSHIPS S 1736, April 1956, 9pp. USN Research Lab., Washington, D.C.

14,679

A cathode ray tube color display suitable for military purposes is described. A new method for obtaining color presentation and its application to an air traffic control display are discussed. The display is a two-color (red and green) five-inch Plan Position Indicator used in conjunction with the carrier all-weather flying monitor display. The two colors are used to differentiate between two categories of aircraft.

I. R 4

14,680

von Békésy, G. NEURAL FUNNELING ALONG THE SKIN AND BETWEEN THE INNER AND OUTER HAIR CELLS OF THE COCHLEA. *J. Acoust. Soc. Amer.*, Sept. 1959, 31(9), 1236-1249. (Harvard University, Cambridge, Mass.).

14,680

This paper attempts to show that 1) the rotating tones in hearing, 2) the rotating vibrations on the skin, 3) the difference limen for the smallest perceptible distance on the skin, and 4) Mach's law of contrast are all a consequence of the same funneling action of the nervous system. A neural funneling unit is proposed that takes into account that a local stimulus produces both an area of activity and, around it, an area of decreased activity. The funneling action between these areas of sensitivity in the cochlea was investigated. The cochlear model (described earlier) was further developed to incorporate the findings.

G. 1.

14,681

McIntire, R.J., Yafenc, R. & Peterson, G.W. FACTORS INFLUENCING DIAL OPERATION: II. SPECIAL-PURPOSE DIALS-SINGLE DIALS. Engng. Res. Rep. SO 3839(12), April 1956, 48pp. Smiths Commission, Albuquerque, N.M. (University of New Mexico, Albuquerque, N.M.).

14,681

To determine the relative merits of three special-purpose, double-number dials, 96 subjects were tested. Each subject first took the dial booklet test in which he read and recorded settings from photographs of the dials; then he entered a booth where he was required to set the actual dials or to check settings already made. A total of 14,400 settings and checkings were made and recorded; time to perform each operation was also recorded. Number and magnitude of errors and time scores were analyzed for differences due to dial design. Dial test booklet results were analyzed to determine whether it was an accurate predictor of dial operation. A test of the hypothesis that checking errors are inversely related to frequency with which errors are encountered was made. T. G. I. R 2 B

14,683

Anderson, E.S., Stenler, F.W., Kellough, R.F., Jr. & Rogers, E.B. AIR-BLAST STUDIES WITH ANIMALS. Subproj. 4 95 02 002 03, AFOSR 1110, OLCR 2266, July 1959, 22pp. USA Chemical Warfare Lab., Army Chemical Center, MD.

14,683

The damage to be expected in man due to the long duration blasts from bombs is not known at present. As a step in obtaining such information, a study of the extent and nature of injuries to large and small animals exposed to air blast in the large shock tube at the Ballistics Research Laboratory, Aberdeen Proving Ground, is under way. This report is of a pilot study, in which single goats, rabbits, and groups of mice were exposed in the tube under a number of conditions that varied, especially the extent of animal translation and the shock front characteristics. The feasibility of using the tube for such experimentation is discussed. T. G. I. R 6

14,684

Burgess, B.F., Jr. THE EFFECT OF TEMPERATURE ON TOLERANCE TO POSITIVE ACCELERATION. NADC WA 5936, Proj. 1M 19 01 12 1, Rep. 16, May 1959, 10pp. US Air Development Center, Johnsville, Penn.

14,684

To extend knowledge of the effect of heat on tolerance to positive acceleration and to explore the effect of environmental temperatures beyond the limit that could be compensated for by the body's normal heat regulatory mechanism, six trained centrifuge subjects received positive acceleration in a temperature range from 75 degrees to 160 degrees F. (Fahrenheit). Impairment in vision was used as the physiological end point, and changes in tolerance to acceleration was used as the criterion for determining the overall efficiency of the various mechanisms of the body in combatting the heat stress. Recordings of skin temperature, respiratory rate, heart rate, reaction time, and light error were made for all centrifuge runs. G. R 3

14,685

Brown, E.L. PSYCHOLOGICAL ASPECTS OF SPACE OPERATIONS. Sept. 1959, 7pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

14,685

Human performance during zero g has been studied while flying over 1000 zero g trajectories in a Convair C-131B transport airplane. A crew of about ten participated in each flight. A summary of the information gained is given in the following areas: 1) human performance on motor and mental tasks, 2) performance on actual emergencies, 3) human performance on experimental tasks, 4) locomotion inside and outside space vehicles, and 5) human perceptive orientation.

14,686

Bowman, D.K., Ostrowski, J.J. & Sebra, W. EFFECT OF LIGHT POLARIZATION ON THE COLOR APPEARANCE OF VARIOUS SURFACES AND SUBSTANCES. Ordnance Proj. TB 2 001, DA Proj. 5 5 99 01 004, Rep. 4102(Final), Feb. 1958, 15pp. USA Materials Lab., Detroit Arsenal, Mich.

14,686

To determine the effect of polarized light on the color appearance of vegetation and colored surfaces in the visible bands of the spectrum, spectrophotometric analysis of color transparencies was made. Natural vegetation and prepared specimens, utilizing natural sunlight and artificial illumination respectively, were photographed with and without a polarizing filter under identical conditions. Comparison exposures (on film strips) were then analyzed for spectral transmittance. T. G.

14,687

Baker, H.D., Doran, M.D. & Miller, K.E. EARLY DARK ADAPTATION TO DIM LUXURANCES. J. Gen. Sci. Amer., Nov. 1959, 52(11), 1065-1070. (Dept. of Psychology, Florida State University, Tallahassee, Fla.).

14,687

To investigate the shape of the dark adaptation curve to dim light during the beginning of adaptation, visual threshold changes were measured at several intervals just before and just after a preadapting light was dimmed to several luminance levels. Five subjects were used. Threshold measurements were used to trace the beginning of dark adaptation. The implications of the findings for visual theory are discussed. G. I. R 17

14,688

Birdsall, T.G. DETECTION OF A SIGNAL SPECIFIED EXACTLY WITH A NOISY STORED REFERENCE SIGNAL. Contract AF 49(638) 369, Proj. 9778, Task 37710, AFOSR TN 59 909, TR 93, Sept. 1959, 22pp. Research Institute, University of Michigan, Ann Arbor, Mich.

14,688

This report treats the optimization problem of detecting the presence of a signal in a background of white Gaussian noise under the restriction that the signal is specified exactly but the receiver memory contains only a noisy version of the signal. The optimum receiver is specified. The performances of both the optimum receiver and the cross-correlation receiver with a noisy memory are calculated and compared for a special case. While this study has implications for many fields, it is only the applications to psychophysics that are discussed here. G. I. R 3

14,689

Bilger, K.C. LABORATORY FACILITIES EMPLOYED IN PSYCHOPHYSICAL MEMORY EXPERIMENTS. Contract AF 49(638) 369, Proj. 9778, Task 37710, AFOSR TN 59 923, TM 72, Sept. 1959, 17pp. Research Institute, University of Michigan, Ann Arbor, Mich.

14,689

Equipment and operating procedures used in psychophysical memory experiments at Electronic Defense Group are described and illustrated. The equipment includes that used to generate and measure signals and noise, PSYVAR (Psychological Testing and Recording) the programming equipment, and ROMPAR (Random Orthogonal Message Presenter and Recorder). This equipment gives precise control of signal parameters and enables one to collect efficiently the large quantities of data required for specification of the parameters of the human hearing mechanism. I. R 2

14,690

Rehke, A.R. MILITARY ASPECTS OF UNDERWEIGHT AND OVERWEIGHT. Res. & Devel. Tech. Rep. USNRL TR 205 MS 060 G01, Dec. 1957, 56pp. USN Radiological Defense Lab., San Francisco, Calif.

14,691

This study analyzes military standards for underweight and overweight individuals. Basic research pertinent to the analysis is summarized. The concept of an organized body pattern (distortion in the healthy individual only by an accumulation of excess fat) such that constants applicable to populations can be derived from measurements on a comparatively few individuals is examined in light of available anthropometric data. Anthropometric data are compiled for both a reference military man and a woman. A weight reduction experiment on one man (age 55) is described.

T. G. R 43

14,691

Clarke, D.G. (Proj. Officer). OPTIMUM INSTRUMENT PRESENTATION AND PANEL ARRANGEMENT FOR ARMY ROTARY-WING AIRCRAFT. REPORT OF PROJECT NR AVN 457.8/59, Proj. NR AVN 457.8/59, Aug. 1959, 9pp. USA Aviation Board, Fort Rucker, Ala.

14,691

To determine the optimum panel arrangement for the "basic six" flight instruments in Army rotary-wing aircraft, aviators with varying amounts of experience flew helicopters under actual and simulated instrument conditions using various panel arrangements. Further testing and study were conducted to determine an optimum presentation for helicopter integrated instrument displays. Instrument flight was attempted from the cockpit's seat, utilizing the pilot's instruments in order to determine whether a copilot's panel is required. Recommendations are included.

I.

14,692

Crosbie, R.J. THE REQUIREMENTS FOR MODIFICATION OF THE HUMAN CENTRIFUGE FOR HIGH PERFORMANCE AIRCRAFT AND SPACE VEHICLE SIMULATION RESEARCH. Proj. NM 11 02 12.6, Rep. 3 & Proj. TED ADC AE 1410, Rep. NADC MA 5907, July 1959, 30pp. USN Air Development Center, Johnsville, Penn.

14,692

This paper presents a proposed modification program for the human centrifuge at the Aviation Medical Acceleration Laboratory. Specifications are given concerning centrifuge improvements as a dynamic simulator for space vehicle studies such as the X-15 and Mercury Project and for g-tolerance and performance investigations. A proposed 100 g capability for the centrifuge is discussed, and an interchangeable capsule concept is explained. Also presented are the detailed requirements for the complete program along with criteria for a feasibility study of the proposed modification.

I.

14,693

Carhart, R. & Jerger, J.F. A PREFERRED METHOD FOR CLINICAL DETERMINATION OF PURE-TONE THRESHOLDS. Rep. 59 91, Sept. 1959, 14pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Audiology Lab., Northwestern University, Evanston, Ill.).

14,693

This paper urges that clinical practices in the determination of pure-tone thresholds be standardized by using the basic features of the Hughson-Westlake technique. This technique was accepted in 1944 by the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. The discussion 1) gives a brief description of an improved version of the Hughson-Westlake technique, 2) reviews those features of auditory behavior that determine the suitability of this method, and 3) reports an experimental comparison between this method and two other methods.

T. R 29

14,694

Crook, M.M. EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Contract DA 49 007 MD 536, Prog. Rep. 2, Oct. 1954, 11pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,694

This is a progress report of a study of the effect of noise in electro-visual display systems upon the recognizability of certain types of visual forms. Test copy is produced by facsimile printing with controlled amounts of white noise added to the printing signal. A set of 96 silhouettes representing familiar objects has been selected and prepared for testing. Some exploratory studies are discussed and future plans detailed.

I.

14,695

Crook, M.M., Bishop, H.P., Coules, J., Gray, F.E., et al. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Contract DA 49 007 MD 536, Final Rep., Jan. 1959, 15pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,695

This is a final report on a research program concerned with the factors affecting the perception of forms in an electro-visual display system (devices in which the visual display is characterized by a limit of resolution and is subject to degradation by visual noise) and related problems of the characteristics of form and subject responses. Samples of familiar and unfamiliar forms were developed and tested for recognition against plain and complex backgrounds under various amounts of degradation by visual noise in a prototype system. Research data from various interim and progress reports are reviewed and summarized.

R 15

14,696

Cohen, A.C., Jr. ESTIMATION FROM RESTRICTED SAMPLES. FINAL REPORT. Contract DA 01-009 ORD 288 & Contract DA 01-009 ORD 463, Jan. 1959, 8pp. Dept. of Mathematics, University of Georgia, Athens, Ga.

14,696

This is a final report on a contract calling for the development of methods for estimation from restricted samples. Technical reports (15) issued by the contract and published papers (9) based on these reports are listed. A final technical report, "Centrally truncated samples from a normal distribution," is attached.

T. G. R 27

14,697

Charipper, B.A. SUBMARINE DEPTH CONTROL WITH A COMBINED PITCH-ANGLE AND PITCH-RATE INDICATOR. PS9 036, Electric Boat Tech. Rep. SPD 59 023, March 1959, 11pp. Electric Boat Div., General Dynamics Corporation, Groton, Conn.

14,697

To examine the value of pitch-rate information to submarine controllers, 18 male subjects (six in each of three experimental display conditions) were required to maintain pitch angle (Part I) and subsequently depth (Part II) of a simulated submarine. The three display conditions were: 1) pitch-angle indicator alone, 2) separate pitch-rate indicator added to the left of the pitch-angle indicator, and 3) combined pitch-rate and pitch-angle indicator. Keeping pitch-angle and depth-keeping performance were analyzed for differences due to the displays used.

T. G. I. R 2

14,700

Endmann, R.L. AN INVESTIGATION WITH NEUTRAL DENSITY FILTERS OF THE RELATIONSHIP BETWEEN CRT SIGNAL DETECTION AND BRIGHTNESS DISCRIMINATION. Proj. 6501, Task 95001, RADC TN 59 318, Nov. 1959, 6pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

14,700

Signal detectability on cathode ray tubes (CRT) depends primarily upon the brightness discrimination ability of the observer. Typical data on brightness discrimination indicates that this function improves continuously up to intensity values well above the maximum light output of a CRT. Yet, observations relating to voltage required for signal detection on CRT's to grid bias, which regulates light output, show a minimum value well below the bias that produces maximum light output. This report presents two previous explanations of this phenomenon and investigates the implications of one. Some special difficulties encountered when trying to apply brightness discrimination data to intensity modulated scopes are discussed.

G. R 2

14,701

Enoch, J.M. THE EFFECT OF THE SIZE OF THE DISPLAY ON VISUAL SEARCH. Contract AF 30(602) 1580; OSURF Proj. 696, Proj. 1763, Task 39855, MCRL Tech. Paper (696) 15 279, RADC TN 59 64, Jan. 1958, 31pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

14,701

A part of an over-all program investigating visual search behavior, specifically with regard to photointerpretation, the effect of the size of display on visual search habits of a group of 12 untrained observers was determined. An ordered series of experimental aerial maps of different sizes were searched for a specific critical detail; eye traces were recorded. These records were analyzed for differences in pattern and efficiency (percent of eye fixations falling within the display area) due to size. The implications of the findings for visual search techniques and aids are discussed.

T. G. R 8

14,702

Educational Research Corporation. A BIBLIOGRAPHY ON HUMAN FACTORS RELATED TO MANNED SPACE VEHICLES. Contract N 61339-294, ERC Proj. 49 6, Oct. 1959, 48pp. Educational Research Corporation, Cambridge, Mass.

14,702

This bibliography on human factors related to manned space vehicles is intended to supplement other listings in the same area by adding to rather than by displacing them. A list of such sources is presented in the introductory notes. The studies are presented alphabetically by author and with annotations that are intended to give the reader some idea whether the citation refers to something he might be interested in. A subject index is included.

R 130 (approx.)

14,703

Enoch, J.M. THE EFFECT OF VISUAL SEARCH OF THE DEGREE OF GENERALITY OF INSTRUCTIONS TO THE PHOTOINTERPRETER. A SUBTASK WHICH IS PART OF THE PROGRAM ON HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION. Contract AF 30(602) 1580, Proj. 1115, OSURF Proj. 696, Task 15001, RADC TN 58 299, MCRL TP (696) 14 270, Jan. 1958, 33pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

14,703

Since one of the main factors affecting a search pattern is the nature of the question given the photointerpreter, this study attempted to determine the effect of using general instructions to locate a class of objects. Three trained photointerpreters were presented a series of high quality small scale aerial photographs and given the following instructions with each: 1) Locate all recreational facilities; 2) Locate all railroad facilities; and 3) Locate all public utilities. The time limit was one minute during which eye movements were recorded and after which the subjects reported their findings. In a second part, airport symbols were searched for. The findings were compared to an earlier study having more specific instructions. T. G. I. R 8

14,704

Eiband, A.M. HUMAN TOLERANCE TO RAPIDLY APPLIED ACCELERATIONS: A SUMMARY OF THE LITERATURE. NASA Memo. 5 19 57E, June 1959, 93pp. National Aeronautics and Space Administration, Washington, D.C. (Lewis Research Center, Cleveland, Ohio).

14,704

The literature is surveyed to determine human tolerance to rapidly applied accelerations. Pertinent human and animal experiments applicable to space flight and to crash impact forces are analyzed and discussed. These data are compared and presented on the basis of a trapezoidal pulse. The effects of body-restraint and of acceleration direction, onset rate, and plateau duration on the maximum tolerable and survivable rapidly applied accelerations are shown.

T. G. I. R 231

14,705

Flanagan, J.L., Stevens, K.N., House, A.S., Mendahl, R.W., et al. RESEARCH ON SPEECH SYNTHESIS. Contract AF 19(604) 2061, AFRC TN 58 140, Scientific Rep. 17, March 1958, 49pp. Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.

14,705

Speech communication research at the Massachusetts Institute of Technology during the period December, 1956 to March, 1958 under U.S. Air Force sponsorship is summarized. Included are studies of the production and perception of vowels and consonants and the development of instrumentation for the synthesis of speech. Particular emphasis has been placed on 1) measurements of resonance bandwidths of the vocal tract, 2) studies of the production and perception of fricative and of nasal consonants, and 3) completion of digital-analog system for the control of speech synthesizers, particularly a dynamic analog speech synthesizer.

T. G. I. R 25

14,705

Forsyth, D.M. & Brown, C.R. FLICKER CONTOURS FOR INTERMITTENT PHOTIC STIMULI OF ALTERNATING DURATION. J. opt. Soc. Amer., Aug. 1959, 49(8), 760-763. (Dept. of Psychology, Johns Hopkins University, Baltimore, Md. & USAF Operational Applications Lab., Bolling AFB, Washington, D.C.).

14,706

Flicker studies generally employ a train of light pulses consisting of a single period of stimulation repeated serially. When fusion points are measured using trains of pulses in which alternate periods were of different duration, a fusion contour can be obtained which identifies those combinations which, when alternated serially, result in a transition point between flicker and fusion. In this study, data were obtained on three flicker contours each of which identifies those combinations of two periods which, when alternated serially, have the same apparent rate of flicker. The implications of the findings for visual theory are indicated.

T. G. I. R 2

14,707

Faylor, R.C. CONSIDERATIONS OF HUMAN ENGINEERING FACTORS IN THE DESIGN OF AN ADVANCED SURVEILLANCE SYSTEM. SC Contract DA 36 039 SC 74899, SC Proj. 3 38 01 401 & DA Proj. 3 38 00 400, Engineering Rep. R252 032, 7pp. Fairchild Engine & Airplane Corporation, Hagerstown, Md.

14,707

The importance of human engineering for satisfactory operation of a system is discussed. Basic human characteristics are next related to ultimate system performance in terms of an advanced surveillance system, the OSPREY, that is in the process of design, development, fabrication and testing. The application is made to the two separate functions of the system: the drone control and the sensory system.

14,709

Grieve, D.W. & Humphries, W.J.A. A NEW HEART BEAT DETECTOR AND ITS AUXILIARY RECORDING AND TELEMETRY SYSTEMS. Rep. 67, July 1957, 16pp. Clothing & Sports Experimental Establishment, Ministry of Supply, London, England.

14,708

A heartbeat detector that will provide a useful method of detection of heartbeats (and their telemetry if required) when the subject is engaged in exercise is described. The device is electronic and employs two ECG (electrocardiograph) channels whose outputs are compared in a coincidence circuit that enables the heart signal to be discriminated from muscle interference. A new feedback device produces an audio oscillation at each beat of the heart and can be used to operate telemetry and recording systems. The applications of this device are discussed.

I. R 9

14,709

Flight Safety Foundation Inc. AUDITORY DISPLAY FUNCTIONS. Human Factors Bull. 59 6H, 1p. Flight Safety Foundation Inc., New York, N.Y.

14,709

This bulletin sets forth, in tabular form, auditory display functions and the type of signal (tones, complex sounds, or speech) that is preferred. Requirements for satisfactory speech communication and for warning and caution displays are itemized.

T. R 2

14,710

Garner, W.R. THE DEVELOPMENT OF CONTEXT EFFECTS IN HALF-LOUDNESS JUDGMENTS. J. exp. Psychol., Sept. 1959, 59(3), 212-219. (Johns Hopkins University, Baltimore, Md.).

14,710

To determine whether differences between subject's half-loudness judgments could be predicted and controlled by deliberate manipulation of stimuli heard in a preliminary series, 135 subjects were required to make half loudness judgments with the method of constant stimuli. Three variables were used: 1) the range of intensities of comparison stimuli in the main series of judgments, 2) the range of intensities in a preliminary series, and 3) the length of the preliminary series. The data were studied by analysis of variance techniques to determine the main sources of variance. The usefulness of this type of judgment is discussed in light of the findings.

T. G. R 4

14,711

Garner, W.R. AN ARGUMENT FOR THE USE OF DISCRIMINABILITY SCALING PROCEDURES IN SCALING SENSORY INTENSITIES. Contract NS ORI 166, Proj. NR 145 08, Task Order I, Rep. 166 I 221, reprinted from the Proceedings of the Fifteenth International Congress of Psychology, Brussels, 1957, 4pp. Johns Hopkins University, Baltimore, Md.

14,711

The thesis of this paper is that those psychological methods using the Fechnerian assumption that psychological units of magnitude or intensity can be equated with units of discriminability are more legitimate, valid, and useful for the scaling of sensory intensities than are those methods using various types of direct response on the part of an observer. To support this thesis, the author uses information derived from research in audition--primarily that of loudness scaling.

14,712

Hartgering, J.B. THE INFLUENCE OF RADIATION ON RECOVERY. Mil. Med., Sept. 1959, 123(3), 210-215. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

14,712

Some implications of radiation on the clinical course and medical management of familiar battle injuries and disease are discussed. The specific pathological processes in the radiation syndrome and particularly their time of onset are considered in relation to the known requirements for treatment of familiar injuries and disease and their potential impact on logistic factors are estimated. The need for sound research directed along clinical lines is emphasized.

T. G. R 1

14,713

Hasbrook, A.H. HUMAN IMPACT SURVIVAL AT 162 G. Contract NRC 401(21), AF CIR 55 0 101, March 1959, 6pp. Aviation Crash Injury Research of Cornell University, Phoenix, Ariz.

14,713

A free fall, survived by a man, involving an impact of approximately 162 g for 0.014 second and an onset rate in excess of 22,000 g per second is reviewed for its significance in the problem of crash safety.

14,714

Graham, C.H. & Hsia, Y. COLOR BLINDNESS AND COLOR THEORY. SOME DISCRIMINATIONS OF NORMAL AND DICHROMATIC SUBJECTS INCLUDING A UNILATERALLY COLOR-BLIND PERSON. A.M.A. Arch. Ophthalmol., Oct. 1958, 60(Part II), 792-799. (Columbia University, New York, N.Y.).

14,714

A report is made of research on the luminosity functions of normal subjects as contrasted with those of protanopes and deuteranopes. Data from this research is presented followed by a description of observations on a subject who gave color-blind (dichromatic) discriminations with the left eye and normal ones with the right eye. Luminosity curves, flicker curves, brightness matches, color mixture, hue discrimination, and color naming and matching data are presented for this subject. These data are discussed in relation to color theory.

G. R 14

14,716

Knauf, G.W. (Chm.). INVESTIGATORS' CONFERENCE ON BIOLOGICAL EFFECTS OF ELECTRONIC RADIATING EQUIPMENTS 14-15 JANUARY 1959. TECHNICAL REPORT. Proj. 5345, RADC TR 59-67, July 1959, 45pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

14,716

This report contains reports of progress by investigators working on the biological effects of electronic radiating equipments. The various studies of microwave irradiation include work with animals, work with cellular organisms, instrumentation, measurement techniques, and the like.

T. G. I. R 11

14,717

Merz, F., Jr. SHIPBOARD EVALUATION OF EXPERIMENTAL WINTER FLIGHT DECK IDENTIFICATION CLOTHING--OPERATION "CONVEX". Proj. NT001 052, Sub-Project .04, Clothing and Textile Div. Rep. 32, 1958, 9pp. USN Bureau of Supplies & Accounts, Department of the Navy, Washington, D.C.

14,717

To evaluate an improved model of an experimental winter flight deck identification vest, 50 vests in six colors and two sizes were issued to a selected group of personnel aboard the USS Takawa whose duties would subject the garments to daily usage on the flight deck. Following three weeks at sea, information was gathered from the wearers as to the vest's visibility, functional utility, comfort and durability. Advantages or disadvantages over the standard identification items were also elicited. Recommendations are included.

I. R 4

14,718

Knapp, M.J. & Berrier, J.L. THE RESPONSE OF ORAL TISSUES TO ULTRASOUND. J. Amer. Dent. Ass., Jan. 1959, 59, 50-61.

14,718

A histologic study of the effect of the ultrasonic dental machine on teeth, their supporting structures, intermaxillary and intermandibular suture regions, and the temporomandibular joint was carried out on 15 young adult dogs. The dogs were divided into five groups of three each. Cavities were prepared in the canines, and first molars on the left side and the contralateral teeth served as controls. Exposure time was varied for each group: 36, 18, 9, 4½, and 2½ minutes. The three dogs were sacrificed at 2, 10, and 30 days postoperatively and examined for changes due to exposure time and to elapsed time after exposure.

T. R. 29

14,719

Karpovich, P.V., Herden, E.L., Jr., & Asa, M.M. ELECTROGONIOMETER AND ITS USE IN THE STUDY OF JOINTS. Contract DA 49 007 MD 889, July 1959, 49pp. Dept. of Physiology, Springfield College, Springfield, Mass.

14,719

A new device, called a universal electrogoniometer, which makes possible automatic measuring and recording of changes in the angles formed by articulating bones is described. The validity, reliability, and objectivity of the device are discussed. Records of angle changes in various activities including trunk bending, squatting, stepping-up-and-down, walking, running, and bicycling are given. Knee electrogoniograms made on artificial and paralyzed legs are also included. The center finder, a device for locating the axis of rotation in a joint, is described, and suggestions for its use are made.

T. G. I. R 3

14,720

Lazet, A. & Walraven, P.I. A COMPARATIVE STUDY OF THE READING OF LINEAR AND LOGARITHMIC SCALES. Rep. IZF 1959 16, 1959, 5pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

14,720

The interpolation characteristics of some linear and logarithmic scales were determined under identical conditions. In both instances, the scale was projected on a screen for three seconds and the subject responded with the value he thought the pointer indicated. Every scale was presented with nine different pointer positions. From an analysis of errors on the linear scale by 32 subjects, values for the log scale were calculated and compared with actual values. Some possible explanations of interpolation characteristics of linear scales are advanced.

G. R 1

14,721

Lee, R.H., Whitten, F.I. & Brown, F.W. III. THE EXPLOSIVE DECOMPRESSION COMPONENT OF AIR BLAST. Proj. NM 64 01 23 BUHED, Medical Research Rep. 4, June 1959, 82pp. USN Mine Defense Lab., Bureau of Medicine & Surgery, Panama City, Fla.

14,721

This report deals solely with explosive (rapid) decompression from pressures above atmospheric down to ambient atmospheric pressures and under conditions uncomplicated by the other blast wave parameters. To demonstrate that "engineering formulae" can be developed and applied to biophysical aspects of explosive decompression, equations, derived from the study of a biophysical analog presumed to simulate the mechanical action of explosive decompression on living animals, were applied to the data from a series of experiments in which mice were exposed to this condition under a wide range of pressures and times. Estimated time constants were compared with actual physical measurements.

T. G. R 12

14,722

MacCracken, M.R. & Jackson, J.R. A HAND-COMPUTED VERSION OF UCLA EXECUTIVE DECISION GAME NO. 2. Management Sciences Research Project, Res. Rep. 59, May 1959, 40pp. University of California, Los Angeles, Calif.

14,722

An example of a competitive manufacturing and marketing game for use as a laboratory experience in decision-making, where no computer facilities are available, is presented. Structurally, this game is almost identical with the widely played "University of California, Los Angeles, Executive Decision Game No. 2" (originally coded for the International Business Machines 650), but can be hand-computed by two persons in a cycle time of approximately 20 to 30 minutes per move. Appendices contain computing forms, nomographs, and tables.

T. G. I.

14,723

McKee, J.W. SINGLE-DEGREE-OF-FREEDOM SIMULATOR INVESTIGATION OF EFFECTS OF SPOOFING DISPLAY-INSTRUMENT SIGNALS ON MAN-MACHINE CONTROL. NASA TN D 148, Dec. 1959, 30pp. National Aeronautics and Space Administration, Washington, D.C.

14,723

A study was undertaken to evaluate human control performance on a simulated vehicle having poor stability, a proportional acceleration control, and an instrument responding to displacement or to summed displacement, velocity, and acceleration information. The effects of combinations and variations of the display signals were studied.

T. G. I. R 2

14,724

Miller, E.F. II. EVALUATION OF CERTAIN VISUAL AND RELATED TESTS: VI. SPECIAL PHORIA TESTS. Proj. NM 14 01 11 Subtask 6, Rep. 7, July 1959, 24pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,724

Four special tests (Vernier Alignment, Monocular Projections, Phoria-Monocular Field, Phoria-Binocular Field) have been reported to detect visual difficulties not otherwise revealed. These tests were evaluated as possible additional visual screening devices for pilots, since there is some evidence that undetected visual anomalies may interfere with their comfort and efficiency in flying. The four special tests and two standard tests of phoria (Risley prism and Maddox rod) were used to test 115 incoming naval cadets; 60 cadets were retested one week later. Comparisons of data from all tests were made and test reliability was studied.

T. G. I. R 6

14,725

Montague, W.E., Baldwin, R.D. & McClure, A.H. THE EFFECTS OF WEARING THE CBR PROTECTIVE MASK UPON THE PERFORMANCE OF SELECTED INDIVIDUAL COMBAT SKILLS. Contract DA 49 106 QM 1, DA Proj. 095 50 000, HUMRO TR 57, June 1959, 44pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,725

The effects of wearing the protective mask on individual combat skills were measured during the first hour and after five consecutive hours of masking. Performance test scores of masked soldiers were compared with their scores when tested under comparable conditions without masks. The skills tested were: driving vigilance, radio communication, target detection with unaided vision and with binoculars, firing shoulder weapons, cross-country running, and unaided voice communications. Implications for Army training practices and for combat command decision-making are discussed.

T. G. I. R 3

14,726

Michel, E.L. & Ewing, C.L. PHYSIOLOGICAL SIGNIFICANCE OF BREATHING PATTERN CHANGES AS A MEANS OF DETECTING HYPOXIA. A REVIEW. Proj. TED NAW AE 5112, Rep. NAWC ACEL 407, Aug. 1959, 9pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn.

14,726

A review of the pertinent literature on factors influencing breathing pattern changes was made in an effort to determine whether an oxygen-want warning system based on the "normal breathing pattern" could give physiologically significant information concerning the presence of hypoxia. An analysis of reported findings was made. Included also is a discussion of the significance and limitations of the breathing pattern affected by hypoxic stimuli.

R 31

14,727

Peters, G.A. PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE FLIGHT. AN ANALYSIS OF SOME OF THE PSYCHO-SOCIAL-SEXUAL PROBLEMS WHICH MAY OCCUR IN MANED SPACE FLIGHT. Engng. Paper 916, Nov. 1959, 19pp. Equipment and Safety Research Section, Douglas Aircraft Company, Inc., El Segundo, Calif.

14,727

An analysis is presented of presently available information regarding the psychological hazards of extended space flight. Based upon the results of the analysis, attention is directed to problems of selection, training, and psychological environment of astronautic crew members. The need for research conducted to determine the relative importance of the various psychological factors and to find means to overcome or compensate for such hazards is stressed.

I. R 42

14,728

Prichard, A.C. EXPECTANCY EVALUATION AS AN AID TO DECISION MAKING. DA Proj. IR 3 55 GO 200, Signal Corps Task. IR 3 55 OI 201, Tech. Memo. IR M 1929, Nov. 1957, 18pp. USA Signal Engineering Labs., Fort Monmouth, N.J.

14,728

A method is described for deriving a measure of the degree of certainty with which human reactions to a given situation may be anticipated. This method of situation evaluation is intended to supply a logical and quantitative foundation upon which decisions can be based. Techniques are outlined for breaking down a complex situation into simpler aspects. Division of work into sub-tasks enables a changing situation to be analyzed continuously. The range of situations that may be evaluated by this method extends from personal to national.

T. G.

14,729

Richman, M.W., Enoch, J.M. & Fry, G.A. THE EFFECT OF LIMITING THE TIME ALLOWED FOR SEARCH UPON VISUAL SEARCH PATTERNS. Contract AF 30(602) 1590, OSURF Proj. 696, Proj. 1115, Task 13001, MCRL Tech. Paper (696) 12 268, RADC TN 58 234, Jan. 1958, 29pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

14,729

To ascertain the effect of limiting the time allowed for search upon visual search patterns of photointerpreters, six experimental aerial maps were used, each of which contained a simulated railroad line and a target, Landolt "C," near a line. Two groups of four subjects were required to locate the target. Group I was allowed 20 seconds search time, although they were not informed of the time limit. Group II was treated identically for the first two maps; then before each of the next four maps a time limit of 12, 9, 6, and 3 seconds was posted. A record of the actual time taken to locate the target and of eye movements was analyzed for effects of these time instructions.

T. G. I. R 4

14,730

Reid, A.M. A COMPARATIVE TRIAL OF GOGGLES, MULTIPURPOSE, IN THE MIDDLE EAST. Rep. 76, July-Aug. 1955, 54pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

14,730

To ascertain the adequacy of two different prototypes of multipurpose goggles with particular reference to dual and glare in a comparative trial with current British issue Goggles, M.T. and Eyeshields, A.T.; both objective and subjective measurements were made using 40 soldier subjects for the former and five separate units for the latter. Field trials were carried out in the Canal Zones; meteorological, dust intrusion, and airborne dust concentration data were collected. Adequacy of visual acuity and field of vision were determined, and the effect on acuity of differing transmission values of various colored lenses was assessed. Subjective information was obtained on dust and glare protection, misting, fit and comfort, and compatibility with headgear.

T. G. I. R 15

14,731

Schwarz, G. ON SOME NON-ORTHOGONAL FACTORIAL DESIGNS. Contract NMR 266(59), Proj. O42 205, Rep. CU 6 59, June 1959, 19pp. Columbia University, New York, N.Y.

14,731

A class of multifactorial designs are defined and analyzed in this paper. The designs considered have each a total number of observations that cannot be divided equally among cells in the design; however, by distributing the observations in a way that is in a certain sense symmetrical, the equations that determine the least squares estimates of the parameters become explicitly solvable. The case of two non-interacting factors with arbitrary numbers of levels is treated. After defining the designs, the estimates and their variances and covariances are computed. A general discussion of the symmetries and algebraic properties involved is given.

R 3

14,732

Shurrager, P.S. POLYMERIZATION OF VITREOUS HUMOR SUBSTRATE IN LIGHT AND DARK ADAPTATION. FINAL REPORT. Contract AF 19(600) 578, IIT Proj. 6062, AFOSR TR 58 161, Dec. 1958, 140pp. USAF Office of Scientific Research, Washington, D.C. (Illinois Institute of Technology, Chicago, Ill.).

14,732

This report contains data and conclusions from several phases of a six-year research project. Included are new physical and chemical properties of vitreous humor during light and dark adaptation and changes that occur throughout adaptation. Psychophysical studies of human threshold sensitivity are presented and discussed as to their relationships to the processes in the vitreous. Unique methods for obtaining these data and presenting them in terms of known quantal and energy contents are given. Inter-relationships among ERG components are analyzed and new techniques for analysis of cyclic phenomena are described. Practical applications of the findings to aviation and military operations are suggested.

T. G. I. R 8

14,733

Tolhurst, G.C. LISTENER RECEPTION: THE EFFECTS OF: PART I - DIOTIC AND DICHOTIC PEAK CLIPPING PART II - REINTRODUCING SELECTIVE FILTERING AT VARIOUS INTERRUPTION RATES PART III - SPECIFIED AMOUNTS OF PEAK CLIPPING. Contract N6ONR 22525, ONR Proj. NR 145 993 & Bumsburg. Proj. NM 18 02 99, Subtask 1, Rep. 82, Jan. 1959, 20pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,733

Part I. To determine the effects of various levels of peak clipping upon speech signals presented diotically and dichotically (modified signal to one ear and clear signal to the other), multiple-choice test lists were presented to panels of listeners. Part II. To study effects of modification of the speech signal upon listening, a clear recording of multiple-choice tests was high- and low-pass filtered, then interrupted at six rates. Resultant signals were then recorded upon a clear recording and played to panels of listeners. Part III. Multiple-choice test lists, peak clipped at six different levels, were responded to under conditions of quiet and plus six decibels of white noise.

T. G. R 22

14,734

Townsend, C., Fry, G.A., & Enoch, J.M. THE EFFECT OF IMAGE DEGRADATION ON VISUAL SEARCH: AERIAL HAZE. Contract AF 30(602) 1560, OSURF Proj. 696, Proj. 1155, Task 15001, MRL Tech. Paper (696) 13 269, RADC TM 58 275, Jan. 1958, 35pp. Ohio State University Research Foundation, Columbus Ohio.

14,734

The effect of general contrast reduction of photographic displays (simulating the effect of aerial haze) on visual search was investigated. Five displays (maps) were used, each of which contained similar content and map symbols; on each was a Landolt "C" at a short distance from a railroad symbol. The over-all contrast was different for each map. Four subjects were required to find the Landolt "C" near the railroad and to signal when found. The time to locate the target and a record of eye movements were analyzed for efficiency of search and pattern of search as affected by image degradation.

T. G. I. R 13

14,735

Vos, J.J. A NEW APPARATUS TO MEASURE THE STILES-CRAWFORD EFFECT ALL OVER THE PUPIL. Rep. IZF 1959 14, 1959, 19pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

14,735

An apparatus is described with which it is easy to measure the Stiles-Crawford effect over all the pupil. The principle upon which the apparatus is constructed, the basic arrangement, the actual apparatus, and its use in praxis are discussed. A mathematical analysis of the accidental and systematic errors is presented.

G. I. R 6

14,736

White, O.E. A STUDY OF THE POSSIBLE APPLICATION OF CLOSED-CIRCUIT TELEVISION AS A TRAINING MEDIUM AT FRANCIS E. WARREN AIR FORCE BASE, CHEYENNE, WYOMING. M.S. Thesis, June 1958, 84pp. University of Wyoming, Laramie, Wyo.

14,736

An investigation into possible means of improving training efficiency through utilization of closed-circuit television was conducted. A review of related research and of the various training curricula at Warren Air Force Base was made to ascertain which areas would be most suitable for closed-circuit television. Classroom sessions were visited and current practices observed; interviews with instructor personnel were also held. Specific training activities were then selected in which the television technique could be used, equipment requirements and estimated costs were submitted, and the effect upon personnel requirements was discussed.

T. R 50

14,737

Wenzel, D.G. & Rutledge, C.O. THE DOSE-EFFECT AND DURATION OF ACTION OF SEVERAL CNS STIMULANTS ON MOTOR AND PSYCHOMOTOR PERFORMANCE. Contract NOKR 583(09), Dec. 1959, 25pp. School of Pharmacy, University of Kansas, Lawrence, Kan.

14,737

To evaluate central stimulants on human performance, four drugs (caffeine, d-amphetamine, methylphenidate, and phermetrazine) were studied for their effects on five relatively standard tests of performance (two types of tapping rate, two types of reaction time, and a motor pursuit task). Fifteen practice subjects were tested; each subject was tested on 13 afternoons, each time receiving a different treatment. The first test was always a control after which the drugs (dosage varied) or a placebo were administered followed by further testing. The test data were analyzed for effect of the drugs, drug dosage, and time elapsed after drug administration.

T. G. R 24

14,738

USA Office of Research & Development. FOURTH ANNUAL ARMY HUMAN FACTORS ENGINEERING CONFERENCE 9-11 SEPT. 1958, USA CHEMICAL CENTER, MD. 127pp. USA Office of Research & Development, Washington, D.C.

14,738

This report contains the proceedings and papers (12) of a conference held to provide direct interchange of information on human factors engineering among personnel of Army development agencies, and between these and representatives of user agencies and other qualified personnel. Papers given include "Application of user guidance to equipment design," "Decrements in driving skill as a function of cumulative environmental stresses," "Vestibular functions in angular acceleration," "Ordnance design concepts for ground mobility," "Minimal subsistence requirements to maintain performance," "Infrared binoculars," and "Human factors problems of combat surveillance in mobile warfare."

T. G. I. R 12

14,739

Embark, K.H. APPLICATION OF USER GUIDANCE TO EQUIPMENT DESIGN. Report from Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., 4-7. USA Office of Research & Development, Washington, D.C.

14,739

The application of user guidance to all stages in the design and development of equipment for the Army is discussed. The problem of how such guidance should be given is discussed and some measures proposed for solving this problem.

14,740

Herbert, M.J. DECREMENTS IN DRIVING SKILL AS A FUNCTION OF CUMULATIVE ENVIRONMENTAL STRESSES. Report from Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., 13-15. USA Office of Research & Development, Washington, D.C. (USA Medical Research Lab., Fort Knox, Ky.).

14,740

This paper describes a research program, underway at Fort Knox, on complex psychomotor functions. The rationale for the program is discussed in terms of the mobility aspects of modern warfare and the corresponding demands upon the soldier. Initial efforts are being directed to the problems of skill-fatigue in vehicle driving and the identification of basic skills underlying the driving task. Test instruments are being designed which will be sensitive to various motor skill patterns and the stressfulness of several environmental factors is being measured.

14,741

Quedry, F.E. VESTIBULAR FUNCTIONS IN ANGULAR ACCELERATION. Report from Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., 15-26. USA Office of Research & Development, Washington, D.C. (USA Medical Research Lab., Fort Knox, Ky.).

14,741

A program of research in vestibular functions during angular acceleration is described. Part of the current work is devoted specifically to the study of phenomena that occur when a person moves his head with respect to the axis of rotation of a turntable. All variables considered to be relevant--angular velocity, angular acceleration and deceleration, time factors, direction, position of head, visual orientation, etc.--are being investigated. Completed work dealing with the theoretical control of vestibular reactions by the vestibular end-organ are discussed. Some data are presented.

G. I. R 9

14,742
Timberlake, T.G. HUMAN ENGINEERING IN CORPS OF ENGINEERS EQUIPMENT DESIGN. Report from Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., 47-54. USA Office of Research & Development, Washington, D.C. (USA Engineer Research and Development Lab., Fort Belvoir, Va.).

14,742

This paper discusses informally some of the human engineering aspects of the work done in the Army Engineer Research and Development. Since most of their equipment is commercially available, emphasis has been placed on maintenance studies. One area where the human factors have been stressed is the design of equipment for Arctic operation. A program being conducted to develop a family of air-transportable construction equipment for use in assault-type operations is discussed in terms of the human factors involved.
T. I.

14,743

Melton, A.W. HUMAN FACTORS PROBLEMS OF COMBAT SURVEILLANCE IN MOBILE WARFARE. Presented at Fourth Annual Army Human Factors Engineering Conference 9-11 Sept. 1958, USA Chemical Center, Md., p. 61. USA Office of Research & Development, Washington, D.C. (University of Michigan, Ann Arbor, Mich.).

14,743

An unclassified abstract of Dr. Melton's SECRET presentation at an USA Human Factors Engineering Conference (September 9-11, 1958) is given. The paper considers some characteristics of military operations under the PENTANA concept, the surveillance requirements that must be met for such operations, and some characteristics of the surveillance system along with such subsystems as sensor and information processing.

14,744

Withington, V. POSITIONAL AND STEERING ERRORS IN HARBOR NAVIGATION. Contract NMR 609(02), NR 238'001; LMP-640-7, Tech. Memo. 41, June 1957, 7pp. Laboratory of Marine Physics, Yale University, New Haven, Conn.

14,744

This paper examines the requirements for an all-weather navigation system for surface vessels in harbors and harbor-approach areas which would permit the use of the present precise steering potential of such vessels. Present errors of navigation under the most adverse conditions are analyzed in terms of instrumental errors, combined instrumental and dead-reckoning errors, precise track delineation, and steering and the time factor. Some of the essentials for the desired system, as indicated by the analysis, are discussed.
G. I. R. 8

14,745

Lefler, J.H. FIXED-WING INSTRUMENT PRESENTATION. FINAL REPORT OF TEST PROJECT NR-AVN 1557. Proj. 1557, Dec. 1958, 47pp. USA Aviation Board, Fort Rucker, Ala.

14,745

To determine the optimum attitude and navigation instrument and/or instrument system presentation for use in Army fixed-wing aircraft, instrument-qualified aviators, with more than average amounts of instrument experience, flew under instrument conditions, using various panel arrangements. Existing attitude and navigation instruments as well as integrated instrument systems (Collins Integrated Flight Systems FD-103C and FD-105, and Sperry Integrated Instrument System) were evaluated. An optimum panel arrangement of flight instruments is recommended for standard Army airplanes.

14,746

USAF Air Research & Development Command Headquarters. HUMAN ENGINEERING ARDC TECHNICAL PROGRAM PLANNING DOCUMENT FOR THE FISCAL YEAR 1959 OPERATING PROGRAM. ASTIA AF TFPD 57 780E, Aug. 1957, 61pp. USAF Air Research & Development Command Headquarters, Baltimore, Md.

14,746

This document supersedes the Technical Program Planning Document entitled "Human Engineering" dated August 1956. Section I treats the military problem in this area as one of determining man's capabilities and limitations and to apply this knowledge to the design of weapons systems. Section II attempts to evaluate present capabilities and limitations in accomplishing this aim with the discussion organized around equipments or operations in which the basic tasks of the operator are similar. Section III points to several possibilities for gaining more information of human behavior characteristics. Technical requirements are given in Section IV.

14,747

USAF Air Research & Development Command Headquarters. PERSONNEL AND TRAINING ARDC TECHNICAL PROGRAM PLANNING DOCUMENT FOR THE FISCAL YEAR 1959 OPERATING PROGRAM. ASTIA AF TFPD 57 780G, Aug. 1957, 73pp. USAF Air Research & Development Command Headquarters, Baltimore, Md.

14,747

This document revalidates and brings up to date Technical Program Planning Document on "Air Force Personnel and Air Force Training," dated August 1956. The major sections are 1) the military problem, 2) evaluation of present capability and limitations, 3) technical possibilities, and 4) technical requirements.

14,748

Schock, G.J.D. A STUDY OF ANIMAL REFLEXES DURING EXPOSURE TO SUBGRAVITY AND WEIGHTLESSNESS. Proj. 7851, Task 78501, AFMDC TN 59-12, June 1959, 15pp. USAF Aeromedical Field Lab., Holloman AFB, N.M.

14,748

Several experiments were conducted to study the role of the vestibular apparatus during states of sub-gravity and weightlessness. A number of cats were used in which either the vestibular portions of the VIII cranial nerves were sectioned bilaterally or the vestibular cortical area of the brain had been removed surgically two months before testing. A comparison of the labyrinthine and postural reflex behaviors of these animals and unoperated cats during periods of weightlessness were observed during aircraft flights where this condition was achieved.
T. R. 6

14,749

Schock, G.J.D. AIRBORNE GALVANIC SKIN RESPONSE STUDIES A PRELIMINARY REPORT. Proj. 7851, Task 78501, AFMDC TN 59 14, June 1959, 9pp. USAF Aeromedical Field Lab., Holloman AFB, N.M.

14,749

Research conducted by the Aeromedical Field Laboratory into the effects of weightlessness has included the recording of galvanic skin response of human subjects exposed to 30-40 seconds of weightlessness achieved in flying jet aircraft in Keplerian trajectories. Electrocardiogram recordings were also made. The data relating to pre-weightlessness, accelerations, and weightlessness were examined for significant changes due to these factors. Instrumentation techniques for the measurements made are described.
R. 3

14,750

Stembridge, V.A., Craft, W.M. & Townsend, F.M. MEDICAL INVESTIGATION OF AIRCRAFT ACCIDENTS WITH MULTIPLE CASUALTIES. J. Aviat. Med., Sept. 1958, 29, 668-675. (Armed Forces Institute of Pathology, Washington, D.C. & USN School of Aviation Medicine, Naval Air Station, Fla.).

14,750

Suggested methods for handling multiple casualties from aircraft accidents are outlined: permission for post-mortem examination, handling bodies at the scene, identification problems, external examination, autopsy with histopathologic and toxicologic studies, and liaison with other accident investigators. A case is presented illustrating the actual performance of these steps.

14,751

Silliphant, M.M. ROLE OF THE ARMED FORCES INSTITUTE OF PATHOLOGY IN AMERICAN MEDICINE. A.M.A. Arch. Surg., Aug. 1958, 77, 153-161.

14,751

A brief resume of the Armed Forces Institute of Pathology (AFIP) historical background is given along with an explanation of its relationship with other Federal agencies. The three-fold mission of AFIP is discussed: consultation, education, and research in pathology. Liaison activities with civilian medicine are outlined. The organization of the Institute and its relationship with Walter Reed Army Medical Center are defined. Recent accomplishments are discussed. I.

14,753

Renaud, G.E. INTELLIGIBILITY TESTING OF VOICE COMMUNICATION SYSTEMS. TECHNICAL NOTE. Proj. 4562, RADG TH 59 156, May 1959, 8pp. USAF Rome Air Development Center; Griffiss AFB, N.Y.

14,753

This report describes methods of testing voice communication. Particular emphasis is placed on the use of PB-50 (phonetically balanced) lists, developed by Harvard University, in testing actual speakers and listeners. T. G. R 4

14,754

Ronchi, L. MAY OCULAR TREMOR EVOKE FLICKER SENSATION? Atti Della Fondazione Giorgio Ronchi, March-April 1959, XIV(2), 140-141. (AFOSR TN 59 778).

14,754

Flicker sensations have been observed to occur in the light adapted eye when a field containing thin luminous stripes was spaced with large dark stripes. The characteristics of ocular tremor and of critical flicker frequency data are discussed in relation to this observation. R 4

14,755

Runyon, R., Gordon, N.B. & Chajet, G. RELATIVE MOTION TRAINING (A PRELIMINARY ANALYSIS). NAVTRADEVEN Proj. 20R21, Tech. Rep. NAVTRADEVEN 20 RM 1 1M, Sept. 1958, 16pp. USN Training Device Center, Port Washington, N.Y.

14,755

This report examines the performance of a variety of perceptual-motor skills in relative motion situations and evaluates the potential of appropriate training systems. The various types of motion situations studied are those in which vehicles are involved in 1) independent motion, 2) collision courses, 3) pursuit courses, and 4) fixed positional relationships. The types of problems that exist for the operator are clarified; hypotheses concerning the types of skills and/or knowledge involved in responding appropriately are formulated; cues used in the "inside-out" (apparent) orientation are differentiated from those used in the "outside-in" (real) orientations; some of the mathematical relationships are expressed; and some training problems likely to be encountered are discussed. G. I. R 4

14,756

Patoski, V.A. & Marjon, P.L. PARTIAL SHIELD REMOTE MAINTENANCE EXPERIMENT. Contract AF 33(600) 32054, Proj. 6(1 9964), AWP Doc. NAF 58 23T MR N 214, July 1958, 30pp. Convair, Fort Worth, Tex.

14,756

An exploratory investigation was made to determine the feasibility of applying the partial shield concept to airplane servicing. A mechanic using long-handled tools performed several inspection and maintenance tasks on a B-47 airplane from within a partial shield mock-up. For each task a record was kept of the mechanic's working time, technique, and operating difficulties. The results were evaluated in terms of major problem areas: work efficiency, accessibility, shield location, operator considerations, and tools. T. I. R 2

14,757

Mann, H. (Proj. Engr.). REQUIREMENTS FOR FORMATION LIGHTS ON HIGH PERFORMANCE CARRIER AIRCRAFT. FINAL REPORT. Proj. TED PTR AE 8025, ET311 248, Rep. 1, June 1959, 12pp. USN Air Test Center, Naval Air Station, Md.

14,757

To establish formation light requirements on high performance carrier-based aircraft, flight evaluation of the existing formation lights on the F11F-1 and F3H-2 airplanes was made. Rheostats were installed in the tail position and in each of the wing position formation light circuits; the pilots of these craft were instructed to vary the rheostat settings in accordance with instructions from various wingmen flying in formation with them. Records were made of the settings that gave good distance and attitude cues without glare. Two settings, one for good visibility and one for poor visibility conditions, were established. Recommendations are made pertaining to the number, locations, dimensions, colors, and intensities of lights. I.

14,758

McAbee, W.H. A HUMAN FACTORS STUDY OF THE AUTOMATIC GROUND CONTROL APPROACH SYSTEM (AGCA). APGC Proj. 4513Y1 F, APGC TH 59 23, June 1959, 83pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

14,758

This human factors study was conducted in conjunction with the functional and operational evaluation of the Automatic Ground Control Approach (AGCA) system to evaluate 1) the human engineering aspects of the equipment, 2) personnel training and skill levels required by Air Force maintenance and controller personnel to maintain and operate the equipment, 3) safety factors, including confidence level of operators, and 4) adequacy of related publications. Based on analysis of data obtained from questionnaires, check lists, individual and group interviews, participation in airborne missions, and collections of job performance data, certain conclusions were drawn and recommendations made. T. I. R 6

14,759

Lawrence, M. THE EFFECT OF OVERSTIMULATION AND INTERNAL FACTORS OF THE FUNCTION OF THE INNER EAR. Contract DA 49 007N MO 634, Prog. Rep. 10, Jan. 1959, 12pp. Physiological Acoustics Lab., University of Michigan, Ann Arbor, Mich.

14,759

This bulletin reports research in progress in the general area of the causes of deafness. During the year 1958 one of the projects was the study of the effects of overstimulation and internal factors on the inner ear. The technique used, recording of the electrical potentials arising from the inner ear when stimulated by sound, has been studied extensively. A series of experiments on functional changes in inner ear deafness is reported. A histological study of the development of sensory-cell innervation in the inner ear and three studies dealing with the relation between the middle and inner ear are among the seven studies described. A list of all reports from 1955 to 1959 is appended.
R 23.

14,762

Brough, J.N. (Senior Proj. Officer). ATTITUDE INDICATOR TYPE FIM. CEPE Rep. 1386, Feb. 1959, 10pp. RCAE Air Material Command, CEPE, Ottawa, Canada.

14,762

To determine the suitability of the Attitude Indicator Type FIM as a flight instrument, flight trials were carried out in a CF100 aircraft. The indicator was mounted together with a sweep second hand clock on an auxiliary panel in the front cockpit. Both day and night flights were made with beacon and ground controlled approaches being made at the conclusion of every flight. The flight assessment was done by visual reference to the actual horizon. Advantages and limitations of the instrument were noted and suggestions were made for improvements in design.
I. R 1

14,763

Holliday, Audrey R. THE EFFECT OF LSM UPON PAIN SENSITIVITY. QUARTERLY REPORT COVERING THE PERIOD JULY 1, 1958 TO SEPTEMBER 30, 1958. Contract DA 18 108 CML 6364, Nov. 1958, 6pp. University of Washington, St. Louis, Mo.

14,763

To investigate the analgesic effect of d-lepergic acid morpholide (LSM), pain thresholds to radiant heat were measured on ten subjects under two conditions: 1) after taking LSM at a dose level of four micrograms per kilogram of body weight, and 2) after taking a placebo. The withdrawal thresholds were analyzed for differences due to the drug.
T. R 6

14,765

Furchtgott, E. EFFECT OF HUNGER AND SATIETY ON ODOR SENSITIVITY. PROGRESS REPORT. Contract DA19 129 QM-844, DA Proj. 7 84 15 007, Rep. 10, Oct. 1958, 5pp. USA Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill.

14,765

Gustatory (sucrose) and olfactory (iso-amyl-acetate) thresholds were determined for eight subjects. Measurements were made at noon and at three o'clock in the afternoon, either after a "high" caloric lunch or after no lunch. The data were analyzed for differences due to hunger or satiety. This is a preliminary report of this investigation.
T. R 1

14,767

Crock, M.N. EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Contract DA 49 007 MO 536, Prog. Rep. 1 (Quarterly Prog. Rep.), July 1954, 14pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,767

Exploratory work was done to map out conditions for systematic testing of the effect of noise on the recognition of familiar visual forms against an unstructured background. About 80 silhouette forms representing familiar objects were reproduced by facsimile printing with a supplementary noise circuit. Copy were produced by this method under various degrees of random noise, the signal/noise ratio being expressed in decibels. Recognition scores for the noisy test forms were obtained from a small group of subjects. These results are to be analyzed with respect to a number of variables that might be important for further experiments.
I.

14,768

Coombs, C.H. AN APPLICATION OF A NONMETRIC MODEL FOR MULTIDIMENSIONAL ANALYSIS OF SIMILARITIES. Proj. MICHIGAN, Rep. 2144 269 T, June 1958, 13pp. Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

14,768

A nonmetric multidimensional model for analyzing similarities data is presented and its application to a confusion matrix on Morse Code signals is recounted. Some of the major problems remaining in the development of the model are summarized.
T. R 9

14,769

Creer, B.V., Stewart, J.D., Merrick, R.B. & Drinkwater, F.J. III. A PILOT OPINION STUDY OF LATERAL CONTROL REQUIREMENTS FOR FIGHTER-TYPE AIRCRAFT. NASA Memo. 1 29 59A, March 1959, 44pp. National Aeronautics and Space Administration, Washington, D.C.

14,769

As part of a program of research on airplane handling qualities, a pilot opinion study was made of the roll performance of fighter-type aircraft flying in their combat speed range. Both a stationary and a moving flight simulator were used, and the results were supplemented by tests in actual flight. The subjects were seasoned test pilots with engineering education and combat air veterans. Each subject was required to rate the roll performance of a given airplane or a given airplane simulation on a numerical rating scale. The data were analyzed in terms of a hypothesis that pilot opinion of lateral controllability would correlate with a roll damping and an aileron power parameter written as roll acceleration.
T. G. I. R 7

14,770

Goodson, J.E. & Miller, J.W. DYNAMIC VISUAL ACUITY IN AN APPLIED SETTING. Contract NMR 586(00), Proj. NR 142 023 & Bumsburg. Proj. NM-17 01 99, Subtask 2, Rep. 16, May 1959, 13pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,770

To determine the relationships between performance in the laboratory and in the air with regard to the visual pursuit of moving targets, 15 subjects were tested under both conditions. The air trials required the subject to view the ground target (two Landolt "C's") as the plane moved at angular velocities of 20, 69, and 90 degrees per second, and to indicate the position of the opening in each "C". Twelve target sizes were used to obtain threshold values at each velocity. A series of thresholds were then determined in the laboratory for one and for two targets. Threshold data were analyzed for effects of air versus laboratory conditions and for one versus two targets.
T. G. I. R 6

14,771

Gardner, R.A. PERCEPTION OF RELATIVE FREQUENCY AS A FUNCTION OF THE NUMBER OF RESPONSE CATEGORIES. USAMRIID Proj. 6X95 25 001 02, Rep. 408, Dec. 1959, 10pp. USA Medical Research Lab., Fort Knox, Ky.

14,771

To study decision behavior in an uncertain situation where the only basis for choice was the perceived relative frequency of events in a series, the number of response categories was increased independently of the number of categories of events. The extra choices were dummies in that no hits could be obtained by choosing them. The subject (384 subjects) was instructed to predict the event (letter of alphabet) that he expected (letter was projected on screen after prediction) by inserting his response plug into the jack under the letter of his choice on a response panel. The relative frequency of choices for the most frequent events was analyzed in relation to the number of response categories. Rate of extinction of dummy choices was studied.
T. R 11

14,772

Hale, H.B. HUMAN CARDIOACCELERATIVE RESPONSES TO HYPOXIA IN COMBINATION WITH HEAT. Rep. 60 14, Sept. 1959, 13pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

14,772

The effects of high ambient temperature on heart rate responses to moderate reductions in oxygen pressure were determined in healthy male subjects. Four experiments were performed: 1) decompression in a heated chamber (49 degrees C) from ground level to 18,000 foot pressure level with total time at reduced pressure of 15 minutes; 2) hypoxia induced by use of an oxygen-nitrogen mixture to an equivalent pressure of 18,000 feet slightly later than heat; 3) hypoxia (equivalent of 14,000 feet) imposed simultaneously with heat by the preceding method for 15-minute periods; 4) same as (3) but with a 45-minute period. The data (heart rate, skin and rectal temperatures, and ventilation) were analyzed for effects of hypoxia combined with heat.
T. G. R 7

14,773

Department of Civil Aviation. PILOTS NOTES ON THE PRECISION VISUAL GLIDE PATH (P.V.G.). DCA Publ. 37, Aug. 1958, 6pp. Department of Civil Aviation, Melbourne, Australia.

14,773

The Precision Visual Glidepath (PVG) is a visual approach aid, for use in visual meteorological conditions, which gives visual guidance in relation to an approach path defined by two bars of lights. The arrangement of lights recommended for runways is described and a representation of PVG as seen by the pilot on final approaches is presented. Following directions for the method of use by the pilot is a summary of pilot notes.
I.

14,774

Brown, W.L., Carr, R.M. & Overall, J.E. THE EFFECT OF WHOLE-BODY RADIATION UPON ASSOCIATION OF PERIPHERAL CUES. Rep. 58 47, March 1958, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex. (University of Texas, Austin, Tex.).

14,774

To test the hypothesis that chronic irradiated monkeys differ from normal monkeys in the degree of association of peripherally placed cues, object-quality stimuli were presented as discrimination problems to three treatment groups: non-irradiated, low-dose irradiated, and high-dose irradiated. The subjects were assigned randomly to three groups: 1) two successive discrimination problems each day for five days; 2) same except that the positive and negative stimuli of the second pair were presented six inches behind the positive and negative pair of the other during training; and 3) same as (2) except that the significance of the stimuli was reversed. Trials to criterion and each problem were averaged and studied by analysis of variance techniques.
T. G. R 8

14,775

Bishop, E.W., Abbott, W.C. & Bowen, H.W. A METHODOLOGY FOR THE EVALUATION OF GROUND SURVEILLANCE RADARS. FINAL REPORT. SC Contract DA 36 039 SC 73253, Proj. 3 99 00 100, Task Order 02, June 1955, 46pp. Dunlap and Associates, Inc., Stamford, Conn.

14,775

An evaluation program for ground surveillance radars is developed in this report. The general basis for evaluation is discussed. A typical radar system is used to develop an illustrative test program. Special attention is given to human factors.

14,776

Bell Helicopter Corporation. ADVANCES OF HELICOPTER VTOL - STOL PORTION OF AMIP ARMY-NAVY INSTRUMENTATION PROGRAM. Contract NDIR 1670 (00), Bell Doc. D228 100 002, Aug. 1959, 36pp. Electronics Department, Bell Helicopter Corporation, Fort Worth, Tex.

14,776

This brochure discusses in non-technical language the salient advances that have been made in the Helicopter VTOL-STOL portion of the Army-Navy Instrumentation Program (AMIP). A general AMIP organization, philosophy, and information flow chart is presented for general orientation to the program. Advances in the following are then discussed: human engineering; information sensing and processing; sensing objects and air velocity; fundamental sensing, computing, display, amplifying, displaying, and mechanisms amplifying; test and evaluation; simulation and research helicopters; and the future.

14,777

Cumming, R.W., Lane, J.C. & Baxter, J.R. INSTALLATION NOTES ON THE PRECISION VISUAL GLIDE PATH (P.V.G.). ARL Hum. Engng. Note 3, July 1959, 17pp. Aeronautical Research Labs. Australian Defence Scientific Service, Melbourne, Australia.

14,777

The Precision Visual Glidepath is an approach aid for use in moderate to good visibility which gives visual guidance in relation to an approach plane defined by two bars of lights on the ground. This note is mainly concerned with the design features of the aid and its installation, and in particular, shows how it might be set up in "difficult" locations.
I. R 15

14,778

Forbes, A.R. PREFERRED LOADS FOR THE AUXILIARY FIRING HANDLE OF THE MARK 3 EJECTION SEAT. FPRC 999, April 1959, 7pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

14,778

To determine the optimum load on an ejection seat auxiliary firing handle (two handed pull), six male subjects were tested under static conditions, and three male subjects were exposed to positive accelerations of five g. The range of loads investigated was from 65 to 95 pounds. Techniques of absolute judgments and paired comparisons were used. Recommendations are included.
T.

14,779

Drucker, A.J. & Brown, Emma E. ABSTRACTS OF PRB RESEARCH PUBLICATIONS--FY 1959. Proj. 29560000, PRB Tech. Res. Note 105, Oct. 1959, 31pp. USA Personnel Research Branch, Adjutant General's Office, Washington, D.C.

14,779

This report identifies both by publication serial number and by Research and Development Research Task all research publications prepared and released by the Personnel Branch of The Adjutant General's Office in fiscal year 1959. Abstracts giving the principal research findings in non-technical language are presented for the majority of the titles.
R 37

14,780
Glover, M. & Glover, P. THE VALIDATION OF PRESENTING
CONCEPTS FOR PERSONNEL AND TRAINING REQUIREMENTS: A CASE
STUDY. Contract NMR 2241 (30), Aug. 1959, 37pp.
Armstrong Institute for Research, Pittsburgh, Penn.

14,780
The feasibility of predicting future personnel and
training requirements for new weapons systems was evalu-
ated. Statements concerning requirements that had been
made five years previously on the basis of a prototype
system were checked against a final model of the system
now in operational use. Statements were obtained from
three areas (knowledge of operation, operational main-
tenance, and trouble shooting), and items drawn from
task analysis, proficiency test material, and equipment
casualty analyses were rated with respect to their cur-
rent applicability by a group of ten experts who were
working with the operational missile. The ratings
were analyzed for reliability.
T. I. R 57

14,781
Faulkner, J.P. & Briggs, G.E. DEVELOPMENT OF SYSTEMS
RESEARCH AND DESIGN METHODOLOGY. QUARTERLY REPORT.
Contract AF 33(616) 6166, Proj. 7134 & AF Proj. 894,
Rep. 894 2, Oct. 1959, 13pp. Ohio State University
Research Foundation, Columbus, Ohio.

14,781
This report describes progress made for the period
July through September 1959 on the various systems ex-
periments underway. These experiments deal primarily
with Air Traffic Control with several exploratory exper-
iments on suitable methodology for modeling decision
making in systems environment. Technical support studies
have had two foci: the investigation of factors in visual
perception, and of factors to be considered in studying
information processing and decision making by teams of
individuals. Titles of reports completed are listed.
R 2

14,782
Fenichel, R.L. & Kydd, G.M. A STUDY OF THE EFFECTS OF
POSITIVE ACCELERATION UPON ERYTHROCYTE HYDRATION IN
HUMAN SUBJECTS. Suedberg, Proj. AM 19 02 12 2, Rep. 1,
& Rep. NAC 5904, May 1959, 11pp. USAF Aviation
Medical Acceleration Lab., Naval Air Development Center,
Penn.

14,782
Human subjects were employed to study the effects of
positive acceleration upon erythrocyte hydration. Ve-
nous blood samples were obtained just before the accel-
eration series was begun, after the third centrifuge
run (2.5 g), and immediately after the last run (5.5 g).
Acceleration exposure began at 1.5 g level and increased
at 1/2 g increments with five minutes between runs, and
was terminated upon the subject's loss of peripheral
lights (about 5.5 g average for the unprotected subject).
Index values of Mean Corpuscular Volume, Mean Corpuscu-
lar Hemoglobin, and Mean Corpuscular Hemoglobin Concen-
tration were determined and analyzed.
T. G. I. R 9

14,783
Fried, C. A STUDY ON THE EFFECTS OF CONTINUOUS
WAVE JAMMING ON THE DETECTION OF ANTIAIRCRAFT OPERA-
TIONS CENTER SYMBOLS. OCO Proj. TBI 1000, Tech. Memo.
9 59, Sept. 1959, 27pp. USA Ordnance Human Engineering
Lab., Aberdeen Proving Ground, Md.

14,783
To investigate the effect of electronic interference
or jamming on the detectability of four symbols (Circle,
Cross, Half Circle, and Cross-Within-Circle), considered
for adoption as Antiaircraft Operations Center Symbols,
the shapes were shown to the subjects under three condi-
tions of continuous wave jamming. Shape diameters re-
mained constant. The task was to scan all quadrants of
the display scope and report the number of hostile tar-
gets in each quadrant. Scanning time and number of er-
rors were recorded and analyzed for each symbol as a
function of noise level.
T. G. I. R 5

14,784
Carr, W.J. SELF-DIRECTING DEVICES: A REVIEW OF
CURRENT CONCEPTS. Contract AF 33(616) 6224, Proj.
1775, Task 7715, NAC 59 02, Aug. 1959, 27pp.
NAF Aerospace Medical Lab., Wright-Patterson AFB,
Ohio. (Orlando University, Leesburg, Penn.).

14,784
A selective review of the literature on self-di-
recting devices is presented with emphasis on those
studies that provide for a functional analysis of the
devices. Three major classes of variables that influ-
ence the effectiveness of learning by such devices are
discussed: characteristics of the device, of the pro-
gram, and of the learner. Major attention is devoted to
an analysis of the process of programming. Discussion
is focused on a number of variables that might affect
the effectiveness of the programming. A working model
is presented, based upon the process of conditioning.
T. I. R 37

14,785
Bendure, A., Forrester, P. & Smith, Lucy. NERVOUS
CONTROL OF SHIVERING: A SHIVERING SUPPRESSOR MECHANISM
OF THE BRAIN STEM. Contract AF 33(616) 6224, Proj.
22 1301 0009, Rep. 1, June 1954, 25pp. USAF Institute
Aeronautical Lab., Lang AFB, Alaska. (University of
California, Los Angeles, Calif. & Long Beach Veterans
Administration Hospital, Long Beach, Calif.).

14,785
To determine the anatomical localization of a shi-
vering suppressor region in the hypothalamus of cats,
the Horsley-Clarke stereotaxic apparatus was used to
hold the animal. Bipolar electrodes were used for stimu-
lation. Action potentials were recorded to detect
shivering or cessation of shivering along with visual
observation. Fifty to 60 points in the hypothalamus
were stimulated for each experimental animal. The loca-
tion of these points were determined by microscopic exami-
nation of the brain after the animal had been killed.
The data were used to map the anatomical region from
which the suppressor effect can be evoked and to locate
the most sensitive region.
T. G. I. R 20

14,786
Lyman, J. (Proj. Leader). ARM PROSTHESIS RESEARCH.
PROGRESS REPORT. Contract W10054 2075, Res. Rep.
59 02, Dec. 1959, 12pp. Department of Engineering,
University of California, Los Angeles, Calif.

14,786
Progress is reported on work conducted under a pro-
gram of research in arm prosthesis. The different as-
pects of the work are: 1) fundamental studies to estab-
lish body control sites for application to externally
powered prostheses, 2) physiological investigations of
amputee temperature regulation and their responses to
changes in the physical environment, 3) engineering
analysis of biotechnical factors in control systems, 4)
selected applications studies, and 5) sensory-motor con-
trol and feedback investigations.
T. I.

14,788
Kahn, A. & Cornog, D.Y. SPACING OF ON-OFF CONTROLS.
Human Factors Data Bull. 39, June 1959, 4p.
Air Arm Division, Westinghouse Electric Corporation,
Baltimore, Md.

14,788
This bulletin presents the results of two studies on
the spacing of various types of ON-OFF switches on con-
trol panels. In the studies, each subject was required
to move his right hand from a centrally located rest
position to a switch and throw it as quickly as possible
without touching or moving adjacent switches. Tables
are included that give the characteristics of each
switch, the mean and standard deviation of ten measure-
ments of the tangential force (ounces) required to oper-
ate the switch, and a comparison of the toggle switches
used here with push-button data. The percentage of
"touching" error as a function of type of switch, dis-
tance between, and direction of throw is shown.
T. I. R 2

14,790

Kahn, A. & Kozmin, A.L. THE EFFECT OF THE NUMBER OF CHARACTERISTICS OF DISPLAYED ERROR ON TRACKING PERFORMANCE. Human Factors Data Bull. 41, Aug. 1959, 3pp. Air Arm Division, Washington Electric Corporation, Baltimore, Md.

14,790

To determine if sufficient control accuracy, which meets systems accuracy, can be achieved when the error signal is presented to the operator in discrete steps (as in a digital computer), subjects were required to track two functions that were combinations of sine waves of varying frequency. Five types of display error were used: 1) direction of error only, 2) error direction plus three indications of magnitude, 3) error direction plus six indications of magnitude, and 4) error direction and continuous magnitude. The results are shown graphically in terms of mean tracking error for the different types of error display. Implications for use of the digital display are discussed.
G. I. R 1

14,791

Kiss, J.S. & Briggs, G.E. DEVELOPMENT OF SYSTEMS RESEARCH AND DESIGN METHODOLOGY. QUARTERLY REPORT. Contract AF 33(616) 6156, Proj. 7154 & 25 Proj. 894, Rpt. 1, July 1959, 15pp. Ohio State University Research Foundation, Columbus, Ohio.

14,791

This is a progress report on a research project dealing with research methods and operational principles for a range of man-machine systems. Because of the continuing nature of the research program some studies initiated under previous contracts will be finished under this one and are reported here. Also, a complete list of technical documents from both contracts is included. Current operational studies of existing systems, research using task simulation, technical studies and supporting research are discussed briefly.
R 45

14,792

Johnson, R.W., Barker, G., Hamilton, D., Hankness, Helen, et al. DIFFERENTIAL PREDICTION WITH INCOMPLETE CRITERION DATA. Contract MGR 477(06), Public Health Research Grant M 743(03), Aug. 1959, 91pp. University of Washington, Seattle, Wash.

14,792

This study concerns the prediction of multiple criteria when there are incomplete criterion data. Such circumstances frequently occur in contexts such as the statistical prediction of college grades, where not every student takes one or more courses in each academic area. It is shown that the appropriate criterion is the conditional event, "success given that individual i participates in criterion activity j ," and that a "method of subgroups" can appropriately be used. This method is described and its disadvantages in computational labor discussed. Two short-cut methods are described and an empirical study made to ascertain whether these methods provide acceptable predictions.
T. R 14

14,793

Hawkes, G.R. & Warm, J.S. COMMUNICATION BY ELECTRICAL STIMULATION OF THE SKIN: III. MAXIMUM I. FOR ABSOLUTE IDENTIFICATION OF CURRENT INTENSITY LEVEL. USAMRL Proj. 6X95 25 001 05, Rep. 410, Sept. 1959, 13pp. USA Medical Research Lab., Fort Knox, Ky.

14,793

To determine the amount of information transmitted (I_t) by absolute identification of current intensity level under "ideal conditions", ten subjects were stimulated with electric current on the pad of the index finger and required to identify the current intensity level of the stimulus. One group was informed of the accuracy of their judgments; the other was not. Four sets of stimuli at four different intensity levels were selected on the basis of preliminary data. Current values ranged from 113 to 295 percent of the Absolute threshold and were always less than tolerance level. The data were analyzed for effect of extension of physical range of stimulus intensities and knowledge of results.
T. G. R 15

14,794

McFarland, R.A. THE ROLE OF PREVENTIVE MEDICINE IN HIGHWAY SAFETY. Amer. J. Publ. Hlth., March 1957, 47, 256-256. (Harvard School of Public Health, Boston, Mass.).

14,794

The thesis presented here is that Highway accidents fall within the province of preventive medicine and the health officer has as much responsibility for their control as he has for preventable diseases. The epidemiologic approach to highway safety is discussed in terms of what is presently known about host (driver) factors, host-agent (vehicular design) relationships, and host-environment (roadway, level of illumination, traffic, etc.) relationships.
G. R 25

14,795

McNair, D.T. & Krendel, E.S. THE HUMAN OPERATOR AS A SECOND SYSTEM ELEMENT. J. Franklin Inst., May & June 1959, 267(5 & 6), 1-49. (Franklin Institute Laboratories, Philadelphia, Penn.).

14,795

The role of human elements in certain closed loop control systems is considered. The analytic basis for measurements of human dynamics is presented in terms of the use of a quasi-linear mathematical model for the human operator—its describing function and remnant. Steady state describing functions measured by various experimenters in the field are discussed and the adaptive, optimizing behavior of the human operator is demonstrated. The remnants are also discussed and plausible sources for their origin postulated. The use of such knowledge by the systems designer is discussed.
T. G. I. R 36

14,796

Unger, H.R. & Mich, L.J. THE EFFICACY OF TRIFALON IN POTENTIATING BONAMINE MOTION SICKNESS PROPHYLAXIS IN DOGS. Rep. 59 78, June 1959, 4pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,796

To determine whether the addition of trifalon[®] (a drug used to relieve anxiety and tension) to bonamine[®] (a drug with established protective capabilities against motion sickness) would afford greater protection against swing-induced vestibular stimulation than bonamine alone, a standardized swinging procedure was utilized to induce vomiting in a group of normal mongrel dogs. Susceptible animals were then randomly placed in three groups: placebo, bonamine[®], and bonamine[®] combined with trifalon[®]. Susceptibility indexes were computed and differences among the three groups compared.
T. R 15

14,797

McFarland, R.A., Moore, R.C. & Warren, A.B. WHY DRIVERS HAVE ACCIDENTS. Public Safety, April 1956, 4pp. (Harvard School of Public Health, Boston, Mass.).

14,797

In this survey integrating within an over-all conceptual framework the information contained in the literature on the role of human factors in vehicular accidents, an attempt has been made to present the various findings in ways useful to those seeking an understanding of the causes of motor vehicle accidents and having an interest in the development of more effective preventive measures. The framework used is epidemiological in nature. In the course of the discussion some of the research necessary for a complete understanding of the relationship among the driver, the vehicle, and the environment in producing accidents are indicated. This is a digest of a longer article.

14,798

Loeb, M. & Rispelle, A.J. THE INFLUENCE OF INTENSE CONTRALATERAL STIMULATION ON THE LOUDNESS OF A LOW FREQUENCY TONE. USAMRI Proj. 6X95 25 001 01, Rep. 409, Sept. 1959, 11pp. USA Medical Research Lab. Fort Knox, Ky.

14,793

A hypothesis was developed on the basis of previous experiments that the acoustic reflex, once aroused, acts in such a way that it provides considerable attenuation for loud tones and little or none for fainter ones. To test this hypothesis a 2200 cps tone, loud enough to activate the acoustic reflex, was introduced to the left ear just before and overlapping that of a 500 cps test tone in the right ear. A comparison tone was then introduced and subjects asked to evaluate the relative loudness of the test and comparison tones. Subsequently the comparison tone was varied in intensity and adjusted by the subject to apparent equality with the test tone (varied from 70 to 105 decibels). The results are discussed in relation to the hypothesis.
T. I. R 13

14,799

Lumeborg, C.E., Jr., Brandt, Gloria, Haugeness, Helen, Hill, Anita, et al. DIMENSIONAL ANALYSIS, LATENT STRUCTURE, AND THE PROBLEM OF PATTERNS. Contract NCAR 477(08), Public Health Research Grant M 743(4), Sept. 1959, 84pp. University of Washington, Seattle, Wash.

14,799

This study develops and describes a technique for the detection of some sources of configural information arising from test data. The general polynomial approach is used with techniques closely related to certain factor analytic procedures. Procedures are described for relating the technique to the systematic variation provided by a set of psychological measures and for utilizing any detected configural information as potential predictor variance in projected uses of those measures. The method is illustrated with data drawn from a study of the dimensionality of personality. The technique of latent class analysis is compared with the one described herein.
T. I. R 31

14,800

McFarland, R.A., Damon, A. & Stoudt, H.W. THE APPLICATION OF HUMAN BODY SIZE DATA TO VEHICULAR DESIGN. SP 142, Nov. 1955, 18pp. Society of Automotive Engineers, New York, N.Y.

14,800

Differences in human body size can sometimes have serious implications for the efficiency and safety, as well as the comfort, of vehicle drivers. This report outlines methods whereby data on human body size may be systematically incorporated into vehicular design. The 5th, 50th, and 95th percentiles of 30 pertinent body dimensions of commercial drivers and of 23 dimensions on 2500 military drivers are presented along with specific values for those cab dimensions definable on the basis of body dimensions. The use of the cab mockup in conjunction with subjects of known body size for determining those cab dimensions related to dynamic human measurements is described.
T. I. R 12

14,801

Mowbray, G.H. & Gebhard, J.W. MAN'S SENSES AS INFORMATIONAL CHANNELS. Contract NCAR 7386, PB 151160, CM 936, May 1958, 64pp. US Office of Technical Services, Dept. of Commerce, Washington, D.C. (Applied Physics Lab., Johns Hopkins University, Silver Spring, Md.).

14,801

This review surveys in a general way what is known about man's ability to make use of his sensory capacities for the gathering of information. Where possible, comparisons between different sense modalities are made and the problem of sensory interactions is discussed. Finally, some suggestions are offered relative to the possible unburdening of men in complex environments by the judicious use of some of the subordinate sensory channels.
T. G. R 128

14,802

McBrier, D.T. & Krendel, E.S. A REVIEW AND SUMMARY OF TRACKING RESEARCH APPLIED TO THE DESCRIPTION OF HUMAN DYNAMIC RESPONSE. Reprinted from the 1958 Western Convention Record, Part 4, 254-262. Systems Technology, Inc., Inglewood, Calif. & The Franklin Institute, Philadelphia, Penn.

14,802

This paper reviews, in their historical perspective, some of the major findings of the joint efforts of engineers and psychologists to describe human dynamic behavior in man-machine systems. Only compensatory tracking studies are considered, especially those that have resulted in quasi-linear mathematical descriptions defining the human's status as a system element in continuous control loop tasks. An attempt is then made to delineate the present state of operator description as quasi-linear mathematical models.
T. I. R 15

14,803

McFarland, R.A. HUMAN AND ENVIRONMENTAL FACTORS OF AUTOMOBILE SAFETY. SAE Transactions, 1956, 64, 625-654. (Harvard School of Public Health, Boston, Mass.).

14,803

This paper points to the multiple causation in most automobile accidents, thus attempts at control should involve consideration of the interaction among the driver, his equipment, and the environment. Of first importance are the basic physical, physiological, and psychological characteristics of the driver but these facts must be associated with specific aspects of the other two in order to understand, and so prevent, accidents. Studies relating to various aspects of this concept are reviewed and the need for carefully controlled experimental studies, epidemiological surveys, and statistical analysis is stressed.
T. G. I. R 52

14,804

McFarland, R.A. HUMAN FACTORS IN HIGHWAY TRANSPORT SAFETY. SAE Transactions, 1956, 64, 731-750. (Harvard School of Public Health, Boston, Mass.).

14,804

This paper is primarily an extensive review of two broad research programs in highway safety and of human factors in vehicular accidents. After showing that highway accidents are a major problem to the nation and that most accidents have multiple causes, it is argued that a successful approach to accident prevention requires consideration of the relationships and interactions between the driver, his equipment, and his environment. The types of research needed are discussed and illustrative findings were cited from various studies, such as driver activity analysis, application of anthropometric data to vehicle design, design of instruments and controls, crash injury research, and environmental factors.
T. G. I. R 70

14,805

McFarland, R.A. HUMAN ENGINEERING: A NEW APPROACH TO DRIVER EFFICIENCY AND TRANSPORT SAFETY. SAE Transactions, 1954, 62, 335-345. (Harvard School of Public Health, Boston, Mass.).

14,805

This paper describes the Harvard School of Public Health research program concerning the human factors in vehicle design and operation. The promising areas of investigation are 1) job and activity analysis including the study of near accidents, 2) health maintenance examination, 3) detection of the accident repeater, 4) personal adjustments, 5) morale, 6) supervision and leadership, 7) human body size and capabilities with reference to the design and layout of all controls, instruments, seats, and areas of vision within the cab, 8) the effect of physical variables on the driver such as noise, vibration, temperature, etc., and 9) safety features to protect the driver if an accident occurs.
T. G. I. R 8

14,806

Nordlie, P.G. METHODOLOGY FOR ANALYSIS OF MAN'S ROLE IN AN ADVANCED SPACE FLIGHT SYSTEM. Contract NOKR 2525 (00), Rep. 5, HSR RM 59/25 SM, Nov. 1959, 13pp. Human Sciences Research, Inc., Arlington, Va.

14,806

This report is part of a feasibility and design study of a manned space flight system. The methodology used in the development of requirements for design of displays and controls for the cockpit of the space flight vehicle is described. The specific methodology described includes 1) phase/function analysis, man-machine allocation, second-by-second operational analysis, pilot work load analysis, link analysis, and use/frequency analysis.

R 9

14,807

McGrath, J.E. & Nordlie, P.G. RESEARCH METHODOLOGY OF REQUIREMENT-SETTING STUDIES. Contract NOKR 2525 (00), Rep. 3, HSR RM 59/23 SM, Nov. 1959, 33pp. Human Sciences Research, Inc., Arlington, Va.

14,807

This report is one of a series of studies on system research methodology. The results of a review of the methods employed in some 50 system studies aimed at establishing various types of requirements for complex man-machine systems are presented. The review is focused on the applicability of available methods for establishing human performance requirements for complex, future weapon systems. Included are description and discussion of steps for conducting requirements studies, and a bibliography of the system studies covered in the review.

R 49

14,808

McGrath, J.E., Nordlie, P.G. & Vaughan, W.S., Jr. A SYSTEMATIC FRAMEWORK FOR COMPARISON OF SYSTEM RESEARCH METHODS. Contract NOKR 2525 (00), Rep. 1, HSR TM 59/7 SM, Nov. 1959, 63pp. Human Sciences Research, Inc., Arlington, Va.

14,808

This is the first report of a research program aimed at synthesis of system research methodology. The purposes of the research are discussed. Certain basic methodological concepts are presented which provide a basis for systematic description and analysis of the system research process. These concepts are developed into a framework for classification and comparison of methods used to accomplish different portions of a total system research problem. A selected list of studies and methodological reports that most influenced the concepts presented in this study is included.

T. I. R-50

14,809

Robinson, J.E., Jr. HUMAN ENGINEERING TESTS OF SELECTED AIRCRAFT ANTI-COLLISION LIGHT SYSTEMS. Contract NOAS 57 541 C & NOAS 59 6008, July 1959, 194pp. Applied Psychology Corporation, Arlington, Va.

14,809

This report describes a human engineering investigation and evaluation of aircraft exterior light systems to determine their relative value as warning and direction-indicating devices. Both ground and flight tests were used with procedures designed to yield quantitative data relevant to the human factors involved. Fifteen observers participated in the tests; ground test problems totaled 5184 and flight test problems totaled 925. Conspicuity was quantified from search time measurements, and direction-indicating capabilities from directional response time and accuracy. The findings are discussed in relation to urgent research problems in this area.

T. G. I. R 22

14,810

Steinkamp, G.R., Hawkins, W.R., Hasty, G.T., Burwell, R.R., et al. HUMAN EXPERIMENTATION IN THE SPACE CABIN SIMULATOR. DEVELOPMENT OF LIFE SUPPORT SYSTEMS AND RESULTS OF INITIAL SEVEN-DAY FLIGHTS. Rep. 59 101, Aug. 1959, 86pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

14,810

The first of a series of reports on seven-day simulated space flights being conducted to determine the biomedical requirements for manned space flights is described. The small space cabin simulator and its involvement is described; the protocol of experimental design is discussed; and pre-testing and post-testing methods are presented. Results of a study of five subjects committed to seven-day periods in this small cabin and on a four to four work-rest schedule are shown and discussed from the standpoint of the physiologic, psychophysiology, and nutritional implications.

T. G. I. R 5

14,811

Schreiber, A.L. MONTE CARLO METHODS AS TOOLS FOR SYSTEM RESEARCH. Contract NOKR 2525 (00), Rep. 7, HSR RM 59/27 SM, Nov. 1959, 19pp. Human Sciences Research, Inc., Arlington, Va.

14,811

The class of research methods denoted by Monte Carlo techniques is described. The applicability of these techniques within the systems research process, the conditions under which they can be utilized, and the kinds of results that they provide are discussed. A selected bibliography of studies that utilize Monte Carlo methods is included.

R 13

14,812

Seminara, J.L. & Peters, G.A. HUMAN FACTORS RESPONSIBILITIES OF DESIGN ENGINEERS. Paper 213, ASME Paper 57 A 167, 1959, 4pp. American Society of Tool Engineers, Detroit, Mich. (Research Section, USA Picatinny Arsenal, Dover, N.J.).

14,812

Presented is a critical observation of the role of the design engineer in human factors. Reasons for aircraft and equipment failures are discussed as are the functions of human factors specialists.

R 10

14,813

Robinson, J.P. LINEAR PROGRAMMING AS A TOOL FOR SYSTEM RESEARCH. Contract NOKR 2525 (00), Rep. 8, HSR RM 59/28 SM, Nov. 1959, 16pp. Human Sciences Research, Inc., Arlington, Va.

14,813

The major features of linear programming, one important class of analysis techniques, are summarized and ways in which these methods can be utilized in systems research are treated. The treatment focuses on the kinds of problems to which linear programming methods can be applied, the conditions necessary for their application, and the kinds of solutions which they can provide. Mathematical basis and computational procedures are treated only when essential to exposition.

R 17

14,814

USA Quartermaster Research & Engineering Command. THE GUIDED MISSILE PROTECTIVE CLOTHING RESEARCH AND DEVELOPMENT PROGRAM OF THE DEPARTMENT OF THE ARMY. FOURTH ANNUAL REPORT. July 1959. 17pp. USA Quartermaster Research & Engineering Command, Natick, Mass.

14,814

This report covers work accomplished in providing specialized protective clothing for supporting crews in missile operations. The following significant accomplishments are described: (1) the new concept of Full and Limited Protective Clothing, its development and user testing; (2) progress in the development of an integrated, liquid air-cooled, full protection ensemble; (3) development and evaluation of an experimental permeable coverall for protection against liquid oxygen and hydrogen and (4) coordination with other branches of the service. R 25

14,815

University of Chicago. THE UNIVERSITY OF CHICAGO USAF RADIATION LABORATORY QUARTERLY PROGRESS REPORT. Contract AF 41(657)252, Quart. Prog. Rep. 30, Jan. 1959, 126pp. USAF Radiation Lab., University of Chicago, Chicago, Ill.

14,815

This report presents work accomplished on a research program on certain biological and medical aspects of atomic energy. Three studies are reported in the area of pharmacological and toxicological compounds as protective or therapeutic agents against radiation injury in experimental animals; three are reported on the effects of ionizing radiations on the biochemistry of mammalian tissues; and two are given on the influence of exposure to low levels of gamma and fast neutron irradiation on the life span of mice. T. G. I. R 123

14,816

Hopkin, V.D. PREFERRED LOAD AND POSITION FOR A HOOD JETTISON HANDLE. FPRC 992, April 1959, 4pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

14,816

To find the preferred position of a firing handle for jettisoning the canopy of an aircraft and to investigate various aspects of the loads for restraining the handle, 15 male subjects were tested. The task was to pull a D-shaped handle through various lengths (zero to nine inches) to activate a firing mechanism. The variables, in addition to length of pull, were load (35 to 105 pounds), position of handle relative to body, and direction of pull. Preferences of the subjects were analyzed and recommendations made. T.

14,817

Jackson, R.O., Swanseen, H.W., May, W., Lach, W.J., et al. THE AIR TRAFFIC CONTROL PROBLEM AS IT EXISTS IN THE LAKENHEATH (ENGLAND) MILITARY CONTROL AREA. Contract AF 19(604) 2272, AFRC TR 59 120(II), Air Traffic Series 2, Nov. 1958, 418pp. Tasker Instruments Corporation, North Hollywood, Calif.

14,817

This report was a thorough system analysis of the air traffic control operation at a military control area in order to define the problems, its phases, and related factors. The facilities were described and rules, procedures, patterns and approach/holding fixes were evaluated. The accuracy and reliability of air traffic control data functions and equipment were investigated. T. G. I. R 100

14,818

Jackson, R.O., Swanseen, H.W., May, W., Lach, W.J., et al. THE AIR TRAFFIC CONTROL PROBLEM AS IT EXISTS IN THE OLATHE (KANSAS) CONTROL AREA. Contract AF19(604) 2272, AFRC TR 59 120(III), Air Traffic Series 3, Nov. 1958, 400pp. Tasker Instruments Corporation, North Hollywood, Calif.

14,818

This volume reports a detailed study of the air traffic control problem as it exists in the Olathe Control Area. The Air Traffic Control facilities were described, and procedures, patterns, air route structure and reporting/holding fixes were evaluated. Climatological data were given; standard operating procedures were itemized; performance characteristics of aircraft operating in the area, and nature of the air movements were analyzed. It was intended that the report would aid systems designers and operations analysts in optimizing systems operation. T. G. I. R 92

14,819

Guignard, J.C. THE PHYSICAL RESPONSE OF SEATED MEN TO LOW-FREQUENCY VERTICAL VIBRATION: SOME PRELIMINARY STUDIES. FPRC 1062, April 1959, 10pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

14,819

To investigate human response to whole-body vibration within a limited band of vibration frequency, vertical sinusoidal vibration was applied to ten male subjects in a standardized sitting position, at frequencies from seven to 60 cps. and accelerations up to one g. Transmissibility, which was defined in the experiments as the ratio of the peak vibration acceleration recorded at the part of the body concerned to that recorded from the reference accelerometer, was measured at the hip and shoulder. Subjective reactions were also noted. Observations were made on the effect of tensing of the body, of discomfort, speech effects, vision, and maintenance of posture. T. G. I. R 27

14,820

Agmon, S., Netanyahu, E., Grunbaum, B., Jakicovski, A., et al. RESEARCH IN THE AREA OF MATHEMATICAL ANALYSIS TECHNICAL: FINAL REPORT. PERIOD: 1 JULY 1957 - 30 SEPTEMBER 1958. Contract AF 61(052) 04, AFOSR TR 59 111(Part 2), Dec. 1958, 33pp. Dept. of Mathematics, Hebrew University, Jerusalem, Israel.

14,820

This is a final technical report of a research project covering various topics in the area of mathematical analysis; seven previous reports have been issued. Included are studies on the coerciveness problem for integro-differential forms, some aspects of extension problem for linear operators in Banach spaces, problems of Tauberian character, some special methods of summability, and problems in conformal map making and in function theory. R 11

14,821

Blackwell, H.R. & Blackwell, G.M. LUMINOSITY FUNCTIONS OBTAINED WITH DIFFERENT METHODS AND DIFFERENT VIEWING CONDITIONS. Proj. MICHIGAN, Rep. 2144 344 I, Jan. 1959, 30pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

14,821

A series of measurements of the human luminosity function made with a variety of methods and under a variety of viewing conditions is summarized. The methodological variants were: 1) method used to arrive at brightness equation; 2) number and spectral composition of the standard radiance used; 3) configuration of the field of the photometric comparator; and 4) direct heterochromatic comparisons versus flicker photometry. A standard measurement procedure was used for one and three degree comparison fields and at four levels of retinal illuminance. The obtained data were compared with CIE luminosity functions. G. I. R 3

14,822

Bullard, R.W. THE GASEOUS ENVIRONMENT AND TEMPERATURE REGULATION. JUNE 1, 1958 - FEBRUARY 1, 1959. Contract DA 49 007 MD 947, March 1959, 43pp. Indiana University School of Medicine, Indianapolis, Ind.

14,822

To study the effects of oxygen deficiency and carbon dioxide excess upon responses involved in mammalian temperature regulation, a series of experiments was conducted. Nude men were exposed to five degrees C ambient temperature for 70-minute periods. At selected times the subjects breathed air rich in carbon dioxide or low in oxygen for 10, 20, or 30-minute periods. Shivering responses, metabolism and body temperatures were recorded and analyzed in relation to the change in gaseous environment. Rats and ground squirrels were exposed to a greater degree of oxygen deficiency in an altitude chamber. Characteristics of the cooling curve/are discussed and the physiological mechanisms involved are described. T. G. R 27

14,823

Burke, R.O. A PRELIMINARY EVALUATION OF THE LINK VISUAL LANDING SYSTEM MARK IV. M.S. Thesis, Jan. 1959, 141pp. University of Wyoming, Laramie, Wyo.

14,823

To evaluate a jet transition simulator utilizing the Link Visual Landing System Mark IV, the attitudes of a group of pilots undergoing a transition training course in which this device is used and their opinions as to its effectiveness were investigated. Questionnaires, listing those normal and emergency procedures which were possible to present in the simulator, were given to 41 trainees and 22 staff training personnel. The instructions were to indicate the items he thought most beneficial and also those least beneficial. These ratings were analyzed by frequency tabulations as well as a percentage score. Several chapters of the report are devoted to discussions of flight training devices in general, a description of the visual landing system, and development of simulator training programs. T. I. R 45

14,824

Burrows, A.A. AN ANGLE OF INCIDENCE INDICATOR USING BOTH AUDITORY AND VISUAL DISPLAY. FPRC 1025, Dec. 1957, 19pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

14,824

A pressure ratio device using both auditory and visual display was assessed as an aid to aircraft landing. Both land-based tests and aircraft carrier tests were carried out to check the reliability and accuracy of the indicator. The indicator yields stall warning over wide ranges, best landing speed, sensing optimum lift to drag ratios in long distance, intercepting aircraft where fuel is important, and thrust and similar measurement in jet engines. T. G. I. R 4

14,825

Crook, M.N. & Gray, Florence E. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: FORM COMPLEXITY AND RECOGNITION. Contract DA 49 007 MD 536, Interim Rep. 9, Jan. 1959, 5pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,825

The relation between complexity of irregular geometrical forms and ability to classify the forms as having been seen or not seen in a preliminary familiarization routine was investigated. Complexity was measured in terms of the number of sides (4, 8, 12, 16, 20). Ten subjects were tested individually by being shown 40 forms, singly for ten seconds, and then attempting to identify those 40 forms on a test sheet containing 200 forms. Results were expressed as number (or percent) of judgments correct. G.

14,826

Crook, M.N. PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Contract DA 49 007 MD 536, Interim Rep. 4, March 1956, 3pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,826

Progress since the Annual Report of October 1955 is summarized, including further analyses of data from two experiments on irregular forms, an experiment in progress designed to provide both time and error scores on the effect of natural versus unnatural brightness relation between figure and ground, work on a technique for producing irregular forms with curved contours, and preparations for subsequent steps in the program.

14,827

Cope, F.W. PROBLEMS IN HUMAN VIBRATION ENGINEERING. Proj. 131 18 01 12.4, Rep. 2, NALC MA 5902, March 1959, 14pp. USN Aviation Medical Acceleration Lab., Naval Air Development Center, Penn.

14,827

The effects of whole body vibration on the human operator of vehicles and methods of prevention are discussed in this paper. The first section is devoted to the ways in which vibration is transmitted from vehicle to man and to methods of preventing such transmission. That portion of the vibration which reaches the man can cause a variety of anatomical, physiological, and performance changes which are discussed in the second section. Finally, an effort is made to relate experimental findings to practical problems. Some practical methods and equipment for vibration protection are described. G. I. R 19

14,828

Crook, M.N. & Weisz, A. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. A PRELIMINARY EXPERIMENT. Contract DA 49 007 MD 536, Interim Rep. 1, Dec. 1954, 8pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,828

A preliminary experiment is described which served the double purpose of testing a technique for producing simulated noise in visual displays and of classifying a group of familiar forms in terms of relative recognizability. The simulated noise technique is described in some detail. G. I.

14,829

Crook, M.N., Bishop, H.P., Gray, Florence E., Hanson, J.A., et al. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: IRREGULAR FORMS VIEWED AGAINST PLAIN AND COMPLEX BACKGROUNDS IN FACSIMILE COPY. Contract DA 49 007 MD 536, Interim Rep. 5, Sept. 1956, 14pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,829

A method for generating unfamiliar forms which are quantitative enough to modify in describable steps was presented in some detail. Two experiments using such forms and their modifications were carried out. The first served mainly to explore several different aspects of the problem of recognition of irregular forms. Form modification, signal/noise ratio, and polygon category were varied. In the second, complex backgrounds were added but the number of items in the other categories was reduced. Results were discussed in terms of the various dimensions. G. I.

14,830

Crook, M.N. & Jaffe, J. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: DIRECTION OF CONTRAST AS A FACTOR IN THE RECOGNITION OF FAMILIAR FORMS. Contract DA 49 007 MD 536, Interim Rep. 5, Oct. 1956, 10pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,830

To investigate the effect of natural versus unnatural brightness contrast directions on the recognizability of familiar forms under noise, 12 male students had to recognize each of 24 such forms (12 light, 12 dark) of three classes of difficulty presented in both contrast directions under each of four or five noise levels. After 12 practice trials on forms not used in the experiment, the subject was shown the eight forms of each difficulty group under each noise level, most severe level first. Recognition time was analyzed as a function of noise level and contrast direction.

T.

14,831

Crook, M.N., Gray, Florence E., Hanson, J.A. & Weisz, A. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: A SET OF IRREGULAR FORMS. Contract DA 49 007 MD 536, Interim Rep. 10, Jan. 1959, 15pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,831

This report describes a general method of constructing irregular forms by two different techniques. In addition, necessary subsidiary rules are enumerated. The forms themselves are of two broad types--those bounded by straight lines, those bounded by curved and straight lines. For each type sets were constructed with 4, 8, 12, 16, and 20 sides. Each original form was modified in four progressive steps. All forms in these sets are illustrated.

I. R 2

14,832

Geoghegan, E., Sargent, F., II & Sayer, Joyce. NUTRITIONAL OBSERVATIONS IN H.M.S. WAVE. RNP-59/954, CES 443, NP 9, March 1958, 39pp. Climatic Efficiency Sub-Committee, NSC, London, England.

14,832

To assess the effect of a cold environment on nutrition, an investigation was conducted on 55 members of the crew of H.M.S. WAVE. Five weeks were spent in a temperate climate (44 degrees to 49 degrees F) and six weeks in the Arctic (34 degrees to 41 degrees F). For 13 weeks records were maintained of food consumption and body weight. Venous blood and timed specimens of urine were collected before the cruise and after six weeks in the Arctic. The data were analyzed and discussed with reference to 1) caloric intake and exposure to cold, 2) cold exposure and metabolism of ascorbic acid, and 3) nutritional requirements in cold climates.

T. R 35

14,833

Edwards, W. SUBJECTIVE PROBABILITY IN DECISION THEORIES. Rep. 2144 361 T, March 1959, 21pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

14,833

This report is concerned with theories which explain choices among risky alternative courses of action by means of the concept of utility, or subjective value, and subjective probability. The mathematical implications of subjective rather than objective probabilities are examined. It is concluded that the traditional form of the theory is more restrictive than has hitherto been supposed and is consequently inconsistent with existing data. A more flexible form of the theory is developed, and an experiment to test its validity is outlined.

G. R 26

14,834

DeBois, P.H. & Gold, D. SOME REQUIREMENTS FOR QUANTITATIVE METHODS IN BEHAVIORAL SCIENCE RESEARCH. AFOSR TN 58 1104, ca. 1958, 41pp. Washington University, St. Louis, Mo.

14,834

Some requirements for quantitative methods of analysis in behavioral research are discussed in relation to the order of measurement which characterizes the data. A technique is developed for dealing with three (or more) categorical variables which will provide some of the kinds of answers obtainable when one or more of the variables involve interval measurement. Two primary problems of interest to the behavioral scientist when dealing with interval data are discussed: 1) the development of means of identifying unitary variables manifested in diverse acts of behavior by groups of individuals, and 2) the application of factor analytic techniques in the determination of the basic variables underlying a set of observed variables.

R 6

14,835

Crook, M.N. & Coules, J. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: FAMILIARITY AND RECOGNITION OF IRREGULAR FORMS. Contract DA 49 007 MD 536, Interim Rep. 8, Jan. 1959, 14pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,835

To investigate the effects of varieties of experience with irregular (unfamiliar) forms on the familiarization process and of degree of familiarity as a factor in the recognition of forms in degraded copy, a series of five experiments were conducted. Irregular geometric test forms constructed by a randomization method were used throughout; three sets were used for familiarization and one for recognition. Several sorting techniques and one reproduction technique were used with different frequencies for familiarization with a final familiarity rating and, in some cases, recognition under noise being obtained.

T. G. I. R 3

14,836

Crook, M.N. & Coules, J. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS: REDUCED CONTRAST AND CONTOUR DEGRADATION AS FACTORS IN IMPAIRMENT OF FORM RECOGNITION. Contract DA 49 007 MD 536, Interim Rep. 7, Jan. 1959, 7pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

14,836

To investigate the differential effect of reduced contrast and contour degradation on form recognition in noisy copy, test sheets of Landolt rings were prepared in three sizes. These sheets were reproduced at various noise levels (contour degradation) and printing current ranges (contrasts). The subject's task was to judge the position of the gap in each ring. Results were expressed as mean percentages of items correct at the several combinations of noise level, printing current range, and ring size. A small-scale check test was made using "familiar" forms (silhouettes of known objects).

T. G.

14,837

Gogel, W.C. THE PERCEPTION OF SPACE WITH BINOCULAR DISPARITY CUES. Proj. 6 95 20 001, Task USAFRL T 2, MEDEA, Rep. 379, April 1959, 24pp. USA Medical Research Lab., Fort Knox, Ky.

14,837

This paper summarizes an approach to the understanding of the perception of space when the depth component is supported only by binocular cues. This theoretical approach emphasizes the perceptual interrelation of frontal and depth extents. Equations expressing the application of this position have been developed for the perception of the depth resulting from a binocular disparity and for perception of three-dimensional shape. Experimental data relating to these equations are reviewed. Implications of this approach are discussed with regard to the perceptual consequences of base and optical magnification.

T. G. I. R 18

14,838

Wolcott, C.F., Hart, T.J. & Raine, L.R. SIXTH INTERIM DEVELOPMENT REPORT FOR MULTICOLOR PLAN POSITION INDICATOR FOR USE IN THE AIR TRAFFIC CONTROL RADAR SAFETY BEACON SYSTEM. Contract NCSR 72571, Index NEO 10234, June 1957, 25pp. Gilfillan Bros. Inc., Los Angeles, Calif.

14,838

The long-range objective of this research is to provide a radar Plan Position Indicator on which pulse coded beacon returns can be displayed in seven color hues depending on the code-to-color assignment. This report covers progress during the period 1 April 1957 through 31 May 1957. Two special tri-color long-persistence phosphor Chromatrons were received and tested, and circuitry problems received attention. Final design values have been established.

T. I.

14,839

Wolcott, C.F., Hart, T.J. & Raine, L.R. SEVENTH INTERIM DEVELOPMENT REPORT FOR MULTICOLOR PLAN POSITION INDICATOR FOR USE IN THE AIR TRAFFIC CONTROL RADAR SAFETY BEACON SYSTEM. Contract NCSR 72571, Index NEO 10234, Aug. 1957, 8pp. Gilfillan Bros. Inc., Los Angeles, Calif.

14,839

The long-range objective of this research is to provide a radar Plan Position Indicator on which pulse coded beacon returns can be displayed in seven color hues depending on the code to color assignment. This report covers the activities during the period 1 June 1957 through 31 July 1957.

T.

14,840

Godshall, J.C. UNDERWATER ESCAPE PROGRAM F4D-1 CANOPY LOAD AND HUMAN EGRESS TESTS ABOARD A SUBMARINE. INTERIM REPORT NO. 5. BuAer TED Proj. ADC AB 6307, Rep. NADC ED 5839, March 1959, 24pp. USN Engineering Development Department, Navy Air Development Center, Penn.

14,840

Preliminary tests for underwater egress from an F4D-1 cockpit section installed on a fleet-type submarine at New London, Connecticut, during July 1958 are described in this report. Pilot egress problems are discussed, including the waterflow effect which tends to close the canopy. It is recommended that certain further tests be conducted at higher sink rates to obtain additional information using both the single-place fighter cockpit, F4D-1, and a two-place trainer cockpit, T2V-1.

T. G. I.

14,841

Gaito, J. HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS. PART 20. THE RELATIONSHIP BETWEEN PHYSICAL AND APPARENT BRIGHTNESS FOR THREE DEGREES OF INSTRUMENT BACKGROUND HETEROGENEITY. Proj. TED NAM AE 7047, Rep. NAMC ACEL 388, March 1959, 9pp. USN Air-Crew Equipment Lab., NAMC, Philadelphia, Penn.

14,841

To investigate the relationship between physical and apparent brightness as a function of degree of background heterogeneity, three experiments were conducted using the method of average error. Background heterogeneity was provided by arranging nine airspeed indicators in a three-by-three matrix on a black panel which was angled 25 degrees from vertical so that the center-most dial face was normal to the direct line of vision. In experiments (1) and (2), the subject equated each instrument singly with the center one and voltage was recorded. Then he equated each instrument with every other one when the lights for the nine instruments were on. In the last experiment, brightness readings rather than voltages were made.

T. G. R 7

14,842

USAF School of Aviation Medicine. BIOASTRONAUTICS ADVANCES IN RESEARCH, March 1959, 181pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

14,842

Fifteen special progress reports are published in this report, all of which deal with medical and biological problems immediately applicable in rocket and satellite flight. The reports include 1) definitions and sub-divisions of space (bioastronautical aspect), 2) instrumentation and biomedical research, 3) primates in space, 4) man in space, 5) closed ecological systems, 6) physiologic instrumentation of man during flight, 7) survival of terrestrial micro-organisms under simulated Martian conditions, and 8) center of gravity and moments of inertia measurements for seat (plus rhesus monkey).

T. G. I. R 40 (approx.)

14,843

USN Research Laboratory. THE EFFECTS OF TASK INDUCED STRESS ON MAN-MACHINE PERFORMANCE. Projs. NR 401 000 & NR 401 002, Aug. 1957, 11pp. USN Research Lab., Washington, D.C.

14,843

Experiment 1 compared performance on two man-machine systems, acceleration control and acceleration-aided control, under normal and stress conditions. Experiment 2 compared the same systems under the same conditions; however, the poorest operators were assigned to the human-engineered system (acceleration-aided), the best to the other. Experiment 3 compared the acceleration and position control under the same conditions; however, the operators had been extensively trained. There were 16 subjects per experiment, and seven task-induced stress conditions, e.g. secondary arithmetic task, prolonged trials.

T. G. I. R 7

14,844

Rand Corporation. AN ANNOTATED BIBLIOGRAPHY OF RAND SPACE FLIGHT PUBLICATIONS. Rev. RM 2113 1, March 1959, 53pp. Rand Corporation, Santa Monica, Calif.

14,844

This annotated bibliography is a list of RAND reports on astronautics and space exploration which are currently available to military, industrial and commercial organizations with "need-to-know". Also a list of libraries where the publications may be found is included.

R 200 (approx.)

14,846

Newton, J.M., Meketon, M., Roock, J. & Stargel, R. AN INVESTIGATION OF TRACKING PERFORMANCE IN THE COLD WITH TWO TYPES OF CONTROLS. Proj. 6 95 20 001, Subtask USAMRL S 4, MEDEA, Rep. 324, Sept. 1957, 13pp. USA Medical Research Lab., Fort Knox, Ky.

14,846

To determine the effect of low ambient temperature on movement-tracking and pressure-tracking, 12 subjects performed these tasks under six temperature conditions: 24.0, -5, -10, -15, and -20 degrees C. Each subject had two experimental sessions per temperature condition; one on each type of control. Number and duration of errors were scored. These data were subjected to analysis of variance.

T. G. I. R 3

14,847

Macley, H. A DESCRIPTIVE THEORY OF COMMUNICATION. Contract AF 49(638)-33, AFOSR TN 58 1112, Aug. 1958, 55pp. University of Illinois, Urbana, Ill.

14,847

A descriptive theory of the process of communication is presented. Communicative behavior is defined and three levels of communication are discussed. An experimental design for studying such behavior is presented next. The units of this behavior are defined in terms of three classes of variables and their interrelations are discussed. Finally, several problem areas are described in terms of these variables.

R 4

14,848

Miller, E.F., II. THE ELIMINATION OF HEADACHE, NAUSEA, AND DIZZINESS, REPORTED BY A STUDENT PILOT DURING INSTRUMENT FLIGHT STAGE BY MEANS OF REMEDIAL VISUAL TRAINING. A CASE STUDY. PART I. TRAINING PERIOD. PART II. ONE YEAR LATER. Spec. Rep. 57 29, Nov. 1957, 16pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,848

This case study describes a remedial visual training program for a student pilot who had frequent occurrences of dizziness, nausea and intense headache while flying on instruments. Three types of training were employed: tachistoscopic viewing of 4-, 5-, 6-, and 7-digit numbers; practice in maintaining fusion under diplopic conditions; and duction tests with Risley prisms. Before this training, measurements of lateral and vertical phorias, muscle balance, and ductions were made. These were compared with the same measurements taken during training.

T. G. R 7

14,849

Mendelson, E.S. A SENSITIVE METHOD FOR REGISTRATION OF HUMAN INTRATYMPANIC MUSCLE REFLEXES. Proj. NM 13 01 13.3, Rep. NAMC-ACEL 368, Feb. 1958, 4pp. USN Air Crew Equipment Lab., Naval Air Material Center, Penn. (Reprinted from J. appl. Physiol., Nov. 1957, 11(3), 499-502).

14,849

By tympanometry, the intratympanic muscle reflexes of 25 subjects were measured for tones of 400-8000 cps at levels of 80-115 db. Each tone was presented several times. Latency, size and direction of pressure were observed. The primary aim of this report was to detail the method of recording.

T. G. R 13

14,850

Reese, W.G. & Dykman, R.A. ORIENTING BEHAVIOR AS A (POSSIBLE) DIAGNOSTIC TEST OF (1) CEREBRAL PATHOLOGY AND (2) EMOTIONAL STABILITY. ARMY PROGRESS REPORT. Contract DA 49 007 MD 746, Jan. 1958, 33pp. Psychiatry Dept., Medical Center, University of Arkansas, Little Rock, Ark.

14,850

The response of a healthy organism to even mild, simple stimuli (lights, tones, breezes, etc.) was called here the orienting response (OR). The preliminary findings from a research study of OR in medical students and in psychiatric and neurological patients were reported. The Ss were presented with a series of auditory signals of conversational intensity and recordings made of heart rate, respiration, skin resistance, and muscle potentials. The student data were used to study 1) adaptation, 2) effect of psychological states such as anxiety and monotony, and 3) various methods of quantifying autonomic data. The patient data will be used to evaluate the diagnostic possibilities of OR.

T. G. R 1

14,851

Reza, F.M. & Jutila, S. SYSTEM RELIABILITY STUDIES. FINAL ENGINEERING REPORT. Contract AF30(602) 1675, RADC TR 59 24 & Rep. EE393 56121, Dec. 1958, 40pp. Electrical Engineering Dept., Syracuse University Research Institute, Syracuse, N.Y.

14,851

Theoretical studies were conducted in the field of reliability and probabilistic networks. The concept of h(p) functions is discussed; the Shannon-Moore expansion theorem is proved and an extension of it given; an additional theorem on necessary conditions for realizability of h(p) functions is presented; some formulae concerning the interrelationships of coefficients of reliability functions for series, parallel and composition of networks have been developed; computation of these coefficients is also included.

I. R 1

14,852

Siegel, A.I. & Wolf, J.J. TECHNIQUES FOR EVALUATING OPERATOR LOADING IN MAN-MACHINE SYSTEMS. A DESCRIPTION OF A MODEL AND THE RESULTS OF ITS FIRST APPLICATION. Contract NMR 2492(00), Feb. 1959, 96pp. Applied Psychological Services, Wayne, Penn.

14,852

A model is developed which may yield improved analysis and prediction of the effectiveness of man-machine systems. It incorporates considerations of intra- and inter-individual differences, individual stress tolerance, effect of stress upon response time and decision making time. Thus, it reasonably agrees with currently accepted thinking regarding human behavior. The model was applied to the pilot's task of landing an F4D aircraft on a carrier. The predictions are presented and evaluated.

T. G. I. R 12

14,853

Sparke, J.W. METHODS OF INDICATING A GLIDE PATH BY VISUAL MEANS. U.D.C. 656 713 985 661, Tech. Note EL 160, Dec. 1958, 28pp. Royal Aircraft Establishment, Farnborough, Hants, England.

14,853

The main requirements for an effective visual glide path indicator system are defined. The information which it would be required to transmit is discussed in some detail along with ways of coding the visual signals. Recent developments in such systems are described, e.g. three-colour sector light system, double bar ground aid, and one is proposed as meeting the requirements most satisfactorily.

G. I. R 4

14,855

Stone, P.T. & Corkindale, K.G. SOME FACTORS AFFECTING THE EFFICIENCY OF VISION AT NIGHT. Rep. 88, Oct. 1957, 19pp. Clothing & Stores Experimental Establishment, Ministry of Supply, London, England.

14,855

This summary of dark adaptation phenomena gathered from the literature brings together factors which must be considered for maintaining optimum night vision. The physiological mechanisms of adaptation are first reviewed. The characteristics of the stimulus situation, e.g., intensity and wavelength of previous light, retinal location; and of the individual, e.g., oxygen, age, alcohol, which influence light sensitivity are outlined and briefly discussed. Recommendations allowing for optimum night visual performance are presented.

G. I. R 50

14,857

Stevens, S.S. ADAPTATION LEVEL VS. THE RELATIVITY OF JUDGMENT. *Amer. J. Psychol.*, Dec. 1958, **LXXI**, 633-646. (Harvard University, Cambridge, Mass.).

14,857

This paper distinguishes between the processes, sensory adaptation and judgmental relativity, and suggests that the theory of "adaptation-level" tends not to keep them separate. In particular, certain questionable assumptions in this quantified theory are indicated, and an attempt is made to show that it is not a good model of the judgmental process. In addition, this theory was shown not to fit the results of category-scaling. The author then proposes the theory of judgmental relativity and its two classes of psychological continua.

G. R. 44

14,858

Townsend, F.M. & Steenbridge, V.A. MODERN CONCEPTS IN INVESTIGATION - AIRCRAFT FATALITIES. *J. forensic Sci.*, Oct. 1958, **3**(4), 381-400. (Armed Forces Institute of Pathology, Washington, D.C.).

14,858

Modern concepts in the investigation of aircraft fatalities are discussed. Primarily the fatalities are evaluated through consideration of environmental conditions--altitude, speed, toxins, temperature, noise and stress, traumatic factors--protective equipment, escape, aircraft design, and pre-existing disease. Representative cases are presented and analyzed.

R 15

14,861

Zegers, R.T. PHOTSENSITIZATION IN RELATION TO MEAN AND STANDARD DEVIATION VALUES. *Psychol. Monographs*, 1959, **73**(11), 1-25, No. 481. (Fordham University, New York, N.Y.).

14,861

The research described was undertaken to determine whether the human eye undergoes a process of photosensitization when it operates at low levels of illumination. Seven related topics are treated. Part 1 deals with the photopic luminosity curves of four subjects demonstrating the normalcy of their color vision. Part 2 reports the data obtained from the investigation of photosensitization (differential threshold for foveal vision at low background levels). The next five parts treat the investigation of the variability of the standard deviation 1) with wavelength, 2) under fixed conditions of field size and method at a few wavelengths, and 3) with field size. Quantum estimates of the mean values of these data are presented.

T. G. I. R 17

14,862

Buchheim, R.W. (Dir.). SPACE HANDBOOK: ASTRONAUTICS AND ITS APPLICATIONS, STAFF REPORT OF THE SELECT COMMITTEE ON ASTRONAUTICS AND SPACE EXPLORATION. House Doc. 86, 1959, 252pp. US Government Printing Office, Washington, D.C. (Rand Corporation, Santa Monica, Calif.).

14,862

This Space Handbook consists of four parts: 1) introduction with historical notes, a discussion of the general nature of astronautics, current state of space technology and action considerations; 2) technology of space environment, trajectories and orbits, rocket vehicles, propulsion systems, propellants, internal power sources, structures and materials, flight path and orientation control, guidance, communications, observation and tracking, atmosphere flight, landing and recovery, environment of manned systems, space stations and extraterrestrial bases, nuclear weapon effects and space, cost factors and ground facilities; 3) applications; and 4) astronautics in other countries.

T. G. I. R 400 (approx.)

14,863

McCormack, J.W. (Chm.). THE NEXT TEN YEARS IN SPACE, 1959-1969, STAFF REPORT OF THE SELECT COMMITTEE ON ASTRONAUTICS AND SPACE EXPLORATION. House Doc. 115, 1959, 221pp. US Government Printing Office, Washington, D.C.

14,863

This report consists of a summary of commentary from men and institutions on what they see in the future for space development, and particularly what scientific progress they think may evolve in the next ten years. Specific parts of the summary cover the moon, Mars and Venus, man in space, space stations and controlled flight, other uses of space, propulsion the key to space travel, long-term speculations, and space policy for the future. The second part of the report includes the full text of the statements received (approximately 50).

T. G. I

14,864

Glaser, E.M. & McCance, R.A. COMPARISON OF HYOSCINE HYDROBROMIDE WITH SOME NEWER PREVENTATIVES FOR MOTION SICKNESS. *RMP* 59/551, SS 91, Feb. 1959, 6pp. Survival-at Sea Sub-Committee, RMPRC, London, England.

14,864

A controlled experiment was carried out with Army volunteers, using naval life-rafts and artificial waves, to compare the merits of various motion-sickness remedies (hyoscine hydrobromide, cyclizine hydrochloride, meclizine hydrochloride, and perphenazine). The motion was fairly severe and lasted for one hour. Each subject (72 in all) received each of six treatments (no drug and no-lactose dummy, lactose dummy, and each of the above drugs) at 48-hour intervals. Incidence of vomiting or retching was recorded by observers, and other symptoms were reported by the subjects on questionnaires within ten minutes of the end of each test. The data were analyzed for the treatment producing the fewest symptoms of motion sickness.

T. R 8

14,865

Culver, Waver E. EFFECTS OF COLD ON MAN, AN ANNOTATED BIBLIOGRAPHY, 1938-1951. SUPPLEMENT NO. 3. *Physiol. Revs.*, Oct. 1959, (Part II), **32**(Suppl. 3), 524pp.

14,865

This bibliography gives a comprehensive coverage of the literature from 1938 through 1951 on the physiological effects of cold on man and prophylactic methods of dealing with the various cold injuries, especially frostbite, immersion foot, and trench foot. It includes the effects of cold on various warm-blooded animals used in experimental laboratories and in other studies simulating conditions of human existence. The references are from a wide range of physiological, medical, and other scientific journals and monographs. Each reference is accompanied by an informative annotation. Only translated titles of works written in languages other than English are included. The references are arranged alphabetically by author within a detailed subject classification.

R 2736

14,866

General Dynamics Corp. ELECTRIC BOAT DIVISION HUMAN FACTORS BIBLIOGRAPHY. April 1959, 3pp. Electric Boat Div., General Dynamics Corp., Groton, Conn.

14,866

This human factors bibliography contains references to studies on submarines, weapon and tactical control, ship control, decision making, monitoring, effects of stressful environment, and training device research. The papers are listed chronologically under each subject-matter topic and cover a period from mid 1956 to the early part of 1959.

R 33

14,867

Hatch, R.S. AN EVALUATION OF THE EFFECTIVENESS OF A SELF-TUTORING APPROACH APPLIED TO PILOT TRAINING. Proj. 1710, Task 77535, WADC-TR 59 320, July 1959, 19pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,871

Coles, R.R.A. & Knight, J.J. AN AUDIOMETRIC SURVEY OF FLIGHT-DECK PERSONNEL OF H.M.S. SHIPS, ARK ROYAL AND EAGLE. RNP 59/950, MES-17, April 1959, 38pp. Hearing Sub-Committee, RANEC, London, England.

14,867

The problem of insuring ready recall of a large body of in-flight job information by Air Force pilots was explored. The effectiveness of a voluntary self-tutoring approach using one type of "game appeal" device was investigated. Two matched groups of pilots were pre-tested on their knowledge of instrument flying information. The device was installed in the crew lounge of one of the groups but not in the other. After a two-month period both groups were tested again. Performance of the two groups was compared. Factors pertinent to the interpretation of the results and implications for further research were discussed.

T. G. I. R 4

14,871

To determine whether any deafness of flight deck men had resulted from current flying operations (jet aircraft) on the aircraft carriers, 224 aircraft-carrier personnel were tested by pure tone audiometry after an average of three weeks' rest from aircraft noise. The hearing of 131 shore-based men was tested in establishing a control group. Each ear was examined clinically and a questionnaire completed in preparation for the audiometric tests which were made at eight frequencies (from 0.25 to 8 kilocycles per second). All hearing losses from causes other than aircraft-noise exposure were excluded, and the remaining subjects grouped in three grades of increasing noise exposure. These data were then compared with the control group for assessment of hearing loss due to aircraft-noise exposure. T. G. R 58

14,868

Hopkin, V.D. A SELECTIVE REVIEW OF PERIPHERAL VISION. FPRC 1078, June 1959, 16pp. Flying Personnel Research Committee, MRC, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England.).

14,872

McCance, R.A. REPORT TO THE ROYAL NAVAL PERSONNEL RESEARCH COMMITTEE ON THE ACTIVITIES OF THE SURVIVAL-AT-SEA SUB-COMMITTEE. RNP 59/947, SS 94, June 1959, 6pp. Royal Naval Personnel Research Center, MRC, London, England.

14,868

A selective survey of the literature on peripheral vision and its functions is presented. The primary concern that initiated the survey was a proposal to use a Peripheral Vision Display in the airplane cockpit. The review is organized around the following topics: 1) developments from early theoretical work, 2) early applied work in aviation, 3) visual and postural cues in balance, 4) the peripheral field during forward motion: applications to landing, 5) scanning and peripheral vision, and 6) some visual characteristics of the periphery.

R 129

14,872

The work sponsored by the Survival-at-Sea Subcommittee over a period of ten years is reviewed. Reports issued to the Royal Naval Personnel Research Committee and publications in the scientific and medical press are listed in the appendix. The various aspects of the work described are: 1) food and water requirements in life rafts, 2) prevention of motion sickness, 3) analysis of depositions of shipwreck survivors, 4) the effects of drinking salt water, 5) the effects of immersion in water, 6) miscellaneous problems, and 7) future studies.

R 56

14,869

Caldwell, Anne E. PSYCHOPHARMACA. A BIBLIOGRAPHY OF PSYCHOPHARMACOLOGY. 1952-1957. Bibliography Series 19, Service Publ. 581, 1958, 258pp. US Dept. of Health, Education, and Welfare, Washington, D.C.

14,873

Sequist, M.R. PERCEPTION OF THE STATISTICAL STRUCTURE OF GROUPED EVENTS. Jan. 1959, 56pp. University of Texas, Austin, Tex.

14,869

This bibliography on psychopharmacology covers the period between January 1952 and December 1956 and extends into 1957. It includes articles concerned with the effect of psychopharmacologic agents on the psychological, behavioral and encephalographic reactions of normals, patients, and laboratory animals. It also contains a drug index, subject list of drugs, ancillary subject list of special conditions, e.g., aged, and an author list.

R 2500 (approx.)

14,873

This study was concerned with the investigation of several aspects of statistical decision theory. Five general hypotheses concerning the ability of human subjects to perceive the underlying statistical structure of sequential events were tested. These hypotheses were derived from a pilot study and from the theory of statistical decision functions. The performance of two randomly assigned groups of 25 subjects each was compared on a questionnaire and two specially constructed sequences containing two discrete events. A mathematical criterion of accuracy was utilized for purposes of evaluation of performance. The implications of the findings for theories of decision making are discussed.

T. G. R 42

14,870

Bennett, P.B. & Glass, A. THE ELECTROENCEPHALOGRAPH AND NARCOSIS UNDER HIGH PARTIAL PRESSURES OF NITROGEN AND ISONARCOTIC CONCENTRATIONS OF NITROUS OXIDE. RNP 59/937, UPS 170, RNPL 11/57, Dec. 1957, 29pp. Underwater Physiology Sub-Committee, RANEC, London. (Royal Naval Physiological Lab., MRC, Alverstoke, Hants, England.).

14,875

Trumbull, R. (Chm.). SECOND SYMPOSIUM ON PHYSIOLOGICAL PSYCHOLOGY, MARCH 19-21, 1958. ONR Symposium Rep. ACR 30, March 1959, 253pp. USN Physiological Psychology Branch, ONR, Washington, D.C.

14,870

To investigate the problem of narcosis induced in divers breathing compressed air, a series of experiments on human and animal subjects were conducted. Electroencephalograms were recorded on men and on animals at various simulated depths (up to 300 feet of sea water) in a pressure chamber, together with psychological tests (multiplication tests, cross-out tests) to ascertain the degree of narcosis induced. Similar experiments involved the breathing of isonarcotic concentrations of nitrous oxide and of helium. Comparisons of electrical activity, of objective signs of mental impairment, and of subjective impressions of narcosis, were made between records taken at the surface with those at the simulated depths.

T. G. I. R 36

14,875

This is a report of the second symposium representing the research program of the Physiological Psychology Branch of the Office of Naval Research. The 23 papers reproduced here represent such diverse fields as physiology, psychology, neuroanatomy, psychophysics, psychoacoustics, and biochemistry. The papers were planned for and arranged in a definite functional sequence, beginning with research upon the nature of the stimulus and continuing through the appropriate sensory modality to the level of perception or integration with other systems. Each speaker presented his latest work and also suggested directions in which future research might be profitable.

T. G. I. R 23

14,876

Beidler, L.M. THE PHYSIOLOGICAL BASIS OF TASTE PSYCHOPHYSICS. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 1-11. USN Physiological Psychology Branch, ONR, Washington, D.C. (Florida State University, Tallahassee, Fla.).

14,876

A theory of the mechanism of taste receptor stimulation has been previously developed in detail and accounts for much of the quantitative data obtained from electrophysiological investigations of the taste responses of many different species of animals. This theory has now been applied to certain psychophysical properties of human taste sensations. Data concerning consecutive just noticeable differences (j.n.d.'s) of sodium chloride, saccharin, and sucrose have been used in the application of the basic taste equation. The results of the experimental data and predictions from theory are discussed in detail. The relation between this approach and that taken by Fechner and Stevens is discussed.

T. G. I.

14,877

Kenshalo, D.R. & Nafe, J.P. THRESHOLD OF THERMAL SENSATION. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 23-31. USN Physiological Psychology Branch, ONR, Washington, D.C. (Florida State University, Tallahassee, Fla.).

14,877

Thermal sensation has been neglected as a subject for study by both the psychophysicist and the electrophysiologist largely because of lack of techniques for stimulus control. Methods of control, capable of controlling the stimulus to within 0.01C degrees of a predetermined point are discussed briefly. Curves of thermal sensitivity for both warm and cool between 26 degrees C and 40 degrees C are presented and discussed with respect to existing measures.

G. I. R 2

14,878

Geldard, F.A. DEVELOPMENTS IN VIBRATORY COMMUNICATIONS. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 33-39. USN Physiological Psychology Branch, ONR, Washington, D.C. (University of Virginia, Charlottesville, Va.).

14,878

Three lines of recent progress in a vibratory research program are reported: 1) the systematic measurement of frequency discrimination (Δf), over its useful frequency range, for mechanical vibrations; 2) the exploration of an important "derived" dimension of vibration—envelope shape or "attack"; and 3) identification of the crucial stimulus variable determining the shape of the frequency function for alternating current electrical stimulation of the skin. The bearing of all three on the more general problem of cutaneous communication is discussed, as is also the status of several stimulus dimensions which are, as yet, unexplored experimentally.

G.

14,879

Stevens, J.C. & Stevens, S.S. THE GROWTH OF SUBJECTIVE MAGNITUDE WITH STIMULUS INTENSITY. Presented at: Second Symposium on Physiological Psychology, USN School of Aviation Medicine, Pensacola, Florida, March 19-21, 1958, 41-49. USN Physiological Psychology Branch, ONR, Washington, D.C. (Harvard University, Cambridge, Mass.).

14,879

For a large class of perceptual continua, subjective magnitude grows as a power function of the physical level of the stimulus. This relation has been demonstrated by two methods: 1) magnitude estimation under which the observer assigns numbers proportional to the apparent magnitude of various stimuli; and 2) ratio production, under which observers set one stimulus to some prescribed apparent fraction or multiple of another stimulus. The continua apparently governed in this manner are discussed with appropriate supporting data and the exponents of the functions are presented. The validity of the methods and functions is further discussed.

G.

14,890

Notterman, J.M. SOME PRELIMINARY PSYCHOPHYSICAL DATA CONCERNING TIME-VARIANT STIMULI. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 51-55. USN Physiological Psychology Branch, ONR, Washington, D.C. (Princeton University, Princeton, N.J.).

14,890

The research program, within which the present study was made, is an attempt to effect a closer relationship between behavior theory and servo system theory. The reported study is of interest in a servo system context because the continuous closed-loop model requires knowledge of the detecting characteristics of human organisms for inputs using combinations of initial stimulus magnitude plus the first and second time-derivatives of this magnitude. Whether the organism discriminates the derivatives or the time integral of these derivatives over an interval of time is being investigated. Preliminary data for judgments of loudness increase are presented for the first two subjects run. Details of the experimental conditions are given.

G.

14,881

Plutchik, R. COMMENTS ON THE PROBLEM OF INDIVIDUAL DIFFERENCES IN PSYCHOPHYSIOLOGICAL RESEARCH. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 89-101. USN Physiological Psychology Branch, ONR, Washington, D.C. (Hofstra College, Hempstead, N.Y.).

14,881

This paper describes certain phenotypic aspects of individual differences, particularly with reference to stress studies, and notes some of the interpretations that have been offered to account for them. Important lines of research are suggested on such broad questions as: 1) the methods to be used for analysis of data, 2) the diagnosis of behavior disorders, and 3) the development of a theory of emotion.

G. I. R 29

14,883

Riggs, L.A. VISUAL EFFECTS OF MINIMAL EYE MOVEMENTS. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 123-135. USN Physiological Psychology Branch, ONR, Washington, D.C. (Brown University, Providence, R.I.).

14,883

The experiments reported are concerned with the eye movements that occur in spite of the attempt of the subject to fixate as steadily as possible on a stationary target. A contact lens that rests firmly on the limbus of the cornea is used to support a plane mirror whose surface is normal to the visual axis. Light reflected from the mirror is used to trace out the motions of the eye on a moving photographic film. The resulting records of eye movement reveal the minimal extent of motions of the retinal image under normal viewing conditions.

T. G. I. R 9

14,884

Baker, H.D. THE EFFECT OF METHOD UPON THE COURSE OF LIGHT ADAPTATION. From the Second Symposium on Physiological Psychology, March 19-21, 1958, 137-145. USN Physiological Psychology Branch, ONR, Washington, D.C. (Florida State University, Tallahassee, Fla.).

14,884

The process of light adaptation has been observed by means of three different measures of visual sensitivity: (1) absolute threshold, (2) equality matches between a dark-adapted retinal area and an area that is adapting to light, and (3) difference threshold. The resulting pictures of light adaptation are compared and the differences discussed.

G. R 8

14,885

Gleason, J.J. RESEARCH ON THE VISUAL PERCEPTION OF MOTION AND CHANGE. From the Second Symposium on Physiological Psychology, March 19-22, 1958, 125-171. *USAF Physiological Psychology Branch*, CMR, Washington, D.C. (Cornell University, Ithaca, N.Y.).

14,886

A series of experiments on visual perception of motion and change over the past five years are discussed. A reformation of the problem of motion sensitivity and a number of tentative conclusions, based on these data, are discussed. Instead of having to do with the perception of "motion" in the abstract, the conclusions apply equally to the perception of objects, and of the rigidity, slant, shape, size, and distance of objects and surfaces. It is suggested that rather than perception of "motion", perception of change-of environmental events as given to the eye by transformations of the optical pattern-is basically that it is also one aspect of the sensory control of behavior by feedback stimulation. R 15

14,887

Solomon, P., Neiler, D., Kinschky, P. & Mordelam, J.M. EXPERIMENTAL SENSORY DEPRIVATION. From the Second Symposium on Physiological Psychology, March 19-22, 1958, 231-251. *USAF Physiological Psychology Branch*, CMR, Washington, D.C. (Harvard Medical School, Boston, Mass.).

14,887

A series of studies on experimental sensory deprivation are described. The impetus for the studies came from observations of transient psychotic states in some poliomyelitis patients treated in tank-type respirators. The method used for the experiments is described. Isolation was produced by using the tank-type respirator with the subject lying flat on his back with arms and legs in rigid but comfortable cylinders and unable to see anything but the front of the tank. A constant minimal light and noise from the meter was present. Other aspects of method, such as subject motivation, personality tests, and correlation with duration of time in tank are reported. Clinical and polygraphic evidence of stress are discussed. T.G. 1.

14,888

Altman, P.L. EXHAUST OF CIRCULATION. Contract AF 33 (616) 72, Proj. 7158, Task 71501, WDC IR 59 593, Oct. 15, 1959, 373pp. *USAF Aerospace Medical Lab.*, Wright-Patterson AFB, Ohio.

14,888

This report presents data on circulation for man, other animals, and plants arranged in tables, graphs, diagrams, and drawings. There are 17 categories represented: circulatory anatomy; chemical composition and physical properties; blood volumes; cardiac outputs; heart rates; blood pressures; blood flow and lymph flows; the electrocardiogram; heart sounds and murmurs; effect of pregnancy; effect of oxygen and carbon dioxide concentrations; effect of compression, decompression, and accelerations; effect of radiation; blood coagulants and anticoagulants; effects of drugs and chemical substances; translation in plants; and effect of pathologic conditions. Contents have been authenticated by 326 leading investigators in the field of physiology. T. G. I. R 3000 approx.

14,889

Anthony, A. & Ackerman, E. STRESS EFFECTS OF NOISE IN VERTEBRATE ANIMALS. Contract AF 33(616) 2505, Proj. 7231, Task 71786, WDC IR 58 622, Sept. 1959, 49pp. *USAF Aerospace Medical Lab.*, Wright-Patterson AFB, Ohio. (Pennsylvania State University, University Park, Penn.).

14,889

The extra-auditory effects of chronic exposure of laboratory animals to intense noise were investigated. Rats, mice, and guinea pigs were exposed to noise in two frequency ranges (150-400 cps and 2-40 cps) at a sound pressure level of 135-140 decibels. Exposure time was 20-40 hours per week for periods of two to nine weeks. Stress response of the animals was measured by changes in the adrenal glands and other organs. The data were analyzed in terms of effect of duration of exposure and of low versus high frequency noise. T. G. I. R 47

14,889

Salley, G.J. & Gleason, J.C. ILLUMINATION AND TERRAIN AS FACTORS AFFECTING THE SPEED OF TANK DRIVEN. Contract DA 48 109 GK 650, Proj. 090 30 000, WDC IR 59 593, March 1958, 38pp. *Human Resources Research Office*, George Washington University, Washington, D.C.

14,890

To obtain data on the travel time of tanks under various combinations of terrain and illumination conditions, 200 tank commander-driver teams were required to drive M48 tanks over a test course. The conditions included 1) five different kinds of terrain, 2) four different levels of natural illumination (daylight, moonlight, starlight, and moonless overcast), and 3) five different kinds of artificial illumination (searchlight, floodlight, blackout drive light, infrared headlights with periscope, and no artificial light). Each team drove under only one level of natural illumination and one of artificial illumination. Tank speeds for the course were analyzed for the effect of these conditions. T. R 2

14,891

Fisher, D.F. & Crawford, E.W. RANGE INDICATIONS OF THE GUN MODEL 8 MASTER-SLAVE MANIPULATOR WITH THE SIXTH OFFSHOOT. Proj. 7158, Task 71506, WDC IR 59 593, 18pp. *USAF Aerospace Medical Lab.*, Wright-Patterson AFB, Ohio.

14,891

The master-slave manipulator is now widely used as a general purpose tool for remote handling. Heretofore, common practice has been for the worker engaged in remote handling to stand while working. However, it is probable that under some circumstances in the future (in a space vehicle situation) the operator may be required to work while in a sitting position. A study was conducted to determine the extent of limitations upon the inherent work range of the master-slave manipulator (G1 Model 8) when the operator is seated. Contours of effective performance areas in five horizontal planes were determined. G. I. R 4

14,892

Bradley, J.W. STUDIES IN RESEARCH METHODOLOGY. I. COMPATIBILITY OF PSYCHOLOGICAL MEASUREMENTS WITH PARAMETRIC ASSUMPTIONS. Proj. 7158, Task 71502, WDC IR 58 574(2), Sept. 1959, 27pp. *USAF Aerospace Medical Lab.*, Wright-Patterson AFB, Ohio.

14,892

The compatibility of typical psychological measurements with the assumptions of common, parametric, statistical tests is examined. Empirically obtained distributions of time scores and mathematically derived error distributions are used to illustrate conditions which give rise to serious violations of assumptions. T. G. R 5

14,893

Chernikoff, R., Drey, J.W. & Taylor, F.V. TWO-DIMENSIONAL TRACKING WITH IDENTICAL AND DIFFERENT CONTROL DYNAMICS IN EACH COORDINATE. IRL Prob. Y02 11, Proj. DA 550 010, Order AE 7047, IRL Rep. 5424, Nov. 1959, 6pp. *USAF Research Lab.*, Washington, D.C.

14,894

In many complex tracking devices the control dynamics may differ in the various coordinates. This requires the operator to supply a different transfer function in each tracking dimension. The purpose of this investigation was to determine the effect upon tracking produced by using various pairings of position, rate, and acceleration control dynamics in the X and Y coordinates of a two-dimensional tracking system. Performance scores for six subjects, who were given trials under all conditions, were analyzed for the conditions of minimum error. The findings are interpreted in terms of the limitations of the information-handling capacity of human operators. T. G. I. R 2

14,895

Duffy, C.W., Brown, W.F., Smith, G.H. & Highmaster, W.J. THE DEVELOPMENT OF JOB DESCRIPTIONS FOR SOME ARMY BATTERY OFFICERS. Tech. Rep. 44, April 1959, 78pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,896

This study is the first stage of a research project designed to determine the level of skill and knowledge required of officers assigned to ICS-ADK (surface to air missiles) batteries so that courses of instruction can be scientifically devised to train officers for their required duties. Information was obtained from experienced officers through checklist responses indicating the importance of and training needs associated with activities drawn from a job description. This report contains final (job descriptions for five officers and training need check lists. The use of this material for establishing training courses is discussed.

T. I.

14,896

Davis, R.C., Carafello, L. & Kohn, K. CHANGING ACTIVITY WITH GASTROINTESTINAL ACTIVITY. J. Comp. Physiol., Aug. 1959, 22(4), 464-473. (Indiana University, Bloomington, Ind.).

14,896

A series of experiments are reported in which the effects of food, rest, visual stimulation, and a gastric balloon on activity recorded from the abdomen by external electrodes were investigated. In some of the experiments simultaneous recordings of electrical activity and recordings from the gastric balloon were made and compared. Subject reports of stomach contractions were also obtained and plotted for correspondence with the other records. The results were compared to studies in the literature on "hunger pangs" and some possible errors in methodology were noted.

G. I. R 11

14,897

Davis, R.C. SOMATIC ACTIVITY UNDER REDUCED STIMULATION. J. Comp. Physiol., June 1959, 22(3), 305-314. (Indiana University, Bloomington, Ind.).

14,897

To determine the condition of somatic variables under low levels of stimulation, two groups of subjects were studied. One group lay on a cot in a dark, soundproofed room for about 40 minutes; the other group was given five minutes of rest followed by continuous moderate light and sound. Recordings were made of muscle potentials from three locations, of circulatory and of respiratory variables. The changes in these records over the period in the two groups were compared. To account for the pattern observed in the reduced stimulus group a hypothesis of increased sensitization or "anticipation" is proposed.

G. I. R 11

14,898

Doolin, B.F., Smith, G.A. & Drinkwater, F.J., III. AN AIR-BORNE TARGET SIMULATOR FOR USE IN OPTICAL-SIGHT TRACKING STUDIES. NACA RM A55F20, Sept. 1955, 33pp. National Advisory Committee for Aeronautics, Washington, D.C. (Ames Aeronautical Lab., Moffett Field, Calif.).

14,898

The design and flight evaluations of an air-borne target simulator for use in tracking studies of fighter-type airplanes equipped with optical gunsights is described. The investigation purposed to obtain experience and to demonstrate feasibility of air-borne target simulation for optical gunsight tracking research. The results suggested that the principles involved are applicable to weapons-system evaluation, to pilot training, and to precision flight-maneuver instrumentation.

G. I. R 6

14,899

Jay, J.M. & Chastkoff, R. THE USE OF QUICKENING IN ONE COORDINATE OF A TWO-DIMENSIONAL TRACKING SYSTEM. Tech. Rep. 44, April 1959, 78pp. Human Resources Research Office, George Washington University, Washington, D.C.

14,899

In a previous study (14,896) it was found that tracking error in one coordinate of a two-dimensional tracking system was affected by the dynamics used in the other coordinate. This study sought to determine how the introduction of quickening into one coordinate of a second-order, two-coordinate tracking system would affect performance in the unquicken coordinate. Eight subjects performed the tracking task under each of eight conditions: each of the dynamics, acceleration and quickened acceleration, was tracked separately in each coordinate for both one- and two-coordinate conditions. Tracking errors were analyzed for the effect of system dynamics.

T. G. I. R 3

14,900

Ferguson, C.N. & Lippala, R.P. DEVELOPMENT OF DEFORMED FIBER BECKET LINES. Contract AF 33(600) 34049, Proj. 6104, Task 6104.9, NAC TR 59-405, Oct. 1959, 17pp. (Naval Research Medical Lab., Wright-Patterson AFB, Ohio. (Spangston Research Laboratories, Inc., Madison, Miss.).

14,900

The suitability of various low-density plastic foam systems was evaluated for use as a padding below liner which would provide maximum comfort with greatest protection against shock and impact. Means of fabricating uniform and reproducible liners by injection of fluid foam into molds were studied. A liner was developed which appears to meet specification requirements for comfort, ease of application, and durability. A description of the liner is given.

G. I.

14,901

Foster, T.M. HUMAN FACTORS IN HIGHWAY DESIGN, OPERATION AND SAFETY PROBLEMS. Aug. 1959, 12pp. Highway Traffic Safety Center, Michigan State University, East Lansing, Mich.

14,901

Human engineering factors in the design and operation of highways are discussed with regard to their contribution to improvement of traffic efficiency and safety. Experimental studies of the way in which driver perception, judgement, and response time can be affected by highway design factors are reviewed. Problems of traffic flow and experimental data relating to the factors involved are presented. The use of mathematical models and simulation in the study of traffic flow are discussed. Examples are given of other human factors data already available or obtainable through specialized studies that suggest ways of obtaining more efficient driver-vehicle-highway-and-environment interrelationships.

G. I. R 12

14,902

Finch, D.M., Charlton, J.M. & Davidson, H.F. THE EFFECT OF SPECULAR REFLECTION ON VISIBILITY. Ca. 1757, 39pp. University of California, Berkeley, Calif.

14,902

The physical characteristics of a task and the distribution of flux from a lighting system as they affect the visibility of an object were evaluated quantitatively in two separate studies. In both studies, samples of handwriting in pencil and of printed ink material were used as tasks. Physical measurements using a micro-photometer were made in one study and a visibility meter was used in a series of field studies. Results of both sets of measurements were expressed in terms of loss of contrast due to specular reflections within the task, and therefore decrease in visibility. The concept of directional reflectance of materials and brightness factors are discussed.

T. G. I. R 15

14,903

Hammock, A.W. HUMAN FACTORS - THE BASIS FOR CRASH SAFETY DESIGN. Contract NMR 2880(00), AT CR 63 0 308, Sept. 1959, 19pp. Aviation Crash Injury Research, Flight Safety Foundation, Phoenix, Ariz.

14,903

This discussion of designing aircraft for crash safety reviews about three factors: 1) the resistance of the human body to injury under various conditions of crash forces; 2) the resistance of aircraft structure to collapse under various accident conditions; and 3) the type and severity of impact to which the aircraft is subjected. Available data are brought to bear on these three topics and various design problems are discussed. T. G. R 2

14,906

Kay, F.D.M., Jr. & Hubson, M., Jr. A RADIOLOGY GUIDE. FMCT II. Contract AF 33(616) 5472, Proj. 7145, Task 7183, WDC-TR 57 11R(11), May 1959, 15pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio. (USA Service Company, Camden, N.J.).

14,906

This Guide examines the practical aspects of radiation protection and radiological health. The following topics are treated: biological effects of radiation, monitoring instruments and techniques, health physics, radiation exposure control, facility design, protective devices, decontamination, permissible doses, emergency procedures, medical treatment of radiation injury, handling and shipping radioactive material, and disposal of radioactive waste. A typical radiological laboratory has been assumed and discussions directed to its requirements relating to radiation protection. A detailed table of radiisotope data is included. T. G. R 411

14,907

Kolstoe, R.E., Hammock, J.C., Emman, G.B., Crab, R.S., et al. CRIMINALITY AND ELECTRONICS MAINTENANCE PERSONNEL: ANALYSIS OF ACTIVITIES WITH IMPLICATIONS FOR TRAINING. FMCT I - 14-33. Tech. Rep. 31, Sept. 1956, 99pp. Human Resources Research Office, General Dynamics Corporation, Washington, D.C.

14,907

To provide information concerning the job in the field of third- and fourth-echelon electronics maintenance personnel in ordnance detachments, data were gathered from 381 officers and enlisted men in 30 detachments in various geographic locations. The data concerned pre-Army background of the men, types of school and job training and its relevance to the job in the field; the specific job activities performed; use of test equipment, test procedures and technical manuals; and estimates of proficiency of repair personnel. Questionnaires, interviews, rating scales, card-sorting tasks, record forms, and observations were used to gather information. On the basis of the results of an extensive analysis of the data, recommendations are made concerning job requirements and job training. T. G.

14,908

Lewis, A. & Kanareff, Vera T. USE OF AUTOCORRELATION AND UNCERTAINTY MEASURES FOR THE ANALYSIS OF DECISION BEHAVIOR. Contract AF 33(616)5645, Proj. 7183, Task 7161B, WDC TR 59 434, Aug. 1959, 34pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio. (Fels Group Dynamics Center, University of Delaware, Newark, Del.).

14,908

A discussion of two methods of analysis of sequential dependencies is discussed in relation to the study of decision behavior. The methods considered are autocorrelation and uncertainty analysis. Each of these approaches is described in terms of computational techniques and specific applications are presented. T. G. R 28

14,910

Kemp, R.J.H., Karelides, J.G., Anderson, R.H. & Krebs, A.T. SYNERGISTIC EFFECT OF CERTAIN RADIO-PROTECTIVE COMPOUNDS. USMIL Proj. 6154 14 001 03, Rep. 437, Dec. 1959, 14pp. USA Medical Research Lab., Fort Knox, Ky.

14,910

To determine the degree of protection afforded mice against lethal and supralethal doses of radiation by optimum concentrations and radioprotective compounds, the following chemical compounds were studied: beta-naphthyl-erythrosine (NBE), beta-naphthyl-erythrosine (NBE), and five-hydroxytryptamine (serotonin). The concentrations chosen for these agents, whether when used alone or in combination, were at dosages that produced no death in any of the control (non-irradiated) mice or on the first two days following radiation exposure. Radiation exposures of 800, 900, and 110 roentgens were studied. T. G. R 8

14,911

Murphy, K., Chalk, Y. & Goto, Y. MEASUREMENT OF THE FATIGUE OF WORKERS IN A NEURAL CODE. Tokyo Psychologica Bull. 1959, 1-25. (Institute of Psychology, Tokyo University, Sendai, Japan).

14,911

Measurements of fatigue were made on 175 miners of Taro Mine in Iwate Prefecture, Northern Japan. Measurements consisted of critical flicker fusion decrements between pre- and post-work values, body weight decrements between pre- and post-work values and subjective reports of fatigue (reported fully elsewhere). The variables considered were the kind of work (rockdriller, timberman, trapper, chissman, capenter, tippler, and battery locomotive operator), the difference between pits (atmospheric temperature difference), and the day of the week (six-day week). Differences in decrements due to the variables were analyzed and discussed in relation to subjective feelings of fatigue and to accident occurrence rate in the mine. T. G. I. R 4

14,912

Newton, J.M. TRAINING EFFECTIVENESS AS A FUNCTION OF SUBMARINE COMPLEXITY. Contract 261339 458, Tech. Rep. MATRADEKER 458 1, Sept. 1959, 93pp. USN Training Service Center, Fort Washington, N.Y. (Electric Boat Div., General Dynamics Corporation, Groton, Conn.).

14,912

To compare the effectiveness of training devices having various degrees of simulation of an operational task, a one-man task in the control of course and depth of a high-speed submarine was selected for study. The performances of depth changing only, course changing only, and simultaneous depth and course changing were measured on five trainers which varied in realism of simulation from the Universal Submarine Simulator (performance on which was used as criterion) which is highly realistic with complete equations for motion to the simulator with no motion. Subjects were trained on one of the five simulators and then tested on the most realistic device. Implications of the results for simulation devices are discussed. T. G. I. R 10

14,913

Rathert, G.A., Jr., Creer, B.Y. & Douvillier, J.G., Jr. USE OF FLIGHT SIMULATORS FOR PILOT-CONTROL PROBLEMS. NASA Memo. 3 6 59A, Feb. 1959, 14pp. National Aeronautics and Space Administration, Washington, D.C. (Ames Research Center, Moffett Field, Calif.).

14,913

Comparisons were made between actual flight results and results obtained with fixed and moving flight simulators in a number of phases of flying airplanes with a wide range of characteristics. These results were then used to study the importance of providing motion stimuli in a simulator in order that the pilot operate the simulator in a realistic manner. Regions of airplane characteristics where motion stimuli are either mandatory or desirable are indicated. G. I. R 2

14,914

Ross, C. & Barry, Jeannette. BIBLIOGRAPHY OF MILITARY PSYCHIATRY 1945-1950. May 1957, 80pp. US National Academy of Medicine, Dept. of Health, Education, and Welfare, Washington, D.C.

14,915

This bibliography of Military Psychiatry covers the period 1952 through 1958 with a few selected references from the early months of 1959. Conventional annotations have been added to the entries which are arranged under the following subject matter areas: manpower utilization, preventive and social psychiatry, combat psychiatry, therapy, psychosomatic problems, neurology and physiology, problems of special circumstances and environments, aviation psychiatry and psychology, forensic military psychiatry, clinical psychology, psychiatric social work, psychiatric teaching and training, prisoners-of-war, medicine, reviews, bibliographies and abstracts, research and statistics, and history. There is an author index. R 736

14,916

Stehney, G.S., Russell, W.D. & Alfano, M.L. FLIGHT INVESTIGATION OF A SMALL SIDE-MOUNTED CONTROL STICK USED WITH ELECTRONIC CONTROL SYSTEMS IN A FIGHTER AIRPLANE. DCA 59 16459, March 1959. 40pp. National Advisory Committee for Aeronautics, Washington, D.C. Langley Aeronautical Lab., Langley Field, Va.

14,917

This paper describes results of a flight test program in which a small stick (about four inches long) mounted at the end of an arm rest at the pilot's side was used as the airplane maneuvering flight controller. The side-mounted controller was used with both a rate a. main control system and an irreversible electronic power control system. Rapid and universal maneuvering was accomplished with each system by each of 14 experienced pilots. Pilot opinions were obtained in post-flight interviews and questionnaires on the suitability of the controller. T. G. I. R 3

14,917

Meltman, G., Gosh, Hille & Lyman, J. AN ANALYSIS OF SUBMERGED RESEARCH CONTROL. Rep. 59 49, Tech. Rep. 1, July 1959, 54pp. Dept. of Engineering, University of California, Los Angeles, Calif.

14,917

Prothesis control with bioelectric signals is analyzed in terms of the signal's function within a body communication link. Three types of signals are considered: Electromyographic (EMG), Electroencephalographic (EEG), and Electrodermographic (EDG). The signals and the terms used in the analysis are defined, and pertinent studies reviewed in terms of the relation of the signals to both neuromuscular events and external stimuli. The studies are evaluated with regard to practical usage of the signals. Experimental work that should lead to an adequate specification of practical control site parameters is outlined. G. I. R 52

14,918

Zechman, F.W., Cherniack, M.S. & Hyde, A.S. VENTILATORY RESPONSE TO FORWARD ACCELERATION. Proj. 7222, Task 71746, NAC TR 59 584, Sept. 1959, 16pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

14,918

This report presents the findings of two series of experiments dealing with the effect of forward acceleration on respiration in man. In the first, the effect of five, eight and twelve g on respiratory frequency, tidal volume, minute volume, and nitrogen elimination were determined. In the second, oxygen consumptions were measured before, during, and after accelerations of five, eight, and twelve g. In both series the trunk was inclined 12 degrees in the direction of acceleration and a rate of onset of one g per second was used. T. G. I. R 15

14,919

Sandroy, J., Jr. & Cochran, R.P. INDIRECT ESTIMATION OF BODY SURFACE AREA AND VOLUME. Rep. Rep. NW 31 C1 CO C1 C1, May 1959, 219-224. US Medical Research Institute, Bethesda, Md.

14,919

A convenient and rapid photographic technique of obtaining data that can be used for the calculation of human body surface area is described. Results are in good agreement with values obtained by a reliable method of readings from a chart. Empirical equations for the calculation of body volume (and density) in man, based essentially on measurements of weight and height, are presented. Comparison of the reliability of the results with those obtainable by established methods of quantitation is made. T. G. R 28

14,920

Sandroy, J., Jr. SURFACE AREA TECHNIQUES AND THEIR RELATIONSHIP TO BODY COMPOSITION. Lecture & Review Series 59 2, March 1959, 14pp. US Medical Research Institute, Bethesda, Md.

14,920

This paper considers the status of surface area methods as techniques of measurement and evaluates their applicability to the determination of various aspects of body composition, as they may be reflected by the relationship of area to other anthropometric or physiological parameters, such as basal metabolism, body volume, lean body mass, body fat, body water and density. Both direct physical measurements (calipers, skinfolds, triangulation and integration) and indirect estimations (various types of mathematical formulas for calculating surface area from its geometric relations to the major dimensions of the body) are discussed. R 44

14,921

Schock, G.J.D. PERCEPTION OF THE HORIZONTAL AND VERTICAL IN SIMULATED SUBGRAVITY CONDITIONS. Proj. 7251, Task 72501, AFOSR TR 59 13, June 1959, 12pp. USAF Aeronautical Lab., Bollman AFB, Md.

14,921

To investigate the ability of subjects to perceive the true horizontal and vertical in subgravity conditions, subjects were tested while immersed in water to simulate such conditions. Each subject, equipped with self-contained underwater breathing apparatus, was seated in a chair and asked to direct the movement of a luminous bar to what he perceived to be the true horizontal and vertical. Various degrees of head and body tilt were used. Tests were repeated on land without visual cues. Errors in judging the horizontal and vertical were compared for the two conditions. T. R 3

14,922

Sidorov, R.C. & Allen, F.L. SHIP CONTROL IN AN EVALUATION OF A HORIZON-AT-INFINITY IN A CONTACT ANALOG DISPLAY. Contract N0002 2512(00), Proj. SUBIC, P29 140, Electric Boat Tech. Rep. SPD 59 064, Aug. 1959, 10pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn.

14,922

The value of the display of a horizon-at-infinity as an aid in depth control of a submarine with a Contact Analog (CA) Display was investigated. Three experimental displays were used: 1) a basic two-surface CA, 2) the basic CA with a horizon-at-infinity, and 3) the horizon-at-infinity without the associated CA surfaces. The subjects were divided into groups of seven, each group being tested on a different display on a task involving changing the depth of a simulated submarine. Mean depth errors and the standard deviations associated with each of 13 depth levels were compared for the three displays. T. G. I. R 10

14,923

Slattery, R.C. ABSOLUTE JUDGMENTS OF STATIC PERSPECTIVE TRANSFORMATIONS. Oct. 1958, 9pp. Electric Boat Division, General Dynamics Corporation, Groton, Conn. (Reprinted from J. exp. Psychol., Oct. 1958, 26(4), 340-364).

14,923

To determine the degree to which accurate estimates of the extent of a perspective transformation depend upon motion in the stimulus, static perspective images corresponding to a flat grid-patterned surface viewed at various pitch angles were projected onto a vertical screen. The 21 perspective patterns that would result from rotation of observer in two-degree steps from zero to -40 degrees were displayed to 25 naval officers who were then asked to judge the extent of their apparent rotation in the medial plane. The method of absolute judgments was employed. Mean estimate and variability of judgments for each pitch angle were calculated. Implications for the contact analog display system for flight are noted.

G. I. R 7

14,924

Roach, Lucis & Accarelli, Ester. ON THE INFLUENCE OF THE INCOMPLETE ADAPTATION OF THE PERIPHERAL RETINA ON THE SPEED OF READING. Atti della Fondazione Giorgio Ronchi, Jan. Feb. 1959, 12(1), 33-42.

14,924

Changes in the speed of reading were investigated during the adaptation to light of the peripheral retina. Luminance level of the peripheral field was isopic (either blue or green), while that of the foveal test field was in the photopic range. The first series was completed after the subject had been dark adapted for 25 minutes; the second series was completed after the onset of the peripheral light; and the third series after 25 minutes of dark adaptation followed by 25 minutes of adaptation to the peripheral light. Three subjects were tested. Data from the three conditions were compared for the effect of incomplete adaptation.

G. I. R 9

14,925

Cristofan, D.W., Rables, F.H., Jr. & Grawicke, M.E. A DEVICE FOR MEASURING GROSS MOTOR BEHAVIOR IN PRIMATES. Proj. 7182, Task 71820, NADC IN 59 353, Oct. 1959, 4pp. USN Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

14,925

To meet the need for a method of measuring gross motor behavior as affected by gravitational forces, a jumping device for primates was developed. It consisted of a large box with a stand at each end and a well, carrying a constant electrical charge, in the middle. Shock, preceded by a tone, was used to make the animal jump over the well to the opposite side. Motion pictures of the jump, as viewed through the plexiglass side and top, allowed measurement of the height and distance of the jump. Other possible uses of the device are described.

I.

14,926

Michaels, R.M. INTENSITY DISCRIMINATION FOR NARROW BANDWIDTHS OF NOISE AT VARIOUS PULSE LENGTHS. Proj. NR 442 000, Task NR 442 003, NPL Prob. 503 03, NPL Rep. 5186, Oct. 1958, 28pp. USN Research Lab., Washington, D.C.

14,926

Upon the assumption that the auditory system acts as an envelope detector, a series of hypotheses were stated predicting how intensity discrimination would be influenced by the variations in the stimulus envelope. Filtered random noise of four bandwidths and four pulse durations were used to vary the rate and number of fluctuations. Seven listeners heard two pulses of noise in succession, judging the intensity of the second relative to the first. The physical differences were determined by taking the ratio of the total energy in each pulse. A transition curve for the responses to the various stimulus differences was plotted and the difference taken as the probable error of the fitted curve. The results were studied with respect to the envelope detector model of auditory discrimination. T. G. I. R 14

14,928

Lyvender, H.J., Busch, A.C. & Sklodowski, V.A. SELECTED ABILITIES AFFECTING TECHNICIAN'S EFFICIENCY IN MISSILE SYSTEMS. Oct. 1959, 19pp. Human Factors Engineering Group, Army Communication Command, Cincinnati, Ohio.

14,928

To attempt identification of variables, other than electronic proficiency, that may be indicative of a successful electro-mechanical trainee for missile systems, a list of characteristics that one should possess for entrance into a specialized missile training program was drawn up and evaluated with reference to job descriptions. Ten different psychological tests, each purporting to measure different areas of these abilities, aptitudes, or knowledge was administered to 71 military and 49 civilian electronic technician trainees. A factor analysis was used to identify groupings of variables characteristic of this group and a multiple correlation analysis was performed to identify these test variables with the criterion (training school grades).

T. G. R 14

14,929

Jacobson, A.J., Wilkins, Madeleine J., Kassianoff, L., Sile, Rita E., et al. 1953 LITERATURE ATTENTION MEDICINE AN ANNOTATED BIBLIOGRAPHY VOLUME 2. 1959, 354pp. AMM Medical Association, St. Paul, Minn. (The Library of Congress, Washington, D.C.).

14,929

This bibliography on aviation medicine covers 1953 literature and some studies from 1952 not included in the first volume. The items, which consist of the complete reference and an informative abstract, are arranged alphabetically with cumulative author and subject indexes included. Areas of subject coverage are: 1) history and general aspects of aviation medicine, 2) aviation psychology, 3) pathology and pharmacology, 4) aviation physiology, 5) preventive medicine and sanitation, 6) special problems in high-altitude and space flight, and 7) miscellaneous problems.

R 1366

14,930

Imus, H.A. & Foelling, J.L. DISQUALIFICATIONS FOR FLIGHT TRAINING DUE TO OCULAR DEFECTS. Spec. Rep. 59 3, May 1959, 5pp. USN School of Aviation Medicine, Naval Air Station, Fla.

14,930

A review of physical disqualifications for flight training revealed that 55 out of 224 cases during the period 14 February 1957 to 27 October 1958 were due to ocular defects. An analysis of the complete record of the eye examination of each case disqualified on this basis was made to determine the actual defects involved.

T.

14,931

Hunt, G.H. & Mehler, S.R. AGING: A REVIEW OF RESEARCH AND TRAINING GRANTS SUPPORTED BY THE NATIONAL INSTITUTES OF HEALTH. Public Hlth. Service Publ. 652, Dec. 1958, 50pp. US Department of Health, Education, and Welfare, Washington, D.C. & National Institutes of Health, Bethesda, Md.

14,931

The research and training projects in aging which are supported by the National Institutes of Health are described. Each project is classified within each Institute and the Division of General Medical Sciences according to an outline which is used by the Center for Aging Research. The major topics in the outline are 1) gerontology-general, 2) major multidisciplinary research projects, 3) structural aspects of aging, 4) physiological and biochemical aspects of aging, 5) psychological aspects of aging, 6) social aspects of aging, 7) identifiable disease processes, and 8) training.

R 124

14,932
 Hitchcock, L., Jr., Mager, R.F. & Whipple, J.E.
 DEVELOPMENT AND EVALUATION OF AN EXPERIMENTAL PROGRAM
 OF INSTRUCTION FOR FIRE CONTROL TECHNICIANS. Contract
 DA 44 109 GM 450, Proj. 095 25 000, HEMRO Tech. Rep. 46,
 May 1958, 29pp. Human Resources Research Office,
 George Washington University, Washington, D.C.

14,932
 This study is part of a long-range research program
 in electronic maintenance and operator training. An ex-
 perimental course of instruction for the M3 Fire Con-
 trol System Maintenance Course of the U.S. Army Air De-
 fense School was developed on the basis of a previous
 analysis of trouble shooting behaviors and maintenance
 habits of experienced and inexperienced technicians.
 Two classes of technicians received training in the ex-
 perimental course and were compared with graduates of
 the standard course on the M3 Mechanic Proficiency Test
 (a performance test). Recommendations for curriculum
 modifications are made.
 T. G.

14,933
 Freedman, S.J. & Greenblatt, M. STUDIES IN HUMAN
 ISOLATION. Contract AF 33(616) 5663, Proj. 7123,
 Task 71741, NADC TR 59 24, Sept. 1959, 46pp.
 USAF Aerospace Medical Lab., Wright-Patterson AFB,
 Ohio. (Massachusetts Mental Health Center, Boston,
 Mass.).

14,933
 Thirty normal college-age subjects were run in
 eight-hour experimental sessions that involved: 1) non-
 patterned visual and auditory input combined with social
 isolation, 2) visual deprivation (blackout) combined with
 auditory patterning and social isolation, and 3) social
 isolation alone. Perceptual and cognitive distortions
 and disorientations differentially induced by these con-
 ditions are described. Six additional somewhat "deviant"
 subjects were run under the first condition. The rela-
 tionship between visual and cognitive imagery was ana-
 lyzed. A theoretical formulation is proposed to account
 for the perceptual distortions reported.
 T. I. R 34

14,934
 Fraizer, J.J. ELECTROLUMINESCENT LIGHTING OF AIRCRAFT
 INSTRUMENTS. Contract AF 33(616) 5273, Proj. 1373,
 Task 13683, NADC TR 58 510, Sept. 1958, 141pp.
 USAF Flight Control Lab., Wright-Patterson AFB, Ohio.
 (The General Electric Company, Ithaca, N.Y.).

14,934
 This report describes the work done in applying
 electroluminescent lamps to a group of aircraft in-
 struments (tachometers, flow meters, voltmeters and two
 vertical tape devices). Specific problems encountered
 are discussed. The results of an investigation of the
 properties of electroluminescent lamps which were sup-
 plied by five manufacturers are presented. The investi-
 gation includes a study of the effects of temperature,
 voltage, frequency, and humidity on the brightness of
 the lamps.
 T. G. I. R 13

14,935
 Davis, L.W. & Basore, B.L. INFORMATION CONTENT OF
 LEARNED MESSAGES. Contract AF 30(602) 1890, Proj.
 4519, Task 45241, OR 3 1004, NADC TR 59 209, May
 1959, 52pp. Diamond Communication, Albuquerque,
 N.M.

14,935
 The primary purpose of this study was to investi-
 gate the application of communication-theory techniques
 to the theory of learning. A search of the existing
 literature was made. Efforts were then made to develop
 a theoretical model based on the principles of communi-
 cation and information theory. Mathematical expressions
 were derived which attempt to describe the results of
 the learning process in terms of probabilities of postu-
 lated events. The expressions were then applied to the
 learning of "binary mosaics" or simple message patterns.
 T. G. I. R 27

14,937
 Brantley, L.R., Dunbar, J.M. & Meyer, H. "SECOND
 SKIN" PROTECTION AGAINST LOW TEMPERATURE EXPOSURE.
 FINAL REPORT TO THE OFFICE OF THE COMTECHMASTER
 GENERAL. Contract DA19 129 GM 795, Proj. DAF 79
 10 0010, Jan. 1958, 90pp. Dept. of Chemistry,
 Confidential College, Los Angeles, Calif.

14,937
 This report presents the results of work undertaken
 toward the development of creams, ointments, etc., which,
 when applied to the hands and part of the face, would of-
 fer protection against injurious effects from exposure
 to low temperatures yet be flexible enough to permit good
 manual dexterity. Vinyl plastisols with good viscosity
 stability have been developed under this program. Accel-
 erators are described with which these plastisols can be
 filmed at temperatures feasible for the skin to form
 either dense or foamed coatings with satisfactory phys-
 ical properties including flexibility at -45 degrees F.
 New silicone rubber coatings were found and a two-layer
 system is described which meets the specifications for
 the "second skin".
 T. G. R 4

14,938
 Blair, W.C. & Kaufman, H.M. COMMAND CONTROL I: MUL-
 TIPLE DISPLAY MONITORING II: CONTROL-DISPLAY SPATIAL
 ARRANGEMENT. Contract NADR 2512(00), Proj. SUBIC,
 PS9 100, Electric Boat Tech. Rep. SDC9 062, Nov. 1959,
 17pp. Electric Boat Division, General Dynamics Corpora-
 tion, Groton, Conn.

14,938
 To determine the effect of varying display-control
 spatial arrangement and total signal frequency on moni-
 toring proficiency, three conditions of display and con-
 trol separation ranging from grouped to separated were
 tested, each with three displays and associated controls.
 A separate group of subjects was used for each of the
 three arrangements. For half the sessions, they were
 given signals at a high and for the other half at a low
 frequency rate. The task was to push one set of controls
 to observe and another to report detections and reset
 signals. Only one display could be observed at a time.
 Reset times were recorded as measures of overall pro-
 ficiency, a frequency and duration of observation were
 taken as observation measures.
 T. I. R 3

14,939
 Berger, H.M. A NOTE ON THE EFFECT OF SORTIES SCHEDULING
 ON MAINTENANCE WAIT-TIME. Tech. Memo. 7, Feb. 1958,
 14pp. USAF Operations Analysis Headquarters, United
 States Air Forces In Europe, New York, N.Y.

14,939
 The problem discussed in this note is the reduction
 of maintenance wait time (time aircraft has to wait
 before the required service is started) that is achieved
 with a fixed maintenance capacity and a fixed flying
 hours commitment by varying the sortie scheduling. In
 the case of unscheduled maintenance, a knowledge of the
 present state of the system should be used to determine
 the number of sorties on the next flight. In the case
 of periodic inspection, all that is necessary is that
 sorties be controlled by aircraft tail number. If both
 types of scheduling are carried out simultaneously
 maintenance wait time can be reduced without increasing
 maintenance resources or decreasing total amount of
 flying.
 G. R 5

14,940

Wernitz, M.W. & Fromer, R. A SET OF DISCRIMINABLE SURFACE COLORS AND SYMBOLS FOR CODING IN ANIMATED TRAINING PANELS. Contract N61339 294, Tech. Rep. NAV TRACVCRN 20 OS 52, May 1959, 19pp. USN Training Device Center, Fort Washington, N.Y. (Educational Research Corporation, Cambridge, Mass.).

14,940

To develop a set of discriminable surface colors and symbols to use for animated training panels, a set of seven colors plus white, light gray and dark gray were selected as representative of readily differentiable color sectors of the color wheel. These colors served as backgrounds for intermediate colors displayed as Landolt rings. Six color-normal subjects were tested for their ability to indicate the position of the break of 72 rings on each background panel. The data (average percent error) were analyzed to discover the 15 most discriminable colors. The procedure for symbol coding involved the ranking (for discriminability) of pairs of symbols (selected from various sources) presented in two different spatial orders by the two experimenters. T. I. R 4

14,941

Clarke, X.P., Hyde, A.S., Cherniack, M.S. & Lindberg, E.F. A PRELIMINARY REPORT OF HUMAN RESPONSE TO REARWARD-FACING RE-ENTRY ACCELERATIONS. Proj. 7222, Task 71746, WADC TN 59 109, July 1959, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

14,941

Tidal volume, electrocardiographic changes, tracking performance ability, and subjective response were evaluated during an acceleration profile designed to encompass several possible rearward facing reentry patterns. A maximum acceleration of 16.5 g and a total time of 170 sec. were employed. Subjects faced the center of rotation with the trunk and head inclined 12 degrees in the direction of the centrifuge axis; they were supported with a contoured net system. Two of the seven Ss repeated the experiment wearing the MC-2 full pressure suit, both pressurized and unpressurized. T. G. I. R 6

14,942

Bryan, G.L., Rigney, J.W., Bond, M.A., Jr., LaPorte, H.R., Jr., et al. THE ROLE OF HUMANS IN COMPLEX COMPUTER SYSTEMS: MAINTENANCE. Contract NGR 228(02), Proj. NR 153 093, Tech. Rep. 26, Jan. 1959, 96pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

14,942

This investigation was designed to 1) observe and describe maintenance requirements and practices for digital computer systems now in use, 2) examine methods for screening, training, and evaluating computer technicians, and 3) to obtain up-to-date information on the organization and supervision of computer maintenance work. Visits were made to 50 representative computing centers and on-the-site information was collected by means of observation, questionnaires, and interviews. The results presented provide a state-of-the-art summary regarding human factors problems in maintenance and serve to define computer personnel problems. R 9

14,943

USA Library. MILITARY ASPECTS OF SPACE EXPLORATION. Spec. Bibliography 16, June 1958, 55pp. USA Library, Adjutant General's Office, Washington, D.C.

14,943

This bibliographic survey was made to throw light on available unclassified literature that points up the military implications of space exploration. The materials are arranged in alphabetical order by title within major and subordinate subject groups. The major groups are miscellaneous; United States space effort; Soviet Russia space effort; satellites, trends and developments (electronics, navigation, orbits, propulsion, guidance, control, and telemetry); environmental factors and problems (acceleration, survival, weightlessness); exploration of the moon and Mars; space ships and stations; international and legal aspects; and conferences, conventions, and symposia. R 200 (approx.)

14,944

Strass, L.L. THE FEDERAL ROLE IN HIGHWAY SAFETY. LETTER FROM THE SECRETARY OF COMMERCE. House Doc. 93, March 1959, 232pp. US Government Printing Office, Washington, D.C.

14,944

This report presents the findings and recommendations of a study made to determine what action can be taken by the Federal government to promote the public welfare by increasing highway safety in the United States. A comprehensive body of facts pertaining to the traffic-accident problem and its setting is presented; a review is made of the highway transportation system - human and vehicle factors, the highway element and systems considerations; and an evaluation is presented of current highway safety activities along with recommendations for an adequate safety program. T. G. I. R 152

14,945

US Coast Guard Headquarters. TYPES OF LIGHT BEAMS FROM AIDS TO NAVIGATION EQUIPMENT. USCG Civil Engng. Rep. CG 250 13, Nov. 1954, 7pp. US Coast Guard Headquarters, Washington, D.C.

14,945

This report describes the various types of light beams encountered in aids to navigation work. The following types are described and their purposes or uses discussed: 1) fan beam, 2) pencil beam, 3) convergent beam, 4) divergent beam, 5) asymmetrical fan beam, 6) polychrome, and 7) V and d beam. I.

14,946

USCG Civil Engineering Div. DAYTIME OPERATION OF LIGHTS DURING FOG. Rep. CG 250 11, Nov. 1954, 14pp. USCG Civil Engineering Div., Washington, D.C.

14,946

The subject of daytime operation of lights on lightships and lighthouses is reviewed in terms of location of the aid with respect to ordinary vessel tracks, the candle power of the light, the degree of reduced visibility caused by fog or haze, and the extent of attendance available at the station. Certain criteria are established for determining when lights should be turned on. T. G.

14,947

Armington, J.C. & Mitnick, L.L. ELECTROENCEPHALGRAM AND SLEEP DEPRIVATION. J. Appl. Physiol., March 1959, 14(2), 247-250. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

14,947

The occipital alpha rhythms were recorded for ten subjects before, during, and after a 98-hour period of sleep deprivation. Five experimental conditions, each lasting two minutes, were employed. The instructions for these conditions were 1) to keep the mind blank with eyes open; 2) same with eyes closed; 3) to count aloud to ten repetitively, eyes closed; 4) same with eyes open; and 5) to add silently a number, cumulatively, eyes closed. Recordings were made with the subjects standing. The records of electrical activity were analyzed for the effects of the sleep deprivation alone and in combination with problem solving. G. I. R 12

14,948

Atkinson, R.C. THE OBSERVING RESPONSE IN DISCRIMINATION LEARNING. Contract NMR 235(58), (NR 170 282), Tech. Rep. 4, Sept. 1959, 17pp. Dept. of Psychology, University of California, Los Angeles, Calif.

14,948

To gain information about the orienting or observing response in discrimination learning, the typical discrimination task was modified so that an observing response could be identified and directly measured. The experimental situation consists of a series of discrete trials. The sequence is as follows: 1) ready signal to which the subject responds in one of two possible ways (observing response); 2) one of three stimulus events (cues) are presented; 3) the subject responds (discrimination); 4) a final reinforcing event ends the trial. Trial type, reinforcing event, and stimulus schedules were varied. Six groups of 40 subjects per group were run; performance data were analyzed in terms of a Markov chain model for discrimination learning.
T. G. R 9

14,949

Bradley, J.V. UTILIZATION OF MULTIPLE CUES IN PAIRED COMPARISONS. Proj. 7182, Task 71514, MACD TR 59 548, Sept. 1959, 41pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

14,949

Subjects were given one, two, or three cues with which to make an either-or decision. Certain hypotheses were formulated to describe the subject's thought processes in utilizing the multiple cues and mathematical models were constructed to simulate them. The models were then used upon data for the single-cue case to predict performance in the multiple-cue case. Predicted performance data were then compared with observed data to test the predictive validity of the model and the tenability of the corresponding hypothesis. The data used for this investigation were discriminations mediated primarily by the tactual sense modality.
T. R 13

14,950

Bittini, Marcella & Ronchi, Lucia. ON THE FACTORS WHICH INFLUENCE THE HUMAN SCOTOPIC ELECTRORETINOGRAM AT DIFFERENT LUMINANCE LEVELS. Atti Della Fondazione Giorgio Ronchi, July-Aug. 1958, XIII(4), 318-323. AFOSR TN 59 334.

14,950

How factors such as the total time of variation of the luminance and the behavior of the time derivative of luminance influence the human scotopic electroretinogram are investigated. Blue and green colored stimuli were used at various luminance levels and responses recorded for one subject: 1) to stimuli of equal energy but different time of variation of the luminance, and 2) to stimuli of equal time of variation but different behavior of the time luminance derivative. The results are discussed in terms of the cues for brightness discrimination furnished by the electroretinographic response.
T. G. I. R 7

14,953

Carterette, E.C. & Cole, M. A COMPARISON OF THE RECEIVER OPERATING CHARACTERISTICS FOR MESSAGES RECEIVED BY EAR AND BY EYE. Contract NMR 235(56), Tech. Rep. 2, June 1959, 14pp. University of California, Los Angeles, Calif.

14,953

The receiver operating characteristics (ROC) curves for auditory and for visual reception were compared experimentally. Spoken messages were received by earphones in a wide band noise at three different speech-to-noise ratios and the visual messages were exposed briefly in a tachistoscope for various durations so as to give intelligibility levels corresponding to those of the auditory case. Four subjects were tested, on the previously learned word lists, for identification and made confidence ratings on the certainty of their responses on a six-point rating scale. Comparisons were made of changes in distributions of rating categories for various speech-to-noise levels; accuracy of reception as function of rating category and the ROC curves.
T. G. R 15

14,954

Delgoffe, R.D. FACTORS AFFECTING SIGNALING BY VISUAL METHODS. Ordinance Task 341 366/43083/12040 & 341 366/63258/01040, MACD Rep. 6034, Dec. 1957, 24pp. USN Ordnance Lab., White Oak, Md.

14,954

A digest of experimental work from various sources is presented as a guide in research and development programs for signaling devices. The factors that affect the effectiveness of the use of visual methods to convey information over relatively large distances are analyzed and discussed in terms of their individual components: physical nature of signal, atmosphere, ambient illumination, and the physiological and psychological response involved in seeing. The following topics are discussed: 1) characteristics of the eye and the seeing process, 2) brightness and visibility thresholds, 3) luminance thresholds for various colors, 4) point sources versus diffuse light, 5) values of background luminance under various conditions, and 6) flashing versus steady lights.
T. G. R 10

14,955

Feallock, J.B. & Briggs, G.E. DEVELOPMENT OF SYSTEMS RESEARCH AND DESIGN METHODOLOGY. Contract AF 33(616) 6156, Proj. 60(8 7164), EF Proj. 894, Rep. 3, Dec. 1955, 13pp. Ohio State University Research Foundation, Columbus, Ohio.

14,955

This is a progress report which gives brief summaries of major tasks accomplished or under study in the following areas: general systems research employing dynamic task simulation, technical studies and supporting basic research, and design and development of research equipment.

14,956

Ercoles, Anna Maria & Fiorentini, Adriana. VISIBILITY OF THE MACH BANDS AS A FUNCTION OF FIELD LUMINANCE. Atti Della Fondazione Giorgio Ronchi, May-June 1959, XIV(3), 230-235. (AFOSR TN 59 781).

14,956

The visibility of a subjective contour (Mach band) was investigated as a function of luminance. It was found that the dark Mach band is visible at levels lower than the luminance threshold for the bright Mach band. At high levels, however, the luminance gradient required for the perception of the dark band is greater than that required for the bright band.
G. R 7

14,957

Ersoch, J.M. THE EFFECT OF IMAGE DEGRADATION ON VISUAL SEARCH: BLUR A SUBTASK WHICH IS PART OF THE PROGRAM ON HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION. Contract AF 33(602) 1580, OSURF Proj. 696 & Proj. 1763, Task 39865, NRL Tech. Paper (696) 16 280, RADG TN 59 63, Jan. 1958, 23pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

14,957

The effect of blur on visual search was studied with the modified ophthalmograph apparatus. The display material consisted of experimental aerial maps containing only areas of white, black, and five shades of gray with the critical detail (Landolt "C") inserted in approximately equally weighted zones. Various degrees of blur were produced in successive displays. Six subjects viewed the displays in fixed order and searched for the critical detail (target). Analysis of data (duration of fixation, correct identifications) was made for effect of quadrant, zone, direction of eye fixation, and blur gradient. The implications of these findings for actual search situation are discussed.
G. I. R 9

14,958
 Ellick, D.E. JUDGMENTS OF THE RELATIVE FREQUENCY OF SEQUENTIAL BINARY EVENTS: EFFECTS OF FREQUENCY DIFFERENCES. Proj. 6190, Task 71554, WADC TR 59 560, Oct. 1959, 17pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

14,958
 The accuracy of discriminating which of two events occur more frequently when both are presented in a random sequential order, at a constant rate too fast to permit counting, was investigated. Subjects were required to indicate on a ten-centimeter scale the proportion of time occupied by the more frequent event. Each judgment was based on a total of 190 events with overall per cent differences between the occurrence of the two elements being 0, 4, 10, and 16. Ten subjects were tested. Estimated proportions were compared to actual proportions, and mean proportion of correct judgments were analyzed as a function of frequency differences.
 T. G. I. R 3.

14,959
 Gatling, F.P. EJECTION SEAT STUDY. Aero Medical Dept. Rep. AM 2 59, 1959, 41pp. USN Aviation Safety Center, Naval Air Station, Va.

14,959
 An analysis of ejections from naval aircraft for the calendar year 1958 is presented with recommendations for research and testing of new equipment for low altitude ejection. The analysis presents 1) ejection rate per 10,000 hours for the years from 1951 through 1958, 2) fatality rates, 3) injuries as affected by altitude of ejections, 4) speed as a factor in injuries, 5) where injuries were sustained, 6) model aircraft, 7) altitude, and 8) emergency preceding ejection.
 T. G. I.

14,960
 Gaylord, R.H. HUMAN ENGINEERING DESIGN RECOMMENDATIONS FOR MINIATURIZED EQUIPMENT. Contract DA 36 039 SC 75054, DA Proj. 3 89 01 602, Quart. Rep. 2, Nov. 1958, 4pp. American Institute for Research, Pittsburgh, Penn.

14,960
 Partial completion of a draft of the Human Engineering Miniaturization Guide has resulted from analysis and collation of information in the literature. A tentative outline is included. The literature so far examined yields considerable information needed for designing small displays but is generally lacking in information necessary in designing small controls. Results to date of canvassing manufacturers of man-machine linkage means are described.

14,961
 Gerathwohl, S.J. EQUIPMENT FOR MANNED SPACE CAPSULES AND LUNAR BASES. SPECIAL REPORT. Feb. 1959, 28pp. USA Medical Research and Development Command, Headquarters, Office of the Surgeon General, Washington, D.C.

14,961
 Equipment variables which are thought to be significant for man's exploration and survival in space are discussed and sets of research tasks necessary for the accomplishment of manned space missions are proposed. Specific areas so treated are 1) equipment for safety, comfort, and survival; 2) the engineered environments; 3) emergency and survival; 4) pilot support; 5) space communications; 6) human performance in space vehicles; and 7) instrumentation and equipment for operational and environmental research.
 R 31

14,962
 Gatling, F.P., Murrel, E.M. & Brickett, J.H. TRENDS IN NAVAL AVIATION INJURY PATTERNS. Aero Medical Dept. Rep. AM 3 59, June 1959, 12pp. USN Aviation Safety Center, Naval Air Station, Va.

14,962
 Data from the Naval Aviation Safety Center were accumulated from accident reports from the close of World War II (1946) through 1958. The data were examined and tabulated by specific accident type, phase, and damage classifications in current use at the Safety Center. Corresponding tables were constructed for fatal injuries. In addition, bailouts and ejections and their relation/injury patterns were developed from the data. These tabular presentations were analyzed for trends in accident aircraft patterns.
 T. I.

14,963
 Jones, Edna M., Gaylord, R.H. & Folley, J.D., Jr. GUIDE TO HUMAN ENGINEERING OF MINIATURIZED EQUIPMENT. FINAL REPORT. Contract DA 36 039 SC 75054, AIR 261 59 FR 202, June 1959, 63pp. American Institute for Research, Pittsburgh, Penn.

14,963
 This guide contains information applicable to the special human engineering problems encountered in the design of miniaturized equipment. It is intended to serve both as a source book of known facts and of suggested principles, and as a means for calling attention to some of the problems created by miniaturization. Section I presents some fundamental concepts and definitions; Section II describes a procedure for human engineering of miniaturized equipment; and Section III presents facts related to each of three proposed solutions to the problem of providing adequate man-machine linkage where space is extremely limited. Actual measured swept areas for different types of controls, tables of data on size recommendations, and related design recommendations are included. T. G. I. R 11

14,964
 Martin, C.L. (Proj. Officer). FIXED-WING INSTRUMENT PRESENTATION EVALUATION OF THE SPERRY INTEGRATED INSTRUMENT SYSTEM. Proj. NR AVN 1557 2, Jan. 1958, 23pp. USA Aviation Board, Fort Rucker, Ala.

14,964
 To evaluate the Sperry Integrated Instrument System (SIIS) as part of the overall Fixed-Wing Instrument Program, the system was installed in an Army aircraft (L-23B, No. 53-6164) and was flown 130 hours. All types of approved instrument approaches and instrument training maneuvers were performed. Aviators with varying degrees of instrument experience were given instruction in the use of this equipment, and transition or training time was recorded. Comparisons of performance with SIIS were made with that possible from present standard displays. Recommendations are included.
 I. R 7

14,965
 Manne, A.S. ON THE JOB SHOP SCHEDULING PROBLEM. Contract MONR 358(01), NR 047 066, Cowles Foundation Discussion Paper 73, May 1959, 7pp. Cowles Commission for Research in Economics, University of Chicago, Chicago, Ill.

14,965
 This is a proposal for the application of discrete linear programming to the typical job shop scheduling program—one that involves both sequencing restrictions and non-interference constraints for individual pieces of equipment. No attempt has been made to establish the computational approach in the case of large-scale realistic problems. The formulation presented here is suggested for computer experimentation.
 R 4

14,966

Meehan, J.P. & Jacobs, Edith. PHYSIOLOGIC PRODUCTION OF CATECHOL AMINES IN RESPONSE TO SEVERAL PHYSICAL STRESSES. Contract AF 33(616) 5591, Proj. 7220, Task 71742, NADC TR 59 534, Sept. 1959, 19 pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Dept. of Physiology, University of Southern California, Los Angeles, Calif.).

14,966

To investigate some aspects of the behavior of the sympathetic nervous system, measurement of the physiologic production of adrenaline and noradrenaline in response to four standardized physical stresses were made on young adult males. The tests were: 1) cold pressor test, 2) Harvard Step Test, 3) treadmill exercise, and 4) centrifuge positive accelerations. Chemical techniques were used to measure the compounds in both blood and urine samples.
T. I. R 17

14,967

McGrath, J.J., Harshbadian, A. & Buckner, D.H. HUMAN FACTOR PROBLEMS IN ANTI-SUBMARINE WARFARE. REVIEW AND CRITIQUE OF THE LITERATURE ON VIGILANCE PERFORMANCE. Contract NCMR 2649(00), NR 153 199, Tech. Rep. 1, Dec. 1959, 100pp. HUMAN FACTORS RESEARCH, INCORPORATED, Los Angeles, Calif.

14,967

This review summarizes systematically what is known about vigilance performance and identifies problems requiring additional research. The several parts of the report are: 1) definitions and measurements, 2) review and critique of studies of vigilance performance, 3) theories of vigilance performance, and 4) conclusions and implications. An annotated bibliography of the experimental literature is included.
R 70 (approx.)

14,968

MacCanon, D.M. EFFECTS OF OXYGEN INHALATION ON COLD PRESSOR RESPONSES OF MAN. Contract DA 49 007 MD 1008, Sept. 1959, 6pp. University of South Dakota, Vermillion, S.D.

14,968

To determine whether oxygen inhalation would alter the responses of the cardiovascular system to the external stimulus of the cold pressor test, ten subjects were tested. Blood pressures and pulse rates were determined in 28 experiments, before, during, and after immersion of the right hand in cold (4 degrees C) for one minute. Air or 100 percent oxygen was inspired throughout the test. The blood pressures and pulse rates were compared for oxygen and for air inhalation. Differences between basal values and changes from basal values resulting from cold pressor responses were analyzed.
R 8

14,969

Lord, F.M. STATISTICAL INFERENCES ABOUT TRUE SCORES. Psychometrika, March 1959, 24(1), 1-17. (Educational Testing Service, Princeton, N.J.).

14,969

Formulae are derived for unbiased sample estimators of any raw or central moment of the frequency distribution of true test scores. A general method is developed for obtaining from each examinee's observed score a least squares estimate of his true score.
G. R 16

14,970

Kydd, G.H., Fenichel, R.L. & Crosbie, R.J. G TOLERANCE IN PRIMATES. II. OBSERVATIONS ON THE RELATIONSHIP OF CAROTID PRESSURE AND END POINT DURING ACCELERATION. Proj. NM 11 01 12.9, NADC NA 5503, Rep. 2, May 1959, 14pp. USN Air Development Center, Johnsville, Penn.

14,970

Observations were made simultaneously of the occurrence of an end point of unconsciousness and carotid pressure in Rhesus monkeys during centrifugation. Closed circuit television and a film record were used for behavioral observations. Centrifuge runs began at a level of 1.9 g and increased to about 12 g. The significance of the findings is discussed with respect to the blood supply.
T. G. R 6

14,971

Kurtz, A.K. AN APPLICATION OF LEARNING THEORIES TO THE TRAINING OF RADIO CODE OPERATORS. Contract NCMR 2519(00), Tech. Rep. 2, Sept. 1959, 16pp. The Psychological Corporation, New York, N.Y.

14,971

To determine the relative merits of two experimental and one control method of training radio code operators, seven successive classes of 60 students entering the United States Naval Training Center, San Diego, California, were studied. Each class was divided into three sections; students were matched, if possible, on the basis of their Radio Code Aptitude Test scores. Using a list of learning principles, methods were devised to facilitate learning and employed in the first four weeks of the 24-week course for one section, in the first two weeks for a second section, and the third group was taught in the standard manner. Appropriate code receiving tests were devised and administered at end of third week and every even-numbered week thereafter. Test results were analyzed for effects of teaching method. T. R 8

14,972

Kulp, C.M. & Rowland, G.E. DETECTABILITY OF NAVAL AIRCRAFT BY VISUAL MEANS. MEASURES TO INCREASE OR REDUCE; DEVELOPMENT OF: DAYLIGHT VISUAL TARGET DETECTION (A SEARCH AND REVIEW OF THE LITERATURE). Contract N 156 37937, TED NAWAE 42222, Part 1, NAWACEL 408, R & C Rep. 59 1 1, July 1959, 111pp. USN Air Crew Equipment Lab., NAWC, Philadelphia, Penn.

14,972

Parameters of visual target detection were drawn from recent visual literature. The importance given to these parameters in the literature was outlined. Specific emphasis was given to the influence that various aircraft exterior paint finishes would have in maximizing target detectability. Environmental and physical variables that might influence visibility were selectively reviewed. General and specific problem areas that appear to merit investigation were outlined. An appendix lists citations about half of which are annotated; both military and civilian literature are included.
R 476

14,973

Kruger, L.V. PITCH EXTRACTION FOR SPEECH SYNTHESIS WITH SPECIAL TECHNIQUES FOR USE IN DIGITIZED BAND-WIDTH COMPRESSION SYSTEMS. Proj. 4602, AFRC TR 59 116, March 1959, 47pp. USAF Communication Sciences Lab., AFRC, Bedford, Mass.

14,973

Pitch channel techniques for voice compression systems are reviewed and comparisons made between time and frequency domain methods for pitch extraction. The problem of extracting pitch from band-limited circuits which have no fundamental is treated. Techniques for improving the rise and fall resolution of the inverted pitch analog signal are shown. Digital transmission of pitch channel information at rates below 150 bits per second is discussed. A hiss-buzz segmenter is described, its uses indicated, and a special reduction technique in digital signal transmission is given. Tracking requirements for a universal pitch extractor are discussed and the channel used in the AFRC Scanvocoder described.
T. I. R 57

14,974

Kreider, M.B., Buskirk, E.R., Iampietro, P.F., & Bass, D.E. EFFECT OF CONTINUOUS COLD EXPOSURE ON NOCTURNAL BODY TEMPERATURE OF MAN. Proj. 7 83 01 006, Tech. Rep. EP 117, July 1959, 6pp. USA Environmental Protection Research Div., QM Research & Engineering Center, Natick, Mass.

14,974

To determine whether nocturnal body temperatures are modified when men live continuously in the cold under controlled laboratory conditions uncomplicated by activity and clothing, five men were studied over a period of 42 days. Cold stress consisted of living at 60 degrees F., wearing only shorts, for 14 days. This cold period was preceded and followed by two weeks at 80 degrees F. Activity and diet were the same throughout; one blanket was used at night. Rectal and skin temperatures were measured periodically during both day and night. The 24-hour patterns of body temperature were studied and comparisons made between those taken the first two and the last two days of the stress period to check on acclimatization effects.

G. R 6

14,975

Kurtz, A.K. RECENT DEVELOPMENTS, PRACTICES, AND RESEARCH IN THE FIELD OF CODE LEARNING. Contract NMR 2519(90), Tech. Rep. 1, Sept. 1959, 52pp. The Psychological Corporation, New York, N.Y.

14,975

This review of research in code learning is devoted predominantly to those publications that have appeared in 1950 or later; some exceptions are made for a few classic and comprehensive studies. Special emphasis is given to those few studies concerned with "second-level" or advanced training. Topics covered are transmission speeds for code-reception practice, tone speed, order of signal presentation, rate of introduction and grouping of signals, amount of practice per signal, types of practice materials, code-voice method, learning theory, arrangement of practice time, progress in code learning, errors, accuracy standards, variety and antimonotony procedures, prediction of success, code sending and typing, and criteria of proficiency.

R 45

14,976

Kristofferson, A.B. & C'Connell, R.H. THE DETECTABILITY OF TARGETS CONTAINING INTERNAL LUMINANCE GRADIENTS. Proj. MICHIGAN, Rep. 2144 297 T, Sept. 1958, 9pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

14,976

Detection thresholds were measured for 13 non-uniform targets consisting of a circular area approximately 60 minutes in diameter, on the center of which a circular luminance increment approximately four minutes in diameter was superimposed. The ratio of center to annular luminance ranged between 1.0 and infinity. Predictions of the luminance of the center area required for the entire target to be at detection threshold were made on the basis of several variants of the element contribution hypothesis, using values of threshold luminance of center and of annulus presented singly. The results from three observers were compared with the predictions.

T. G. R 9

14,978

Garner, W.R. CONTEXT EFFECTS AND THE VALIDITY OF LOUDNESS SCALES. Contract NS CRI 166, Proj. NR 145 089, Rep. 166 I 187, June 1954, 20pp. USN Office of Naval Research, Washington, D.C. (Psychological Lab., Johns Hopkins University, Baltimore, Md.).

14,978

To determine to what extent half-loudness judgments made with a method of constant stimuli can be influenced by the context of the stimuli presented to the observer, each of three groups of observers was given a different non-overlapping range of variable stimuli to be judged with respect to a standard stimulus. For each observer an intensity value for half judgment was computed by linear interpolation on the psychophysical function to determine an intensity equivalent to half of the judgments being more than half as intense. Such a value was computed for the first half, the second half, and for the complete series. The means, medians, and standard deviations were compared. Individual differences on judgments were compared.

T. G. R 9

14,979

Greene, P.H. FACTORS IN VISUAL ACUITY. Contract AF 18(600) 1454, Proj. 9777, AFOSR TR 58 85, Aug. 1959, 114pp. USAF Office of Scientific Research, Washington, D.C. (Committee on Mathematical Biology, University of Chicago, Chicago, Ill.).

14,979

A study is made and an interpretation is suggested for experimental findings (1) on the location of perceived contours in studies of Mach bands (sharply defined subjective bands seen in continuous luminance distributions), (2) irradiation (change in apparent width of a bar with changes in luminance), and (3) resolution distance (minimum distance separating two bars which can just be perceived as separate). Experiments are proposed to test the interpretation.

G. I. R. 38

14,980

Carterette, E.C. & Cole, M. REPETITION AND CONFIRMATION OF MESSAGES RECEIVED BY EAR AND BY EYE. Contract NMR 233(58), (NR 170 282), Tech. Rep. 3, June 1959, 18pp. Dept. of Psychology, University of California, Los Angeles, Calif.

14,980

To compare the auditory and visual modes of reception over successive repetitions of a message, a rating method was used to obtain receiver operating characteristics (ROC) for 60 heterogeneous words. A single message was sent under difficult conditions of reception and was repeated until it had been assigned the highest accuracy category on the rating scale or until it had been sent a maximum of six trials. The accuracy of reception for both modes was analyzed as a function of confidence rating and intelligibility level.

T. G. R 14

14,981

Basore, B.L. REDUNDANCY FOR IMPROVING ACCURACY IN COMMUNICATIONS. Contract AF 19(604) 4078, AFRC TR 59 170, June 1959, 41pp. Dikewood Corporation, Albuquerque, N.M.

14,981

A study of the role of redundancy in communication was carried out principally in terms of an n-dimension model of message space. An effort was made to determine an intuitively clear method of comparing the significance of redundancy in reducing error rates in a communication link with the contribution realized through the use of long messages and delay. Conclusions were drawn with respect to cost of communications in relation to channel capacity usage.

R 11

14,982

Roiten, G.G. ASSESSMENT OF VIBRATION NUISANCE. UDC 534 831, Trans. 695, Oct. 1957, 5pp. Royal Aircraft Establishment, Farnborough, Hants, England.

14,982

This paper contains a brief statement of methods of analyzing a particular vibration spectrum or pattern into zones as a preliminary step in assessing the vibrational nuisance level of a particular source of vibration.

T. G. R 1

14,983

Townsend, F.M. THE UTILIZATION OF PATHOLOGY IN AIRCRAFT ACCIDENT INVESTIGATION. Reprint from "Medical Aspects of Flight Safety." AGARD. 30, 1959, 9pp. PERGAMON Press, New York, N.Y. (USAF Institute of Pathology, Washington, D.C.).

14,983

Aircraft accidents continue to be a problem within the United States Air Force. The contribution of the pathologist to the field of flight safety is discussed. It is stressed that an investigation by the pathologist should encompass all the many factors which affect the "man-aircraft" relationship. The approach to this field is characterized as a consideration of 1) environmental factors, 2) traumatic factors, and 3) pre-existing disease. Several case histories are given to illustrate the need for continuing research in the first and last areas. Air Force recommended procedures for the Medical Investigation of Aircraft Accident Fatalities are reviewed in light of the duties of the pathologist.
R 15

14,984

Slechta, R.F., Forrest, J., Carter, W.K. & Wade, E.A. COMFORT EVALUATION OF THE C-124 CREW SEAT (WEBER). ONE OF A SERIES OF STUDIES PERTAINING TO THE DESIGN EVALUATION OF PILOT AND CREW STATION EQUIPMENT. Contract AF 33(615) 3066, Proj. 7215, Task 71724, WADC TR 58 316, Oct. 1959, 15pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

14,984

To evaluate certain design characteristics of the C-124 Crew Seat (Weber) in terms of their adequacy for the maintenance of human comfort, 17 subjects were tested during a voluntary sitting period of seven hours' maximum duration. Subjective and behavioral laboratory tests were administered at hourly intervals using a questionnaire type of comfort rating for overall comfort and for comfort of specific body regions. Following termination of the sitting period (termination was at the will of the subject up to the seven hour period), final comfort ratings and individual seat parts ratings were completed by all subjects. On the basis of test data and specific comments made by subjects, recommendations for seat design improvement are made.
T.G. I. R 1

14,985

Rosenblatt, F. THE PERCEPTON A THEORY OF STATISTICAL SEPARABILITY IN COGNITIVE SYSTEMS. Contract N0R 2381(00), Proj. PARA, Rep. VG 1196 G 1, Jan. 1958, 262pp. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.

14,985

The theory of statistical separability and the design of the perceptron (electronic brain model) which are presented in this report originated from a series of studies of memory trace mechanisms in the central nervous system. This report constitutes the basic theoretical exposition of the theory. Following an introductory discussion, the following topics are developed: stimulus sampling and perceptual generalization, basic organization of the perceptron, equations of statistical separability (analysis of the predominant phases; the post-dominant phase for an ideal environment; in differentiated environments), bivalent enforcement systems, temporal pattern recognition, methods of figural analysis, cognitive sets, and selective recall.
G. I. R 23

14,986

Rees, D.W. & Copeland, Mola K. THE EFFECTS OF SERIAL POSITION IN CHECK-LIST DESIGN. Proj. 7184, Task 71586, WADC TR 59 552, Sept. 1959, 17pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

14,986

An experiment was conducted to determine 1) whether serial position effects occur in the use of check-lists, and 2) whether these effects can be modified. Subjects responded to a serial presentation of instructions by actuating switches. Two check-lists of instructions were tested: a high and a low generalization list. The two criterion measures of performance were time spent observing the list (search time) and number of errors made. The data were studied by analysis of variance.
T. G. R 6

14,987

Reza, F.M. BASIC CONCEPTS OF INFORMATION THEORY FINITE SCHEME. Contract AF 19(604) 2452, Scientific Rep. 2, AFRC TN 59 588, SURI Rep. EE 507 5995 2, Sept. 1959, 75pp. Syracuse University Research Institute, Syracuse, N.Y.

14,987

The basic elements of information theory of discrete channels is presented in a manner parallel to the presentation of the elements of discrete probability theory. A measure for information content of a discrete system is developed and used for evaluating the rate of transmission of information in a communication system. The approach is mathematical rather than philosophical with emphasis on logical clarity. The method of presentation should prove of some interest to scientists and engineers who wish to acquire some introductory knowledge of the subject.
G. I. R 14

14,988

Pollack, M. TECHNICAL STUDIES IN CARGO HANDLING - V. THE EFFECT OF COMMUNICATION ON A N-STAGE SHUTTLE PROCESS. Contract N0R 233(07), Rep. 58 43, May 1958, 20pp. Dept. of Engineering, University of California, Los Angeles, Calif.

14,988

In this paper a simple communication model is presented. This model is used for estimates of the effect of communication on an N-stage shuttle process using the data from a previous simulation study of the process. The functional relationship between effectiveness and balance allowance (average delay) is determined. Balance allowance values from the simulation study and from a study of a large amount of actual cargo handling data are compared. For these values of balance allowance, the corresponding values of coefficient of variation used in the simulation study are obtained.
G. I. R 5

14,989

Pollack, M. AN ENGINEERING ANALYSIS OF CARGO HANDLING - VII. SOME STUDIES ON SHUTTLE AND ASSEMBLY LINE PROCESSES. Contract N0R 233(07), Rep. 58 12, Feb. 1958, 41pp. Dept. of Engineering, University of California, Los Angeles, Calif.

14,989

Two types of flow processes are described and formulated—a shuttle and an assembly line process. Variations of each are studied for the general N-stage condition. The shuttle process is considered for multiple shuttles per stage, storage capacity at the nodes, and the combination of multiple shuttles per stage with storage capacity at the nodes. The assembly line process is considered for multiple machines per stage both with and without set-up times included. The mathematical method of recurrence relations is used to formulate these relations for the various significant variables (delay and arrival times of items at various positions) of both processes. A bibliography of recent studies in queueing theory and assembly line analysis is included.
T. I. R 45

14,990

Mori, Gina F. IS IT POSSIBLE TO MEASURE THE CONTRAST ENHANCEMENT OF A FIGURE WITH "QUASI PERCEPTIVE CONTOURS"? Atti Della Fondazione Giorgio Ronchi, March-April 1959, XIV(2), 137-139.

14,990

A figure with quasi-perceptive contours is described as one where a figure is seen as superimposed upon the paper where other figures are drawn (stratification effect). One such figure is illustrated in which an equilateral triangle, whose vertices coincide with the centers of three black circles from which a sector has been removed, is seen as superimposed upon another triangle having its vertices (drawn in black) at points between the three circles. An explanation of this effect is offered in terms of contrast enhancement effect and measurement of this effect was attempted. Differential thresholds were determined at various points near the perceived border or contour, both inside and outside the figure. The data were compared for differences in luminance between figure and background. T. I. R 4

14,992
Isack, C.M., Christensen, M.M., Greenhill, P.,
Guent, F.M., et al. AN EXPERIMENT OF THE PERCENT
MILITARY EFFECTIVENESS OF SOLDIERS WITH VARIOUS DEGREES
OF DISORIENTATION FROM GB VAPOR IN VARIOUS TACTICAL
SITUATIONS. Proj. 4 OS 02 023, Subproj. 4 OS 02 023 C4,
ONR 2794, Aug. 1959, 14pp. USA Chemical Warfare Lab.,
Army Chemical Center, Md.

14,993
The severity of poisoning by GB (nerve gas) vapor
in man is defined in terms of the nature and extent of
traumatic signs and symptoms from animal data and a review
of literature on accidental and experimental human ex-
posures. Estimates of the frequency of poisoning by
various GB exposures to GB vapor are presented for mild,
moderate, severe, very severe, and lethal effects. The
percent military effectiveness in four tactical situa-
tions is estimated for soldiers with these degrees of
poisoning.
T. G. I. R 7

14,994
Ten Cate, W. APPENDICES TO REPORT 147 (May, 1953) ON
VEHICLE VIBRATION. (ANSWERING OF REPORT 147:
REMARKS). Trans. 694, Oct. 1957, 14pp. Royal
Aircraft Establishment, Farnborough, Hants, England.

14,995
This report contains comments on 12 papers pertaining
in some way to whole body vibration. Some of the results
are presented in graphic form.
T. G. I. R 12

14,996
Ward, J.E., Hawkins, K.R. & Stallings, R.D. PHYSIOLOGIC
RESPONSE TO WEIGHTLESSNESS ESTIMATION OF ACCELERATION.
Rep. 59-25, Aug. 1959, 6pp. USAF School of Aviation
Medicine, Brooks AFB, Tex.

14,997
To study the effect of the null-gravity state on
elimination of liquid body rates, 26 subjects were ex-
posed to a total of 37 separate jet aircraft flights
during which zero-gravity parabolic flight maneuvers
were performed. The capability of the subjects to initi-
ate micturition during weightlessness following a peri-
od of hydration was studied.
T. I. R 3

14,998
Wolf, E. & Zigler, M.J. SOME RELATIONSHIPS OF GLARE AND
TARGET PERCEPTION. Contract AF 33(616) 3305, Proj.
7186, Task 71551, WADC TR 59-394, Sept. 1959, 29pp.
USAF Aerospace Medical Lab., Wright-Patterson AFB,
Ohio. (Visual Research Lab., Wellesley College,
Wellesley, Mass.).

14,999
This study was carried out to describe quantitatively
the relationship between the luminance of a glare source
and threshold luminance of a test target when both are
varied in angular subtense and distance from each other.
The threshold visibility of the test target was deter-
mined for various sizes and luminances of the glare
source, various angular separations between the two, and
for various exposure times and retinal locations. Thresh-
old luminance for the readability of Landolt rings, let-
ters, and dials were similarly determined.
T. G. I. R 18

14,999
Walters, D.L. A STUDY OF THE REFERENCE AND 90-DAY AUDIO-
GRAMS OF A GROUP OF AIR FORCE AIRCRAFT AND ENGINE
MAINTENANCE MEN. Rep. 59-94, Oct. 1959, 14pp. USAF
School of Aviation Medicine, Brooks AFB, Tex.

14,995
The reference and 90-day audiograms of a group of
aircraft and engine maintenance men were examined and
analyzed separately and comparatively. Both audiograms
were displayed by overall hearing classification as de-
termined by the individual's poorer ear and by left ear
versus right ear hearing class. Mean and median audi-
grams were computed by age groups. The 90-day follow-up
audiograms for the left ear were compared with the refer-
ence audiograms for 103 of these men.
T. G. I. R 7

14,996
Staves, J.C. WALKING UNDER ZERO-GRAVITY CONDITIONS.
Proj. 7154, Task 71505, WADC TR 59-327, Oct. 1959, 8pp.
USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

14,996
This is the first report on experiments with perma-
nent magnetic sandals that enable a man to walk with an
approximately normal gait under weightless conditions.
Four subjects were observed as they attempted to initiate
self-rotation while in the weightless condition pro-
duced aboard a C-131B aircraft during the zero-g maneu-
ver. Subjects reported upon their orientation percep-
tions during this period. A basic index was formulated
to define magnetic requirements in terms of the inductive
forces required to hold a subject stationary. A vector
analysis of the 1-g walking gait was made. Further
studies are proposed.
R 3

14,997
Spano, L.A. & Bailey, T.L. AUXILIARY HEATING SYSTEMS
FOR COMBAT CLOTHING. Proj. 7-93 30 C01, ONR TR 20,
(APO 1), July 1959, 60pp. USA Pacific Division & For-
man Div., ON Research & Engineering Command, Natick,
Mass.

14,997
The results of a re-examination by the Quartermaster
Corps of the environmental protective properties of pre-
sent clothing systems for troops operating in Arctic cli-
mates are given. The examination was conducted with re-
ference to 1) what degree of protection is now provided,
2) what can be anticipated in the immediate future, and
3) what programs must be initiated to answer unsolved
problems. On the basis of the findings, a research pro-
gram is outlined: 1) development and evaluation of aux-
iliary heating systems for warming troops exposed to
deep cold, 2) development of auxiliary heating devices
and systems for the extremities, and 3) design and devel-
opment of a combat clothing ensemble provided with an in-
tegral auxiliary heating system.
T. G. I. R 15

14,999
Fitts, P.M. (Ed.). NOTES AND SELECTED READINGS ON
HUMAN ENGINEERING CONCEPTS AND THEORY. Aug. 1959,
710pp. College of Engineering Summer Session, Univer-
sity of Michigan, Ann Arbor, Mich.

14,999
There are two major parts in this volume on Human
Engineering. The first part is in outline form and cov-
ers lectures and papers on the following general topics:
human factor engineering—an overview of concepts and
theory; survey and analysis of human factor engineering
problems in selected systems; recent advances in simu-
lation and measurement; special topics; special environ-
mental problems and stress effects; general psychologi-
cal theory relevant to human factor engineering; and lab-
oratory projects. The second part contains 37 selected
original papers and research reports of pertinence to
the above topics. The whole comprises an intensive
course for practicing engineers and scientists.
T. G. I. R 700 (approx.)

15,015

Poplinsky, P.N. & Poplinsky, M.E. CIRCULARITY IN GROUP PROBLEM-SOLVING. Contract NMR 495 (111) (NR 170 346), Proj. EF 704, Tech. Rep. 4, Dec. 1958, 16pp. Ohio State University Research Foundation, Columbus, Ohio.

15,016

This is an account report of accomplishments on a research study designed to identify and measure behaviors that are independent and critical, but contribute to group productivity, and to determine the conditions, both to such behaviors. The study included a specific statement of the problem, work accomplished, work in progress, and immediate plans.

R 5

15,017

Rinkade, R.G. & Kline, J.S. THE USE OF AN OPERATIONAL GAME AS A METHOD OF TASK FAMILIARIZATION. Contract AF 33(616) 3412, Proj. 7-54, Task 7-54, NOD TR 59 224, July 1959, 13pp. USAF Tech. Rep. 1, AF 33(616) 3412, July 1959, 13pp. Laboratory of Aviation Psychology, Ohio State University & Ohio State University Research Foundation, Columbus, Ohio.

15,018

An evaluation of the usefulness of an operational game as a system task-familiarization device was attempted. A sample of 25 subjects was divided into two groups after completion of skill component training. One group was given five hours of practice on an operational game derived from radar air traffic control task. The other group went directly into system training on an end task provided by an electronic air traffic control simulator. Comparison was made of the two groups' proficiency during system training on the end task during a final six-hour training period.

R 8

15,019

Black, J.W. PREDICTING THE CONTENT OF SHORT PHRASES. Contract NMR 495(119), NR 140 993/6-16 59, EF Proj. 1002, Rep. 82, Jan. 1959, 5pp. Ohio State University Research Foundation, Columbus, Ohio. (Reprinted from: QUART. J. Speech, Oct. 1959, 111(3)).

15,017

To study the predictability of the content of short phrases under three conditions (type of material, knowledge of source of material, and units of different length and position), approximately 400 new students in the naval flight training program were required to guess successive letters of the text until the correct letter had been found. Two samples of the printed language were selected: phrases from flight instruction and from newspaper. Each phrase contained five syllables and 3, 4, or 5 words. One half of the subjects were told the source of each phrase; the remainder were told that all phrases were "newspaper language". Mean percentage of correct first guesses through all letters and spaces and amounts of information (in bits) per space were analyzed for the effects of the experimental conditions. T. R 6

15,018

Harris, J.G., Jr. A STUDY OF VISUAL-AUDITORY CONFLICT INVOLVING THREE STIMULI. Res. Proj. NA 14 G1 11, Subtask 7, Rep. 2, June 1959, 31pp. USN School of Aviation Medicine, Naval Air Station, Fla.

15,018

Conflicting and similar visual and auditory stimuli were presented in random manner to 40 subjects. The visual stimuli were either three geometric forms with a printed name of one of the forms or three colors with the printed name; the auditory stimulus was the spoken name presented simultaneously with the visual stimulus. The task was to respond by pressing the appropriate key: all the same, all different, or one of the three was in disagreement with the other two. Response times and errors were recorded and analyzed for differences among response categories and stimulus types. Several possible applications of the experimental method are discussed.

T. I. R 1

15,019

Griffith, A., Clark, E. & Zentgraf, J.J. OBSERVATIONS ON HUMAN SUBJECTS LIVING IN A "TWIN ROOMING ROOM" FOR PERIODS OF TWO DAYS: CANNED STRESS. Res. Proj. NMR-13 6021, Subtask 1, Rep. 47, Oct. 1959, 36pp. USN School of Aviation Medicine, Naval Air Station, Fla.

15,019

To investigate the consequences of prolonged visual rotation of human subjects living in a "twin rooming room", five healthy subjects and one control (basis of visual-ocular function) were monitored. The nearly identical, windowless room was constructed around the center post of a centrifuge which was rotated at rates varying from 1.5 to 10.0 rotations per minute for periods of two days each. During each period, the subjects were engaged in a series of tasks designed to serve as stimulants and in the same time give time measure of their performance. The results, presented and analyzed in this report, consist primarily of the symptoms reported by the subjects. Some inferences are drawn as to neuropsychological mechanisms involved.

T. G. I. R 23

15,021

Kadel, A.R. SUPPORTING MAN IN SPACE: 1970-1975. RM 5774 85, Nov. 1959, 47pp. Technical Military Planning Operation, General Electric Company, Santa Barbara, Calif.

15,021

This report discusses progress in space technology that is expected to take place by 1970 and anticipates several bold adventures into space during the period 1970-1975, such as successful trips to the moon and the beginning of interplanetary travel (Mars, Venus, etc.). Needed requirements and capabilities for such accomplishments are discussed in the following areas: 1) the physical environment—atmosphere, gravitational forces (acceleration and zero g), temperature, and radiation; and 2) acoustic noise and vibration.

T. G. R 55

15,022

Silverman, B.E. THE COMPARATIVE EFFECTIVENESS OF ANIMATED AND STATIC TRANSPARENCIES. Contract 661339 76, NAVTRACEN TR 78 1, April 1958, 23pp. USN Training Device Center, Port Washington, N.Y. (New York University, New York City, N.Y.).

15,022

To compare the training effectiveness of animated and static transparencies, three training devices differing in the number of moving parts and the testing methods differing in their emphasis on verbal function were used. The subjects (130) were assigned at random to one of the three devices and, within devices, to either the animated or static training condition. Training was accomplished in small groups, each group being exposed to a standard tape recorded lecture and a particular visual device. Testing was done in groups for the written tests and individually for the performance test. Test results were analyzed for differences due to type of transparency, number of moving parts, and degree of verbal components in tests.

T. I. R 2

15,023

Morris, F.M. THE INFLUENCE OF KINESIS UPON NEAR HETEROPHORIA MEASUREMENTS. M.S. Thesis, Jan. 1958, 57pp. Indiana University, Bloomington, Ind.

15,023

To investigate the variability of three commonly used methods of measuring lateral phoria at near (Prism Diplopia, Screen-Maddox Rod, Modified Thorington) and to determine to what extent manipulatory localization would affect the perceived or apparent localization of the target, measurements of lateral heterophoria at 40 centimeters were made on 40 subjects (20 trained and 20 untrained). Measurements were taken on two separate days using visual cues only and again on two other days using both visual and kinesthetic cues (placing hands on target support and moving target beyond and in front of the testing distance). Differences due to tests, training of observers, and cues were analyzed.

T. I. R 24

15,024
Broch, H.C., Trubell, F.K., Jr. & Salcedo, V.L.
HUMAN RESPONSE TO AUTOMATIC TRAFFIC LIGHT
PATTERNS. June 1959, 11pp. Frank Parsons Engineering
Group, Ann Arbor, Mich., Chicago, Ill.

15,025
To study the effects of providing additional cues
to the automobile driver through the medium of traffic
signal lights on the behavioral responses (decision
time, stopping time), 24 subjects performed on an auto-
mobile simulator. The task was to drive and stop in
response to a standard and three experimental traffic
light patterns. Half of the group received instruction
on the experimental system while the other half
received none. All subjects were given simulation practice.
A detailed analysis was made of the objective
differences in behavioral and response times and the in-
dividual subjective preferences. The optimum signal
light pattern is described.
T. G. I. R 2

15,026
Caldwell, L.S. THE EFFECT OF THE SPATIAL POSITION OF
A CONTROL ON THE STRENGTH OF SIX LINEAR HAND MOVEMENTS.
Proj. 5956/25 001, Task C3, Rep. A11, Dec. 1959. 42pp.
USAF Medical Research Lab., Fort Knox, Ky.

15,027
To determine the effect of control position on the
force with which six linear hand movements could be made
along the X, Y, and Z axes of an essentially isometric
control, five subjects were employed. Measurements were
made of the maximum force applied in a five-second period
to a dynamometer handle by each of six linear hand move-
ments. Maximum strength of each movement was measured at
80 control positions (five handle distances, four angular
elevations, and four lateral positions). The data were
analyzed by the method of orthogonal polynomials (explan-
ation in appendix), and recommendations for optimum control
positions were made.
T. G. I. R 6

15,028
Pettie, C.R. THE LOUDNESS DIFFERENCE LIMIT FOR TONES
IN NOISE. Proj. 5956/25 001, Task C3, Rep. 314,
Aug. 1959, 5pp. USAF Medical Research Lab., New London,
Conn.

15,029
To determine whether loudness discrimination for
tonal signals in a noise background is stable throughout
a range of intensities, a forced choice variant of the
constant stimulus method was used. A tone was presented
in thermal noise to two experienced subjects. The differ-
ential sensitivity was explored for the tone at six
levels (three to forty decibels) above the 50 percent
recognition threshold in a broad band noise. The Differ-
ence Limit, 75 percent criterion, for a pure tone (1000
or 6000 cps) was established over the range of intensities
used. These data were compared to previous data for
listeners in a quiet situation.
T. G. I. R 13

15,028
Rulon, P.J. A STUDY OF THE ACCURACY OF RECOGNITION OF
THE INCIPENT STALL IN FAMILIAR AND UNFAMILIAR PLANES.
Rep. 74, Nov. 1947, 136pp. Civil Aeronautics Admini-
stration, Washington, D.C.

15,028
To investigate the accuracy of recognition of the
incipient stall during flight with light aircraft, check
flights were administered to subjects (student pilots,
private pilots, and flight instructors) in aircraft e-
quipped with stall warning indicators that were visible
only to the check-pilot. During the execution of assign-
ed maneuvers, subjects were directed to fly as close as
possible to the edge of the stall without actually stall-
ing the plane. Performance was judged by means of the
warning indicators. On other flights the pilots were
directed to fly normally; the check-pilot measured per-
formance as before but without the subject being aware of
the check. The results are discussed with respect
to regulatory policies.

15,029
Douglas Aircraft Company, Inc. STUDY SPEC. - HUMAN
ENGINEERING OF CONTROL SYSTEMS. July 1956, 14pp.
Douglas Aircraft Company, Inc., 51 Segundo, Calif.

15,029
This specification defines the requirements for a
human engineering study to determine the optimal control
linkage between the human operator, the integrated in-
strument display system currently under development by
the Joint Army-Air Instrument Development Program, and
the airplane into which the integrated display system
will be installed. A selected bibliography on control
systems is included.
R 23

15,031
Schwartz, R.E. RESPIRATORY PATTERN AND RESPIRATORY
RESPONSE TO CARBON DIOXIDE. Proj. 5956/25 001, Task C3,
Rep. 314, July 1959, 14pp. USAF Medical Re-
search Lab., New London, Conn. (Reprinted from
J. Appl. Physiol., July 1959, 12(1), 1-7).

15,031
To determine the cause of the marked individual vari-
ations in the respiratory response to carbon dioxide
(CO₂), 65 subjects were exposed to various CO₂ concentra-
tions (8.5, 9.3, 9.4, and 9.5 percent) for 15 minutes
followed by a recovery period of equal length. Respira-
tory responses to CO₂ and to air were studied for rela-
tionships that might be present. The practical applica-
tions of the findings to the problem of personnel selec-
tion were discussed.
T. G. I. R 24

15,032
Stodol, A., Minas, J.S., Batock, P. & Pipetz, M.
SOME DESCRIPTIVE ASPECTS OF TWO-PERSON NON-ZERO-SUM
GAMES. Conflict Resolution, June 1959, 11(2), 114-
119. (Ohio State University, Columbus, Ohio).

15,032
This paper presents the initial results of a study
of how people actually behave in game situations. Pairs
of subjects played two-person non-zero-sum games and
their behavior was recorded. Possible psychological de-
terminants of the observed behavior are discussed.
T. R 5

15,033
Schipper, L.M., Versace, J., Kraft, C.L. & McGuire,
J.C. HUMAN ENGINEERING ASPECTS OF RADAR AIR TRAFFIC
CONTROL. II AND III: EXPERIMENTAL EVALUATIONS OF
TWO IMPROVED IDENTIFICATION SYSTEMS UNDER HIGH DENSITY
TRAFFIC CONDITIONS. Contract AF 33(616) 43, Proj.
7192, WADC TR 56 68, July 1956, 45pp. USAF Aero Medi-
cal Lab., Wright-Patterson AFB, Ohio. (Ohio State
University & Ohio State University Research Foundation,
Columbus, Ohio).

15,033
In two experiments, radar air traffic controller per-
formance was investigated in simulated return-to-base
problems at several traffic densities with two improved
identification systems—the Clock Code omnipresent system
using a symbolic code attached to each blip and the Light
Pencil interrogator system which gave on-demand identifi-
cation. The controller's environment included noise-free
displays with an localized lighting system. The basic
problems were simulated return-to-base missions of jet
and propeller-driven aircraft under instrument flight
rules (IFR). Traffic densities ranged from 25 to 40 air-
craft per hour. Various performance criteria were used
in the analysis of the efficiency of the two identifica-
tion systems.
T. G. I. R 10

15,034

Stroud, R.C. COMBINED VENTILATION AND HEAT-REMOVAL EFFECTS OF SENSITIVITY TO RESPIRATORY CHANGES. Proj. 7146, Task 7129, WADC TR 59 350, Sep. 1959, 13pp. USAF Medical Research Lab., Dayton, Ohio. (Reprinted from J. Appl. Physiol., May 1959, 14(3), 245-246).

15,035

To develop a method for measuring respiratory sensitivity to changes in oxygen (O_2) tension independent of change in carbon dioxide (CO_2) tension, a combined analysis of breath-holding and ventilatory drive was made. Comparisons were made of experimentally determined responses of three subjects to various combinations of O_2 and CO_2 tensions with values predicted by the analysis.

T. G. R 7

15,036

McGuire, J.E. & Webb, P. EFFECTS OF FLIGHT ON COOLING OF THE BODY BY CONVECTION. Proj. 7146, Task 7129, WADC TR 59 350, Sep. 1959, 13pp. USAF Medical Research Lab., Wright-Patterson AFB, Ohio.

15,037

To determine the feasibility of using a ventilating suit as a vehicle for body cooling prior to heat exposures, a series of experiments was conducted with three experienced subjects. During the cooling phase various ventilating air temperatures (30, 45, and 60 degrees F.), air flow rates (10, 20, and 34 cubic feet per minute), and time durations (30, 60, and 90 minutes) were explored with both light and heavy clothing assemblies. The heat phase consisted of sitting in a chamber held at a constant temperature of 160 degrees F. until tolerance (impending heat stroke) was reached. Results were expressed in several forms: an index of strain, body storage rates, tolerance times, terminal rectal temperatures, etc. Recommendations are made for optimal usage of the suit for extension of heat tolerance. T. G. I. R 6

15,038

Clarke, L.P. & Headley, R.M. STUDIES OF PRIMATE TOLERANCE TO SOME COMPLEX ACCELERATIONS. Proj. 7222, Task 7146, WADC TR 59 630, Nov. 1959, 8pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

15,039

Satellite vehicles during unstable re-entry into the denser portions of the earth's atmosphere may be subjected to complex accelerations. Five primates were exposed to simulated deceleration in the forward facing position of up to 20 g combined with sine wave pitch oscillations through half amplitudes of 20 degrees at three and five cps. Accelerations (headward-footward and forward-backward) were measured on the seat at head level and directly on the skull of one animal. Types of movement made by the animals after centrifugation were observed. Post-mortem examinations were made and are reported.

T. G. I. R 4

15,040

Jeantheau, G. THE DIFFERENTIAL EFFECTS OF SPEED AND LOAD STRESS ON TASK PERFORMANCE. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 7, July 1959, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

15,041

To investigate the effect of various levels of speed and load stress on performance in an information processing task, ten subjects were required to discriminate and report pairs of identical symbols within symbol matrices of various sizes (four rows and two, three, or four columns). Each matrix was referred to as a "message," the rows were "words," and the cells were "symbols." Five levels of presentation were used: 17, 20, 24, 30, and 40 messages per minute. Each subject worked under all conditions, and performance was assessed both in terms of error scores and a derived information measure. The value of information measures in assessing tasks of this type is discussed.

T. G. I. R 8

15,042

USA Infantry Human Research Unit, Fort Benning, Ga. IMPROVED SELECTION CRITERIA FOR PARACHUTIST TRAINING. RESEARCH MEMORANDUM. Oct. 1958, 8pp. Human Research Research Office, George Washington University, Washington, D.C.

15,043

This note presents a discussion of the problem encountered as a result of the use of silhouette targets for marksmanship training and the manner in which the targets were modified for research purposes. The standard Army silhouette target is constructed of cardboard with the shape of a human target in a prone or kneeling figure. Problems of resistance to weather and durability, under conditions of bullet strikes were encountered. New targets constructed of fibreglass and composite materials were compared for initial cost, durability, repair and repair time.

15,044

Miller, D.E. & Crawford, R.M. TASK PERFORMANCE WITH THE NEW MODEL 8 MASTER-SLAVE MANIPULATOR AS A FUNCTION OF VIBRATION, DISTANCE, AND FREQUENCY. Proj. 7184, Task 71583, WADC TR 59 712, Nov. 1959, 16pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

15,045

To investigate the ability of Master-Slave Manipulator (JPL Model 8) operators to identify the slave hands and their movements with corresponding components and functions of the human body (forearm, wrist, and finger movement), a handling task involving rearrangement of blocks was devised. The task was performed under two conditions: 1) with standard slave (two red), and 2) with slave (two modified so that the one corresponding to the thumb of the operator was green). Work time as a function of task distance (9, 24, and 63 inches) was investigated and work ratios, based on mean time ratios for direct versus remote handling, were determined.

T. G. I. R 7

15,046

Crook, R.M. VISUAL FACTORS AFFECTING EFFICIENCY IN THE TASK OF PHOTOINTERPRETATION. ANNUAL SUMMARY REPORT. Contract W33-494(17), Dec. 1959, 7pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

15,047

Work accomplished on a research study of visual factors affecting efficiency in photointerpretation is summarized. Two phases are described: 1) a general survey of visual factors in photointerpretation, and 2) a preliminary investigation of some specific factors. On the basis of survey results an outline of factors affecting visual performance in photointerpretation is presented. The specific problems which have received attention are general illumination, illuminants for colored transparencies, differential illumination in stereo viewing, binocular viewing of duplicate photographs, and visual fatigue.

R 12

15,048

Dennis, J.P. SOME SUGGESTED MEASUREMENTS FOR THE DESIGN OF THE DRIVER'S COMPARTMENT IN WHEELED VEHICLES. Tech. Memo 82, Jan. 1958, 7pp. Clothing & Storage Experimental Establishment, Ministry of Supply, London, England.

15,049

This note presents data concerning seat design and positioning of controls in the driver's compartment of wheeled vehicles. Explanatory notes are reduced to a minimum. The recommended measurements and characteristics derived from the literature are given under the following headings: seat dimensions, seat cushioning, seat back, positioning of foot pedals, range of seat adjustment, hand controls, and clearance and accommodation.

T. I. R 7

15,043

Swyer, J.F. FEASIBILITY STUDY AND DESIGN OF A SELF-EXTENDING LIGHT VALVE. Contract AF 33(616) 5469, Task 71839, WDC TR 59 81, Oct. 1959, 15pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Palacet Incorporated, Blue Ash, Ohio).

15,043

Investigation of the phototropic phenomenon to determine the feasibility of phototropic material as a protective, self-extending light valve against the energy yields of high-intensity light sources has been accomplished. The practical utilization of such materials as a protective eye device against atomic flash and as a complete was employed. T. G. R 14

15,044

Forbes, T.W. SOME FACTORS AFFECTING DRIVER EFFICIENCY AT NIGHT. 1295 837, Dec. 1959, 15pp. Highway Traffic Safety Center, Michigan State University, East Lansing, Mich.

15,044

The results of selected research studies yielding background information on human reactions are combined to demonstrate certain relationships of importance in traffic design, operation, and safety as they affect night driving efficiency. The data presented are those on 1) perception, judgment, and response time in reduced visibility; 2) pupillary response times and visibility; 3) reduction and change of color sensitivity; 4) color constancy; and 5) visual factors and physical fatigue. G. R 9

15,045

Forbes, T.W. HUMAN FACTORS IN HIGHWAY SAFETY. Oct. 1959, 17pp. Highway Traffic Safety Center, Michigan State University, East Lansing, Mich.

15,045

This paper on human factors in highway safety emphasizes that the driving public must be convinced of the importance of specific knowledge of best operating procedures and of maintaining most effective personal condition and driving behavior. Highway officials, designers, traffic engineers and safety experts should likewise be aware of such specific, scientific information. The perceptions, judgments, responses, knowledge, motivation, alertness and personality factors of the driver are analyzed as they relate to the task of driving. The Human Engineering approach to the study of safe driving is discussed and illustrated with specific examples. G. R 11

15,046

Lewis, W.L. DESIGN FOR SAFETY. A COLLECTION OF DESIGN NOTES AND HUMAN ENGINEERING BULLETINS SHOWING DESIGN FACTORS FOR IMPROVED SAFETY. 1957, 46pp. Daniel and Florence Guggenheim Aviation Safety Center at Cornell University, Ithaca, N.Y.

15,046

These design notes present a series of oversights in design which have led to accidents or potentially serious incidents in the operation of aircraft. Each note describes the situation, the danger, the fix and states a design precept governing the case. The notes are not intended as design criteria, but only to pass on to engineers the lessons learned from difficulties in the past. Some Human Engineering Bulletins are included to illustrate the importance of using information already available to improve safety by engineering for human use. T. G. I. R 18

15,047

Morris, J.D., Malins, H.L. & Morris, C.V. BITE TIME AUTOMETRY - TEMPORAL INTEGRATION IN THE HYPACUSIC. Proj. AM 22 01 20 03 03, VIII(5), Sep. 1959, June 1959, 15pp. USAF Medical Research Lab., New London, Conn. (Reprinted from A.M.A. Arch. Otol., June 1956, 67: 699-713).

15,047

To determine whether hearing for very brief duration times can lead to a useful test for the diagnosis of hearing disorders, complete otological notes together with complete audiometry and tests of recruitment and of energy integration were obtained on a group of normal ears and patients with hearing impairment. In these latter cases, at least one normal or near-normal frequency was available to serve as a reference for frequency balancing and for integration data. A selected series of 25 defective ears was presented, using the slope of integration and the T_0 (duration, in milliseconds) above which no further improvement in threshold occurs, which provides information as to the integrative power of the ear. Conclusions as to the usefulness of a temporal integration test are made. T. G. R 11

15,048

Howell, W.C. & Kraft, C.L. SIZE, BOLD, AND CONTRAST AS VARIABLES AFFECTING THE LEGIBILITY OF ALPHA-NUMERIC SYMBOLS ON RADAR-TYPE DISPLAYS. Contract AF 33 (616) 3612, Proj. 7184, Task 71583, WDC TR 59 536, Sept. 1959, 36pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

15,048

To determine the functions relating size, blur, and contrast, and their interactions, to legibility of alpha-numeric symbols on a radar-type display, 12 subjects were studied under all 64 conditions obtained by combining factorially four levels of each of the three variables. The stimuli, 36 alpha-numeric symbols (26 letters of alphabet, Mackworth style, and ten Arabic numerals) were projected on a ground-glass screen one at a time at a rate controlled by the subject's verbal responses. Speed and accuracy were both stressed. Performance indices were information transmitted, speed, and accuracy. Confusion data were also reported. Optimum legibility is reported for the combined variables. Implications and possible generality of these data are discussed. T. G. I. R 17

15,052

Liverant, S. & Scodel, A. INTERNAL AND EXTERNAL CONTROL AS DETERMINANTS OF DECISION MAKING UNDER CONDITIONS OF RISK. Contract AF 49(638) 317, 1959, 14pp. Ohio State University, Columbus, Ohio.

15,052

A test was made of the hypothesis that individuals approaching a situation that involves decision-making under conditions of risk differ on a dimension of internal-external control (those who believe they can exert some modicum of control versus those who do not). An internal-external control test of 60 forced-choice items was administered to 85 Ss, each of whom engaged in a risk-taking situation in which he was required to bet on the outcome of a pair of dice 30 times. Four amounts of money and seven alternative outcomes with known objective probabilities could be selected. The differences in selection of high, intermediate, and low probabilities, in payoff values, in amounts of money spent were analyzed with relation to internally and externally oriented Ss. T. R 15

15,053

May, Pauline T., Arnold, R.D. & Denenberg, V.H. STATISTICAL STANDARD OPERATING PROCEDURE. STAFF MEMORANDUM. Aug. 1953, 7pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,053

This note sets forth standard statistical operating procedures for 1) experimental design, 2) statistical analysis, and 3) general rules. Included are lists of symbols and formulas for use.

15,054
Marrifor, D. CREW COMPLEMENT EVALUATION. Proj. 27
1 F. Feb. 1949, 54pp. Flight Safety Foundation.
Woods Hole Mass.

15,054
This report proposes a study of the basic factors that must be considered in a systematic investigation of crew complement problems by scientific methods. The objectives of a continuing and expanding research program designed to provide objective and dependable evidence bearing on crew size are set forth; general and special problems of methodology and evaluation are pointed out; research methods now available and likely to be useful to the investigation are described; and a plan is outlined for putting these methods to work in achieving the program objectives.

15,055
Chambers, R.M. & Smith, R.J. (Eds.). "WHAT NEEDS DOING ABOUT MAN-IN-SPACE?"—A DISCUSSION AT THE 1959 AMERICAN PSYCHOLOGICAL ASSOCIATION CONVENTION, 1959, 46pp. General Electric Company, Philadelphia, Penn.

15,055
This report contains eight short presentations on the topic "What Needs Doing About Man in Space?" given by psychologists who represented industry, government, and university activities. The major issues discussed were: 1) the role that man has in space; 2) criteria for determining whether a space vehicle should be manned or unmanned; 3) allocation of man-machine functions; 4) techniques and devices for simulating space flight conditions; 5) need for reliable data about man, machines, and space; 6) man's intellectual capabilities in space environments; 7) kinds of tasks to be used in studying man's capabilities; 8) selection of men for space flight; and 9) the need for new approaches to the problem.

15,056
Denerberg, V.H. ANALYSIS OF VARIANCE DESIGNS WITH DISPROPORTIONATE SUBCLASS NUMBERS. Aug. 1953, 4pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,056
This note points out that when experimental designs have multiple classifications (more than one criterion of classification) the textbook formulas for analysis of variance do not hold unless the N's are equal or proportional in all subclasses. Snedecor's discussion of disproportionate subclass numbers is summarized and the techniques for analysis when the subclass frequencies are disproportionate offered by Walker and Lev and Lindquist are discussed. Suggestions are offered as to the types of design that appear best suited for field research.
R 3

15,057
Guggenheim, H.F. (Chm.). SURVEY OF RESEARCH PROJECTS IN THE FIELD OF AVIATION SAFETY. 1959 ANNUAL SUPPLEMENT. 1959, 85pp. Daniel & Florence Guggenheim Aviation Safety Center at Cornell University, New York, N.Y.

15,057
This is the ninth in a series of annual surveys listing information on non-classified research conducted in various fields affecting aviation safety. Several hundred new projects are reported; the status of all active projects was checked and descriptive statements revised to accord with information obtained. A section containing completed projects is included. Areas in aviation research safety where additional effort is required are outlined.
R 900 (approx.)

15,058
Conover, D.W. THE AMOUNT OF INFORMATION IN THE ABSOLUTE JUDGMENT OF MUNSSELL RUE. Contract AF 33(616) 3612, Proj. 7154, WADC TR 55-267, June 1955, 4pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Coker State University & Ohio State University Research Foundation, Columbus, Ohio).

15,058
Using surface colors provided by the Munsell 50-hue series of colored papers, a preliminary equal-discrimination scale for the absolute recognition of colors was developed. Based on these data 16 colors were selected that represented an equally spaced series. This scale was validated with a second group of subjects. Both the initial and validating data were analyzed to determine the maximum amount of information in absolute judgments of hue which can be transmitted to the average color-normal observer by use of surface colors of maximum saturation. The implications for practical coding purposes are noted.
I. G. I. R 49

15,059
Alexander, H.S. & Charles, W.D. AN EXPERIMENTAL STUDY OF PROLONGED INTERMITTENT PHOTIC STIMULATION. Proj. 7154, Task 71580, WADC TR 59-715, Nov. 1959, 6pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

15,059
To investigate the resistance of the human operator to effects of intense, flashing lights for prolonged periods of time, four subjects were exposed to very bright intermittent photic stimulation at five, ten, and fifteen cycles per second for a period of two and one-half hours. Bipolar electroencephalograms were recorded from the right and left occipital, parietal, and post-temporal areas of the brain. Continuous recording and monitoring were conducted for the first 30 minutes followed by three to five minute recordings every 20 minutes and, finally, 20 minutes of continuous recording at the end of the period. A simple addition test was given at 15-minute intervals. The data were analyzed for effects of photic stimulation over time.
I. R 2

15,063
Carroll, J. PRINCIPLES OF CRASH-INJURY INVESTIGATION. Rep. AF CIR 62-0-107, Sept. 1959, 37pp. Flight Safety Foundation, Phoenix, Ariz.

15,063
This presentation of the principles of crash-injury investigation was given at the sixth annual postgraduate course in aviation medicine. The thesis of the paper is that in survivable aircraft accidents, unnecessary injuries and death are produced primarily through aircraft design deficiencies and that primary corrective considerations lie strictly in the field of crash safety design engineering. In order to develop crash safety design parameters it is necessary to collect and analyze accident-injury data. Instructions are given as to the procedures to follow, the kind of data to collect, and how to conduct the investigation. Report forms, design data sheets, a list of basic equipment, and some bulletin board materials are included.
G. I.

15,065
Bilger, R.C. LABORATORY FACILITIES EMPLOYED IN PSYCHOPHYSICAL MEMORY EXPERIMENTS. Contract AF 49 (638) 369, Proj. 9778C, Task 37710, AFOSR TN 59-923, Tech. Memo. 72, Sept. 1959, 17pp. University of Michigan Research Institute, Ann Arbor, Mich.

15,065
Equipment and operating procedures used in psychophysical memory experiments at Electronic Defense Group are described and illustrated. This equipment gives precise control of signal parameters and enables one to collect efficiently the large quantities of data required for specification of the parameters of the human hearing mechanism.
I.

15,066

Lyons, J.D. SUPPLEMENT TO A BIBLIOGRAPHY OF HUMAN FACTORS IN RADAR OPERATION AND MAINTENANCE. STAFF MEMORANDUM. Aug. 1955, 12pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,066

This supplemental bibliography of 115 items covers the period between 1 September 1953 and 1 March 1955, plus some articles published prior to 1 September 1953 which did not appear in the original bibliography. Categories used in the supplement are discussed in the original bibliography.
R-115

15,070

Bradley, J.V. TACTUAL CODING OF CYLINDRICAL KNOBS. Proj. 7184, Task 71501, WADC TR 59 182, Sept. 1959, 29pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

15,070

Tactual coding of knobs by use of bizarre shapes is frequently achieved at the expense of manipulability and setting precision, which appear, in many cases, to be optimal when knobs are cylindrical. Certain parameters of cylindrical knobs were therefore investigated: rim surface, diameter, and thickness. Each parameter was studied in a separate experiment with the other two held constant. In addition, the effect of wearing gloves and time limitations were investigated. The subject's task was to feel one of two knobs whose pictures were before him and identify the correct picture. The data were analyzed in terms of the cues that would permit efficient tactual coding.
T. I. R 18

15,071

Cock, S.P. & Leon, H.A. PHYSIOLOGICAL EFFECTS OF INERT GASES. Contract AF 29(600) 1313, Proj. 7851, Task 78516, AFMOC 59 26, June 1959, 35pp. USAF Aerospace Medical Lab., Holloman AFB, N.M. (University of California, Berkeley, Calif.).

15,071

This report presents the results of investigations on the use of helium and other inert gases in sealed cabin environments. Included in the report is an extensive bibliography (127 items) of previous work in the field. The report is prepared from progress reports and the final report on one phase of a long-range program studying information essential for the successful operation of sealed cabins in space flight. The investigations summarized here include metabolic, tissue, and heat exchange studies.
T. G. I. R 169

15,072

Burns, N.M. & Gifford, E.C. PRESSURE-SUIT MOBILITY: A PRELIMINARY STUDY. Proj. TED NAM AV-43003, Part 4 & Proj. NAM 15 01 13 5, Part 1, Rep. NAMC/ACEL 412, Oct. 1959, 15pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

15,072

Three pressure suit configurations (N-3, N-5, and N-7) were tested in a reaction time apparatus for the degree of mobility restriction they imposed on the subject when the suit was inflated to five pounds/square inch and when it was not inflated. Comparisons of reaction time and sustained sequential performance were made among the suit configurations and between the two pressure conditions.
T. G. I. R 3

15,073

Brown, J.L. THE USE OF COLORED FILTER GOGGLES FOR PROTECTION AGAINST FLASH BLINDNESS. Proj. TED ADC AE 5210, Task WMOOS-15 6002-1, Rep. 89 & Rep. WADC MA 5917, Oct. 1959, 24pp. USN Aviation Medical Research Lab., WADC, Johnstown, Penn.

15,073

To determine the effects of very bright flashes of light on the ability to perform visual acuity tasks, each of two observers identified the position of an acuity grating after presentation of a 0.9 second flash of a luminance of 12,500, 50,000 or 100,000 ft-L. The acuity target luminance varied from 0.75 to 4.24 log ft-L; acuity levels were 0.13 and 0.33; filters transmitting one per cent and ten per cent, as well as no filter condition were used. The observer was dark adapted 15 to 20 minutes prior to testing. Perception time was analyzed as a function of filter condition, luminance of adapting flash and target, acuity level.
T. G. I. R 6

15,074

Lehiste, Ilse. AN ACOUSTIC-PHONETIC STUDY OF INTERNAL OPEN JUNCTURE. Contract NCMR 1224(22) NR C49 122, Rep. 2, Aug. 1959, 116pp. Speech Research Lab., University of Michigan, Ann Arbor, Mich.

15,074

To investigate experimentally the phonetic manifestations of juncture, and to reconsider the phonemic interpretation of such features, three subjects, all speaking the Midwestern type of American English recorded a total set of 192 sentences, first with test words appearing in random order, then arranged in contrasting pairs. Analysis was undertaken to determine the extent to which morpheme boundaries are signalled by information present in sound waves. A technique to observe acoustical clues associated with juncture is described. Implications of the findings are discussed.
T. I. R 166

15,075

Moser, H.M. & Durham, R.E. AN EXAMINATION OF THE SPOKEN VOCABULARY USED IN AIR TRAFFIC CONTROL. Contract AF 19(604) 4575, EF Proj. 882, AFMOC TN 59 73, Tech. Rep. 55, Nov. 1959, 34pp. Ohio State University Research Foundation, Columbus, Ohio.

15,075

To obtain a frequency count of words used in air traffic communications as well as to determine the flexibility and limitations of this type of spoken vocabulary, a count was made of 3000 running words from Approach and Ground Control towers from each of three airports. These were analyzed for the total number of different words, for the Type-Token Ratio (TTR, a measure of vocabulary flexibility or variability), for six 500-word samples, and for five 100-word samples. Decremental TTR and the total TTR for the entire sample from each airport also were found.
T. R 13

15,076

Mengelkoch, R.F., Adams, J.A. & Gainer, C.A. THE FORGETTING OF INSTRUMENT FLYING SKILLS AS A FUNCTION OF THE LEVEL OF INITIAL PROFICIENCY. Contract N61339 126, NAVTRADEVEN 71.16-18, ca. 1958, 124pp. USN Training Device Center, Port Washington, N.Y.

15,076

To determine 1) how instrument flying skills are affected by a four-month interval of non-flying and 2) whether this effect differed as a function of initial level of flying proficiency, two matched groups of ROTC students were given a "high" and "intermediate" amount of flight training and then tested for retention after a four-month period of non-flying. Implications of the results for programs to maintain flight proficiency are discussed, and suggestions are made for needed further research.
T. G. I. R 13

15,077

Meeker, W.F. ACTIVE EAR DEFENDER SYSTEMS: DEVELOPMENT OF A LABORATORY MODEL. Contract AF 33(616) 3051, Proj. 7231, Task 71786, WADC TR 368(11), Dec. 1959, 41pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Radio Corporation of America, Camden, N.J.).

15,077

A laboratory model active ear defender using negative acoustic feedback to provide noise reduction was constructed. The noise reduction obtained at each ear on one subject in a noise field of approximately 100 decibels was demonstrated. Improved transducer arrangements were then developed and further tests were made with arrangements for insert or semi-insert use as well as for conventional over-the-ear headset. The amount of noise reduction from 100 to 300 cycles per second was determined. Design requirements necessary to extend the range to higher frequencies are discussed. G. I. R 9

15,078

McConnell, D. & Shelly, M.W. TRACKING PERFORMANCE ON A SEQUENCE OF STEP FUNCTIONS WHICH APPROXIMATES A CONTINUOUS FUNCTION AS A LIMIT. Contract AF 41(657) R, Proj. 1710, WADC TR 59 43, July 1959, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

15,078

To investigate the relations between continuous tracking error and error in tracking a sequence of step functions which approached the continuous signal as a limit, five paid male subjects each served six times in each of 36 conditions. Response measures were root-mean-square error between target and cursor and between cursor and limiting continuous function. Results were compared to previous findings concerning relations between stimulus amplitude and response amplitude. T. G. R 20

15,079

Pendergrass, E.P. EFFECTS OF X-RAY UPON THE SKIN OF HUMAN VOLUNTEERS. Contract DA 49 007 MD 191, Oct. 1959, 7pp. University of Pennsylvania, Philadelphia, Penn.

15,079

The purpose of this investigation, undertaken during World War II, was to determine the feasibility of using X-ray to depilate the donor site prior to skin grafting. There were 99 human volunteers in the original study. The thigh was the usual site of irradiation; dosage and fractionation were varied. It was determined at an early stage that permanent epilation was always accompanied by other undesirable radiation sequelae. However, follow-up of the volunteers has been maintained and observations on late radiation sequelae are reported herein.

15,080

Lowder, R.G. CONSIDERATIONS IN PREDICTION OF MAINTAINABILITY. Proj. 7184, Task 71586, WADC TN 59 375, Nov. 1959, 7pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

15,080

This brief report suggests a method for predicting how much maintenance will be required by a system before it goes into production. It also contains recommendations for construction of such a prediction instrument. R 6

15,081

Gain, P. & Fitts, P.W. A SIMPLIFIED ELECTRONIC TRACKING APPARATUS (SETA). Contract AF 41(657) 70, Proj. 1710, WADC TR 59 44, Nov. 1959, 12pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

15,081

A simplified electronic tracking apparatus which is economical and portable is described. By manipulating a control device the subject keeps a pointer of a zero-center meter at the null point. Voltages generated by the subject are compared with corresponding voltages generated by the meter. Result of the comparison is the sum of the voltages, or error. Error then introduced to the subject's display and to a second amplifier is integrated by a third amplifier and displayed on a voltmeter on the experimenter's console. G. I. R 4

15,082

Jolley, O.B. A SUMMARY OF PRIOR RESEARCH ON INTEGRATED CONTACT/INSTRUMENT FLIGHT TRAINING. STAFF MEMORANDUM. June 1958, 23pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,082

This report is a summary of prior research in the area of training effectiveness of the integrated contact/instrument flight training concept. Implications of results of these studies for further research are discussed. R 8

15,084

North, T.C., Harpell, G., Pugh, A.L. III. & Gröndstra, Jan. TECHNIQUES FOR AIR CONTROL SYSTEM APPLICATIONS. Proj. 8764, Task 46608, AFRC TR 59 165, July 1959, 38pp. USAF Astronautics Sciences Lab., AFRC, Bedford, Mass.

15,084

This report consists of four Laboratory Memos which describe: 1) a passive coincidence circuit designed to aid the prediction of collisions when used with an iterative display computer; 2) an optical analog-to-digital converter; 3) a two-speed joy stick; and 4) an electronic switch built to switch direct-current analog tracking voltages to permit tracks to be labeled. These techniques had been found feasible; but they were not used in the production model of the Tactical Air Control System. I.

15,085

Harris, J.L. OPTIMUM FIXATION PERIOD FOR VISUAL SEARCH. Contract N0BS 72039, Proj. NS 714 100, Task 3, Rep. 3 4, March 1959, 30pp. S.O. Duntley, La Jolla, Calif.

15,085

This study undertakes the prediction of visual search performance by calculational technique. The purpose of the report is "to illustrate sample calculations utilizing the most recent psychophysical-visual data and extending the technique to allow determination of the optimum fixation period for a specified visual search task." G. R 6

15,087

Montague, W.E. & Kolstoe, R.H. ANALYSIS OF ACTIVITIES WITH IMPLICATIONS FOR TRAINING. Task NICOBO, May 1957, 64pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,087

To obtain information concerning field activities of enlisted electronic maintenance personnel, data were gathered from 76 men in seven Ordnance NIKE detachments. A "reliable and comprehensive" description of the field situation and job activities is given. Maintenance activities were related to the school training the men had received. Training courses were evaluated by the men. T. G. I. R 1

15,086

Root, R.T. ANNOTATED BIBLIOGRAPHY OF RESEARCH STUDIES IN AVIATION MECHANICAL MAINTENANCE TRAINING. STAFF MEMORANDUM. March 1957, 21pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,088

This annotated bibliography of 33 items is divided into three sections covering: 1) Mechanic Evaluation; 2) Task Analysis, Proficiency Measurement, and Criteria Measurement; and 3) Notices of Research Projects (Bio-Sciences Information Exchange). R-33

15,089

Root, R.T. AN ANNOTATED BIBLIOGRAPHY OF RESEARCH ON TRAINING AIDS AND TRAINING DEVICES. STAFF MEMORANDUM. Aug. 1957, 118pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,089

This bibliography was prepared as a comprehensive source of information in training aids and devices, especially in the armed service. Section I contains titles and abstracts of reports and articles on training devices; Section II includes reports and articles pertaining to the use and evaluation of training aids; Section III contains methodological articles concerned with methods for determining need for training aids and devices, ascertaining design requirements, and evaluation of aids and devices in use; Section IV contains items concerned with basic research relevant to training aids and device theory. R-349

15,090

Moser, H.M., Oyer, H.J., Fotheringham, W.C., O'Neill, J.J., et al. THE EFFECT OF AUDITORY STIMULATION ON THE PRONUNCIATION OF ENGLISH WORDS BY NON-NATIVE SPEAKERS. Contract AF 19(604)-4575, RF Proj. 882, AFRC TN-59 56, Tech. Rep. 54, Sept. 1959, 16pp. Ohio State University Research Foundation, Columbus, Ohio.

15,090

To investigate the effects of auditory stimulation on the pronunciation of non-native speakers of English, eight foreign students recorded 50 stimulus words under two conditions: 1) pre-stimulation, in which the subject merely read words printed on a list, and 2) post-stimulation, in which the subject first listened to three pronunciations of a single test word by an American speaker and then attempted to imitate the pronunciation. Intelligibility scores were derived, and mean scores obtained under each of the two conditions were compared. T. R 12

15,091

Shapiro, R. & Consolazio, C.F. REPORT ON ENERGY REQUIREMENTS OF MEN EXPOSED TO SOLAR RADIATION AND HEAT. Proj. 5 60 11 020, Rep. 240, July 1959, 20pp. USA Medical Research and Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

15,091

To determine the effect of solar radiation and temperature on energy expenditure and caloric requirements, ten male subjects were exposed for ten days to humidity controlled periods of low (67 degrees F.), intermediate (73.3 degrees F.), and high (100.6 degrees F.) temperatures and to a period of direct sunlight (78.3 degrees F.). Sweat and pulse rates, internal body temperatures and blood pressures were recorded daily. Energy expenditure for controlled levels of activity and basic metabolism rates were measured with the Muller-Franz meter. Food and water were supplied freely and consumption recorded. Foods were analyzed for protein, fat, moisture and ash. Calories were computed using energy equivalents of 4, 9, and 4 for protein, fat, and carbohydrates. A discussion is included. T. R 23

15,093

Reig, R.W. NON-LINEAR ADAPTATION IN MANUAL CONTROL SYSTEMS. Contract NOBS 72017, Rep. 7420 R 4 & Contract DA 19 020 ORD 4637, Rep. 7967 R-3, June 1959, 81pp. Massachusetts Institute of Technology, Cambridge, Mass.

15,093

To test the human operator as a feedback control element in a situation where a non-linear type of control characteristic appeared to have a good chance of performing better than an "optimum" linear system, three operators were trained and run using the Sanborn and the oscilloscope as visual displays. "Optimum" was defined as minimizing the mean square value of the difference between system input and system output. The specific objective was to determine if a human operator could adapt to a non-linear characteristic when it was to his advantage to do so. Previous work on human operator behavior is reviewed. T. G. I. R 11

15,094

Goffard, S.J. EFFECTIVENESS OF VARIATIONS IN CODE PRACTICE. Task RADOP II, May 1958, 25pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,094

To relieve the monotony involved in practice required to develop skill in receiving International Morse Code, new practice materials, designed to be more interesting, were devised and evaluated experimentally against old materials. Two hundred sixty men, 138 experimental and 122 control subjects, were used in the research. Speed, progress, and follow-up tests were administered. R 9

15,096

Simons, D.G. & Archibald, E.R. SELECTION OF A SEALED CABIN ATMOSPHERE. AFMDC TR 59 36, Sept. 1959, 16pp. USAF Missile Development Center, Holloman AFB, N.M. (Reprinted from J. Aviat. Med., May 1958, 22, 330-337).

15,096

This report considers the selection of oxygen supply, the problem of carbon dioxide and water vapor removal systems, and the determination of the cabin atmosphere pressure for a flight duration of 24 hours. Tolerable limits were selected for no-performance decrement rather than for comfort. G. I. R 16

15,097

Vitro Laboratories. STRATO-LAB CADDI SYSTEM FUNCTIONAL REQUIREMENTS. Contract NMR 2656(00). Tech. Rep. 118, Oct. 1959, 66pp. Vitro Laboratories, Silver Spring, Md.

15,097

This report lists the functional requirements imposed on the Strato-Lab in tabular form. Requirements in the following areas are included: 1) Flight Operations Requirements, 2) Environmental Requirements, and 3) Experimental Research Requirements. There is a summary discussion of general conclusions which have been drawn concerning design aims and functional limitations considered to be of prime importance.

T. G. I. R 4

15,099

Suppes, P. BEHAVIORISTIC FOUNDATIONS OF UTILITY. Contract NMR 225(17), Proj. NR 171 034, Tech. Rep. 23, July 1959, 29pp. Institute for Mathematical Studies in Social Sciences, Stanford University, Stanford, Calif.

15,099

The author uses the behavioristic notions of stimulus, response and reinforcement to derive a theory of subjective probability and utility. After discussing the fundamental assumptions of stimulus sampling learning theory, the author attempts to show how this theory may be used to derive a utility function for various simple choice situations. Results of this discussion then are related to Shannon's concept of entropy and Luce's choice axiom.

I. R 18

15,100

Draper, J., Edwards, R.G., Hardy, R.H. & Hughes, W.P. METHOD OF ESTIMATING THE RESPIRATORY COST OF A TASK BY USE OF MINUTE VOLUME DETERMINATIONS. SEPTEMBER 1952. Rep. 29, April 1954, 9pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,100

A method of assessing the metabolic cost of a task by the variance analysis of determinations of minute volumes of expired air is described. The method was validated by a weight-carrying experiment and was then applied in a comparison of respiratory response to different foot and back loads.

T. I. R 4

15,102

Finnie, A.W., Reid, A.M. & Lewis, B.D. STREAMLINING THE SOLDIER IN BATTLE ORDER. A FORM OF LOAD CARRIAGE. Rep. 60, Aug. 1956, 40pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

15,102

This report describes a form of load carriage which seeks to distribute the present battle order load equally between front and back in such a way that comfort and stability are increased. A small comparative field trial was made of this equipment and the Z2 (modified) equipment, which is generally accepted as the best existing British load carriage equipment for battle order. The main field trial was supported by range firing tests and a test on water uptake and time of drying out of both equipments. Subjective opinions were also obtained.

T. I. R 6

15,103

Hardy, R.H., Edwards, R.G. & Hughes, W.P. SOME MOVEMENTS OF THE FOOT DURING WALKING. FEBRUARY, 1953. Rep. 28, Jan. 1954, 16pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,103

To examine the movements of the foot during walking and to relate the movements observed to probable muscular activity and specific muscular function, foot movements of 150 subjects, walking on a power-driven endless belt, were recorded by means of cinematography, electromyography and photography of specifically placed neon traces. Measurements were made with reference to inversion during the terminal phase of the forward step; abduction of the great toe during the same phase; inversion of the feet during the thrust phase; eversion of the foot during passing phase (free leg passing standing leg); and internal rotation of the leg. Data are treated by means of the Chi Square. A discussion is included.

T. G. I. R 16

15,104

Hardy, R.H. CRITERIA OF COMPARISON OF DIFFERENT TYPES OF FOOTWEAR (AUGUST-SEPTEMBER 1951). Rep. 16, April 1952, 21pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,104

To determine if simple laboratory observations before and after a forced march of 13 miles could detect any differences in response of a subject to the exercises in General Service Boots compared with Crepe-soled shoes, observations were made of 11 subjects by means of slow motion cinematography, standard radiography, standard photography, plethysmometry, dynamometry, and subjective responses. Data are treated statistically by comparing before and after observations of subjects using both kinds of footwear. Results are discussed in terms of the establishment of criteria for footwear comparison.

T. I. R 14

15,105

Kenchington, K.W.L. & Draper, J. TRIALS AT LOW TEMPERATURES OF GLOVES-COLD/WET (MARCH-APRIL, 1955). Rep. 55, Feb. 1957, 28pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

15,105

To compare the performance of three different combinations of handwear for use under cold/wet conditions, the following tasks were carried out by 12 1/2 year old subjects in a climatic chamber at 32 degrees F and 10 degrees F: marching, resting, handling wet line, loading and firing a rifle, and dismantling and reassembling a Bren gun. Objective measurements were made of hand temperatures and of manipulative dexterity. Subjective assessments of hand comfort and suitability were also obtained. Recommendations are made concerning relationships between thermal environment, condition of gloves, dexterity and required activities.

T. G. I. R 6

15,106

Kenchington, K.W.L. & Draper, J. PETROLEUM RESISTANT MITTENS PART II. A SURVEY OF HAND DIMENSIONS. CEPRE Rep. 21, Nov. 1952, 17pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,106

To determine the range and distribution of hand sizes of potential users of petroleum resistant mittens, a simple sizing board was used to obtain hand length and breadth dimensions from a random sample of 100 servicemen. Theoretical distributions are fitted to the data and used in preparing different hand sizing schemes based upon two breadths and three, four, and five different lengths. Proportions of mittens to be manufactured for each hand size are calculated for each of these schemes and the percentages of the population expected to be fitted by the scheme are determined. Recommendations for the future design of petroleum resistant handgear are included.

T. G. I.

15,107

Proctor, K.A. COMMENTS ON THE LAY-OUT OF THE DRIVER'S SEAT. F.T. 1000. Mem. 2, Dec. 1952. 4pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,107

A drawing of a conventional motor vehicle seat is reviewed. The following features of the layout are discussed and recommendations made: general layout, steering, foot pedals, hand brake, gear lever, seat (angle and firmness), and seat adjustment. T. I. R 8

15,108

Proctor, K.A. & Stockbridge, H.C.M. COMMENTS ON THE SEATING ARRANGEMENTS F.T. 402. Mem. 3, April 1951. 4pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,108

Drawings of general arrangements and seating in the Morris Motors F.V. 302, A.1575 and A.1571 tanks were inspected and commented upon. Comments were focused on, and included, the following aspects of seating: aspects of design such as dimensions, covering, surface inclination, relation of seat to controls, and leg-rest height. T. I. R 4

15,109

Proctor, K.A. & Stockbridge, H.C.M. COMMENTS ON THE COMMANDER'S SEAT F.T. 603. Tech. Mem. 6, Dec. 1952. 5pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,109

An armrest support was designed and built which, while using minimum space, would retain the desirable features of an earlier buttack support: provision of adequate body stabilization while enabling the operator (Commander/Forwarder) to rotate his body and a machine gun easily in one movement. Ten subjects supported themselves in a neck-up for ten minutes in a position approximating that in the turret of the F.V. 503. Subjective opinions of the comfort of the buttack support were obtained. The arm rest support was discussed in terms of suggested modifications and use on vehicles other than the F.V. 503. T.

15,110

Beld, A.M., Reckmann, E.T. & Draper, J. A COMPARATIVE PHYSIOLOGICAL FIELD TRIAL OF FOUR TYPES OF LOAD CARRIAGE EQUIPMENT. Rep. 43, Jan. 1955, 22pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,110

The trial represents an attempt to assess the physiological strains imposed by four types of load carrying equipment. The assessment consisted of 1) a validation field trial in which the value of the measurements was examined, 2) a main field trial in which the four equipments were compared in battle order, and 3) a laboratory trial comparing the equipments. The measurements were 1) physiological—pulse rate, rectal temperature, respiratory ventilation volume, and subjective ratings; 2) performance tests—rifle fire, Bren magazine filling and sand shovelling. Marches of three and six hours and periods of 28 hours continuous duty in the field and half hour walks at three miles per hour (treadmill) in the laboratory were carried out. T. I. R 7

15,111

Reckmann, E.T. & Taylor, P.F. BODY TEMPERATURE STUDIES PART III. RECTAL AND ORAL AS INDICES OF INTERNAL TEMPERATURES. SOME THEORETICAL AND PRACTICAL CONSIDERATIONS. Rep. 53, April 1954, 48pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,111

The interrelationship is considered of temperatures in men taken simultaneously in the mouth and at three points in the rectum under the following conditions: 1) rest, 2) physical change, 3) exercise, 4) heating and cooling, 5) eating and drinking. The results are of some fundamental interest but may also throw light on practical problems concerning the physiology of clothing and equipment. Data from various animals are included. T. I. R 60

15,112

Simmons, G.J., Anderson, D.M. & Draper, J. FUTURE BOMBING PROLONGED PERFORMANCE ON A SIMPLE COMPENSATORY TRACKING TASK. DUNDEE - MARCH 1954. Rep. 45, Jan. 1954, 14pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,112

To test the hypothesis that absence of variability of sensory input relates to fatigue of tracking performance, a preliminary experiment was conducted with 21 subjects. Each subject was tested for an uninterrupted period of two hours on a simple compensatory tracking task that required keeping the target correctly aligned by cranking a handwheel at a constant speed. It was considered that failure to attend the display would result in target deviation. The resulting errors were recorded and analyzed for consecutive half-hour periods. T. I. R 11

15,113

Stokes, A.S., Hughes, W.P. & Draper, J. PRELIMINARY TRIAL OF HEAVY LOAD CARRIAGE. CARRIER, MURRAY, G.S. & U.S. PARACHUTE, TUNNO. Rep. 46, July 1954, 24pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,113

This study compares the Carrier, New-Pack, G.S., Type "T" and U.S. Parachute, Piqued and investigates the ventilation volume and pulse rate when loads greater and less than one-third body weight are carried. Four men carried loads of 40 and 75 lb. on 50-minute marches in summer weather on the above carriers; physiological measures were taken at different intervals throughout. Subjective opinions were also obtained. The physiological data were subjected to variance analysis. T. I. R 11

15,114

Tolson, J. & Draper, J. BODY TEMPERATURE STUDIES PART I. SKIN TEMPERATURE SYMMETRY AND MEAN. Rep. 52, July 1956, 19pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

15,114

To obtain information on skin temperatures at symmetrically placed points on the body and to compare various methods of estimating mean skin temperature, three experiments were performed. 1) Temperature variation over small areas of skin were measured on one subject. Temperatures at points on the circumference and at the center of one-inch diameter circles on various parts of the body were determined. 2) Skin temperatures were measured at a large number of symmetrically placed points on the skin of one subject. 3) Experiment two was repeated on four subjects. Six different methods were used to calculate mean skin temperatures. T. G. I. R 19

15,115

Bodd, A.M., Brager, J., Florida, A.V., Anderson, B.M., et al. A COMPARATIVE PSYCHOLOGICAL TEST OF A PROGRESSIVE COMBAT EQUIPMENT FIGHTING ORDER. (C.E.F.C.) AND THE ENVIRONMENTAL EQUIPMENT 2.2 (M.P.). Rep. 64, Sept. 1957, 44pp. Clothing and Storage Experimental Establishment, Ministry of Supply, London, England.

15,115

The trial was carried out in two phases 1) a conditioning period during which the 16 subjects were habituated up and standardized as far as possible by repeated practice in taking all obstacles under 2) the test period in which equipment was compared during normal soldierly activities such as marching, running, jumping, etc., in performance of such tests as dexterity and finally, in a long exercise of 26 hours continuous duty. Measurements were taken of post exercise pulse rates, time measures where appropriate, subjective opinions, and observational notes with photographs. Comparisons were made on the basis of all these measures.

T. G. 2. R 5

15,116

Brown, G.M., Zayner, M.C., Bernstein, A.J. & Chamber, H.A. DEVELOPMENT AND EVALUATION OF AN IMPROVED FIELD RADIO REPAIR COURSE. NUMBER 18 58, Sept. 1959, 81pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,116

Information obtained in a field study was the basis for devising a course of instruction for Field Radio Repairmen, MOC 286-1. The new course emphasizes recognizing and correcting the most common troubles in the most frequently repaired items of equipment. A systematic trouble-shooting procedure was provided and "functional context training" features (theoretical material presented in a maintenance-oriented context) were incorporated. To evaluate the new course two groups of 100 students each were given the new course and the standard course respectively and were then administered a comprehensive battery of job-related proficiency tests. Performance scores were compared for relative proficiencies.

T. G.

15,118

Selmares, S. & Tappscott, R.J. THE EFFECTS OF VARIOUS COMBINATIONS OF DAMPING AND CONTROL POWER ON HELICOPTER HANDLING QUALITIES DURING BOTH INSTRUMENT AND VISUAL FLIGHT. NASA TN D 58, Oct. 1959, 38pp. National Aeronautics and Space Administration, Washington, D.C. (Langley Research Center, Langley Field, Va.).

15,118

To determine the effects of control power and damping variations on handling qualities, four experienced pilots made 35 visual flight maneuvers and Instrument Landing System approaches conducted under simulated blind-flying conditions in a 5,500 lb. reciprocal-engine helicopter. Control power (moment on helicopter produced for a given control displacement) ranged from one-half original to four times the original power. Damping (moment on helicopter proportional to and opposing angular velocity) ranged from very low to high. Results are evaluated on the basis of pilot opinion and appropriate statistical procedures (t tests) and discussed in terms of applicability to the other aircraft.

T. G. 2. R 8

15,119

Whitmore, W.C. (Proj. Officer). OPERATIONS RESEARCH AS A MEANS OF COMMUNICATION WITH MANAGEMENT. Ca. 1958, 15pp. USN Bureau of Ordnance, Washington, D.C.

15,119

This paper discusses the need for management oriented operations research as a means of communication between technical staffs and management. Five documented examples of inadequate communication between technical staff and management are presented. Also two examples of adequate communication are given. Recommendations for the nature of communication from technical staffs to management are discussed in the light of the percentage of communication taking place in industry.

R 3

15,120

Goodill, H.S. SURVEY OF PERSONAL AND ENVIRONMENTAL FACTORS IN DRIVING. FINAL REPORT. Contract DA 49 007 MD 302, Nov. 1959, 41pp. University of Colorado Medical Center, Fort Collins, Colo.

15,120

To determine if specific personality factors associated with accident/violation driving could be used to identify non-safe drivers before they began to drive, a predictive study of 6906 "pro-drivers" (median age 15 years) were administered a battery of personality tests (Guilford-Zimmerman Temperament Survey; Allport, Vernon, and Lindzey Study of Values; Driver Survey; and the CAT). Also, these specific tests on a group of 32 driver education subjects and 104 non-driver education control subjects were gathered and analyzed in terms of 26 measures of personality and value for each subject.

T. G. 2 7

15,121

Kemper, R.M. A BREATH-HOLDING TEST: A PRELIMINARY INVESTIGATION OF ITS PSYCHOMETRIC USEFULNESS. Proj. NM 18 09 1 2, Vol. IX, Oct. 1959, 340-348. USN Medical Field Research Lab., Camp Lejeune, N.C.

15,121

To explore the usefulness of a group objective test of breath-holding in contributing to the assessment of temperamental characteristics, a method was presented for administering such a test. The test was administered to a group of 51 Marine Corps officer helicopter pilots on two occasions. Test-retest reliability was computed. Test scores were then related to personality measures obtained from the Guilford-Zimmerman Temperament Survey, the Minnesota Multiphasic Inventory and the Objective-Analytic Personality Test Battery. Significant relationships are interpreted and recommendations for further study are made.

T. R 13

15,123

Aracs, E. & Stuart, W.A. ANALYSIS OF DESIGN U.S. ARMY PROTECTIVE HEADGEAR. Contract DA44 109 OM 1821, March 1956, 49pp. Ement Area, Industrial Design, New York, N.Y.

15,123

A device constructed of light-weight armor materials to protect the head against fragmentation type missiles was designed, developed, and evaluated. First, the basic requirements for such an equipment are set forth, e.g., bump, environmental, ballistic protection; and the three variables in headgear make-up-weight and material, size, suspension are presented. Eight types of helmet are pictured and described with their basic advantages and disadvantages.

I.

15,124

Sanders, J.W. SURVEY OF HUMAN DYNAMICS DATA AND A SAMPLE APPLICATION. Contract AF33(616) 5607, Proj. 7180, Task 71501, WADC TR 59 712, Nov. 1959, 12pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.).

15,124

This study concerns the application of the results of research on the human transfer function to compensatory tracking tasks in which the human operator is part of a closed loop tracking system. The form of a quasi-linear (linear for a particular task) human transfer function was laid out on the basis of previous experimental results. Calculations were made of mean square tracking error, and effects of variation of aircraft dynamics on tracking error were examined, assuming human reaction time and neuromuscular lag were constant.

I. R 11

15,125
Negan, J.J. TRACKING PERFORMANCE RELATED TO DISPLAY CONTROL CONFIGURATIONS. Proj. 20 F-108, NAVTRACDEVEN TR 322 1 2, Jan. 1959, 22pp. USN Training Device Center, Port Washington, N.Y.

15,125
To determine the relative merit in terms of operator performance, six display-control configurations using a continuous random input, position and rate control, and pursuit and compensatory tracking were tested. Ninety-six male college students served as subjects. Questions such as the following were investigated: Does the operator perform better with linear or rotary display configuration? Are differences in eye-hand coordination performance with various display-control situations magnified or diminished with practice? Implications of the results are discussed for the form in which information is presented to, and in which control is exercised by, operators in instructor's stations and other training equipment.
T. I. R 35

15,126
Molnar, A.P. & Lybrand, W.A. BASIC DEVELOPMENT ACCOMPLISHED ON WIDE-ANGLE, NON-PROGRAMMED, VISUAL PRESENTATIONS. VOLUME II. Contract N61339 404, NAVTRACDEVEN TR 404, April 1959, 195pp. USN Training Device Center, Port Washington, N.Y. (Carmody Corporation, Buffalo, N.Y.).

15,126
Part I of this report contains a discussion and evaluation of equipment and techniques used in visual presentations and a summary of functional design criteria which should be considered in the design of visual equipment for training purposes. There are also recommendations for research and development. Part II contains abstracts of documents pertaining to visual presentations and includes the areas of design approach, training purpose and characteristics, description of useful components, and a brief summary of reports reviewed. Part III consists of a 75-item general bibliography. Part IV presents the state-of-the-art questionnaire sent to manufacturers and organizations.
R 147

15,127
Molnar, A.P. & Lybrand, W.A. BASIC DEVELOPMENT ACCOMPLISHED ON WIDE-ANGLE, NON-PROGRAMMED, VISUAL PRESENTATIONS. VOLUME I. Contract N61339 404, NAVTRACDEVEN TR 404, April 1959, 142pp. USN Training Device Center, Port Washington, N.Y. (Carmody Corporation, Buffalo, N.Y.).

15,127
This report is a survey of research and basic development on wide-angle, non-programmed, visual presentation. It summarizes available information in a form intended to be useful to design engineers working in this area. The visual presentations discussed are used primarily as training and research tools for the purpose of simulating the "real visual world" to operators of vehicle systems.
T. I. R 31

15,128
Howell, W.C., Christy, R.T. & Kinkade, R.G. SYSTEM PERFORMANCE FOLLOWING RADAR FAILURE IN A SIMULATED AIR TRAFFIC CONTROL SITUATION. Contract AF 33(616) 3612, Proj. 7164, Task 71583, WADC TR 59 573, Sept. 1959, 15pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Laboratory of Aviation Psychology, Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

15,128
The situation in which the operator assumes control in the system after failure of a primary automatic component was studied using the Ohio State University Electronic Air Traffic Control Simulator. Primary variables were: prebreakdown activity of operator and degree of procedural flexibility in the task. Six trained undergraduates participated both as operators and pilots. A factorial design was employed. Performance was measured in two categories: system efficiency and safety. The results are handled in terms of manual takeover of an aircraft after loss of Planned Position Indicator information in an air traffic control system.
T. I. R 7

15,129
Murphy, G.L. & Newman, P.H. HUMAN FACTORS HANDBOOK FOR DESIGN OF TESTING AND MONITORING GROUND SUPPORT EQUIPMENT. VOLUME II. Contract AF 29(601) 513, Proj. 7800, AIR 257 59 FR 196, AFSC TR 59 12, April 1959, 77pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

15,129
This handbook is one of a series designed to guide military and industrial designers who translate ideas into drawings and equipment. This volume was prepared for designers of testing and monitoring equipment used to support airborne weapons. Types of equipment discussed include: handheld, portable, and console type testers, controls, displays, panel layout. General considerations in the design of test equipment are discussed also.
I. R (approx.) 33

15,130
Murray, E.J., Schein, E.H., Erikson, K.T., Hill, W.F., et al. THE EFFECTS OF SLEEP DEPRIVATION ON SOCIAL BEHAVIOR. J. soc. Psychol., 1959, 42, 229-236. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

15,130
To determine the effect of sleep deprivation on a variety of social activities and on the frequency of change from one activity to another, two experiments were performed in which behavior observations were made for 72 and 98 hours of sleep deprivation. In the first, 10 subjects were observed extensively (every 15 minutes); whereas the second was done to obtain a larger sample of subjects (50) using fewer observations (at beginning, then after 66 to 88 hours) after a longer loss. The percentage of various categories of behavior were statistically compared for the experimental and control groups as well as within the experimental as a function of hours of loss.
T. G. R 8

15,131
Murphy, G.L. & Newman, P.H. HUMAN FACTORS HANDBOOK FOR DESIGN OF TRANSPORTING, POSITIONING AND LIFTING GROUND SUPPORT EQUIPMENT. VOLUME I. Contract AF 29(601) 513, Proj. 7800, AIR 257 59 FR 195, AFSC TR 59 11, April 1959, 100pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

15,131
This handbook is one of a series designed to guide military and industrial designers who translate ideas into drawings and equipment. This volume was prepared for designers of transporting, positioning, and lighting equipment used to support airborne weapons. Types of equipment discussed in this handbook include vehicles and major vehicle components, and auxiliary and emergency equipment. General considerations in the design of positioning, lighting, and transporting equipment are discussed. Chapter IV considers problems of work spaces.
T. G. I. R 43

15,132
Plomp, R. & Bouman, M. RELATION BETWEEN HEARING THRESHOLD AND DURATION FOR TONE PULSES. J. acoust. Soc. Amer., June 1959, 31(6), 749-758. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

15,132
The relation between hearing threshold and duration for tone pulses was examined in light of a new hypothesis: "Switching on a tone pulse of intensity results in an effect somewhere in the hearing pathway, that approaches its end value asymptotically according to an exponential function, this end value being proportional to the perception occurs when s exceeds a critical value so." Masked thresholds at a fixed noise level were obtained on two observers at 250, 500, 1000, 2000, 4000, 8000 cps. for durations of ten seconds to one msec., by a descending series of intensities. A formula was derived to correct for short pulse durations because these data deviated from the hypothesis. The data from other relevant studies are also discussed in terms of the present hypothesis. T. G. I. R 13

15,133

Levine, R.A. & Rainey, R.B. THE BASE MAINTENANCE-OPERATIONS MODEL USED IN RAND LOGISTICS RESEARCH. Proj. RAND, RM 2374, May 1959, 43pp. RAND Corporation, Santa Monica, Calif.

15,133

This research memorandum presents a non-mathematical explanation of a model used in studying "the interaction of aircraft operations and base-level logistics, particularly direct maintenance". The purpose of the paper is to "help the reader gain a full understanding of past and future publications on RAND research in this area". The model measures the effects of Air Force maintenance and operations policies, simulating the random nature of real-world maintenance and operations events.

I. R 5

15,134

Holt, R.R. & Goldberger, L. PERSONOLOGICAL CORRELATES OF REACTIONS TO PERCEPTUAL ISOLATION. Contract AF 33 (616) 6173; Proj. 7222, Task 71743, NADC TR 59-735, Nov. 1959, 46pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Research Center for Mental Health, New York University, New York, N.Y.).

15,134

To determine the relationship between personality and reactions to sensory deprivation, 14 male students were subjected to eight hours of such deprivation, then retested on a battery of cognitive tests as well as several personality assessors. Fourteen measures of reaction were derived from the behavior and verbalizations in the deprivation situation. From personality data Q-sort ratings were obtained. The results are presented as rank-order correlation coefficients between the dependent variables from the isolation study and independent variables of personality.

T. R 36

15,135

Holding, D.H. AN APPROACH TO THE PROBLEM OF EQUIPMENT COMPLEXITY AND MAINTENANCE TIME USING ARMY SELECTION GROUP DATA. Tech. Memo. 18, ca. 1954, 6pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,135

The problem of equipment complexity and its relation to maintenance time was examined in terms of criteria of efficiency and potential manpower using army selection group data. The criteria of efficiency are operating time, operating complexity, and existing operator/maintainer ratio. The potential manpower problem involves army selection procedures, aptitude tests, and educational standards. No specific recommendations are made.

T. G. R 3

15,136

Holding, D.H. DISPLAY-CONTROL RELATIONSHIPS. Tech. Memo. 31, Jan. 1955, 11pp. Clothing & Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,136

Experimental work on display-control relationships is reviewed and summarized in terms of single and multiple display-control combinations. The aspects of display-control combinations considered include direction of motion, time relations, movement ratios, and arrangement of multiple display-control units. Suggestions are made concerning each of the above aspects taken separately, but recommendations are all of a general nature. The appendix includes Control-display illustrations.

I. R 43

15,137

Kossack, C.F. & Beckwith, R.E. THE MATHEMATICS OF PERSONNEL UTILIZATION MODELS. Contract AF 41(657)-160, Proj. 7719, Task 17112, NADC TR 59-359, Nov. 1959, 36pp. USAF Personnel Lab., Lockland AFB, Tex. (Purdue University, Lafayette, Ind.).

15,137

A personnel utilization model was developed for the study of policy problems in a complex personnel organizational structure. Included are definitions of concepts and terms, flow diagrams, and an illustration of the model applied to Airman training and assignment. A specialization of the model using the mathematics of Markovian processes is also presented. The advantages of developing and using such a technique are indicated.

I. R 15

15,138

Harris, J.D. AUDITORY FATIGUE FOLLOWING HIGH FREQUENCY PULSE TRAINS. Proj. NM 22 03.20.02.01, XVIII(1), Rep. 306, Jan. 1959, 9pp. USN Medical Research Lab., Naval Submarine Base, Conn.

15,138

Auditory fatigue following trains of high-tone pulses was measured in 156 young men varying: 1) sound pressure level (SPL)—90 to 120 db., 2) duration of exposure—1 to 25 minutes, 3) duty cycle—1.4 to 100 per cent. Stimulation was at 3500 cps. Index of fatigue was the total cumulated loss of threshold occurring in the first ten minutes of recovery. Equi-noxious contours were obtained with the MUX, a new unit derived from the fatigue index employed. From these data protection levels and damage risk criteria were specified.

T. G. R 13

15,139

Halsey, Rita M. IDENTIFICATION OF SIGNAL LIGHTS: I. BLUE, GREEN, WHITE, AND PURPLE. II. ELIMINATION OF THE PURPLE CATEGORY. Proj. NM 22 02 20.03.01, XVIII(5) Rep. 310, May 1959, 14pp. USN Medical Research Lab., Naval Submarine Base, Conn. (Reprinted from: J. opt. Soc. Amer., Jan. 1959, 49(1), 45-55).

15,139

Identification of colored light signals by 100 observers using one of six color names (red, yellow, green, blue, purple, white) was done for two intensity levels of each of 50 stimuli presented singly against a dark background. The test colors were blue, green, white, and purple. Ten observers in four rows were run at a time, thus there were four viewing distances (10 to 17.5 ft.) and four sizes of stimulus (4 ft. 10 ins. to 4 ft. 6 ins.) they recorded their observations on data sheets. The results were represented as chromaticity zones. A second experiment repeated the above one except "purple" was eliminated as a possible response. The data from these two studies are applicable to colored signal specifications.

T. G. I. R 14

15,141

Gravendeel, D.W. & Plomp, R. THE RELATION BETWEEN PERMANENT AND TEMPORARY NOISE DIPS. AMA Arch. Otolaryng., June 1959, 62, 714-719. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

15,141

Permanent and temporary noise dips were measured on 288 soldiers and 36 recruits respectively by continuous audiometry. The relation between these two forms of noise deafness was sought to determine whether the same mechanism is responsible for these losses. Spread of dips across the frequency spectrum and average shape of dips were determined from the audiometric data. Comparison of these characteristics in the two cases provided some evidence about the nature of the mechanism.

T. G. R 7

15,142
Leach, J. H. Integrated, Santa Monica, Calif. WACEL PANEL STUDY AND DEVELOPMENT SUMMARY REPORT 1957-1958. Contract AF 33(616) 2167, Proj. 6190, Task 61940, WADC TR 58 447 & Leach Engng. Rep. 1289 I, March 1959, 29pp. Wright Air Development Center, Wright-Patterson AFB, Ohio.

15,142
The primary objective of this study was "advancement of the state of the art of instrument panel and cockpit design." Cockpits were designed for specific classes of vehicles, and instrumentation and layouts of these cockpits are described. Individual items studied and selected for further study by the Air Force and Airframe manufacturers are enumerated. The philosophy of cockpit arrangement is discussed and a new philosophy, "Pilot-Manager System" was developed. Pilot reaction to design was obtained through the use of questionnaires. T. G. I. R 21 approx.

15,143
Darby, C. L. AN ANNOTATED BIBLIOGRAPHY ON THE AUTOMATION OF INSTRUCTION RESEARCH MEMORANDUM. Task TEXTRUCT, July 1959, 36pp. USA Air Defense Human Research Unit, Fort Bliss, Tex.

15,143
This bibliography contains 95 references to articles concerning 1) Individual Teaching Devices: Self-Scoring Tests; Subject Matter Trainer; Skinner Teaching Machines; and Crowder "Intrinsic" Programming, 2) Group Instructional Devices: Films and the Classroom Communicator, 3) Theoretical Issues and Relevant Experiments, and 4) Learning Theories: Some General References and Applications. R 95

15,144
Dennis, J. THE SERPENT TEST - A STUDY OF FATIGUE. Tech. Memo. 19, April 1954, 7pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,144
A dynamic equilibrium test, the Serpent Test, was used to measure the effect of a stressful environment. Ten groups of six subjects each went through periods of work and rest randomly ordered. Work was a step task with step rate 90 per minute, temperature 91 degrees, and duration 30 minutes. After work or rest each subject performed the Serpent Test, threading a brass ring around a coil with minimum contact between the two. Number of contacts and time to perform test were the main measures compared by analysis of variance. I. R 14

15,145
Corkindale, K. G. & Siddall, G. J. A SHORT EVALUATION OF NUPRONITE SAFETY NIGHT DRIVING GOGGLES. Tech. Memo. 35, June 1955, 9pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,145
To evaluate the general design of Nupronite safety night-driving goggles and to determine their anti-glare properties, five subjects, under glaring conditions, each made 20 judgments wearing glasses (and 20 judgments while not wearing glasses) of the position of a Landolt broken ring. Results were discussed in terms of acuity vs. anti-glare properties (determined by subjective opinion). Also, a questionnaire was administered to five subjects wearing goggles. The items concerned: reduction of traffic headlight glare, reduction in visual field, misting and windproofing, comfort and adjustment, durability, and reflection from silvered portions of the lenses. Results from both the acuity test and the questionnaire are utilized in presenting the satisfactory as well as unsatisfactory anti-glare and acuity properties. I. R 4

15,146
Enoch, J. M. & Fry, G. A. VISUAL SEARCH OF A COMPLEX DISPLAY: A SUMMARY REPORT. A SUBTASK WHICH IS PART OF THE PROGRAM ON HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION. Contract AF 33(612) 1580, Proj. 636, & Proj. 1763, Task 39883, NRCAL Tech. Paper (696) 17 28C, WADC TR 59 60, April 1958, 12pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

15,146
The findings from a series of experiments designed to delineate the natural modes of approach by the photo-interpreter during a visual search task were briefly reviewed. The major phases of the problem thus considered included: degree of specificity of instructions, display content, size and physical quality, time allowed for search, and training-experience of observer. Applications of these results and suggestions for future research are also considered. R 12

15,149
Consolazio, C. F., Johnson, R. E. & Pecora, L. J. REPORT OF PHYSIOLOGICAL MEASUREMENTS FOR USE IN THE STUDY OF METABOLIC FUNCTIONS. Proj. 6 60 13 017, Rep. 239, July 1959, 416. USA Medical Research and Nutrition Lab., Fitzsimons Army Hospital, Denver, Colo.

15,149
This brochure on physiological measurements revises and brings up to date the procedures used in the study of metabolic functions. These techniques include methods for testing: physical fitness, respiratory metabolism, respiratory gases, blood gases, pulmonary function, body composition, and heat balance through clothing. T. G. I. R 339 (approx.)

15,150
Birnbaum, A. ON THE ANALYSIS OF FACTORIAL EXPERIMENTS WITHOUT REPLICATION. Contract NONR 266(33), Pt. J. NR 042 034, CU 36 59 NONR 266(33) NS, Jan. 1959, 26pp. Columbia University, New York, N.Y.

15,150
The statistical theory and some representative applications of some new methods for analysis and interpretation of data from factorial experiments without replication are presented. A schematic statistical model which is the formal basis for these methods is detailed, and some critical values computed. These approaches are compared with the conventional inference procedures based on Student's t statistic. Optimal inference rules are described and related to an inference procedure based on a modulus-ratio statistic. The advantages of the latter are discussed. T. R 8

15,151
Barlow, R. E. & Hunter, L. C. MATHEMATICAL MODELS FOR SYSTEM RELIABILITY. Contract DA 36 039 SC 78281, Engng. Rep. EDL E35, Aug. 1959, 105pp. Sylvania Electric Products, Inc., Mountain View, Calif.

15,151
This paper presents "a workable method for determining the reliability of large, complex systems. Repair is an integral part of the model proposed and the usual assumption of component independence is not made." Reliability of the system is defined in terms of a stochastic process. There are specific applications of the generalized concept. Two types of preventive maintenance policy are presented. The problem of optimal checking procedures is solved for one class of failure distributions. T. G. R 9

15,152 Alexander, L.F., Ford, J.D., Jr., Jensen, B.T., Jordan, W., et al. PROBLEMS ENCOUNTERED IN DEVELOPING AND MAINTAINING A FIELD SYSTEM TRAINING PROGRAM. SP 107, Sept. 1959, 21pp. System Development Corporation, Santa Monica, Calif.

This volume contains 5 papers presented at the 1959 Annual Meeting of the Human Factors Society at UCLA, Los Angeles, Calif. The first paper deals with the requirements for a field system training program. Among the topics covered are: stimulus inputs, motivation and morale, knowledge of results, utilization of knowledge of results, personnel selection and turnover. The second paper deals with the appropriate contribution of simulation techniques to system training. Among the topics discussed are the reasons for simulation and several general principles regarding simulation. The third paper deals with new machine training techniques, including feedback, and debriefing. Among the topics discussed are reasons for debriefing, information in this area, operational definitions, and pay-off connected with debriefing. The fourth paper deals with problems of conducting system training in a military culture. Major problems cited are those due to: a) introducing new procedures into a culture utilizing military personnel as training personnel, and c) aspects of the military culture antagonistic to new training procedures.

15,153 Hendler, E. THE EFFECTIVE STIMULUS FOR WARMTH SENSATION IN MAN. Proj. NM 17 01 13-2, Rep. NAMC ACCL 460, Aug. 1959, 10pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

15,153 To determine threshold warmth sensation, a central, circular area of forehead skin, blackened or unblackened, of an experienced subject was exposed to radiation from an infrared source. A stimulus was presented; the subject indicated whether or not he had experienced a warmth sensation. Skin temperature was recorded after each exposure, and an interval between exposures allowed this to return to a relatively steady level. Exposure duration and source intensity were varied.
I. G. R 14

15,154 Henderson, W.H. & Winter, R.D. INSTALLATION AND HARNESSING PROCEDURES FOR THE CONTROL SELECTOR MECHANISMS. Tech. Note 9 & Rep. 59 50, Dec. 1959, 9pp. University of California, Los Angeles, Calif.

15,154 This report describes prosthetic control mechanisms which provide bilateral shoulder amputees "cross control". The installation of the selector mechanisms and alternator operation are described in addition to the dual control system and its alignment.
I. R 2

15,155 Stidall, G.J. NOTES ON THE DESIGN AND LAYOUT OF CONTROL HANDHEELS FOR RADAR TRACKING. Tech. Memo. 20, March 1954, 5pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,155 The design and layout of control handheels for radar tracking are considered and evaluated in terms of position of the handheel relative to the operator, speed of cranking, dimensions, inertia, friction, optimum gear ratios, and directions of movement relative to the display. Recommendations are derived from pertinent studies relating to the above. The appendix contains curves of error in handheel tracking as a function of winding speed, optimum cranking rates as a function of load weight and handheel radii, and travel time and adjustment time for discrete settings of a pointer as a function of gear ratio.
G. R 14

15,156 Strong, R.L. CATEGORY III TEST OF AN INTEGRATED VISUAL APPROACH AND LANDING AIDS (IVALA) SYSTEM. FINAL REPORT. June 1959, 24pp. USAF Strategic Air Command, Westover AFB, Mass.

15,156 The Integrated Visual Approach and Landing Aids System was evaluated with particular emphasis on its all-weather aircraft recovery capability. One hundred and twenty-eight landings were completed in visibility conditions of from zero to one-half mile, by line crews flying various types of current operational aircraft. Configuration "A" approach lighting system, Narrow Gauge lighting system, centerline run-out lighting system, and transverse roll guidance bars were evaluated as to their role in the satisfactory guidance for approach and landing in minimal visibility conditions. Detailed data on the design and maintenance of these systems are also presented, and recommendations are set forth.
I. G. I.

15,157 Von Diringshofen, H. OBSERVATIONS ON THE PHYSIOLOGY OF THE SENSES DURING THE TRANSITION FROM ACCELERATIONS TO WEIGHTLESSNESS. From: "Rocket Technology and Space Research, April-June 1959, 3(2), 1-8". Trans. 61, Nov. 1959. USA Feltman Research & Engineering Labs., Picatinny Arsenal, N.J.

15,157 This report describes subjective observations during short periods of weightlessness realized through free fall, parabolic flights, and the sling test (laboratory conditions). The period of weightlessness lasted anywhere from 7 to 14 seconds under these conditions. The discussion is aimed particularly at indications of human tolerance of weightlessness as influenced by the transition stage from acceleration to weightlessness. These observations are made with reference to test flights of the rocket plane X-15.

15,159 Campbell, F.W. & Westheimer, G. FACTORS INFLUENCING ACCOMMODATION RESPONSES OF THE HUMAN EYE. Contract WNR 495(09), RF Proj. 654, Tech. Rep. 5, Sept. 1959, 4pp. Ohio State University Research Foundation, Columbus, Ohio. (Reprinted from: J. opt. Soc. Amer., June 1959, 49(6), 568-571).

15,159 To establish the role of chromatic aberration, spherical aberration, and astigmatism in supplying information to the brain on the direction of error in out-of-focus blurring, four subjects adjusted an out-of-focus high-contrast test object until it was in focus. These adjustments were made in a normal optical situation, i.e., with all clues operating in a monochromatic situation, i.e., without chromatic aberration; in a monochromatic plus pupil annulus situation, i.e., without chromatic and spherical aberration; and in a situation with all three clues missing. All subjects were homotropized; and an artificial pupil was used. Dioptric displacement of the target was recorded.
I. R 3

15,160
Whittenberger, R.K. IMPROVED SEAT AND BACK CUSHIONS. Contract AF 33(600)27477, Proj. 7215, Task 71724, WDC TR 59 376, Rev. 1959, 26pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Goodyear Tire and Rubber Company, Akron, Ohio).

15,160
This report reviews the development of an improved pilot seat and back cushion assembly which would offer optimum comfort and minimum fatigue. Some of the variables studied were: gauge, compression, pressure distribution, and contouring. Several seating materials and seat designs were also tested. Results are presented in terms of adherence to design criteria. Appendices include the data sheets for the cushions, description of the process for producing polyurethane foams, summaries of general properties of foams, etc.
T. G. I. R 7

15,161
Moerden, J. van. UNITERMS: SPACE FLIGHT MEDICINE. UDC: 613.693:629.19, TDC 16903, Feb. 1959, 45pp. Netherlands Armed Services Technical Documentation and Information Centre, Den Haag, The Netherlands.

15,161
This bibliography on space medicine contains summaries of reports and articles compiled from the abstract card indices of the Netherlands Armed Services Technical Documentation and Information Centre. Some of the reports are available on loan from the Centre. The index indicates wide coverage of factors related to space travel; from biological and physiological to psychological variables; design of vehicles and suits; radiological problems of space flight, etc. One hundred eight abstracts are included. A majority are in English, but some are in German or Dutch.

15,162
Payne, R.B. TRACKING PROFICIENCY AS A FUNCTION OF THERMAL BALANCE. Tech. Rep. 58 14, May 1959, 10pp. USAF Arctic Aeromedical Lab., Ladd AFB, Alaska.

15,162
This experiment investigated the relation between body heat loss and performance decrement in monitoring and controlling a complex visual display, and the effect of glycine administration on such decrement. The USAF SAM Multidimensional Pursuit Test was given to 72 airmen. Considerable training in this task preceded testing. Subjects were assigned to one of nine conditions: three temperatures (70, 55, and 40 degrees F.) and three glycine treatments (0, 20, and 40 grams). A test session consisted of 160 one-minute trials, separated by 15-second rest intervals. The performance scores were treated by analysis of variance technique.
T. G. I. R 12

15,163
Robinson, E.J. HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION FINAL REPORT. Contract AF30(602) 1579, Aug. 1958, 81pp. Physical Research Labs., Boston University, Boston, Mass.

15,163
The effect of presentation speed, target complexity and work load on the precision with which a human observer is able to detect and recognize the number of rectilinear figures appearing in an array which contains non-critical curvilinear figures was investigated. Six subjects had intensive training on the stimulus arrays. Nine experimental conditions were used: three exposures (5, 10, 15 sec.), three numerosity loads (8, 16, 28 figures), three work loads. The data were subjected to analysis of variance. A second experiment which contained some refinements, but otherwise was the same, was run; and the data were analyzed and compared to the earlier findings.
T. G. I. R 4

15,164
Galbraith, H.J. & Snyder, L.D. PERSONNEL NAVIGATION SYSTEM STUDY. FINAL REPORT. APPENDIX 13 - HUMAN FACTORS AND PACKAGING CONSIDERATIONS. Contract DA 36 039 SC 73037, Rep. RLF 3838 1, April 1959, 481pp. Systems Research Lab., Motorola, Riverside, Calif.

15,164
This is a preliminary analysis of the operational aspects of the personnel navigator, an equipment to be carried by a foot soldier for self or destination location. The specific operational requirements discussed is its flexibility—all weather and all terrain capability. The major man-machine interaction characteristic discussed is its ease of handling. Rough measurements of linear and angular accelerations that may be expected of a man carrying the navigator were obtained and analyzed briefly.
T. G. I.

15,165
Shearer, J.W., Peterson, D.A. & Slebodnick, E.B. TECHNIQUES FOR HUMAN FACTORS EVALUATION OF PROTOTYPE SPECIAL WEAPONS AND ASSOCIATED EQUIPMENT. SUPPLEMENT II. Contract AF 29(601) 513, Proj. 7800, AIR 259 59 FR 198 Sup. II, AFSWC TR 59 14, July 1959, 200pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

15,165
This is an instruction booklet supplementing an earlier report. The Instructions Evaluation Guide and Equipment Evaluation Guide (contained in an earlier report) together contain some 800 items. This supplement contains the 500 items for the Equipment Evaluation Guide. The authors give detailed instruction for using these cards in file card form in the present booklet. Supplements contain the cards for both guides.
I.

15,166
Shearer, J.W., Peterson, D.A. & Slebodnick, E.B. TECHNIQUES FOR HUMAN FACTORS EVALUATION OF PROTOTYPE SPECIAL WEAPONS AND ASSOCIATED EQUIPMENT. SUPPLEMENT I. Contract AF29(601) 513, Proj. 7800, AIR 259 59 FR 198 Sup. I, AFSWC TR 59 14, July 1959, 80pp. USAF Special Weapons Center, Kirtland AFB, N.M. (American Institute for Research, Pittsburgh, Penn.).

15,166
This supplement to an earlier report of the same title contains the cards (300 items) for the Instructions Evaluations Guide. Instructions for use of those cards in file card form are included.

15,167
Siddall, G.J. & Corkindale, K.G. AN EVALUATION OF LAMAC GLARE GOGGLES. Tech. Memo. 34, June 1955, 12pp. Clothing and Equipment Physiological Research Establishment, Ministry of Supply, London, England.

15,167
This is an evaluation of the Lamac Glare Goggles for general use. Three general techniques were employed: examination for durability, adjustment ease, etc.; testing of glare effects on acuity; and questionnaire for user opinions. For the second method, five subjects indicated the position of Landolt rings with a central and 45-degree glare source both with and without the goggles. Decision time and error measurements were obtained and analyzed by analysis of variance technique. These findings plus the durability factors and user opinions are discussed in terms of the range of usefulness of the goggles.
T. I. R 2

15,168

Sweeney, E.J., Kinney, Jo Ann S. & Ryan, Alma P. STANDARDIZATION OF A SCOTOPIC SENSITIVITY TEST. Proj. NM 23 01 20.04.03, Vol. XVIII, No. 3, Rep. 308, March 1959, 8pp. USN Medical Research Lab., Naval Submarine Base, Conn.

15,169

A scotopic sensitivity test was examined to determine 1) whether it could measure individual differences in night sensitivity in a sample of enlisted men, and 2) the most efficient means of administering and scoring it. Some reliability and validity checks were made. The test consisted of points of light located 5, 10, and 20 degrees from central fixation on each of the four axes of a quadrant. The intensity was constant at 4.986 log μ cd, the size was varied in six equal steps: .10 to .25 degrees. The sample was 108 enlisted men. Number of correct responses for each stimulus size for each radial position were obtained and analyzed. Results were also obtained and compared for two testing procedures, monocular vs. binocular viewing, retest, etc. T. G. R 5

15,169

Schwartz, I. & Dimick, F.L. COMPARISON OF HIGH ACUITY SCORES ON SNIFFEN AND ORTHO-RATER TESTS. Proj. NM 23 01 20.04.01, Vol. XVII, No. 11, Rep. 304, Oct. 1958, 5pp. USN Medical Research Lab., Naval Submarine Base, Conn. (Reprinted from: Amer. J. Optom. & Arch. Amer. Acad. Optom., June 1958, 35(5), 309-313).

15,169

High acuity scores on Snellen and Ortho-Rater tests were compared in order to determine their size relationship and to set up a transformation equation of score from one test to the other. A total of 1,071 scores in each of the tests was obtained. The correlation ratio and coefficient of correlation were obtained. Prediction from one score to the other is discussed, and conversion scores are presented. T. G. I. R 2

15,170

Rao, U.V.R., Savage, I.R. & Sobel, M. CONTRIBUTIONS TO THE THEORY OF RANK ORDER STATISTICS: THE TWO-SAMPLE CENSORED CASE. Contract NONR 2582(00), Task NR 042 200, Tech. Rep. 8, Sept. 1959, 19pp. University of Minnesota, Minneapolis, Minn.

15,171

In this article rank order theory is developed for the two-sample problem in which not all of the random variables are observed, i.e., the observations have been censored. The approach is similar to the regular two-sample case except in the consideration of likelihood ratios of rank orders. Several censoring rules and terminal procedures are presented and discussed. R 4

15,172

Van Den Brink, G. & Bouman, M.A. VISUAL ACUITY DEPENDENT ON SPHERICAL CORRECTION. Ophthalmologica, Sept. 1959, 138(3), 222-224. (Institute for Perception RVO-TNO, Soesterberg, The Netherlands).

15,172

The results of some experiments on state of accommodation and its relation to dioptric power are briefly discussed. Measurements of visual acuity were made for several values of spherical power at a number of luminances. The relationships among these factors are briefly indicated. G. I.

15,173

Vos, J.J. ABOUT THE DANGER OF OCULAR LESIONS BY INFRARED SEARCHLIGHTS. Rep. 12F 1959 8, ca. 1959, 8pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

15,173

This report discusses the possible danger of ocular injuries from infrared radiation. Using data from other sources, the effective thermal dose upon the iris diaphragm is calculated and compared tabularly with other data. Results from a previous study by the author are used to calculate the temperature rise in the retina. These two indices are evaluated in terms of potential ocular lesions. T. G. R 4

15,174

Vos, J.J. A THEORY OF RETINAL BURNS. Rep. 12F 1959 6, ca. 1959, 26pp. Institute for Perception RVO-TNO, Soesterberg, The Netherlands.

15,174

A quantitative formulation of the generation, conduction, and convection of heat is applied to the occurrence of functional damage of the retina by heat. Experiments by W.T. Ham, et al., on retinal flashburns in rabbit eyes were then analyzed. In general, a satisfactory explanation did not use the critical temperature level concept, which proved too simple, but was in terms of "equal steam production". G. I. R 8

15,175

USN Aviation Safety Center. AIRCRAFT MAINTENANCE ERROR STUDY. 1958, 39pp. USN Aviation Safety Center, Norfolk, Va.

15,175

This report for the calendar year 1957 covers all aircraft accidents in which primary and/or secondary cause was maintenance, service, or supervisory error. The accidents or incidents were broken down by aircraft system involved. The authors state that basic causes for maintenance errors among all model aircraft were fundamentally the same, and point out that pilots and maintenance personnel should read the narrative for all models. Most of the errors fall within the categories of 1) improper and incomplete security of equipment, 2) improper adjustments, and 3) leaving loose objects adrift. I.

15,176

Wheaton, J.L. FACT AND FANCY IN SENSORY DEPRIVATION STUDIES. Rev. 5 59, Aug. 1959, 60pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

15,176

This study was undertaken to provide a comprehensive review of the literature, and to separate "fact from fancy" in reports of work in the area of sensory deprivation. Research leading to current studies on sensory deprivation are discussed. Summaries of published reports cover autobiographic, anecdotal, clinical, and experimental literature. Present knowledge of isolation effects on human behavior is summarized. There is a discussion of probable implications for space travel and military use. R 211

15,183

Chapman, A. RESEARCH TECHNIQUES IN HUMAN ENGINEERING. 1959, 316pp. The Johns Hopkins Press, Baltimore, Md.

15,183

This text describes some methods for collecting data on men and machines and their interrelationships, and discusses some principles and guide lines for ways of doing dependable studies on people. Specifically covered are methods of direct observation, methods for study of accidents and near-accidents, statistical methods, the experimental method, psychophysical methods, and articulation testing methods.
T. G. I. R 118

15,184

Marum, E.R. VISUAL RECOGNITION ALONG VARIOUS MERIDIANS OF THE VISUAL FIELD II NINE-ELEMENT TYPED WRITTEN TARGETS. Proj. MICHIGAN, Rep. 2144 293 T, Dec. 1953, 23pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

15,184

To study visual recognition of targets (composed of binary elements) presented along various meridians, 20 observers (ten experienced, ten inexperienced) recorded on a matrix target patterns which were presented on the N-E, NW-SE, W-E, or NE-SW meridian of the visual field. Target exposure was approximately 0.1 seconds; luminance of field approximately 6.8 foot-lamberts. Observers were sometimes informed in advance which meridian would be used. The different experimental and subject conditions were tested by the Friedman two-way analysis of variance.
T. G. I. R 43

15,186

Luizov, A.V. PERCEPTION OF BRIEF VARIATIONS IN BRIGHTNESS. NSF TR 199, Feb. 1954, 3pp. National Science Foundation, Washington, D.C.

15,186

This paper was aimed at establishing the relation between contrast in time and duration of brightness change at the threshold of discrimination. Four observers viewed a dark field on which a 14-foot light spot was presented and judged whether or not they had seen the flicker when a pendulum and shutter passed before it. The data were discussed in terms of the dependence of perceived brightness on the time-varying luminance.
T. I. R 8

15,187

Libber, L.M., SantaMaria, L.J. & Tiller, P.R., Jr. ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS. PART 4. PHYSIOLOGICAL CHANGES PRODUCED IN HUMANS BY PROLONGED CONFINEMENT IN AN OXYGEN-RICH ENVIRONMENT. Proj. TED NAM AE 1403, Rep. NAMC ACEL 386, Oct. 1958, 9pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

15,187

To determine whether the combined effects of decrease in food palatability and a simulated altitude of 10,000 feet would have pronounced effect on food and water intake, six subjects spent a seven-day test period in a simulated space vehicle. Results are discussed in terms of weight loss; urine was tested for specific gravity, output, and presence of a stress substance. Recommendations are made for further research.
T. G. R 10

15,188

Leisinger, J. (Dir.). SCIENTIFIC REPORTS ON INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES IN CZECHOSLOVAKIA. Vol. 3, 1958, 162pp. Institute of Industrial Hygiene and Occupational Diseases in Prague, Prague, Czechoslovakia.

15,188

This volume abstracts all of the papers published on industrial medicine by the Institute of Industrial Hygiene and Occupational Diseases in Prague and by other "Institutes and Scientific Arrangements in Czechoslovakia" for the year 1958. Some specific topics are: dust, shocks, radiation, high and low temperatures; also reported are studies in toxicology, and studies on occupational diseases of skin, blood, nervous system, etc.
R 309

15,189

Dale, H.C.A. A PRIORI PROBABILITIES IN GAMBLING. Nature, March 1959, 183, 842-843. (Applied Psychology Research Unit, MRC, Cambridge, England).

15,189

To examine the question of a priori probabilities directly, subjects were questioned before they began to play at a laboratory gambling task. One hundred thirty-one subjects used in the first experiment had a choice of three bets, of long, short, and medium odds. In the second experiment 142 subjects were given only one pay-off matrix, in which it paid to avoid the bet with long odds. Results are discussed as they relate to previous findings that individuals tend to over-estimate the frequency of occurrence of infrequent events and under-estimate that of comparatively frequent ones.
T. R 5

15,190

Broadbent, D.E. INFORMATION THEORY AND OLDER APPROACHES IN PSYCHOLOGY. Reprint from: 'Proceedings of the Fifteenth International Congress of Psychology', 1959, 111-115. North Holland Publishing Co., Amsterdam, Holland. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 344/58).

15,190

The author holds that information theory, far from having exhausted its usefulness to psychology, does provide an "objective language for discussing events within the nervous system," and... "puts a new emphasis on the process of discriminating the actual sensory event from other possible ones, which older approaches have neglected." Experiments which have raised doubts as to usefulness of the theory are discussed.
R 10

15,191

Dale, H.C.A. & Brown, I.D. AN APPARATUS FOR INVESTIGATING CERTAIN ASPECTS OF FAULT-FINDING. APU 318/58, Aug. 1958, 9pp. Applied Psychology Research Unit, MRC, Cambridge, England.

15,191

An apparatus is described which can be used to study the strategies which subjects use when searching in different kinds of systems. The apparatus is designed specifically to provide a means for investigating one aspect of the task of searching for a fault in electronic equipment, and is described in some detail. Ideal methods of diagnosis are described, then related to behavior of the maintenance engineer.
I. R 4

15,193

Dennis, J.P. & Siddall, G.J. THE STRAUSSLER EXPERIMENTAL VEHICLE: AN EVALUATION OF THE DISPLAYS, CONTROLS AND SEATING FOR EFFICIENCY AND COMFORT IN OPERATION. Tech. Memo. 38, Jan. 1956, 4pp. Clothing & Storage Experimental Establishment, Ministry of Supply, London, England.

15,193

This article describes and evaluates the Straussler experimental vehicle which was designed to be extremely maneuverable over rough and marshy country. The seating and controls and displays are detailed and improvements suggested.

G. I.

15,195

Cron, B.F. & Martin, R.L. STATISTICAL DECISION OBSERVER TESTS. NE 051600 22A, 1 501 02 00, USL Research Rep. 400, Oct. 1958, 17pp. USN Underwater Sound Lab., Fort Trumbull, Conn.

15,195

This report evaluates the efficiency of the human sonar observer in detecting the presence of signal in a noise background by comparing his decisions with those of the ideal statistical observer for a given set of conditions. The reasoning and sensory factors were separately tested in several situations. The main parameters include processing time, utility and a priori probability of noise alone. The continued application of statistical decision theory to multistage decision tests and games of conflict is recommended.

G. I.

15,196

Bowen, H.M., Andreassi, J., Truax, S., & Orlovsky, J. OPTIMUM SYMBOLS FOR RADAR DISPLAYS. Contract NONR 2682(00), Sept. 1959, 33pp. Dunlap and Associates, Inc. Stamford, Conn.

15,196

The experiments described in this report were conducted to discover 1) sets of geometric symbols which could be recognized with high accuracy under a variety of display conditions and discriminated from each other, and 2) the size and stroke width to height ratio desirable for symbols to be used on complex displays. Absolute discriminability was established for a set of 20 geometric shapes, and makes possible the selection of a set of geometric shapes which will seldom be confused. The study was specifically oriented towards radar displays. Recommendations were made regarding appropriate dimensions of such symbols.

T. G. I. R 42

15,197

Bartlett, Susan C., Beinert, R.L. & Graham, J.R. STUDY OF VISUAL FATIGUE AND EFFICIENCY IN RADAR OBSERVATION FINAL REPORT. Contract AF 30(602) 667, RADG TR-55 100, 1955, 70pp. Dept. of Physics, Hobart College, Geneva, N.Y.

15,197

Three experiments are reported in which the effects of luminance of sweeping sector background, speed of rotation of the sweep, and intermittence of appearance of pips on radar observer efficiency and visual fatigue were studied. Luminances were .003, .03, and .3 ml; speeds were 4, 6, 10, and 15 rpm; intermittencies varied. Three naive subjects monitored a radarscope for one or two-hour watches and reported each time a target appeared. Phorias were measured before and after each session. Target detection data were subjected to analysis of variance. Individual variability is discussed.

T. G. I. R 19

15,200

Bowen, H.M. THE RADAR SIGNAL AND THE HUMAN OBSERVER. June 1954, 12pp. Applied Psychology Research Unit, NEC, Cambridge, England.

15,200

This paper attempts to define the optimum match between the variable features of the radar display and the visual and mental abilities of the human observer. Brief reviews of relevant findings on signal detection as a function of noise, background brightness, on signal location and tracking as a function of scale, display size, on the effect of ambient illumination, and on the effect of operator alertness are presented.

15,201

Crutchfield, R.S., Woodworth, D.G. & Albrecht, Ruth E. PERCEPTUAL PERFORMANCE AND THE EFFECTIVE PERSON. Contract AF 18(600) 8, Proj. 7730, Task 77353, WADC TN 58 60, April 1958, 85pp. USAF Personnel Lab., Lackland AFB, Tex. (University of California, Berkeley, Calif.).

15,201

To explore the potential contribution of a number of perceptual tests in assessing and understanding the personality of the effective person, ten perceptual-cognitive tests were administered to 100 Air Force captains. Some of the tests were: size-weight illusion, perception of vertical, Gottscheldt figures. The subject was scored on each test according to the measure(s) derived from it. These measures were correlated with all 600 other scores obtained for such areas as intellect, interests, emotional adjustment, etc. They were also compared with certain Air Force criterion measures of military effectiveness.

T. I. R 11

15,202

Clark, W.C. & Blackwell, H.R. RELATIONS BETWEEN VISIBILITY THRESHOLDS FOR SINGLE AND DOUBLE PULSES. Proj. MICHIGAN, Rep. 2144 343 T, April 1959, 31pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

15,202

The relation between detectability and certain aspects of the temporal characteristics of targets was systematically investigated. Targets were single continuous pulses which varied in duration and double pulses which varied in temporal separation; background luminance was varied for both. Detection thresholds were obtained by the method of constant stimuli on seven observers. The threshold data were used to evaluate the temporal contribution mathematical model in terms of its predictive value and some of its assumptions.

T. G. I. R 65

15,203

Abramson, M.M. APPLICATION OF "COMPARISON OF EXPERIMENTS" TO RADAR DETECTION AND CODING PROBLEMS. Contract NONR 225(24), NR 373360, Tech. Rep. 41, July 1958, 83pp. Stanford University, Stanford, Calif.

15,203

This paper develops some practical methods for comparing experiments with an infinite as well as a finite number of outcomes. This technique, "comparison of experiments", deals with the data upon which the decision is based, not the making of decisions. The methods developed were then applied to radar detection and elementary binary coding examples.

G. I. R 11

15,204

Andrews, I.G. & Ross, S. INDICATORS OF BEHAVIOR DECREMENT SUMMARY REPORT ON SECOND YEAR OF OPERATION. Proj. DA 49 007 MD 222 (O.I. 19 52), Tech. Rep. 23, No Date, 12pp. University of Maryland, College Park, Md.

15,204

This report summarizes a year of research devoted mainly to the study of higher levels of behavior organization under stress. Some of the variables investigated were: protracted performance of visuo-motor discriminations under monotony, differential ego-involvement in various tasks, differential individual anxiety, administrative pressure. The types of behavior studied include vigilance, reasoning and problem solving, and visual tracking.

15,206

Eddowes, E.D. DETECTION OF STATISTICALLY DEFINED PATTERNS IN A MATRIX OF DOTS. Human Factors Data Bull. 44, Nov. 1959, 3pp. Westinghouse Electric Corporation, Baltimore, Md.

15,206

A series of experiments are reported which investigated problems in the detection of patterns on noisy displays. The displays were based on a square matrix of dot positions which provided vertical or horizontal bar patterns with varying numbers of dots (noise) in alternate bars. Conditions investigated were 1) amount and kind of noise (dot number and separation), 2) number of bars, 3) exposure time, and 4) multiple exposure. Subjects were required to determine if any given test display contained vertical or horizontal patterns. The results were discussed in terms of statistical properties of the stimuli.

G. I. R 1

15,208

Fightmaster, W.J. PLANNING FOR MAINTAINABILITY. Human Factors Data Bull. 43, Oct. 1959, 2pp. Westinghouse Electric Corporation, Baltimore, Md.

15,208

In this report, information that can be used in planning the design of equipment to minimize maintenance problems (maintenance of operational equipment with minimum "down" time) is considered. The following general areas particular to the human factor in equipment maintenance are reviewed: physical activities, physical dimensions, weight-lifting capacity, and characteristics and types of errors unique to the maintenance man.

T. R 1

15,209

Enoch, J.M. EFFECT OF THE SIZE OF A COMPLEX DISPLAY UPON VISUAL SEARCH. J. opt. Soc. Amer., March 1959, 49(3), 280-286.

15,209

To determine the effect of the size of a complex display upon natural visual search tendencies, 12 subjects were presented an ordered series of seven experimental aerial maps of different visible area. Eye traces were recorded on a modified ophthalmograph while they searched for a specific critical detail. Eye traces were analyzed in terms of: 1) average duration of fixation and average interfixation distance, 2) percent of eye fixations falling outside of the display area, and 3) analysis by zones. Distributions of the percentage of eye fixations were submitted to quadrant analysis. Discussion is in terms of optimum display sizes and typical zones of fixation.

T. G. I. R 12

15,210

Fraser, D.C. THE STUDY OF FATIGUE. Aug. 1954, 5pp. RAF Institute of Aviation Medicine, Farnborough, Hants, England.

15,210

In order to arrive at an objective definition of fatigue, pertinent research is reviewed and evaluated in terms of established principles and tests for fatigue. The results are discussed which were obtained by studying fatigue as change in control sensitivity occurring during a prolonged visual task. Changes in fatigue are inferred from changes in subject's variance around his own mean. Neither the data or its analysis are presented in this report. An objective, operational definition of fatigue is presented.

15,211

Blackwell, H.R. & Smith, S.W. THE EFFECTS OF TARGET SIZE AND SHAPE ON VISUAL DETECTION II CONTINUOUS FOVEAL TARGETS AT ZERO BACKGROUND LUMINANCE. Proj. MICHIGAN, Rep. 2144 344 T, Jan. 1959, 23pp. Vision Research Labs., University of Michigan, Ann Arbor, Mich.

15,211

This paper reports results of studies in which the luminance difference for threshold detectability was measured for 45 targets of various shapes and sizes against zero background luminance. Using foveal presentation, measurements were made on eleven observers using the method of constant stimulus with the temporal forced-choice procedure. The data were subjected to both empirical and theoretical analysis.

T. G. I: R 8

15,212

Tanner, W.P., Jr. PSYCHOPHYSICAL APPLICATION OF THE THEORY OF SIGNAL DETECTABILITY. Contract DA 039 SC 15358, Proj. M970, DA Proj. 3 99'04 042 & SC Proj. 29 194 B O, Task EDG 6, EDG Tech. Rep. 18 & Rep. 1970 5 S, Feb. 1954, 12pp. Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

15,212

The detection of light signals in a uniform light background was used to demonstrate experimentally the internal consistency of a new theory which defines the form of data expected from such "yes-no" and "forced-choice" psychophysical experiments. This theory assumes: 1) false alarm rate and correct detection vary together, 2) neural activity is a monotone increasing function of light intensity, 3) all stages prior to cortex function only in transmission of information. Hypothetical detection curves are presented and the data are analyzed in terms of these.

G. I. R 2

15,214

Smith, S.W., Blackwell, H.R. & Cuthshaw, C.M. THE EFFECTS OF TARGET SIZE AND SHAPE ON VISUAL DETECTION III EFFECTS OF BACKGROUND LUMINANCE, DURATION, WAVELENGTH, AND RETINAL LOCATION. Proj. MICHIGAN, Rep. 2144 346 T, Dec. 1958, 17pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

15,214

To determine the extent to which noncircular targets are less detectable than circular ones of equal area, circles, rectangles, and a cross were presented in the rod-free fovea to eight observers using the temporal forced-choice psychophysical method. Five target luminances, three target durations, and four background luminances were tested. Also an eight degree peripheral location and red and green targets were examined for some conditions. The results are considered in terms of a theoretical analysis based upon the element contribution hypothesis.

T. G. R 11

15,215

Vanderplas, J.M. RADAR OPERATOR VISUAL FATIGUE. A SUMMARY OF AVAILABLE EVIDENCE AND SOME PRELIMINARY SUGGESTIONS FOR THE REDUCTION OF VISUAL FATIGUE. RDO 694 45, WORD IN 52 44, Aug. 1952, 9pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

15,215

This report constitutes a survey of the pertinent literature on the problem of visual fatigue, with emphasis given to the application of the literature to problems of visual fatigue encountered by radar operators on long missions. A summary is presented of the evidence on objective measures of visual fatigue and factors (either general or specific) in illumination, contrast, size of objects, viewing distance, motivation, attention and distraction, rest periods, sweep line, brightness and eye movements, which may contribute to visual fatigue of radar operators. Preliminary suggestions are made for possible reduction of visual fatigue.

R 27

15,216

Whitmore, P.G. SOME PROBLEMS IN THE ANALYSIS OF TROUBLE SHOOTING BEHAVIOR. Research Rep. 2, Oct. 1959, 26pp. Human Resources Research Office, George Washington University, Washington, D.C.

15,216

To determine for the NIKE AJAX IFC system effective trouble shooting procedures, knowledge and skills which contribute to these procedures, training necessary for the skills, and to derive generalized maintenance principles from comparison between the M33 and the above system, the present research was conducted. The data used for the present analysis had been collected mainly in three previous studies on electronics maintenance training, and from a multiple-choice test given to maintenance people. The activity category system was modified and added to in order to better discriminate between various forms of activity.

T. R-7

15,217

Taylor, F.V. & Garvey, W.D. THE LIMITATIONS OF A 'PROCRUSTEAN' APPROACH TO THE OPTIMIZATION OF MAN-MACHINE SYSTEMS. Ergonomics, Feb. 1959, 2(2), 187-194. (USN Research Lab., Washington, D.C.).

15,217

Two basic approaches to optimize the performance of man-machine systems are discussed: one which attempts to adjust the human component by training, the other to adjust the mechanical elements to fit the man. Limitations of the training approach are indicated, and a study is reported which compares the effectiveness of resultants of the two approaches under "task-induced" stress situations.

G. I. R 8

15,218

Slechts, R.F., Forrest, J., Carter, W.K. & Wade, E.A. COMFORT EVALUATION OF THE C-97A/KC-97E PILOT SEAT (WEBER) ONE OF A SERIES OF STUDIES PERTAINING TO THE DESIGN EVALUATION OF PILOT AND CREW STATION EQUIPMENT. Contract AF 33(616) 3068, Proj. 7215, Task 71724; WADC TR 58 313, Nov. 1959, 16pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

15,218

This study evaluated certain design characteristics of the Weber Pilot Seat in terms of human comfort. Method of evaluation was a battery of subjective and behavioral laboratory tests administered by means of hourly questionnaires. Sixteen subjects sat for a period of seven hours, getting up when their discomfort was intolerable. The subjective tests include rating the seat and rating the discomfort of several body regions. Also, the number of minutes the subjects were seated was measured.

T. G. I. R 1

15,219

Tiller, P.R. & Figue, A.M. ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS-- A SECOND STUDY PART 4: CONCENTRATIONS OF EPINEPHRINE AND NOREPINEPHRINE IN URINE DURING CONFINEMENT IN A SIMULATED SPACE CHAMBER. Proj. TED NAM AE 1403, Rep. NANC ACEL 416, Nov. 1959, 8pp. USN Air Crew Equipment Lab., NANC, Philadelphia, Penn.

15,219

To measure the effects of stress that a spaceship crew would experience while living together in a confined area and performing various tasks, concentrations of epinephrine and norepinephrine in urine were estimated on six men prior to, during, and after eight days confinement. The mean and standard deviations are presented and compared to those obtained under normal circumstances. Results of earlier studies in this series are also discussed.

T. R 13

15,220

Whittenburg, J.A. METHODOLOGY FOR EVALUATION OF A MAN-MACHINE SURVEILLANCE SYSTEM. Contract NMR 2525 (00), HSR RM 59/26 SM, Rep. 6, Dec. 1959, 19pp. Human Sciences Research Inc., Arlington, Va.

15,220

"To determine the performance capabilities and limitations of the human as a component of a weapon system not-in-being", with specific focus on the capabilities of the human as an aerial observer, this paper presents methodological requirements and reports steps taken to meet them in research which were reviewed. Data from the studies which were reviewed are presented in a series of charts which show relationships, differences, and point up need for further research.

I. R 16

15,221

Siddall, G.J. & Anderson, D.M. DISPLAY AND CONTROL RECOMMENDATIONS FOR A FILM READER. Tech. Memo 54, Aug. 1956, 8pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

15,221

Film reader equipment is examined and recommendations made for the design of individual items and their associated layouts. Included are: task analysis, item (equipment components) analysis, arrangements for combining all items, and seating arrangements. The appendix contains drawings of: the layout of main components, recommended layout of switch panel, and a recommended seat.

T. I.

15,223

Usher, T.H. CONDITIONAL FEEDBACK APPLIED TO HUMAN OPERATOR TESTING. Extramural Res. Grant 9401 15, Res. Rep. 22, Oct. 1959, 72pp. Dept. of Electrical Engineering, University of Toronto, Toronto, Ontario, Canada.

15,223

A method of display called a "conditional feedback" display was defined and compared with pursuit and compensatory systems. An IBM 650 digital computer was used to obtain average system step-responses. The systems were compared on the basis of error growth curves. Choice of optimum display was on the basis of minimum input-output error.

T. G. I. R 11

15,224

Lee, A. THE EFFECT OF TARGET VELOCITY ON A FRONT-
PARALLEL PLANE ON HORIZONTAL SPATIAL COORDINATION AT
PERIPHERAL VISION LOCUS. *Psych. Monographs*, Sep.
1958 71, April 1958, 10pp. Willow Run Labs.,
University of Michigan, Ann Arbor, Mich.

15,225

To determine the magnitude of localization error for
a black vertical rod which oscillates in a given fronto-
parallel plane as a function of target velocity at each
of three specified photopic levels of binocular retinal
illumination, ten practiced subjects made binocular set-
tings of equivalence in a two-end test apparatus that
provided "real" depth cues. The ten target velocities
ranged from 1.00 degrees/second to 35.00 degrees/second
and the three photopic levels of retinal illumination
were 2.86, 3.15, and 3.64 log trolands. Localization
errors are plotted as a function of target velocity and
level of illumination. The results are discussed in re-
lation to existing experimental data.
T. G. I. R 9

15,226

Law, J.C. & Conway, R.W. PILOT OPINIONS AND PRACTICES
ON THE APPROACH TO LANDING: A QUESTIONNAIRE SURVEY AMONG
AUSTRALIAN CIVIL AND MILITARY PILOTS. *Jap. J. Psychol.*,
April 1959, 70pp. *Psychological Research Labs.*,
Australian Defence Scientific Service, Melbourne,
Australia.

15,227

In this report replies to two questionnaires on
pilot opinions and practices on the approach to landing
are analyzed question by question. Eight hypotheses con-
cerning pilot opinion and practice in approach to land-
ing are tested. Questionnaire items concern types of
aircraft flown, approach preferences, touch down point,
information used in controlling the descent path, pilot
opinion on risk of undershoots and overshoots, visual
cues to glidepath and numerous other variables. In-
strument questionnaire replies are compared with opera-
tional pilot questionnaire replies. The approacher con-
tains sample questionnaires.
T. G. I. R 7

15,228

Turner, A.S. APPLICATION AND EXTENSION OF SEQUENTIAL
DECISION THEORY TO THE RADAR SEARCH PROBLEM. *OSN*
Bureau of Ordnance (NED 1402), M.I.T. Lincoln Lab.
(DDC B 157), Tech. Rep. 4, May 1957, 62pp. *Massa-
chusetts Institute of Technology*, Cambridge, Mass.

15,229

Application and extension of sequential decision
theory to two basic search problems (with emphasis on
the optimum nature of sequential detection of signals
in noise): 1) to establish a fixed-reliability minimum-
time search, utilizing a pulsed, early warning search
radar with a single electronically scanned antenna and
fixed guard range gate. Possible time savings as a func-
tion of truncated sequential detection versus fixed-
sample detection are discussed. 2) to establish a fixed-
time maximum reliability search utilizing a pulsed beam-
rider guided-missile seeker with a single scanned gate.
Appendix A contains discussion of a scheme for instru-
menting a sequential detector for pulsed signal in nor-
mal noise.
T. G. I. R 17

15,230

Simon, B. (Ed.). PSYCHOLOGY IN THE SOVIET UNION.
1957, 300pp. *Stanford University Press*, Stanford,
Calif.

15,231

This book, a collection of papers by Soviet psychol-
ogists, is intended to familiarize English readers with
the general direction of Soviet psychology. The philo-
sophical basis of Soviet psychology and a brief summary
of its present organization serve as introduction. The
topic areas include higher nervous activity and percep-
tion, psychology of understanding, role of language in
formation of temporary connections, spatial discrimina-
tion, theory of memory, child psychology, objective
method in psychology.
T. R 69

15,232

Kincaid, W.M. THEORETICAL MODELS FOR THE DISCRIMINATORY
PROCESS IN VISUAL DETECTION. *Psych. Monographs*, Sep.
1958 71, Jan. 1959, 3pp. *Vision Research Labs.*, *University
of Michigan*, Ann Arbor, Mich.

15,233

This paper attempts to clarify thinking about the
nature of the discriminatory process involved in visual
detection. A variety of theoretical models (e.g.,
simple threshold, theories of signal detection in the
presence of noise) are shown to be variations of a more
general model. The more general model is "expressed in
terms of an abstract space corresponding with the set
of possible states of the central nervous system". Dif-
ferent subsets of this space correspond to different
responses. Suggestions for further research are includ-
ed.
R 8

15,234

Martens, E.R. VISUAL RECOGNITION ALONG VARIOUS MEASURES
OF THE TEST FIELD. VI. 8-ELEMENT AND 10-ELEMENT BINARY
PATTERNS. *Psych. Monographs*, Sep. 1944-1953 T, Nov. 1958,
10pp. *Vision Research Labs.*, *University of Michigan*,
Ann Arbor, Mich.

15,235

To study the recognition capacity of human observers,
17 observers were shown linear binary patterns which were
presented tachistoscopically at facilitations of 0, 45,
90, and 135 degrees in the visual field. Eight-element
and ten-element targets were used. Mean errors per ob-
server per presentation were analyzed for differences
among the various pairs of facilitations. This experiment
was sixth in a series devoted to testing visual responses
to similar targets. A theoretical analysis of factors
which may be involved in tasks such as those used in
these experiments was included.
T. G. I. R 7

15,236

Kincaid, W.M. & Hamilton, C.E. AN EXPERIMENTAL STUDY OF
THE NATURE OF FORCED-CHOICE RESPONSES IN VISUAL DETEC-
TION. *Psych. Monographs*, Sep. 1944-1953 T, Jan. 1959, 29pp.
Willow Run Labs., *University of Michigan*, Ann Arbor,
Mich.

15,237

By otheses about the nature of forced-choice re-
sponses in visual detection were examined in this paper,
and their predictions were tested. The hypotheses ex-
amined include 1) the psychophysical curve, 2) the
fixed-criterion hypothesis, and 3) the decision-making
hypothesis. Experimental principles are discussed, and
results of experiments given. Theoretical implications
are presented.
T. G. R 13

15,238

Kendler, H.H. LEARNING. *Ann. Rev. Psychol.*, 1959,
10, 43-88. (New York University, New York, N.Y.).

15,239

This review covers the period April, 1957-April, 1958.
The review reflects current preoccupation with the de-
veloping of theoretical formulations. The literature re-
viewed is classified and discussed under the following
topics and sub-topics: 1) neo-behaviorism and stimulus-
response functionalism, motivation and learning, discrim-
ination and generalization, retention and transfer; 2)
Skinner's position, his contributions and those of his
followers; 3) statistical learning theory, experimental
tests of the theory, theoretical articles designed to in-
tegrate available data, and purely theoretical articles
related to mathematical theory; 4) cognitive theory; and
5) intertheoretical differences. The review is summa-
rized in a series of seven general statements.
R 204

15,235
Jenkins, H.M. PERFORMANCE ON A VISUAL MONITORING TASK AS A FUNCTION OF THE RATE AT WHICH SIGNALS OCCUR. Tech. Rep. 47, Oct. 1953, 25pp. Massachusetts Institute of Technology, Cambridge, Mass.

15,236
To determine the effect of the rate at which signals are presented on performance in extended watches, three experiments were performed utilizing 100 subjects in a visual monitoring task in which the signal was an increase in the amplitude of deflection of an indicator needle. Performance as a function of signal rate (7.5-400 signals per hour) was measured in three ways: percentage of signals detected; incidence of false reports; and time required to respond to an obvious signal provided by onset of a pilot light. Results were submitted to chi square, plotted and discussed in terms of possible performance improvement.
T. G. I. R 8

15,236
Law, F.M. EFFECT OF SUPRATHRESHOLD CHANGES IN BRISQ-NESS ON FORM PERCEPTION. *Am. J. Physiol.*, Dec. 1958, 123(3), 409-419. (Department of Anatomy, Johns Hopkins University School of Medicine, Baltimore, Md.).

15,236
To determine the effects of sudden supra-threshold stimulation of brightness (from +1.2 to -1.6 log millilamberts) on peripheral form perception, 11 subjects responded as to presence, absence, and position of sets of four combinations of five Landolt circles. In a series of 12 experiments, angle deviation (30 to 45 degrees), test object size, test object contrast (27 to 97 percent), test object brightness (+1.2 to -1.6 millilamberts), and preparation of the subjects were manipulated. Interactions between variables are plotted. Results are discussed in terms of retinal structure and function.
T. G. R 8

15,237
Laboratorio di Fisiologia dell'Università di Milano. INVESTIGATION OF THE FATIGUE IN MAN. FINAL REPORT. Contract AF 61(514) 637, AFOSR TR 58 117, ca. 1958, 5pp. Laboratorio di Fisiologia dell'Università di Milano, Milan, Italy.

15,237
This is a condensed version of a study designed to determine the effects of stress on lower neuron activity. Total reflex times were obtained from spinal sensory and motor neurons as well as from supra-spinal centers, utilizing medical students (age 20-25 years). Results were reproduced utilizing animals. The reflex-time data were attained under the following stress-inducing conditions: hypoglycemia, hypoxia, physical exercise, sleeplessness, and high environmental temperature. The effects of 15 drugs such as acetylcholine, cortisone and ritalin were determined. Results are discussed.

15,238
Poulton, E.C. ON READING AND VISUAL FATIGUE. *Am. J. Psychol.*, Sept. 1958, 71(3), 609-610. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 337/58).

15,238
In this report, a "factual" error made by Carmichael and Dearborn in "Reading and Visual Fatigue," is discussed. The alleged error concerns the correlation between fatigue from prolonged reading and eyelid blinks. The pertinent data from Carmichael and Dearborn is submitted to t test and discussed briefly in terms of blinking as a criterion of ocular fatigue.
G. R 2

15,239
Isaacs, D.B. (Prof. Dir.). BOMBER OPERATOR "FATIGUE": THE EFFECT OF LENGTH AND REPETITION OF OPERATING PERIODS ON EFFICIENCY OF PERFORMANCE. Contract ONR 919, ONR Rep. 3304 & Res. Rep. 6, Jan. 1944, 36pp. Applied Psychology Research Unit, MRC, Camp Murphy, Fla. (Yerkes Laboratories of Primate Biology, Orange Park, Fla.).

15,239
To determine the effect of long and repeated periods of operation of an A-scan oscilloscope on performance efficiency on "fatigue effects", eight highly trained subjects, under simulated field conditions, were tested during four-hour periods of continuous scope operation on successive days for a period of approximately three weeks. Efficiency in detection of signals and accuracy in determining azimuth of target signals were measured as a function of operating periods and submitted to analysis of variance as well as graphic representation. Fatigue as a function of "echo" was also measured. Results are discussed. Three appendices contain additional material.
T. G. I.

15,240
Leonard, J.A. THE DISCRIMINABILITY OF SIMULATED VISUAL SIGNALS. ca. 1957, 5pp. Applied Psychology Research Unit, MRC, Cambridge, England.

15,240
To establish some of the factors making for ease or difficulty in discriminating amplitude-modulated signals displayed on a Cathode-Ray tube, subjects performed the following tasks in response to a simulated set of signals found on a probability basis: 1) a standard identification task, 2) sorting, 3) paired identification task, 4) paired-associates learning task, and 5) reconstruction of the stimulus on a physical model. Stimuli are metric histograms which are rendered randomly nonsensical by probability based variations in complexity, redundancy, and noise. Results are discussed in terms of the applicability of easy nonsense symbols generated by probability models, as a tool for provision of visual "nonsense" material which can be graded on an APU basis.
2.7

15,241
Leonard, J.A. TACTICAL CHOICE REACTIONS: I. *Quart. J. Exp. Psychol.*, May 1959, XI(Part 2), 76-83. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 339/59).

15,241
To observe the effect of varying the number of alternatives on choice reaction time in a task having an initial high degree of compatibility, vibratory stimuli from relay armatures were presented to 1, 2, 4, or 8 fingers of eight subjects. The response was to depress the armature to the finger(s) stimulated. Reaction time was compared as a function of the amount and identity of the fingers stimulated. Errors in choice of response finger(s) were also recorded. Implications for further research are discussed.
T. R 12

15,242
Honeyman, W.M., Cowper, M.C. & Yallop, J.M. EFFECTS OF ASYMMETRICAL POSITIONS OF AIRCRAFT CONTROLS INVESTIGATION WITH DIFFERENT TYPES OF CONTROL COLUMN. FPRC 656, Feb. 1946, 16pp. Flying Personnel Research Committee, London, England. (Psychological Test Research Section, Cambridge University, Cambridge, England).

15,242
To determine whether the effects of offset position on the use of aileron control and rudder depended on the type of column used, 18 experienced pilots were tested for errors in aileron control, hand control and rudder deviation under nine positional combinations of control column and rudder. Knowledge of error was presented to subjects on a cathode ray tube. Data were submitted to analysis of variance. Results are discussed in terms of previous experimental evidence and bomber versus fighter control columns. Detailed tables of results and illustrations of control columns are included in the appendix.
T. I. R 1

15,244
Leonard, J.A. FIVE CHOICE SERIAL REACTION APPARATUS. APU 326, April 1959, 18pp. Applied Psychology Research Unit, MRC, Cambridge, England.

15,244
This paper describes an apparatus which has been used in experiments on environmental stress. The apparatus is designed for self-paced operation by both correct and error responses. Circuit details and descriptions of working parts of the whole circuit are given, together with plates and diagrams. Special notes are included for those building their own equipment.
I.

15,245
Horst, P. RELATIONS AMONG A SETS OF VARIABLES. Contract MMR 477(08), Public Health Research Grant M 743(C4), Dec. 1959, 32pp. University of Washington, Seattle, Wash.

15,245
This article presents a "more efficient computational solution for the case of two sets of variables and a generalized solution for any number of sets." Applications of the method were discussed, and an example is given to demonstrate the solution for more than two sets.
T. R. 8

15,246
Mechler, E.A., Russell, J.B. & Preston, H.G. THE BASIS FOR THE OPTIMUM AIDED-TRACKING TIME CONSTANT. J. Franklin Inst., Oct. 1949, 246(4), 327-334. (Franklin Institute Laboratories for Research and Development, Philadelphia, Penn.).

15,246
This report presents evidence for the utility of an optimum aided tracking constant (0.2-0.8 seconds) for continuous velocity signals. The general mathematical formulae for aided tracking are developed and the relation between the optimum aided tracking time constant and interval between signals is discussed.
G. I. R 5

15,247
Pepler, R.D. WARMTH AND PERFORMANCE: AN INVESTIGATION IN THE TROPICS. Ergonomics, Nov. 1958, 2(1), 63-88. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 284/58).

15,247
The effect of unusual levels of environmental warmth on the performance of skilled tasks by young European men living in the tropics was studied. Five experiments were performed: three on manual tracking, one on prolonged visual watchkeeping, one on high speed decision taking. The tracking was done at several temperatures (66-92 degrees F) with several handle loadings (8-32 lb.). The vigilance was done at 67, 82, and 92 degrees F. The decision task was done at 72, 81, 86, and 91 degrees F. These findings were compared to some obtained with artificially acclimatized men.
T. G. I. S 11

15,248
Roth, E. SOME THEORETIC ASPECTS OF THE USE OF INERT GASES IN SEALED CABIN ENVIRONMENTS. Rep. 58 152, Nov. 1959, 18pp. USAF Aerospace Medical Center, Brooks AFB, Tex.

15,248
The physical analysis of decompression bubbles within the body was reviewed in an attempt to provide a working model for selection of several inert gas combinations in sealed cabins. The maximum bubble size and symptom frequency after decompression appear to be proportional to a gas factor (solubility in oil \times diffusion coefficient in oil/solubility in water). The inert gases--helium, neon, argon, krypton, xenon, and nitrogen--were compared with this relationship in mind.
T. G. R 40

15,249
Marin, R.E., Grant, D.A. & Nystrom, C.O. TEMPORAL PREDICTIONS OF MOTION INFERRED FROM INTERMITTENTLY VIBRATED LIGHT STIMULI. Contract AF 18(600) 54, RDO Proj. 694 49; WADC TR 54 69, Jan. 1954, 14pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Wisconsin, Madison, Wisc.).

15,249
The accuracy of predicting when a moving object would reach a target was studied as a function of: velocity (.10 foot/second, .05 foot/second), interval between onset of successive cue lights (8 or 4 seconds), number of cue lights (2, 4), and distance for target from last cue light (2 or 4 ft.). Twenty-two subjects viewed the successive illumination of cue lights placed at even intervals in a horizontal row, then estimated the time it would take the imaginary object to reach target light by pressing button at predicted arrival time. For each of the 16 experimental conditions, three estimates were made by each subject. Analysis of variance technique was used.
T. I. R 4

15,250
Page, D.E. & Goldberg, I.A. HUMAN FACTORS EVALUATION OF A KEYSSET ENTRY TECHNIQUE FOR FREQUENCY AND CHANNEL SELECTION. 1959, 16pp. International Telephone and Telegraph Laboratories, Nutley, N.J.

15,250
A keysetting device which was used for manually setting five-digit numbers was evaluated in terms of accuracy and time of operation. Five subjects operated the device under each of five experimental conditions: discrete pulsing, 2.1 digits/seconds, 3.4 digits/seconds, 5.6 digits/seconds, 12.8 digits/seconds. Keysetting errors and mean keysetting time were analyzed as well as the initial search and decision time.
T. G. I.

15,251
Poulton, E.C. TIME FOR READING AND MEMORY. Brit. J. Psychol., Aug. 1958, 49(3), 230-245. (Applied Psychology Research Unit, MRC, Cambridge, England). (APU 392/58).

15,251
To determine how comprehension was affected by "altering the speed of reading to the greatest feasible extent," 192 subjects were required to study series of statements, presented under various conditions. Tests of memory, recall, and recognition followed immediately; a delayed test of memory was given one week later. Two subsidiary questions were also investigated: Is it possible to learn as much by reading a part of the document carefully, as by reading it all more hurriedly? Is comprehension affected by the degree of rigidity of pacing while reading?
T. G. R 15

15,252
Kidd, J.S. A SUMMARY OF RESEARCH METHODS, OPERATOR CHARACTERISTICS, AND SYSTEM DESIGN SPECIFICATIONS BASED ON THE STUDY OF A SIMULATED RADAR AIR-TRAFFIC CONTROL SYSTEM. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 236, July 1959, 29pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Ohio State University & Ohio State University Research Foundation, Columbus, Ohio).

15,252
This paper summarizes 14 major systems experiments concerned with relatively complex man-machine system operations, and carried out through the use of dynamic systems simulation. Results of the studies were presented in tabular form. Tentative generalizations are made regarding the following characteristics: 1) distribution of functions, and 2) procedural flexibility. Practical applications are made to problems of traffic load, procedures, and displays. Future trends are predicted.
T. I. R 25

15,253

Kidd, J.S. & Kirkade, R.G. OPERATOR CHANGE-OVER EFFECTS IN A COMPLEX TASK. Contract AF 33(616) 3612, Proj. 7184, Task 71583, WADC TR 59 235, Aug. 1959, 12pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Lab. of Aviation Psychology, Ohio State University & OSU Research Foundation, Columbus, Ohio).

15,253

To determine the effect of operator change-over and extended operational activity (i.e., a 3.5-hour work shift) and to determine the effect of prechange-over participation by a replacement operator on subsequent performance loss, 12 laboratory trained subjects performed in a simulated radar air traffic control system. At the moment of operator change-over, and for an extended operational period thereafter, performance was measured (in terms of system efficiency and safety). In the second phase, operator change-over efficiency (system efficiency and safety) was measured for the same 12 subjects as a function of the following levels of change-over operator participation: no participation; auditory participation; auditory plus visual participation, and parallel control. T. G. I. R 14

15,254

Johnson, L.B. (Chm.). PROJECT MERCURY: MAN-IN-SPACE PROGRAM OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. Rep. 1014, Dec. 1959, 97pp. US Government Printing Office, Washington, D.C.

15,254

This is a report of a staff study, made to provide basic information on Project Mercury. Program descriptions are based on current program planning, and include history and organization of the Project, its relationship to manned space flight, the proposed arrangements and operation of the Mercury System, a description of the Project Mercury System, orbital flight operations, biomedical progress, and selection and training of astronauts. Appendixes contain general references to space flight, biological and medical aspects, public impact of early satellite launchings and observations regarding manned space flight developments in USSR, and biographies of the astronauts. T. G. I. R 1

15,255

Brandaleone, H. MEDICAL ASPECTS OF MOTOR-VEHICLE ACCIDENT PREVENTION IN INDUSTRY. J. Amer. med. Ass., Jan. 1957, 163(4), 237-239.

15,255

To determine the effects of a comprehensive medical program on motor-vehicle accident rate in industry, the following program was undertaken in two companies: 1) the establishment of rigid preplacement, driver-selection examinations; 2) periodic medical examinations of operators; and 3) a comprehensive medical program for employees. Comparisons are made with previous years and the year of the establishment of this program in terms of accident rate, absenteeism, financial loss due to accidents. The results are discussed in terms of the human factor in motor-vehicle accidents and recommendations of the Industrial Medical Association are included. T. R 7

15,256

Elliott, H. NEUROLOGICAL AND NEUROSURGICAL ASPECTS OF TRAFFIC ACCIDENTS. J. Amer. med. Ass., Jan. 1957, 163(4), 242-245.

15,256

This article contains a review of neurological and neurosurgical aspects of injuries resulting from traffic accidents with special emphasis on injuries resulting in death. The following aspects are discussed (with recommendations included): incidence, mechanisms, multiplicity, and variability of head injuries; community "death traps"; first aid and ambulance transportation; and extent of alcohol intoxication and aspects of drug usage. T. G.

15,258

Braunstein, P.M. MEDICAL ASPECTS OF AUTOMOTIVE CRASH INJURY RESEARCH. J. Amer. med. Ass., Jan. 1957, 163(4), 249-255.

15,258

To determine the medical findings which can be expected in the 1,000,000 persons injured by automobile injuries each year, a sample of 1000 injury-producing accidents were studied utilizing data obtained from various agencies in ten states. Injuries were divided as to severity level into: minor, moderate, severe, serious, critical, and fatal. Each level of injury was analyzed as to causation and area or areas of the body where the injuries were sustained. Recommendations are made for an epidemiologic approach to crash injuries. T. I. R 8.

15,259

Winternitz, M.C. (Chm.). SYMPOSIUM ON STRESS (16-18 MARCH 1953). March 1953, 332pp. USA Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D.C.

15,259

Some of the topics covered were: visceral circulation on homeostasis, metabolic responses in acute and chronic stress situations; the pituitary-adrenocortical system in stress situations, stress in the combat zone, psychological reactions in stress situations, group behavior in stress situations, cultural perspectives on stress, experimental evocation of stress, influence of drugs on stress states, implications of stress in psychological warfare, etc. T. G. I. R 255

15,261

Smith, A.A. & Boyes, G.E. AMBIENT ILLUMINATION AND PERSISTENCE OF TARGETS ON RADAR DISPLAYS EMPLOYING MAGNESIUM FLUORIDE PHOSPHORS. DRML Proj. 163 & PCC Proj. D77 94 20 22, DRML Rep. 163 13 & HR 133, Nov. 1957, 5pp. Defence Research Medical Labs., Toronto, Ontario, Canada.

15,261

The effect of ambient illumination on the visibility of small radar targets at decay times of 0, 12, and 24 seconds was studied. Three levels of ambient illumination—darkness, 0.1, and 0.5 foot-candle—were used. Ten subjects participated. Analysis of variance was performed on the thresholds. T. G. R 2

15,262

Stockbridge, H.C.W. MICRO-SHAPE-CODED KNOBS FOR POST OFFICE KEYS. Tech. Memo. 67, March 1957, 4pp. Clothing and Stores Experimental Establishment, Ministry of Supply, London, England.

15,262

This study was aimed at designing and selecting a set of small, shape-coded knobs suitable for Post Office type keys. Seven knobs were presented to each of 14 male subjects for identification after an initial practice. Successes and errors are interpreted in terms of discriminability of knobs. T. I. R 4

15,263
Mornet, G.M. AGE-HEIGHT-WEIGHT STANDARDS SUITABLE FOR USE IN MEDICAL EXAMINATIONS OF AIRCREW CANDIDATES. FPRC 633, Feb. 1946, 3pp. Flying Personnel Research Committee, London, England.

15,263
This is primarily an age-height-weight table based on two surveys of RAF aircrew during which 14,000 were measured. Each cell gives average weight plus the range of weights for that age and height as represented by the 1st and 99th percentiles. This table replaces a much earlier one based on civilian population done by life insurance companies; it is more realistic for use in medical examinations of aircrew men.
T. R 2

15,265
Jerger, J.F. CUMULATIVE AUDITORY FATIGUE. Rep. 58 46, March 1958, 9pp. USAF School of Aviation Medicine, Randolph AFB, Tex.

15,265
This study explored the cumulative auditory fatigue phenomenon by measuring these effects induced by three successive one-minute fatiguing stimuli of different intensities. Six one-hour sessions were run on each of 26 subjects, using six fatiguing intensities--85, 90, 95, 100, 105, and 110 db.--in random sequence. Cumulative fatigue was defined as the difference between threshold recovery time after the first fatiguing tone and that after the third tone. Rank-order correlation coefficients were computed for the different intensities. Other analyses were also made.
T. G. I. R 8

15,266
Hick, W.E. AN ASPECT OF SEARCHING WITH BINOCULARS. APU 140/50, Sept. 1950, 5pp. The Psychological Laboratory, MRC, Cambridge, England.

15,266
The efficiency of searching for a small object with binoculars using both eyes was compared to searching with one eye with the view toward a proposed modification of binoculars. Six subjects performed searches with the object at each of five positions on a screen. The object subtended 10.6 minutes of arc, as seen through binoculars. Search times were analyzed.
T. G. I.

15,267
Charipper, B.A. SHIP CONTROL VIII SINGLE-ELEMENT VS. TWO-ELEMENT DISPLAY IN TWO-DIMENSIONAL TRACKING. Contract NMR 2512(00), Proj. SUBIC, P59 009, Electric Boat Tech. Rep. SPD 59 003, Feb. 1959, 7pp. General Dynamics Corporation, Groton, Conn.

15,267
Tracking performance of 60 male naval officers using a single-element display was compared to that using a two-element display. The tracking task was submarine course-keeping and depth-keeping; the controls were joystick, wheel and slide, and wheelstick. The data were analyzed as a function of display and controls.
T. G. I.

15,268
Bernard, C.R. A METHOD OF INCREASING THE AMBIENT ILLUMINATION OF RADAR OPERATIONS ROOMS WITHOUT REDUCTION OF SIGNAL DETECTION THRESHOLD. Tech. Note RAD 619, Sept. 1955, 13pp. Royal Aircraft Establishment, Farnborough, Hants, England.

15,268
An experimental installation of radar consoles equipped with narrow band filters in a room with ambient lighting was evaluated in terms of signal detectability. This performance was compared to that on an unfiltered console in an unlighted room to determine whether the new system was acceptable.
G. R 3

15,269
USA Personnel Research Section. REPORT ON COMPARISON OF THREE VISUAL ACUITY TESTS. PMS Rep. 249, Feb. 1942, 3pp. USA Personnel Research Section, Washington, D.C.

15,269
This report compares the scores of about 395 men on the Snellen, Broken Circle #1 and #2, Shortened Circle, and AAA acuity tests. Intercorrelations were obtained mainly between the Snellen and Broken Circle #1 and #2 scores. The results are described in terms of reliability as well as relationship among the tests.
T

15,270
Nesbitt, M.F. & Ott, E.R. RESEARCH IN QUALITY CONTROL. Contract NMR 404(11), Task NR 042 021, Tech. Rep. 2, Aug. 1958, 11pp. Rutgers University, New Brunswick, N.J.

15,270
The concepts of research and quality control are examined in their broad and narrow interpretations. Then the concept of research in quality control is delineated and discussed in general terms. Recommendations for support of such research are made.
T. R 3

15,272
Wels, E.G., Jr., Marko, A., McLennan, M.A. & Correll, E.G. DEVELOPMENT OF AN OXYGEN PARTIAL PRESSURE TRANSDUCER. Proj. 7222, Task 71751, WADC TN 59 395, Nov. 1959, 15pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

15,272
This investigation was aimed at establishing a method for monitoring the oxygen supply of man during stress experiments. The requirements for such a method were stated, and a review of various systems was made. The polarographic principle was thus selected and examined in detail.
G. I. R 9

15,273
Waters, L.K. & Wherry, R.J., Jr. FACTOR ANALYSIS OF SELECTION TESTS AND PERFORMANCE MEASURES IN U.S. NAVAL SCHOOL PRE-FLIGHT. Proj. MRO05.13 3763, Subtask 10, Rep. 2, Aug. 1959, 11pp. USN School of Aviation Medicine, Naval Air Station, Fla.

15,273
"A 19-variable matrix representing the relations among selection test total and sub-scale scores, course performance in US Naval School, Pre-Flight, and a peer rating of officer potential was factor analyzed." These data were collected from 336 cadets. Six factors were obtained from the matrix based on variables loading .35 or greater. In addition correlations were obtained between selected predictors and pre-flight technical courses, and some recommendations made regarding the use of these scores as predictors.
T. R 5

15,274
Moellner, R.C. & Graybiel, A. THE LOSS OF COUNTER-ROLLING OF THE EYES IN THREE PERSONS PRESUMABLY WITHOUT FUNCTIONAL OTOLITH ORGANS. Proj. MRO05.13 6001, Subtask 1, Rep. 50, Dec. 1959, 8pp. USN School of Aviation Medicine, Naval Air Station, Fla.

15,274
On three totally deaf subjects ocular torsion was measured when the subject was tilted or exposed to centripetal force. This procedure was arranged to ensure only otolith stimulation. Counter-rolling was determined by comparative measurements of the position of the eye made from photographs of the face before, during, and after each procedure. Several angles of tilt were tested. These records were compared to those of normal subjects by the F test.
T. G. R 10

15,275

Van Cott, H.P. HUMAN ENGINEERING METHODS FOR SYSTEM DEVELOPMENT. Paper 58 A 279, Sept. 1958, 5pp. American Society of Mechanical Engineers, New York, N.Y.

15,275

This article briefly describes the beginning of human engineering, its relation to engineering, and two of its methods: system function analysis and task analysis.

I. R 2

15,276

Sydiah, D. ON THE EQUIVALENCE OF CLINICAL AND STATISTICAL METHODS. J. appl. Psychol., 1959, 43(6), 395-401. (University of Saskatchewan, Saskatoon, Canada).

15,276

This paper compares linear statistical and clinical methods of personnel assessment with respect to: a) correlation with interview decisions, b) correlation between models, and c) errors of measurement. Eight interviewers assessed from 14 to 50 Canadian Army applicants using biographical, test, and interview information. The assessment consisted of a 120-item Q-sort check list. These data were quantified into statistical and clinical scores, and the aforementioned correlations computed.

T. R 7

15,277

Shaw, W.J. OBJECTIVE MEASUREMENT OF DRIVING SKILL. International Road Safety and Traffic Rev., Autumn, 1957, 10(1), 37-39. (Applied Psychology Research Unit, MRC, Cambridge, England).

15,277

This paper covers specifically the driver variables which make for safe driving or for accidents. The research in this area has used two approaches: the statistical approach in which large numbers of accidents are examined to establish causal relationships, and the experimental approach in which some physiological or psychological attribute of the person is related to some criterion of driving ability. Some accident surveys and experimental techniques are briefly covered.

G.

15,278

Schutzberger, M.P. & Marcus, R.S. FULL DECODABLE CODE-WORD SETS. IRE Transactions, 11-5(1), March 1959, 12-15.

15,278

This paper considers how the decodability condition imposes restrictions on a set of code words. A generating function that describes the composition of the code words is defined, and the relation between this function and a "full" set of code words is found.

R 8

15,279

Rubinstein, I. SOME FACTORS IN PROBABILITY MATCHING. J. exp. Psychol., June 1959, 57(6), 413-416. (USA Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D.C.).

15,279

An experiment on probability matching was performed to determine how an optimal solution is achieved. In group A, two differently colored cards were presented randomly with the restriction that blue occurred 67 per cent and yellow 33 per cent of the time. In group B, the same cards were used except three different color cards were used in place of yellow. In the third group, three cards were used--they were shuffled before each trial. These predictions were subjected to median tests and χ^2 .

T. G. R 7

15,281

Ott, E.R. ANALYSIS OF MEANS. Contract NMR 404(11) Task NR 042 021, Tech. Rep. 1, Aug. 1958, 29pp. Rutgers University, New Brunswick, N.J.

15,281

The methods of statistical analysis described in this paper are an extension of Shewhart control chart techniques. These procedures compare directly the differences between means instead of the variance ratios. The two methods are: that which holds constant all suspected sources of variability and that which varies different factors suspected of contributing to variation in a predetermined way. The major section of the paper is devoted to presenting in detail the procedure, analysis of means. Several examples of using this method are also included.

T. R 25

15,282

Johnson, R.A. MODEL 16 AUTOMATIC BLOOD PRESSURE MEASURING INSTRUMENT. Contract AF 33(616) 5829, Proj. 7164, Task 71832, WADC TR 59-429, Dec. 1959, 45pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

15,282

The development of an instrumentation system to automatically monitor human blood pressure and provide an electrical signal that can be automatically recorded or telemetered is described in detail. The aim of this program was to develop an indirect method of measuring blood pressure by the alternate occlusion and patency of an artery by some passive pressure applied directly over the artery. The device is capable of providing physiological information about pilots while they are flying research aircraft.

T. G. I.

15,283

Hitt, W.D. QUANTITATIVE METHODS IN APPLIED PSYCHOLOGY. Dec. 1959, 8pp. Battelle Memorial Institute, Columbus, Ohio.

15,283

This article reviews the quantitative methods used by research psychologists and points up some of the problems to which these methods may be applied. Psychophysics, psychological scaling methods, analysis of variance, correlation analysis and prediction, factor analysis, and a few other techniques are included.

G.

15,285

Ely, J.H. DATA COLLECTION FOR THE DESIGN AND EVALUATION OF MAN-MACHINE SYSTEMS. 58 A 241, Dec. 1958, 4pp. American Society of Mechanical Engineers, New York, N.Y.

15,285

This article discusses some of the most important considerations in the collection of data on human performance in man-machine systems in non-laboratory situations. Some of these include: establishing system requirements, selecting the population, repeating measurements, objective vs. subjective data, special techniques for data collection.

15,286

Coombs, C.H. PSYCHOLOGICAL MEASUREMENT AND A THEORY OF DATA. Proj. MICHIGAN, Rep. 2900 23 T, Sept. 1959, 29pp. Willow Run Labs., University of Michigan, Ann Arbor, Mich.

15,286

"The theory of data is a mathematical model which provides a foundation for psychological measurement and leads to a simple classification of models and the study of their interrelations." This theory is formally developed--it characterizes data in terms of three basic dichotomies and classifies models in abstract terms in eight categories. The mathematical character of these models is discussed and examples of data indicated.

T. I. R 56

15,287

Dale, H.C.A. A FIELD STUDY OF FAULT-FINDING IN WIRELESS EQUIPMENT. APU 329/58, March 1958, 18pp. Applied Psychology Research Unit, MRC, Cambridge, England.

15,287

The following questions about fault-finders for C 42 wireless equipment were investigated: how do they work; is the difference in their methods related to their fundamental knowledge, practical experience or familiarity with the equipment; what are the characteristics of an efficient procedure? Fifteen experienced persons were observed while attempting to locate a fault which had been deliberately inserted in the wireless equipment. Objective records, introspection and impressions were obtained from each subject. A general strategy based on the individual methods is recommended.
T. I. R 5

15,288

Dale, H.C.A. ON THE NATURE OF FAULT-FINDING IN ELECTRONIC EQUIPMENT. APU 328/58, March 1958, 7pp. Applied Psychology Research Unit, MRC, Cambridge, England.

15,288

This theoretical paper describes the task of fault-finding and some psychological problems related to it. General methods of testing equipment and the efforts involved are indicated. The choice of strategy is then discussed in terms of economy of time and effort.
R 7

15,289

deRivers, J. THE POSTURAL SWAY TEST AND ITS CORRELATIONS. Res. Proj. MRO05 13 3001, Subtask 7, Rep. 3, Nov. 1959, 31pp. USN School of Aviation Medicine, Naval Air Station, Fla.

15,289

The relationship between the postural sway test and preflight navigation grades and flight grades was studied in several separate experiments. In one, swayers and non-swayers were compared for anxiety as well as the aforementioned grades. In another they were compared for their memorizing ability on meaningful and meaningless relationships. In another, several measurements were obtained by the sway test on a group that was informed about the test and one that was uninformed. Also questionnaires were administered to some subjects.
T. R 15

15,291

Davis, J.F. MANUAL OF SURFACE ELECTROMYOGRAPHY. Proj. 7184, Task 71580, WADC TR 59 184, 122pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (McGill University, Montreal, Canada).

15,291

The methodology and instrumentation of surface electromyography (EMG) are presented. Principles (and their applications) of electrode placement, and standard placements, are given. Varieties of ink-writing EMG's are evaluated and specifications for a satisfactory research instrument are discussed in terms of type of power supply, type of recorder, and desirable characteristics for pre-amplification, main amplification and laboratory construction to minimize artifacts. Finally operations of EMG's are discussed in terms of methods of eliminating artifacts, and measurement of primary and integrated records. Illustrations are provided.
T. G. I. R 15

15,292

Briggs, G.E. & Howell, W.C. ON THE RELATIVE IMPORTANCE OF TIME SHARING AT CENTRAL AND PERIPHERAL LEVELS. Contract M61339 508, Tech. Rep. NAVTRADEVEN 508 2, Oct. 1959, 14pp. USN Training Device Center, Port Washington, N.Y.

15,292

This study investigated the acquisition of skill in a two-dimensional tracking task as a function of the amount of peripheral time sharing (alternate eye fixation between information display). Six subjects performed the tracking task under conditions where the rate of information presented on the two displays varied and where the distance between the two displays also varied. Data were analyzed by means of analysis of variance. Central and peripheral time sharing are discussed.
T. G. I. R 14

15,294

Briggs, G.E. & Wiener, E.L. FIDELITY OF SIMULATION: I. TIME SHARING REQUIREMENTS AND CONTROL LOADING AS FACTORS IN TRANSFER OF TRAINING. Contract M61339 508, Tech. Rep. NAVTRADEVEN 508 4, Oct. 1959, 12pp. USN Training Device Center, Port Washington, N.Y. (Ohio State University, Columbus, Ohio).

15,294

To determine the effect that fidelity of simulation (degree of control loading) of a training device has on transfer of training as a function of the complexity of the task, 48 undergraduates performed in a two-dimensional control task which simulated an operational interceptor aircraft. Transfer of training was measured as a function of: control loading (spring stiffness present in a control column) and peripheral time-sharing requirements (number of simultaneous dimensions of control required). Each subject received 24 (40-second) training trials followed by eight (40-second) transfer trials. The results are plotted and subjected to analysis of variance. Implications and recommendations are in terms of optimum high fidelity of control loading.
T. G. R 5

15,295

Gottsdanker, R. REACTION TIME: THE TIME TO INITIATE A RESPONSE. MH Aero Doc. U ED 6102, Dec. 1958, 13pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

15,295

This paper reviews experimental studies of reaction time (RT), especially as they concern categories of uncertainty which prevent the synchronization of response with signal. Categories which have been subjected to experiment and for which there are some "solid conclusions" and categories which at present are only possibilities for investigation were discussed. The uncertainties discussed were: Temporal, Signal-Region, Response, Discriminal, Competitive, Option, Translation, and Encoding-Decoding Uncertainty. Other variables affecting RT were discussed briefly.
R 29

15,296

Gottsdanker, R. THE INTRINSIC ACCURACY AFFORDED BY THE OPERATOR'S MOVEMENTS. MH Aero Doc. U ED 6122, May 1959, 17pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

15,296

This report reviews two general kinds of research devoted to investigating the intrinsic accuracy afforded by operator movements with special emphasis on performance at airplane control boards without visual error-feedback. The first type of research involves production of some physical extent (displacement, force, etc.) and the second concerns discrimination through "kinesthetic recognition". Variables are considered, such as direction and unit of response, and others. Indices of performance are discussed with emphasis on statistical analysis of response data. Previous experimental research in both areas is considered and evaluated.
R 22

- 15,305
Senders, J.W. & Leonard, T.E. AN APPLICATION OF HUMAN DYNAMICS DATA. THE ESTABLISHMENT OF OPTIMUM LINEAR DYNAMICS FOR PILOTED AIRCRAFT BY THE MINIMIZING OF MEAN SQUARE TRACKING ERROR. MH Aero Doc. R ED 6125, June 1959, 33pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.
- 15,305
This report describes the use of the minimum mean square error criterion in establishing linear machine dynamics best suited for human control. Methods are developed for predicting quasi-linear human behavior and for calculating mean square tracking error. Optimum linear dynamics for a piloted aircraft in a typical tracking task are determined.
T. G. I. R 11
- 15,306
Silver, C.A. (Proj. Engr.). LAYOUT OF COCKPIT DISPLAYS AND CONTROLS. MH Aero Doc. U ED 6139, Nov. 1959, 27pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.
- 15,306
Cockpit organization was discussed as it affects optimum display of information required by the pilot for normal, standby, and emergency operation. The necessity for optimum arrangement with as little transitional interference from experience with present to new and more complex types of aircraft was considered. Recommended placement is given for each of ten functional areas and for placement of displays and controls within these areas.
G. I.
- 15,307
Shackel, B. A NOTE ON PANEL LAYOUT FOR NUMBERS OF IDENTICAL ITEMS. Ergonomics, May 1959, 2(3), 247-253. (E.M.I Electronics Ltd., Hayes, Middlesex, England).
- 15,307
Two brief tests were reported in which the operator's task was the sequential selection of two items from two groups of twenty-four items. A total of ten subjects was used, chosen to be representative, in intelligence level and prior training of persons likely to use analog computers and similar machines. Differences between two layouts were discussed with reference to the question whether the spatial layout best for a small number of similar items on a panel also is best when extended to a large number of items.
T. I. R 3
- 15,308
Senders, J.W. HUMAN TRACKING BEHAVIOR. MH Aero Doc. U ED 6141, Nov. 1959, 37pp. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.
- 15,308
Research concerning variables involved in the establishment of optimum man-machine interaction in airplane display tracking is reviewed and recommendations are given. Considerations include display (modality, size, area, amplitude of motion, brightness, and pursuit and compensatory presentation); the man (human dynamics and training); the control (feel, sensitivity, and miscellaneous characteristics); intermittency; controlled element (delay and aided quickening); and a summary and conclusions. A manual tracking system is illustrated.
- 15,309
Shackel, B. MACHINE DESIGN FOR SAFETY. Paper presented to the National Industrial Safety Conference Scarborough May 8th - 10th, 1959, EMI Psychol. Rep. 53, 1959, 20pp. Royal Society for the Prevention of Accidents, London, England.
- 15,309
This report contains a general discussion of some aspects of machine design for safety. Emphasis is on safe usage, the need for feedback, safe design and practicing at design for safety at all levels. Recommendations are given for achieving optimum machine design for safety.
R 5
- 15,310
Saul, E.V. (Princ. Investigator). HUMAN ENGINEERING BIBLIOGRAPHY 1957-1958. Contract MONR 494(13), ONR Rep. ACR 43, Oct. 1959, 298pp. USN Office of Naval Research, Washington, D.C. (Human Engineering Information and Analysis Service, Tufts University, Medford, Mass.).
- 15,310
This bibliography, one of a series of annual bibliographies, provides abstracts of literature pertinent to human factors research. Instructions for and illustrations of use are given for the bibliography, which is divided into five parts: 1) Topical Outline of the Literature in Human Engineering, which includes over 300 topics; 2) Facsimile of Subject Matter Files; 3) Alphabetical Index to the Human Engineering Literature; 4) Citations and Abstracts; and 5) Author Index.
R 1630 (approx.)
- 15,311
Webb, S. & Coburn, R. DEVELOPMENT AND TESTING OF A HAND-CONFIGURED KEYSER. NE 09130 4, Tech. Memo. TM 357, Sept. 1959, 9pp. USN Electronics Lab., San Diego, Calif.
- 15,311
In order to evaluate and list a 16-button keyset, six college students performed on each of two experimental keysets. Time required, errors and subject preference were recorded. In terms of these measurements, an experimental "hand-configured" keyset was compared with a static configured keyset. Results were analyzed by a test and discussed in terms of improvements of communication between an operator, his display, and a computer-aided data processing equipment. Illustration of the two keysets were included.
T. I.
- 15,312
Shapiro, A. & Bates, C., Jr. A METHOD FOR PERFORMING HUMAN ENGINEERING ANALYSIS OF WEAPON SYSTEMS. Contract AF 33(616) 5688, Proj. 8(8 7192) & SRI Proj. IU 2568, Task 71838, WADC TR 59 784, Sept. 1959, 68pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Stanford Research Institute, Menlo Park, Calif.).
- 15,312
This report described a weapon system analysis and integration model which was developed to include the system's human elements, and which could be employed as an aid in "analysis, synthesis, evaluation, planning, and management control of weapon systems." A section devoted to using the model describes how it provides "a way for the systems analyst of the systems manager to maintain an integrated overview of a system and to include and contain changes and developments as they appear."
I. R 2

15,313

Parker, J.F., Jr. & Fleishman, E.A. PREDICTION OF ADVANCED LEVELS OF PROFICIENCY IN A COMPLEX TRACKING TASK. Contract AF 41(657) 64, Proj. 1710, Task 71605, WADC TR 59 255, Dec. 1959, 57pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Psychological Research Associates, Inc., Austin, Tex. & Yale University, New Haven, Conn.).

15,313

To investigate relationships between ability variables and progress in learning a complex perceptual-motor skill, to specify the abilities underlying terminal proficiency on a complex control task, and to investigate the way in which the contribution of these abilities to proficiency change over time, 203 subjects were given a large battery of printed and psychomotor apparatus tests. Five performance measures were obtained for each subject. All test scores and criterion (task) measures were transformed into stanines, and intercorrelations obtained between the measures. The matrix of intercorrelations was factor analyzed, and 15 ability factors identified. The authors pointed out relevance of the findings for learning of complex skills, problems in training, and in test development. T. I. R 23

15,316

Campbell, J.W. & Blank, H.E., Jr. EXPERIMENTAL RADAR DATA COMPUTER. Marine News, Dec. 1959, 4pp. (Dunlap and Associates, Inc., Stamford, Conn.).

15,316

This paper discusses the need for improved methods of processing radar data, especially in situations where a ship's watch officer may be heavily loaded with work and failure to use available radar information or misinterpretation of radar data results. Plans for a prototype experimental radar data computer are presented, and the potential values of such a computer are discussed.

I.

15,317

Backlund, F. THE POSSIBILITY OF MEASURING SATIATION. Rep. 6, May 1959, 16pp. University of Uppsala, Uppsala, Sweden.

15,317

Using previous investigations of the strength of the influence that a figure has on its field, the experiments described in this paper were undertaken to quantify satiation as an aspect of figural after-effect. Four experiments were described: in the first a procedure used previously by Nozawa was used in slightly modified form; the second experiment repeated one of Nozawa's experiments, the third introduced modifications into the methods used in the second, and the fourth was carried out with both increasing and decreasing variable stimulus. Results are discussed as they relate to those obtained in other studies.

T. I. R 11

15,320

Uhrig, R.A., Reap, C.J. & Black, D.P. A STUDY OF FACTORS THAT CONTRIBUTE TO THE GENERATION OF MODIFICATION AND MAINTENANCE WORKLOADS. June 1959, 58pp. USAF Air University, Wright-Patterson AFB, Ohio.

15,320

The purpose of this study is to "find, analyze, and recommend ways to reduce the effect of those factors which contribute to the generation of modification, engineering change proposal, and technical order compliance work loads for a weapon system..." The factors are discussed as they exist at various levels of command. Sources of modification and maintenance requirements together with direct and indirect causes are discussed. Procedures and actions used are evaluated and criticized. Recommendations are made for corrective actions for the weapon phasing system.

T. I. R 43

15,322

Gerathwohl, S.S. & Haber, H. A STUDY OF RUNWAY MARKINGS. Proj. 21 02 007, Rep. 2, April 1949, 1-2. USAF School of Aviation Medicine, Randolph AFB, Tex.

15,322

To study the chevron as an aircraft runway marking, two experiments were conducted. Five chevrons differing as to their angle (30, 60, 90, 120, and 150 degrees) were studied by means of a fog simulator to select the most efficient angle. In the second study, the effect of perspective distortion on the appearance of the chevron was studied by means of a changeable angle. The subjects had to form an angle of 60 degrees by free judgment (with a paper model for comparison) while viewing the apparatus both vertically and at a three degree angle. On the basis of this and one previous study a Runway Marking Plan was designed.

G.

15,323

Gerathwohl, S.S. & Haber, H. A PROPOSED RUNWAY IDENTIFICATION LIGHTING SYSTEM. Proj. 21 02 007, Rep. 3, April 1949, 5-6. USAF School of Aviation Medicine, Randolph AFB, Tex.

15,323

A Runway Identification Lighting System is described which converts the daylight marking previously described (15,322) into a self-luminous pattern. Advantages of this system of runway identification are discussed.

15,328

Guignard, J.C. & Travers, P.R. EFFECT OF VIBRATION OF THE HEAD AND OF THE WHOLE BODY ON THE ELECTROMYOGRAPHIC ACTIVITY OF POSTURAL MUSCLES IN MAN. SOME QUALITATIVE OBSERVATIONS. EPRC Memo 120, April 1959, 11pp. Living Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

15,328

The influence of whole-body, head, and limb vibration upon the electromyographic activity of resting and active postural muscles was observed in man. Concentric needle electrodes were used with the Royal Air Force type three electromyograph throughout the experiments. Observations of postural muscle activity were made by cathode ray oscilloscope display and appraised clinically. Frequencies of vibration ranged from 2 to 10 cps and vibrational accelerations from 0.6 to 1.0 g. The resulting observations were discussed and suggestions for further quantitative investigations were made.

I. R 14

15,330

Jones, L.V., Shuford, E.H. & Johnson, E.S. A RATIONAL ORIGIN OBTAINED BY THE METHOD OF CONTINGENT PAIRED COMPARISONS. Contract DA 19 129 QM 1045, Rep. 3, Jan. 1959, 16pp. Psychometric Lab., University of North Carolina, Chapel Hill, N.C.

15,330

The authors described a new paired comparisons method, based on choice between lotteries, for the measurement of subjective values of objects with respect to a rational origin. An experiment is described in which a contingent comparisons questionnaire was administered to 146 subjects who were required to "draw" one of five options representing possible receipt of one of four or no gifts. The method is considered to be a case of decision making under risk, which is defined. Six assumptions are stated on which the model rests. Results are compared with those from an earlier and similar study.

T. G. R 11

15,331

Jenkins, W.O. THE DISCRIMINATION AND REPRODUCTION OF MOTOR ADJUSTMENTS WITH VARIOUS TYPES OF AIRCRAFT CONTROLS. *Amer. J. Psychol.*, July 1947, LX, 397-406. (Indiana University, Bloomington, Ind.).

15,331

The series of studies reported here was concerned with the accuracy with which three groups of 20 blindfolded pilots were able to reproduce pressures ranging from 1 to 50 pounds with stick-type, wheel-type, and rudder-pedal-type controls. The subjects were strapped in a cockpit seat and given practice trials until the desired pressure was approximated, after which test-trials were run for the same pressure and control as that practiced but without the knowledge of results given during practice. A group of 13 non-pilots and two additional groups of pilots were tested with the stick with no practice given to determine the course of learning. Standard deviations, difference limits and constant errors in pounds were analyzed. T. R 1

15,332

Jacobson, H. DEPTH PERCEPTION A LITERATURE SURVEY. Contract NONR 2718(00), M 1453, Aug. 1959, 28pp. Man-Machine Information Center, Washington, D.C.

15,332

The purposes for which this study was undertaken were: 1) to aid interested workers in determining the available literature on depth perception, and 2) to assist the Man-Machine Information Center in serving subcontractors engaged in ANIP, SUBIC, and SURIC programs. The bibliography is in two parts: one covering the period 1940 to the present (1959) and a second extending backwards from 1940 to "the time that the great artists began achieving an acceptable illusion of the three-dimensional world on a two-dimensional surface." Source coverage was given. R 382

15,336

Armour Research Foundation. A STUDY OF THE VENTILATION NOISE PROBLEM IN NAVAL VESSELS. Contract NOBS 54669, Proj. A 024 9, Tech. Rep. 3, March 1953, 48pp. Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill.

15,336

This report presents the octave band analysis of noise measurements taken in 100 compartments of eight vessels of Task Force 86, and 30 compartments of the USS MIDWAY (CVB-41). The data are presented in terms of median overall and octave band sound pressure levels for each compartment (median levels determined from the set of noise measurements taken at different times). Comparisons are made of the collected noise spectra of compartments of different type vessels, of the variation of spectra levels with time, and of the media spectra for different types of compartments. The results are related to design problems. T. G. 1.

15,345

Nail, M.L. SUBMARINE HABITABILITY: A LITERATURE SURVEY (1951-1959) A. ATMOSPHERIC CONTROL B. PERFORMANCE UNDER STRESS. Contract NONR 2718(00), May, 1959, 31pp. Man-Machine Information Center, Documentation Incorporated, Washington, D.C.

15,345

This report presents a bibliographic sampling of reference items assembled in a literature study on submarine habitability from 1951 to date. The two-fold purpose of this search is given as 1) to define the scope of a short-range approach to screening the literature, and 2) to determine pertinent monographs, journal articles, and reports to be acquired and processed for the storage and retrieval system of the Man-Machine Information Center, which will be utilized in reference service to the subcontractors in the SUBIC (Submarine Integrated Control) program. The items given here have been classified on the basis of title into broad subject classes: atmospheric control and performance under stress. R 400

15,346

Nail, M.L. NOISE LEVELS IN AIRCRAFT. WORKING BIBLIOGRAPHY. Contract NONR 2718(00), April 1959, 6pp. Man-Machine Information Center, Documentation Incorporated, Washington, D.C.

15,346

This bibliography on noise levels in current aircraft contains references on the following major areas: noise fields, biological and psychological effects of high intensity sound, speech intelligibility as affected by aircraft type noise, and selected bibliographies. 1 68

15,348

USN Physiological Psychology Branch. BIBLIOGRAPHY OF RESEARCH REPORTS 1 JANUARY 1947 - 1 JANUARY 1954. March 1954, 36pp. USN Physiological Psychology Branch, ONR, Washington, D.C.

15,348

This is a Bibliography of technical reports from research projects completed under the auspices of the USN Physiological Psychology Branch, Office of Naval Research. The reports are cumulative to 1 January 1954 and are listed in order of publication date under the respective research contract numbers. R 500 (approx.)

15,349

Pepinsky, H.B., Pepinsky, Pauline N., Minor, F.J. & Robin, S.S. TEAM PRODUCTIVITY AND CONTRADICTION OF MANAGEMENT POLICY COMMITMENTS. Reprint 11, Nov. 1959, 5pp. Engineering Experiment Station, Ohio State University, Columbus, Ohio. (Reprinted from *J. appl. Psychol.*, 1959, 43(4), 264-268).

15,349

In an experiment designed to test the influence of group structure on team productivity in a simulated industrial setting, 20 four-man teams were divided into ten consecutive team pairs. Each member of a pair was subjected to either 1) a condition in which subsequent events contradicted the team's expectations of management, or 2) a condition in which expectations were confirmed. Results were discussed 1) as they related to the hypothesis that confirmation teams would be the more productive, and 2) in terms of alternative rationales. Theoretical implications of the experiment were suggested. T. R 8

15,352

Pollack, I. "LONG-TIME" DIFFERENTIAL INTENSITY SENSITIVITY. *J. acoust. Soc. Amer.*, March 1955, 27(2), 380-381. (USAF Operational Applications Lab., AFRC, Washington, D.C.).

15,352

This note considered the differential intensity threshold for noise bursts made over "long" (one-half, one, three day, and longer periods) time intervals. In a given 30-second sitting a listener was presented three five-second noise bursts. The sound level of the first was judged relative to the last signal heard in the previous session; the second sound level was then judged relative to the first; and the third was the reference signal for the next experimental session. The over-all reference level was 90 db sound pressure level. Long- and short-term judgments were compared graphically. G.

15,354
Ramo, S. THE GUIDED MISSILE AS A SYSTEMS ENGINEERING PROBLEM. Canada Aeronaut. J., Jan. & Feb. 1957, 3(1 & 2), 3-9, 37-43. (Ramo-Wooldridge Corp., Los Angeles, Calif.).

15,354
This paper first discusses systems engineering rather broadly, indicating the common characteristics of complex engineering systems and the factors that usually must play a large part in system invention and design. Particulars are then added in the exploration of systems engineering by reference to the guided missile art. Finally, the way to improve our ability to invent and design engineering systems is discussed.

15,361
Baker, C.H. & Lavery, J.J. PERFORMANCE DURING TRAINING AS A CRITERION OF RETENTION OF MOTOR SKILLS. ca. 1952, 28pp. Defense Research Board of Canada, Toronto, Ontario, Canada.

15,361
Two experiments were undertaken: 1) to determine a) the effect of varying amounts of practice with error feedback on subsequent retention, and b) whether the degree of subsequent retention is a function of time; and 2) to study a technique for presenting error feedback in a novel way in order to enhance subsequent retention. In the first experiment, four groups of 12 Ss each were required to draw lines of a stated length while blindfolded. Error feedback was a statement of "right" or "wrong." Experimental conditions varied for each of three groups; the fourth group served as control. Effect of the form of error feedback provided during training on subsequent retention was investigated and implications of results for the design of simulators were discussed.
T. G. R 11

15,365
Haight, F.A. THE GENERALIZED POISSON DISTRIBUTION. Reprint 80, Aug. 1959, 5pp. Institute of Transportation and Traffic Engineering, University of California, Los Angeles, Calif.

15,365
The assumption of random distribution of arrival times of cars in a study of vehicular traffic was found to be unsatisfactory because: 1) very small gaps do not occur as frequently as theory requires, and 2) some interference between vehicles exists which introduces an element of regularity into arrival times. Alternative models were discussed: Feller's model for Type I particle counter and Gerlough's suggestion to translate the negative exponential distribution away from the origin. A Type III distribution was suggested and was developed as a more satisfactory type of solution.
T. R 8

15,366
Haight, F.A. TWO QUEUES IN PARALLEL. Reprint 70, 1958, 10pp. Institute of Transportation and Traffic Engineering, University of California, Los Angeles, Calif. (Reprinted from: Biometrika, Dec. 1958, 45, 401-410).

15,366
"The method of differential-difference equations is used to investigate the case in which each arrival to a system of two queues joins the shorter queue, or, if they are of equal length, one particular queue. In case each person must remain in the queue which he originally joins, relations are obtained between the asymptotic state probabilities. If queues are permitted to change queues whenever it seems advantageous to do so, the formulation is simplified, and explicit expressions are obtained."
R 1

15,367
Haight, F.A. OVERFLOW AT A TRAFFIC LIGHT. Reprint 78, 1959, 5pp. Institute of Transportation and Traffic Engineering, University of California, Los Angeles, Calif. (Reprinted from: Biometrika, Dec. 1959, 46, 420-424).

15,367
Under the assumption of continued input in every circumstance except zero queue length, the probability is computed of Z cars being in the queue at the beginning of a red phase of fixed cycle lights when there were X cars in the queue at the beginning of the preceding green phase. The case of traffic along a main street into a signalized intersection which is governed by a light possibly actuated by side street traffic is also considered.
R 5

15,368
Haight, F.A. QUEUEING WITH RENEGING. Reprint 74, 1959, 14pp. Institute of Transportation and Traffic Engineering, University of California, Los Angeles, Calif.

15,368
This paper considers a queue in which a person who has joined it may decide to leave if it appears that the time consumed will exceed the time he has available. Three specific problems are treated: 1) How to make a rational decision while waiting in a queue, 2) The probable effect of this decision, and 3) The behavior of a queue in which all persons are employing such a procedure.
G. R. 10

15,369
Haight, F.A. TOWARDS A UNIFIED THEORY OF ROAD TRAFFIC. REPRINT 68, April 1958, 14pp. Institute of Transportation and Traffic Engng., University of California, Los Angeles, Calif. (Reprinted from: Operations Res., Nov.-Dec. 1958, 6(6), 813-826.).

15,369
Three types of descriptive theories of vehicular traffic (vehicles treated individually, statistically, or as particles satisfying a certain partial differential equation) are treated briefly. It is indicated how the three methods correspond to different types of traffic situations and how the properties common to each type are dealt with. The operating speed y of a car is a function of desired speed x and traffic density λ , where x and y are random variables and λ a real parameter. Relationships are proposed between the distributions of x and y and quantities which occur in empirical studies of traffic. It is postulated that for large λ queueing theory may be usefully employed, and several necessary modifications are discussed.
I. R 35

15,371
Kelly, J., Dennen, W. & Martel, R. RESEARCH REPORT AN EXPERIMENTAL STUDY OF VARIABLES ASSOCIATED WITH THE LEARNING OF MORSE CODE PART I. Oct. 1958, 16pp. Educational Methods & Evaluation Dept., USA Security Agency School, Fort Devens, Mass.

15,371
In an effort to select and utilize the most efficient and practical methods of training Morse Code operators, an investigation was conducted of variables in the learning situation that were judged to be of singular importance to the outcome of training in the job situation: 1) incorporation of actual job features into initial training, 2) diversification of teaching techniques, and 3) overlearning. Three groups of enlisted students in the USA Security School, equated on general ability on General Technical Score (Army General Classification Battery) and code aptitude, were trained to receive International Morse Code by three different instructional techniques designed to test the variables. An evaluation of variable (1) was reported here. (See also 15,372).
T. G.

15,372
Bally, J., Janner, M. & Martel, R. RESEARCH REPORT
AN EXPERIMENTAL STUDY OF VIBRATIONS ASSOCIATED WITH
THE LANDING OF WHEAT CERE FROM THE
SUBSISTENCE METHODS & Evaluation Dept., USA, Security
Agency School, Fort Devens, Mass.

15,373
This was a continuation of the study reported in
15,371. On variables associated with the landing of Wheat
Cere. The second and third variables—diversification of
training techniques and overloading—were reported here.
Data from the three training groups were used in
evaluating the effects of the first and second variables.
All three groups were administered a series of standard-
ized tests to evaluate the effect of overloading.
T. G. 2

15,374
Lowless, R.E. ATTENTION TO INDIVIDUAL CHANNELS IN A
BIBRARY EXPERIMENTAL. AFRC Memo 129, Sept. 1959,
App. Elmsford Personnel Research Committee, London,
England. (Sheffield Department of Industrial Health,
University of Durham King's College, Newcastle-on-Tyne,
England).

15,375
An earlier experiment showed that a higher rate of
signal detection was obtained when signals were simulta-
neously presented through vision and audition than
were obtained from either channel alone. Some Ss were
reported to have had initial difficulty in using the
bimodality presentation. This experiment attempted to
determine whether the difficulty lay in attending to
both signal sources at once. The same apparatus was
used as before by which signals in the two channels were
derived from a common source and were of equal signal
level; signals in each channel could be separately con-
trolled. Three groups of Ss served under one of the
following conditions: visual or auditory signals alone
and both single and double signals. Rates of signal de-
tection were compared. T. R. 1

15,376
Levin, M.C., Schoeller, M. & Gerstner, H.B. INITIAL
CLINICAL REACTION TO THERAPEUTIC WHOLE-BODY X-RADI-
TION - SOME CIVIL DEFENSE CONSIDERATIONS. Rep. 60 1,
Nov. 1959, App. USAF School of Aviation Medicine,
Brooks AFB, Tex. (Medical Branch, University of Texas,
Galveston, Tex.).

15,377
This report describes early clinical events displayed
by 11 cancer patients after whole-body x-ray treatment
in a single large dose and compares these events with
published reports of "radiation sickness" with acute se-
quelae observed in nuclear accidents. The potential role
of early radiation-induced response in nuclear disasters
is evaluated.
T. R. 14

15,384
Licklider, J.C.R., Christman, R.J. & Guttman, M. ON
JAMMING SPEECH COMMUNICATION WITH COHERENTLY AMPLITUDE-
MODULATED INTERFERENCE. Contract AF 18(600) 1219,
AFRC IN 57 58, Oct. 1957, 22pp. USAF Operational
Applications Lab., Bolling AFB, Washington, D.C.
(Massachusetts Institute of Technology, Cambridge,
Mass.).

15,384
Two ways of achieving the goal of speech intelli-
gibility to friendly and unintelligibility to enemy ears
were investigated. In both techniques an interfering sig-
nal was superimposed upon the speech signal which, when
removed, left the speech intelligible. The two techniques
were based on different strategies for shaping the inter-
ference to impair intelligibility, and each is described
and illustrated.
G. I. R. 3

15,385
McIntosh, J.L., Day, D.J. & Beckner, E.L. INVESTIGATION
DURING THE PROBLEM OF CANOPY OPENING IN ESCAPE FROM
DOWNED AIRCRAFT. Tech. Rep. IN 257, AFRC Paper 1961,
Sept. 1959, 3pp. Royal Aircraft Establishment,
Farnborough, Hants, England. (RAF Institute of Aviation
Medicine, Farnborough, Hants, England).

15,386
This report presented a re-evaluation of the problem
of canopy ejection from a submerged aircraft. When an
aircraft has ditched and submerged with the canopy closed,
the canopy may be forcibly held shut by the water pressure
load. A theoretical analysis of the problem was made and
preliminary trials conducted to evaluate the factors which
prevent ejection of the canopy. The time required for
a subject to eject the canopy manually after the air-
craft had submerged to 35 feet was determined. Recommen-
dations were included.
T. G. 1. R. 3

15,390
Moser, R.M., Decker, J.J., O'Sullivan, J.J. & Adler, S.
A COMPARISON OF SINGLE- AND DOUBLE-BOUNCE TRANSMISSION
UPON THE INTELLIGIBILITY OF OPERATIONAL WORDS. Contract
AF 18(600)1316, AF Proj. 519, Tech. Rep. 30 & AFRC IN
55 66, May 1959, App. Ohio State University Research
Foundation, Columbus, Ohio.

15,391
This study extends previous studies of the effects of
voluntary stuttering upon the transmission of two-digit
numbers and single words. A "double-bounce" type of
transmission was employed to investigate the hypothesis
that no difference would be found in articulation scores
between "single-bounce" and "double-bounce" transmission
of single words. Material recorded by a male speaker
consisted of 50 words randomized into six lists of 50 test
items each. Ten listeners were trained on practice lists
using non-stuttered speech. Intelligibility scores for
the two types of transmission were compared.
T. G. R. 5

15,392
Steiner, S.H. STANDARDIZATION OF AN ENDPOINT TO POSI-
TIVE ACCELERATION ON THE HUMAN CENTRIFUGE. Proj. 7222,
Task 71746, WDC IN 59 426, Dec. 1959, 8pp. USAF Aero-
space Medical Lab., Wright-Patterson AFB, Ohio.

15,395
To establish an objective and standardized endpoint
for positive acceleration experiments, a comparison was
made of blackout thresholds to a red filtered light of
760 mμ, raised 0.5 log units above the visual threshold
in dark adapted subjects and to a white light in the
same subjects. Differences among the subjects as well
as differences between the two lights were analyzed.
The variability of results from centrifuge to centrifuge
was discussed together with physiological implications,
advantages, and possible sources of error.
T. G. R. 7

15,399
Torgersen, P.E. AN EXAMPLE OF WORK SAMPLING IN A HOS-
PITAL. Reprint 12, Nov. 1959, 4pp. Engineering Experi-
ment Station, Ohio State University, Columbus, Ohio.
(Reprinted from J. Industrial Engng., May-June 1959, 197-
200).

15,399
This article illustrates with a case study two of
the newer applications of work sampling: 1) analysis of
human activities in a setting somewhat alien to the in-
dustrial engineer and 2) measurement of performance in
professional work groups. The example given concerns a
work sampling of the work of the registered nurse in a
hospital. A step-by-step description is given of the
preliminary work and the manner of making the observa-
tions. The data from 1600 observations are presented in
tabular form and used to point up the possibilities of
work sampling in this type of situation.
T. R. 7

15,404
Walsack, J.W., Crook, Doreen J. & McBride, P.I.
STUDIES ON DARK ADAPTATION EXPERIMENTS I, II, AND III -
THE PRE-EXPOSURE TOLERANCE OF THE HUMAN FOVEA ADAPTED
TO DIFFERENT BRIGHTNESS LEVELS, INCLUDING DARKNESS.
FINAL REPORT PERIOD: 1 SEPTEMBER 1952 - 30 AUGUST 1953.
Contract AF 30(632) 195, DARC TR 54 26, Oct. 1954, 34pp.
WAFB Rome Air Development Center, Griffiss AFB, N.Y.
(Institute for Applied Experimental Psychology, Tufts
University, Medford, Mass.).

15,402
The effect on foveal dark adaptation of pre-exposure
of the eye for brief durations to light of relatively low
brightness was investigated. Monocular measurements
were made of both absolute brightness sensitivity (R)
and difference or contrast sensitivity (DE), using a one-
degree square centrally-fitted test patch. The three
experiments dealt with 1) the pre-exposure tolerance of
the dark-adapted fovea, 2) the pre-exposure tolerance of
the fovea adapted to different brightness levels, and 3)
the pre-exposure tolerance as measured by contrast sensi-
tivity. Pre-exposure brightnesses ranged from 0.10 to
100 fcd/l and duration from 1 to 100 seconds. Adaptation
levels of 0.10, 1.0, and 10 fcd/l were used.
T. G. I. R 14

15,403
Chase, R.A., Norvey, S., Standfest, Susan, Rapin, I.
J., et al. STUDIES ON SENSORY FEEDBACK: THE
EFFECT OF DELAYED AUDITORY FEEDBACK ON SPEECH AND KEY-
TAPPING. Aug. 1959, 25pp. Communications Lab., De-
partment of Biometrics Research, New York, N.Y. (Colum-
bia University College of Physicians and Surgeons, New
York, N.Y.).

15,403
Assuming that alteration in sensory feedback infor-
mation would result in change in motor performance in
question, the present investigation sought to answer:
1) are changes in time and intensity of speech and key-
tapping under Delayed Auditory Feedback (DAF) qualita-
tively the same for the two motor systems? 2) does the
same DAF result in more change in motor performance for
one system than for the other? 3) does the amount of
change in a subject's performance under DAF in the two
modalities correlate? Fourteen subjects were asked to
repeat the sound "b" in groups of three sounds under
normal and delayed feedback. They were also asked to
tap on a key in groups of three under the same condi-
tions.
T. G. I.

15,406
Dempster, W.T., Cabel, W.C. & Felts, W.J.L. THE ANTHRO-
POMETRY OF THE MANUAL WORK SPACE FOR THE SEATED SUBJECT.
Amer. J. phys. Anthropol., Dec. 1959, 11(4), 289-317.
(Department of Anatomy, University of Michigan, Ann
Arbor, Mich.).

15,408
The anthropometry of the manual work area was ap-
proached by an indirect method using photographic records
of time exposures showing the motions of a tiny neon lamp
at the hand grip. The records of 22 seated male subjects
were analyzed for eight sets of motions involving the for-
ward-directed hand and different grip orientations. The
limits of space within reach relative to the mid-sagittal
junction of the seat and chair back were defined. Vari-
ability data were obtained from the graphical records of
the different hand-range spaces. The findings are dis-
cussed in relation to the geometry of the more effective
hand positions and in relation to practical problems of
work space designing.
T. G. I. R 48

15,409
Elliot, P.R. TABLES OF D'. Contract AF 19(504) 2277,
2009 7 T, Tech. Rep. 97 & AFMRC TR 59 56, Oct. 1959,
43pp. Dept. of Electrical Engineering, University of
Michigan Research Institute, Ann Arbor, Mich.

15,409
Tables of d' for yes-no and forced-choice experiments
are presented in this report together with explanations
and assumptions involved in the calculations. The tables
were compiled for use in a specific type of experiment in
signal detectability in which a single signal with fixed
probability of occurrence is transmitted over a channel
with band-limited white Gaussian noise.
T. G. R 3

15,411
Frances, A.S. THE PERSONNEL PROBLEMS OF OFFICE AUTO-
MATION. Dunlap and Associates, Inc., Stamford, Conn.
(Reprinted from The Office, Dec. 1959, 4pp.).

15,411
This article discusses the personnel conversion
operations needed when automatic equipment is installed
in an office. A model is presented which covers most of
the personnel problems to be expected and the methods of
using the model are discussed. The advantages of a
systematic procedure for determining the basis for person-
nel conversion are pointed up.
T.

15,412
Gullford, J.P., Berger, R.W. & Christensen, P.R. A
FACTOR-ANALYTIC STUDY OF PLANNING. I. HYPOTHESES AND
DESCRIPTION OF TESTS. Rep. 10, July 1954, 28pp.
Psychological Lab., University of Southern California,
Los Angeles, Calif.

15,412
The first phase of an attempt to isolate and define
abilities that may be important in the domain of plan-
ning was reported. Upon the basis of a review of the
literature, four hypotheses were formulated as to fac-
tors to be expected in terms of the classes of activi-
ties involved in the various stages of planning. These
were 1) orientation, 2) prediction, 3) elaboration, and
4) ordering. Two additional qualitative factors were
posed: 5) ingenuity, and 6) evaluation. Tests were con-
structed, adapted, or selected to test the hypotheses;
31 tests were so chosen. A later report will give the
results of administration and analysis of the tests.
T. R 15

15,420
Howland, D. APPLICATION OF OPERATIONS RESEARCH TO
HIGHWAY PROBLEMS. Reprint 8, Jan. 1959, 9pp. Engin-
eering Experiment Station, Ohio State University,
Columbus, Ohio. (Reprinted from Highway Res. Bd.
Proc., 1958, 37, 72-80).

15,420
The basic character of operations research is des-
cribed briefly as an attempt to conceive of specific prob-
lems as problems in the area of decision theory. In terms
of this characterization, a question is raised regarding
the role of operations research in the analysis of high-
way problems. Some examples of the application of this
type of research to highway problems are given. This ap-
proach is compared with the traditional approach to high-
way problems. Some advantages as well as the difficul-
ties associated with the use of operations research in
this manner are pointed out.
R 11

15,421

Velasquez, T. CORRELATION BETWEEN ALTITUDE AND CONSCIOUSNESS TIME IN HIGH-ALTITUDE NATIVES. Sep. '60 8, Dec. 1959, 10pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Institute of Andean Biology, Dept. of Pathological Physiology, Faculty of Medicine, Lima, Peru).

15,421

The consciousness time was determined after withdrawal of oxygen supply at 32,000, 34,000, 36,000, 38,000, and 40,000 feet of simulated altitude, in high-altitude natives, residents of Moracocha, located at 14,900 feet. A correlation curve between level of altitude and consciousness time was derived from the results. The endpoint used corresponded to the time of "imminent unconsciousness."

T. G. I. R:7

15,425

Benson, A.J. & Dearnaley, E.J. ESTIMATES OF ABILITY DURING ITERATIVE PERFORMANCE OF A FATIGUING TASK AND MEASURES OF ELECTROMYOGRAPHIC ACTIVITY IN A MUSCLE GROUP NOT DIRECTLY INVOLVED. Rep. 1092, July 1959, 1pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

15,425

To examine the relationship between EMG activity while Ss attempted to maintain a constant tension on a double-handled isometric myograph for as long as possible and estimates made by the Ss of how long they could continue, the integrated EMG was recorded from the left gastrocnemius soleus muscle group during three separate pulls separated by a five-minute rest. Each S was instructed to pull as long as he could and to estimate before and at 15-sec. intervals how long he could maintain the tension; duration of pulls, estimates of duration, and EMG were analyzed for relationships with fatigue, learning, and personal data items.

T. G. R 10

15,426

Benson, A.J. & Dearnaley, E.J. ESTIMATES OF ABILITY DURING A FATIGUING TASK WITH AND WITHOUT COMPETITION AND MEASUREMENT OF ELECTROMYOGRAPHIC ACTIVITY IN MUSCLE GROUPS NOT DIRECTLY INVOLVED. Rep. 1089, Feb. 1959, 13pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

15,426

The experiment reported here was a preliminary inquiry into two possible approaches to the general problem of fatigue and motivation: 1) the measurement of electromyographic activity in muscles not engaged in the primary task, and 2) subjective estimates of performance. In ten subjects the integrated electromyogram was recorded from the left gastrocnemius soleus muscle group while the subject attempted to maintain a tension of ten kilograms on a double handled isometric myograph. Experimental conditions were: 1) the tension achieved was not displayed, 2) the tension developed was displayed, 3) tension was displayed and an award was made for maximum duration and accuracy. Estimates of pull duration were made before (and at 15-minute intervals) each pull.

G. I. R 18

15,433

Colman, H.J. A HUMAN FACTORS STUDY OF THE INTEGRATED VISUAL APPROACH AND LANDING AIDS (IVALA) SYSTEM. AFRC TR 59 52, Dec. 1959, 96pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

15,433

This report presents the results of a human factors study of the visual approach and landing aids system installed at Dow Air Force Base, Maine. An evaluation is reported of the following components for their capability in providing pilots with sufficient visual guidance to complete a landing under any visibility conditions: Narrow Gauge Lighting System, Configuration "A" Approach Lighting System, Centerline Runout Lighting System, and Transverse Roll Guidance Bars. A comparative evaluation of Configuration "A" Approach Lighting System with the system installed at Westover Air Force Base, Massachusetts, is also reported. Recommendations are included.

T. I. R 24

15,436

Dearnaley, E.J. CHANGES IN ESTIMATES OF PERFORMANCE INDUCED BY THE THREAT OF RECEIVING AN ELECTRIC SHOCK IF THE ESTIMATES ARE NOT ACHIEVED. AFRC Memo 12, Oct. 1959, 5pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

15,436

To investigate how estimates of time for which it is possible to continue a difficult task would be affected by some element of danger if estimated performance was not achieved, 18 male subjects each made three attempts, separated by five-minute intervals, to maintain a tension of ten kilograms (± five per cent) on a double handled isometric myograph for as long as they could. Before his second and third attempt, each subject was asked to estimate his performance in time units; the threat of electric shock for failure to achieve the estimate was made for one of the last two trials. Estimates, expressed as percentage of previous performance, were studied for condition of threat of punishment vs. no-threat.

T. R 6

16,045

Stevens, S.S. MEASUREMENT, PSYCHOPHYSICS, AND UTILITY. Reprinted from "Measurements Definitions and Theories," 1959, 18-63. John Wiley and Sons, New York, N.Y. (Psychological Lab., Harvard University, Cambridge, Mass.).

16,045

The author discusses problems in the definition of measurement and reviews the classical view. Five kinds of scales of measurement are discussed and statistical measures appropriate to measurements made on the various classes of scales presented. The problem of measurement of subjective magnitude is raised and various psychophysical methods are presented. Problems involved in the measurement of utility are raised, and three approaches to the problem of measuring utility are considered. Objections to each approach are discussed.

T. G. R 46

16,054

Newman, E.B. & Miller, G.A. FINAL REPORT. Contract AF 33(038) 14343, AFRC TR 60 50, Dec. 1959, 55pp. Psychological Labs., Harvard University, Cambridge, Mass.

16,054

This final technical report lists all work done and papers published in fulfillment of contracts with the Air Force to investigate the pattern of behavior in a communication system. The report includes a full list of personnel, chronology, a list of the 12 projects which were supported, and a list of publications (18 plus 19 status reports). Appendix A contains reports of experiments which were conducted to study quantitatively the information that a brief exposure makes available to an observer.

T. G. I. R 94

16,055

Newman, E.B. MEN AND INFORMATION: A PSYCHOLOGIST'S VIEW. Nuovo Cimento, 1959, 13(X), 539-359. (Psychology Dept., Harvard University, Cambridge, Mass.). (AFRC TR 6051).

16,055

When man is viewed as a communication system, certain questions regarding his capabilities as compared with those of channels such as the telephone or TV arise. Problems which arise when an informational analysis of human behavior is attempted are discussed, and findings are presented concerning: 1) human limitations and capacities for obtaining information from single perceptual displays, 2) perceptual capacity in real time, 3) channel capacity in motor output, 4) memory, and 5) learning.

G. I. R 20

16,056

Layman, R.S. & Christner, Charlotte A. HUMAN ENGINEERING. Battelle Tech. Rev., Jan. 1957, 1-5. (Battelle Memorial Institute, Columbus, Ohio).

16,056

This brief survey of human engineering discusses the history of problems of man-machine relationships, the nature of human engineering, human engineering and psychology, industrial applications of human engineering, contributions of human engineering to human welfare, and problems of automation.

I.

16,057

USN Office of Naval Research. NAVAL HUMAN ENGINEERING BULLETIN. No. 39, Oct. 1959, 10pp. USN Office of Naval Research, Washington, D.C.

16,057

This publication includes a brief report of the Human Engineering Conference, with notes from the keynote address on future roles of human factors in electronics. Thirty-one unclassified GNR code 495 reports are listed, covering all reports received since publication of the last bulletin. The reports cover a wide variety of human engineering problems, including surveillance and manned space flight studies.

R 31

16,058

Bond, G.F. SUMMARIES OF RESEARCH REPORTED ON DURING CALENDAR YEAR 1959. Dec. 1959, 19pp. USN Medical Research Lab., New London Submarine Base, Conn.

16,058

Twenty summaries of research conducted at the Naval Medical Research Laboratory during the calendar year 1959 are presented in this report. Titles of three reports issued as memorandums are also given. Reports of research in the following areas are among those included: audition, vision, submarine and space cabin atmosphere, and patterns of reaction to stress.

R, 23

16,064

Freedman, S.J., Grunebaum, H.U. & Greenblatt, M. PERCEPTUAL AND COGNITIVE CHANGES IN SENSORY DEPRIVATION. Contract AF 33(616) 3663, National Institute of Mental Health Research Grant M 1863, June 1958, 17pp. Dept. of Psychiatry, Harvard Medical School, Boston, Mass. & Brandeis University, Waltham, Mass.

16,064

To compare the effects of visual and auditory "non-patterning" under social isolation conditions with social isolation alone, 26 subjects were subjected to an eight-hour experimental session. Subjects were divided into two groups, one of which received continuous non-patterned visual and auditory stimulation and one which was socially isolated but with vision, audition and touch remaining unimpaired. Differences in performance scores were analyzed for significance of these variables on perceptual distortion, visual input, auditory input, motility, and social interaction. A theoretical formulation was proposed for the understanding of distortion.

T. I. R 16

16,091

Ramo, S. ICBM: GIANT STEP INTO SPACE. Astronautics, Aug. 1957, 34-41, 83-88. (Ramo-Woolridge Corp., Los Angeles, Calif.).

16,091

The long range ballistic missile program is described. Past and future developments are discussed in terms of technical know-how and of management. The history of guided missile development is summarized. Both intercontinental and intermediate-range ballistics are discussed.

I.

16,092

US Government Printing Office. SECOND SEMIANNUAL REPORT OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION COVERING THE PERIOD APRIL 1, 1959, THROUGH SEPTEMBER 30, 1959. March 1960, 164pp. US Government Printing Office, Washington, D.C.

16,092

This report covers the period April 1 through September 30, 1959. Activities are listed and described chronologically and include the descriptions of activities in the following areas: 1) the space flight program: operational missions, space vehicle program, manned flight, research, satellite applications, sounding rocket development, international cooperation, and tracking and data systems; 2) advanced aeronautics and space research: propulsion and power generation, control and guidance of craft, materials and structures, fluid mechanics, space and aircraft aerodynamics, and operations and environment; 3) organizations and supporting activities. Publications prepared during this period are listed.

T. I. R 140 (approx.)

16,093

Pollack, I. ASSIMILATION OF SEQUENTIALLY ENCODED INFORMATION. Amer. J. Psychol., July 1953, 66(3), 421-435.

16,093

This paper presents a methodology for use in studying verbal learning which is based on the theory of information. The approach allows an objective quantification, in units not specific to the particular experimental operations considered, of 1) the learning materials used (the informational input), 2) the information lost (the error output), and 3) the information gained (the difference between 1 and 2). It is contended that by using such units comparisons can be made of the results of a diversity of experiments. An illustrative experiment in learning designed to fulfill the methodological requirements is reported and the results considered briefly.

G. I. R 20

16,094

Egan, J.P., Greenberg, G.Z. & Schulman, A.I. OPERATING CHARACTERISTICS. SIGNAL DETECTABILITY, AND THE METHOD OF FREE RESPONSE. Contract AF 19(604) 1962, AFRC TR 59-58, Dec. 1959, 54pp. Hearing and Communication Lab., Indiana University, Bloomington, Ind.

16,094

This paper reports experiments concerned with the detection of signals presented at random times. Using the method of free response, it was assumed that the listener divides time into a succession of subjective temporal intervals and that these implicitly define a trial. The further assumption was made that the listener's criterion is associated with a particular point on a particular operating characteristic. The problem was to establish a relation between measures of the number of responses per signal and the assumed critical probabilities. Data were obtained from seven listeners in one experiment and from four in a second. Limitations in the method of analysis are discussed. An additional analysis was made of the data in which only the first response made after each signal was tabulated.

T. G. R 7

16,095

Egan, J.P. RECOGNITION MEMORY AND THE OPERATING CHARACTERISTIC. Contract AF 19(604) 1962, AFRC TR 58-51, June 1958, 32pp. Hearing and Communication Lab., Indiana University, Bloomington, Ind.

16,095

The problem of locating and defining the role of a criterion in the behavior of the individual is troublesome. Confidence ratings in judgments are related to a posteriori probability of the occurrence of a particular stimulus, given a particular response. The operating characteristic can be used to display the degree to which the subject can partition the stimuli by his ratings. The present study attempts to show how the operating characteristic may be applied in the study of recognition memory. The purpose of the experiments was to determine the form of the operating characteristic for recognition memory. Forty-eight subjects participated in two experiments. The shape of the operating characteristic for recognition was analyzed for individuals and averaged for subjects with similar performance.

T. G. R 11

16,096

Egan, J.P., Schulman, A.I. & Greenberg, G.Z. OPERATING CHARACTERISTICS DETERMINED BY BINARY DECISIONS AND BY RATINGS. *J. Acoust. Soc. Amer.*, June 1959, 31(6), 768-773. (Indiana University, Bloomington, Ind.).

16,096

The theory of signal detectability is discussed as it relates to the study of the detectability of a signal by listeners. A measure of performance is derived which is relatively independent of the procedure employed and which is also unaffected by circumstances which can influence the criterion adopted by the listener. Two psychophysical experiments were performed in which the performance of listeners using multiple criteria was compared with performance in which a single criterion was required. In the second experiment, using the rating method alone, the relation between the measure of performance and the ratio of signal energy to noise power per unit bandwidth was investigated.
T. G. I. R 11

16,097

Bishop, A.B. A MODEL FOR OPTIMUM CONTROL OF STOCHASTIC SAMPLED-DATA SYSTEMS. Reprint 4, Nov. 1957. Engineering Experiment Station, Ohio State University, Columbus, Ohio. (Reprinted from: *Operat. Res.*, Aug. 1957, 5(4), 546-550).

16,097

This paper reports a model developed for a "sampled-data feedback control system for processes having randomly-distributed outputs or involving measurement techniques that introduce a significant component of variance in the measured values of the controlled variable. ... The method of derivation involves successive operations on the normal probability density function. The effects on system response..., oscillatory tendencies and system variance of various values of the constant... are discussed." Two classes of criterion function are also mentioned from which optimum values of the proportionality constant can be determined.
T. R 2

16,098

Howland, D. THE HUMAN AS A MONITOR IN A MAN-MACHINE SYSTEM. Reprint 7, Oct. 1958. Engineering Experiment Station, Ohio State University, Columbus, Ohio. (Reprinted from: *News in Engng.*, Oct. 1958, 23-29).

16,098

This study investigated 1) the gradual decrease in performance as measured by failure to detect signals over long-time intervals and 2) development of a better understanding of the process by which a decision is made as to whether some aspect of a situation has changed or not. Two groups of 12 subjects observed sequences of reading with minimum time-lag for a four-hour period. To investigate the hypothesis that log-keeping would reduce error, one group was required to maintain a written record of readings. The data were discussed within the framework of a feedback control model.
G. I. R 9

16,099

Howell, W.C. & Briggs, G.E. INFORMATION INPUT AND PROCESSING VARIABLES IN MAN-MACHINE SYSTEMS: A REVIEW OF THE LITERATURE. Contract N61339 508, NAVTRADEVEN 508 1, Oct. 1959, 71pp. USN Training Device Center, Port Washington, N.Y. (Ohio State University, Columbus, Ohio).

16,099

This survey was undertaken for the purpose of providing recommendations for the handling of information by various sensory systems. The report covers: 1) sensory input variables—comparison of human sensory mechanisms, variables involving realistic distortion of input information, and problems in the detection of visual signals; 2) information-processing variables—amount and distribution of input information, prediction and extrapolation of input information, and the quantifying of human information processing; and 3) display-control relationships.
R 245

16,103

Corbin, H., Carter, J., Reese, E.P. & Volkmann, J. (Eds.). EXPERIMENTS ON VISUAL SEARCH 1956-1957. FINAL REPORT. I. AIDS TO THE IDENTIFICATION OF CONVERGING GROUPS. Contract AF 19(604) 1713, Task I, AFRC TR 57 59, July 1958, 11pp. Psychophysical Research Unit, Mount Holyoke College, South Hadley, Mass.

16,103

This is the third in a series of experiments concerned with the speed and accuracy of identifying converging groups of objects. Ss were shown series of displays of dots; on each successive display, every dot was displaced slightly; certain dots converged on the last display while others moved on random courses. Previous experimentation showed this to be a difficult task; this experiment was designed to test possible aids: 1) markings made by S on plastic overlay, 2) destination points marked in the display, 3) rings drawn around point of convergence, and 4) arrows attached to each dot indicating direction of movement. Applications of the results to practical identification problems were suggested.
G. I. R 1

16,104

Corbin, H., Carter, J., Reese, E.P. & Volkmann, J. (Eds.). EXPERIMENTS ON VISUAL SEARCH 1956-1957. FINAL REPORT. II. SPEED AND ACCURACY OF SEARCH FOR TARGETS IN A HORIZONTAL ARRAY. Contract AF 19(604) 1713, Task II, AFRC TR 57 59, July 1958, 10pp. Psychophysical Research Unit, Mount Holyoke College, South Hadley, Mass.

16,104

Three experiments were accomplished on the ability of observers to spot targets that appear suddenly on the scene. The basic task in all studies was to search for a small dot of light which might appear anywhere on a curved "horizon" line in the visual field. In the first study, Ss searched for targets over five values of stimulus range (5, 40, 80, 120, and 158 degrees) with three levels of target-to-background brightness. The second study varied the time between ready signal and appearance of a moderate, constant brightness target over a 158-degree range. Last, the search performance was studied by controlling the head and eye movements pursuant to search.
G. I. R 2

16,106

Ericksen, S.C. A REVIEW OF THE LITERATURE ON METHODS OF MEASURING PILOT PROFICIENCY. Contract AF 33(038) 23183, Proj. 508 016 0003, Res. Bull. 52 25, Aug. 1952, 24pp. USAF Pilot Training Research Lab., Goodfellow AFB, Tex. (American Institute for Research, Pittsburgh, Penn.).

16,106

A review of literature on methods of measuring pilot proficiency is presented as a general summary of the research contributions that should be recognized when dealing with problems in this area. The studies surveyed include the years through 1951. Following an historical review, these topics are dealt with: 1) selection without criteria, 2) early studies with a psychological orientation, 3) evaluation of subjective measures, 4) studies done in USN aviation, and 5) recent studies involving civilian pilot data. In addition to the major topic there is a discussion of some studies that provide a comparison between subjective and objective grading methods.
R 53

16,107

Drizin, D.H. THE 'HILO' INDICATOR AN EXPERIMENTAL INVESTIGATION OF HUMAN FACTORS RELEVANT TO THE DESIGN OF A LONG-RANGE CARRIER-BORNE ANGLE OF APPROACH INDICATOR. FPRC Memo 127, Nov. 1959, 16pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

16,107

It is doubtful whether mirror and projector sights now in use will prove adequate for use with carrier-borne aircraft. The split-beam indicator (Hilo) described here would be effective at distances of between 1000 and 4000 yards from the carrier. An experimental investigation into human factors relevant to the detailed design of this indicator was concerned with these questions: Is there any advantage in interposing a band of neutral filter between the red and green segments of the component filter system? What shades of red and green would provide the clearest Hilo indication? Specific recommendations are made for design of the indicator.
T. G. I. R 2

16,109

Cameron, C. & Corkindale, K.G. THE PSYCHOLOGIST'S ROLE IN THE DEVELOPMENT OF AIR DEFENCE SYSTEMS. FPRC Memo 103, Oct. 1959, 7pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

16,109

This report consists of a series of propositions or statements, some of them definitions, under the following topics: 1) Systems and systems design, 2) Air defence systems, 3) The systems design team, 4) Stages of systems design, and 5) The psychologist as member of the design team.
R 17

16,112

Brehner, J. & Burrows, A.A. THE EVALUATION OF AIRCREW INFORMATION SYSTEMS. FPRC Memo 108, Feb. 1959, 9pp. Flying Personnel Research Committee, London, England.

16,112

The purpose of this paper was to examine methods and criteria for evaluations of aircrew information systems and to make recommendations for such evaluations where this was possible. The problems inherent in the evaluation of such systems were raised in historical perspective. Aircrew Information Systems were defined, various approaches to evaluation explored, a list of principles for use in developing checklists was given, an analysis of operations to be performed upon the information presented to the operator was made, performance measures used in the evaluation of aircrew information systems were discussed, and certain recommendations were made.
T. R 6

16,113

Llewellyn-Thomas, E. & Mackworth, N.H. CONTROL OF INFORMATION INPUT BY THE TELEVISION EYE MARKER. Reprinted from the 12th Annual Conference on Electrical Techniques in Medicine and Biology, Nov. 1959, 1p. Defense Research Medical Labs., Toronto, Ontario, Canada.

16,113

This brief note describes an apparatus for recording eye movements which permits the investigator to follow the eye movements of the viewer superimposed on the object or scene which is being viewed or scanned. Various uses of the technique are pointed out.
I. R 3

16,117

Seltzer, L.J. & McRuer, D.T. SURVEY OF ANALOG CROSS-SPECTRAL ANALYZERS. Contract AF 33(616) 5822, Proj. 7184, Task 71561, WADC TR 59 241, Dec. 1959, 72pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Systems Technology, Inc., Inglewood, Calif.).

16,117

This is a survey of analog devices which have been used to compute cross-spectra in the processing of data from human response experiments. The report includes: 1) general background on correlation and spectral measurement, 2) measurement fundamentals for closed-loop situation found in human response tests, 3) a discussion of the theoretical measurement of cross-spectra, 4) a survey of analyzers, 5) a discussion of the approximate behavior of analyzers with real physical components, 6) a discussion of the accuracy of spectral estimates, and 7) an appendix which contains derivation of the more pertinent equations found in the report.
T. G. I. R 28

16,119

Eason, R.G. AN ELECTROMYOGRAPHIC STUDY OF IMPAIRMENT AND ESTIMATES OF SUBJECTIVE EFFORT ASSOCIATED WITH VOLUNTARY MUSCULAR CONTRACTION. PO 06401, NE 091300 3 (NEL N4 2), Rep. 898, May 1959, 27pp. USN Electronics Lab., San Diego, Calif.

16,119

To study the feasibility of using the surface electromyogram (EMG) as an index of muscular fatigue and subjective effort, a behavioral task was employed, restricted to voluntary contractions of certain muscles of the arm (hand dynamometer). The measurements were of changes occurring in the EMG as a function of the magnitude and duration of isometric contraction. The first experiment investigated relationships between EMG and degree and duration of voluntarily sustained contractions; the second dealt with rate of acquisition and amount of local and generalized impairment during sustained contractions; and the third tested the hypothesis that surface EMG reflects amount of effort required to maintain a sustained contraction.
T. G. I. R 36

16,121

Tiffin, J. & Bromer, J. ANALYSIS OF EYE FIXATIONS AND PATTERNS OF EYE-MOVEMENT IN LANDING A PIPER CUB J-3 AIRPLANE. Rep. 10, Feb. 1943, 24pp. Division of Research, US Civil Aeronautics Administration, Washington, D.C. (Purdue University, Lafayette, Ind.).

16,121

To study the different types of eye fixations and eye-movement patterns that occur during the landing of an airplane by pilots with varying degrees of skill, photographs were taken of the pilot's eyes during the last five to ten seconds before landing at the rate of 16 frames per second with a camera specially mounted in a Piper Cub J-3. Pictures of 177 landings made by 33 pilots (ranging from the elementary stage of dual instruction to over 200 hours flying experience) were analyzed frame-by-frame. Graphs of the eye movements show the different visual fields used and are separated into four groups according to flight experience of the pilot. A supplement contains two pertinent reports of progress on a later study of visual depth perception in aviation.
G. I.

16,122

Tinker, M.A. & Carlson, W.S. SENSITIVITY OF PERIPHERAL VISION IN RELATION TO SKILL IN LANDING AN AIRPLANE. Rep. 14, April 1943, 15pp. Division of Research, US Civil Aeronautics Administration, Washington, D.C. (University of Minnesota, Minneapolis, Minn.).

16,122

This document sets forth the same experimental study of response time to peripherally presented stimuli as related to skill in landing an airplane as given in 16,123. However, there is a more adequate presentation of the data and analyses in this document than in 16,123.
T. I. R 9

16,123

Tinker, M.A. TESTS FOR THE SENSITIVITY OF PERIPHERAL VISION. Jan. 1941, 28pp. Division of Anthropology and Psychology, National Research Council, Washington, D.C. (University of Minnesota, Minneapolis, Minn.).

16,123

To test the hypothesis that response time to peripherally presented visual stimuli might be related to skill in landing an airplane, a disjunctive reaction time experiment was performed. The subject was required to indicate, by pressing an appropriate lever, in which quadrant the break in an illuminated ring appeared; the ring surrounded a central fixation spot of light. Three sizes of ring, three sizes of break, and three levels of illumination were used. On the basis of instructor ratings of landing skill, ten pilots were selected from the top and ten from the low ratings. Several comparisons were made in an effort to evaluate the visual reaction time data as related to landing skill.

T.

16,124

Kelly, E.L. THE DEVELOPMENT OF "A SCALE FOR RATING PILOT COMPETENCY." Rep. 18, July 1943, 21pp. Division of Research, US Civil Aeronautics Administration, Washington, D.C. (Purdue University, Lafayette, Ind.).

16,124

This study describes the development of a scale for rating pilot efficiency. On the basis of preliminary trials, a 14-item graphic scale was devised and subjected to experimental study. Instructor ratings of the best and the poorest students were secured from 91 flight instructors in the Civilian Pilot Training program connected with various colleges. The 91 pairs of rating scales were scored on a 20-point scale and studied graphically. Additional ratings were secured on a roughly random sampling of students. A factor analysis of the intercorrelations was made and the resultant factors described. An appendix provides weights for the various items which permit more accurate scoring of the scale.

T. G. I. R 1

16,126

Butler, R.A. & Galloway, F.T. FACTORIAL ANALYSIS OF THE DELAYED SPEECH FEEDBACK PHENOMENON. *J. Acoust. Soc. Amer.*, May 1957, 29(5), 632-635. (Audiology and Speech Center, USA Walter Reed Army Hospital, Washington, D.C.).

16,126

Two experiments designed to investigate the interaction between delay times and intensities of the delayed speech signal were reported. In the first experiment, 144 persons served as subjects. Delayed speech feedback was given at various sensation levels. In the second experiment, 240 subjects were asked to respond under each of two different presentation rates and two intensity levels. Four delay conditions were incorporated into this study. Summaries of analysis of variance for error scores were presented for each experiment. Interactions among the several variables were discussed.

T. G. I. R 2

16,128

Thompson, R.W. & Bartley, S.H. APPARENT DISTANCE OF MATERIAL IN PICTURES ASSOCIATED WITH HIGHER ORDER MEANINGS. *J. Psychol.*, 1959, 48, 353-358. (Dept. of Psychology, Michigan State University, East Lansing, Mich.).

16,128

To test the assertion that the figure of a man when in the left rather than the right hand part of the picture and with back turned toward the viewer is phenomenally nearer than when facing him, 18 observers were asked to match various sized prints of two scenes for apparent distance of the crucial element. Data were subjected to analysis of variance. Results were compared with those obtained in other similar studies.

T. R 6

16,130

Heinemann, E.G. & Merrill, T. TILT ADAPTATION AND FIGURAL AFTER-EFFECTS. *J. exp. Psychol.*, Dec. 1954, 48(6), 468-472. (Harvard University, Cambridge, Mass. & Massachusetts Institute of Technology, Cambridge, Mass.).

16,130

Three experiments were performed to determine whether changes in apparent tilt of lines after long inspections represent an alignment effect or an adaptation to the norm. Twelve subjects served in one or more of the experiments. Subjects were required to fixate a mark for a period during which only the standard line was exposed, then to judge direction of tilt of a variable line exposed briefly. Measurements were made under four conditions. In some instances the standard line was vertical and the cardboard on which it was presented was tilted; in some, both the standard and the cardboard were tilted. Differences between angular positions of the standard and the variable were tested for significance. Results were compared with those from similar experiments.

T. I. R 6

16,131

Garner, W.R. SYMMETRIC UNCERTAINTY ANALYSIS AND REDUNDANCY OF PRINTED ENGLISH. Reprinted from: "Proceedings of the Fifteenth International Congress of Psychology," Brussels, 1957. Contract NSORI 166, Proj. NR 145 089, Task I, Rep. 166 I 220, 1-7. Johns Hopkins University, Baltimore, Md.

16,131

Information analysis is considered as a technique essentially analogous to analysis of variance. Although the analogy is useful, it may also be restrictive in that variance analysis requires that the criterion must have a metric. In information, or uncertainty analysis, this need not be so, but can use the same property of the criterion variable as of the predictor variables. Equations are developed and are discussed as they apply to sequential data where there are sequential dependencies. Definition of the term "redundancy" is questioned in the light of the above discussion.

R 2

16,133

McCormack, P.D. PERFORMANCE IN A VIGILANCE TASK AS A FUNCTION OF INTER-STIMULUS INTERVAL AND INTERPOLATED REST. *Canad. J. Psychol.*, 1958, 12(4), 242-246. (Defence Research Medical Labs., Toronto, Ontario, Canada).

16,133

To investigate performance in a vigilance task as a function of task duration, length of inter-stimulus interval, and degree of interpolated rest, 60 subjects were tested. The task lasted 50 minutes with some subjects working the entire period, others resting five minutes or ten minutes before completing the last ten minutes. The task was to depress a switch whenever a light appeared through an aperture (one centimeter in diameter). The light was presented 51 times to each subject, the intervals between stimuli being 30, 45, 60, 75, and 90 seconds. Response times were recorded and analyzed for effects due to the experimental conditions. The results are discussed in relation to the expectancy hypothesis and the hypothesis that inhibition is response-generated.

T. G. R 5

16,141

Contini, R., Drillis, R. & Slote, L. DEVELOPMENT OF TECHNIQUES FOR THE EVALUATION OF HIGH ALTITUDE PRESSURE SUITS. Contract AF 33(616) 3592, Proj. 6333, Task 71516, WADC TR 58 641, Dec. 1959, 121pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Research Division, College of Engineering, New York University, New York, N.Y.).

16,141

To develop objective criteria to facilitate the selection of that pressure suit or component that permits the operator maximum function and to make available to the designer objective data from which he may improve the design of the item, an extensive study was made of the techniques and methodologies associated with biomechanics for their application to pressure-suited personnel. Physiological and psychological techniques were studied for their usefulness in the overall application. Following this study, a methodology and experimental techniques were devised and used to investigate the basic movements of the upper extremities in terms of the above purposes.

T. G. I. R 115

- 16,151
Wilkinson, R.I. PERFORMANCE AFTER LACK OF SLEEP: THE INFLUENCE OF INCENTIVE, FAMILIARITY WITH THE TASK, AND INDIVIDUAL DIFFERENCES. RNP 60/969, Copy 62, Sept. 1959, 6pp. Royal Naval Personnel Research Committee, MRC, London, England. (Applied Psychology Research Unit, MRC, Cambridge, England).
- 16,151
Previous studies have been reported in which the loss of one night's sleep can seriously impair the performance of a simple, prolonged mental task (Five Choice Test of Serial Reaction). The experiment reported here investigated three aspects of this problem: 1) effect of knowledge of results, 2) influence of familiarity with task, and 3) consistency among subjects in effect of sleep loss. Twelve subjects were given a test of serial reaction time in which repeated simple choices had to be made quickly and accurately over a period of 30 minutes. Four testing conditions were used: with knowledge of results after normal sleep and after no sleep the previous night, with no knowledge of results after normal sleep and after no sleep. Tests were given twice a week for six consecutive weeks. T. G. R 4
- 16,153
Broadbent, D.E. & Little, E.A.J. EFFECTS OF NOISE IN A WORK SITUATION. RNP 60/965, Copy 64, Sept. 1959, 8pp. Royal Naval Personnel Research Committee, MRC, London, England. (Applied Psychology Research Unit, MRC, Cambridge, England).
- 16,153
Laboratory experiments have established that high intensity, meaningless, and continuous noise may affect performance of laboratory tasks which are long and require continuous attention. This report describes an investigation to determine whether similar effects apply to men who are accustomed to noise in their working situation. The situation studied involved one stage in the production of one film. Measurements of efficiency were made before and after acoustic treatment of one of two interconnected rooms and were continued over a period of several weeks in the treated and untreated rooms. R 4
- 16,154
Creelman, C.D. DETECTION OF SIGNALS OF UNCERTAIN FREQUENCY. Contract AF 19(604) 2277, 2559 5 T, Tech. Memo. 71 & AFRCR TN 59 60, Sept. 1959, 20pp. Dept. of Electrical Engineering, University of Michigan Research Institute, Ann Arbor, Mich.
- 16,154
Alternative models which characterize ways in which hearing mechanisms of human observers may be extended in frequency sensitivity are discussed. One decision procedure for a multiple filter model is considered in some detail as a general model for decision situations in which each available response specifies a subset of the signal alternatives. Two experiments were conducted in an attempt to choose between a sweeping-filter and a multiple-filter model. Detection in a two-alternative forced-choice situation in which the signal could be one of two possible signals was used as a test of the two models. G. R 10
- 16,159
Psychological Research Associates, Inc. INTRODUCTION TO THE TSQ-13 SUBSYSTEM OF THE TACTICAL AIR CONTROL SYSTEM 21 2L. Contract AF 19(604) 5194, PRA Rep. 59 13, May 1959, 33pp. Psychological Research Associates, Inc., Arlington, Va.
- 16,159
This manual is to serve as an introduction to the TSQ-13 Data Processing Subsystem of the 212 L Tactical Air Control System. The manual deals primarily with personnel, equipment and procedure changes caused by this subsystem. Topics discussed include system description, missions of the system, equipment in the system, personnel in the system, and operational procedures of the system. There is a glossary of terms and abbreviations common to the system. T. I.
- 16,160
Burns, R.M. & Burdick, R.L. BIOASTRONAUTICAL RESEARCH FOR PROJECT MERCURY. 1959, 8pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.
- 16,160
This paper described experiments designed to obtain measures of performance from Project Mercury astronauts while wearing the Mercury full pressure suit and working on a mock-up of the Mercury capsule panel. Any number of stimuli from 1 to 12 could be presented simultaneously to the subject, who was required to actuate appropriate switches or controls in response. Response times were taken, number of responses, number of errors, and two latencies were recorded. Subjects were tested both under conditions of ventilation-air pressure and with the suit inflated. Recommendations were made for modifications in design of Mercury panels and for training procedures as a result of findings. T. R 3
- 16,162
Ziegler, R. & Lazo, J. MEDICAL AND HUMAN ENGINEERING ASPECTS OF FLIGHT IN NON-CONVENTIONAL AIRCRAFT. Oct. 1959, 15pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.
- 16,162
This paper lists and discusses factors which must be taken into consideration by the human engineer when investigating human functioning in high altitude or space flight. The role of the human operator, unusual problems regarding both operator responses and aircraft design, specific principles to be followed in the development of consoles and panels, and problems of illumination are discussed. R 22
- 16,165
Irvin, H.D. SIBYL: A LARGE, GENERALIZED ELECTRO-MECHANICAL MACHINE FOR LABORATORY INSTRUMENTATION IN ENGINEERING PSYCHOLOGY. Sept. 1959, 12pp. Bell Telephone Laboratories, Inc., Murray Hill, N.J.
- 16,165
This paper describes the application of a general-purpose relay machine of modular construction to some kinds of psychological studies. The hardware described was developed to 1) reduce time required to set up a given experimental apparatus and 2) reduce cost of experimentation. This machine is being applied to two principle kinds of studies: those concerning communications services and devices, and studies of man-machine systems under normal environmental conditions for the subject. Further applications are discussed and advantages and disadvantages of the method are pointed out. I.
- 16,168
Roby, T.B. & Lanzetta, J.T. CONSIDERATIONS IN THE ANALYSIS OF GROUP TASKS. Psychol. Bull., March 1958, 55(2), 88-101. (Tufts University, Medford, Mass. & University of Delaware, Newark, Del.).
- 16,168
This report proposes a paradigm that may be useful in preliminary attempts to isolate and define important group-task characteristics. Based on the paradigm, several classes of relatively molecular differentiating properties of tasks are discussed. Then the concept of "critical demands" task properties at a higher level of abstraction is introduced. Such demands will serve as useful intervening variables between molecular task properties and task performance measures. Finally, an attempt is made to apply both the molecular and critical demand analyses to a widely used task and to show how the usefulness of this task could be further extended. T. I.

- 16,170
Christner, Charlotte A., Schutz, H.G. & Ray, H.W. SOME FACTORS AFFECTING VISUAL SEARCH TIME FOR SYMBOLS ON A LARGE VISUAL DISPLAY. Contract AF 30(602) 1766, 1959, 17pp. Battelle Memorial Institute, Columbus, Ohio.
- 16,170
The present study "grew out of the need for information on some of the factors which had to be considered when placing a large number of symbols on a visual display on both a clear and cluttered background, such as needed for large global display." The variable to be investigated was visual search time. Factors chosen to be studied for effect on visual search time included: 1) symbol density, total number of symbols on display; 2) symbol types, number; and 3) type of surface symbols displayed upon, i.e., clear or a map. Ten Ss were used and the three factors were employed in a factorial design. Data were analyzed by analysis of variance and multiple regression techniques.
T. G. I. R 8
- 16,173
Archibald, E.R. & Simons, D.G. SEALED CABIN ATMOSPHERE PROBLEMS. Task 78516, AFMDC TR 59 42, Dec. 1959, 15pp. USAF Missile Development Center, Holloman AFB, N.M. (USAF Aeromedical Field Lab., Holloman AFB, N.M.).
- 16,173
Certain physiological problems encountered in the design and operation of hermetically sealed cabins are discussed. Known parameters that limit human performance are presented along with a discussion of atmospheric environmental factors as to upper and lower limits for a flight of 24 hours duration where conditions of "no performance decrement" are desired. The parameters presented include inspired carbon dioxide partial pressure, alveolar oxygen partial pressure, and total cabin pressure.
T. G. I. R 6
- 16,174
Altman, I., Jenkins, J.P. & McGrath, J.E. THE TRANSFORMATION OF SMALL GROUP RESEARCH INFORMATION FOR COMPUTER ANALYSIS. Contract AF 49(698) 256, Supp. Agreement 1(58 446), HSR TN 59/9 GN, Oct. 1959, 61pp. Human Sciences Research, Inc., Arlington, Va.
- 16,174
Relationship coding forms (RCF) developed to classify "information about individual variables and the nature, e.g., significance, directionality, etc., of their relationship with other variables" provided raw data for the present study. To prepare data for key punching for electronic data processing, a data translation form was used to code 1) identifying information concerning the study, 2) information about variables, and 3) information about the relational term. Types of questions to be asked of the data were descriptive or actuarial, and questions involving the integration of knowledge in the small group field. The Data Translation System is described in detail. Rules and procedures for application of the classification systems are contained in an appendix.
I. R 2
- 16,175
Blyth, C.S. INFLUENCE OF PHYSICAL CHARACTERISTICS, PSYCHOLOGICAL FACTORS AND DRUGS ON THE CAPACITY OF MAN TO WORK IN THE HEAT. Contract DA 49 007 MD 949, Nov. 1959, 17pp. USA Research and Development Div., Office of the Surgeon General, Washington, D.C. (Laboratory of Applied Physiology, University of North Carolina, Chapel Hill, N.C.).
- 16,175
To determine the effect of caffeine, dexedrine, dehydration, and superhydration on man's capacity to withstand heat and exercise stress, a total of 90 different experiments was performed on 15 male subjects. Measures used to evaluate the stress were heart gain, heart rate, sweat loss, and mental, psychomotor, strength, and psychological tests. Heat stress was provided in a hot room at 110 degrees F, humidity of 25-30 percent, and air velocity of three to five mph. Exercise stress was provided by a motor-driven treadmill, moving at four mph at zero grade. Three acclimatization and six experimental periods, each of three-hours duration, were utilized. The difference between performance before entering the hot room and after some time in the heat was used to appraise the influence of the various conditions. T. R 5
- 16,181
Walker, P.G., Pool, E.T., Parker, J.F., Kelly, P.J., et al. HUMAN FACTORS SUPPORT PROGRAM FOR OPERATOR PERSONNEL AM/TSQ-13 DATA PROCESSING SUBSYSTEM (SYSTEM 4121). Contract AF 19(604) 5194, AFMDC TR 59 57, FRA Rep. 59 30, Dec. 1959, 15pp. Psychological Research Associates, Inc., Arlington, Va.
- 16,181
Purposes of this program were to 1) provide operator manuals to be used in training operator personnel for manning TSQ-13 equipment, 2) conduct a training program, and 3) develop proficiency measures for evaluation of operator performance after training. The training manuals include both equipment operation and system operation. Proficiency measures were developed for Cartrac operators, Auxiliary Data Panel operators, Weapons Controller positions, MIO, and SIG positions. Proficiency tests were pretested before being used as measures of performance.
T. R 1
- 16,183
Lit, A. THE EFFECT OF FIXATION CONDITIONS ON DEPTH DISCRIMINATION THRESHOLDS AT SCOTOPIC AND PHOTOPIC ILLUMINANCE LEVELS. J. exp. Psychol., Dec. 1959, 58(6), 476-481. (Vision Research Labs., University of Michigan, Ann Arbor, Mich.).
- 16,183
The effects of systematic variations in conditions of fixation on depth discrimination thresholds were investigated. The methods of fixation were: 1) steady fixation on the movable comparison rod, 2) steady fixation on the immovable standard rod, and 3) fixation on either of the rods at will. A two-rod test apparatus involving real-depth cues was used. The rods were viewed under conditions of equal binocular retinal illuminances ranging from a low scotopic to a high photopic level. Threshold data were based on equidistant (equality) settings of the stimulus rods. The results were discussed in reference to photochemical theories of vision and the current controversy on the role of convergence cues in stereoscopic acuity.
T. G. R 8
- 16,184
Livingstone, R.E. & Weems, B.F. (Proj. Officers). TEST AND EVALUATION OF THE NAVY HELICOPTER RESCUE SEAT. Proj. J28-3/1 17, Sept. 1958, 20pp. USCG Testing and Development Div., Office of Engineering, Washington, D.C. (USCG Air Station, Miami, Fla.).
- 16,184
The grapple-type helicopter rescue seat as developed by the U.S. Navy was tested and evaluated for Coast Guard use. In flight tests, comparisons were made among three types of rescue equipment: the seat, the sling, and the Erickson Rescue Basket. Following the tests, the seat was redesigned to reduce the possibility of its hanging up or fouling in rigging or overlaps of small boats and ships. During redesign, padding of the seat to reduce possible injury to survivors was accomplished. Further evaluation was made of the padded grapple seat and three prototype redesigns. Following further modifications, a wheel-type and grapple-type seat were evaluated.
T. I.
- 16,185
Landahl, H.D. MATHEMATICAL BIOPHYSICS OF COLOR VISION: III. COLOR CONSTANCY. Bull. Math. Biophysics, 1959, 21, 395-402. (AFOSR TN 59 904). (University of Chicago, Chicago, Ill.).
- 16,185
A mechanism involving interaction between a given region and the remaining field was introduced to account for certain aspects of the phenomena of color constancy. The trichromatic, symmetric mechanism was introduced and a number of examples were discussed and illustrated numerically.
G. I. R 8

- 16,186
Jones, L.V. & Jeffrey, T.E. DEVELOPMENT OF SUITABLE RATING SCALES FOR MEASURING THE SUBJECTIVE REACTIONS OF TROOPS USING QM ITEMS UNDER ACTUAL FIELD TEST CONDITIONS. Contract DA-19 129 QM 1291, FEA MRS 5902, MRS 59 71, Tech. Rep. R 5, Nov. 1959, 87pp. USA Quartermaster Field Evaluation Agency, Fort Lee, Va. (Psychometric Lab., University of North Carolina, Chapel Hill, N.C.).
- 16,186
An investigation was conducted to determine those aspects or characteristics of issue clothing and equipment that are primary determiners of soldier acceptance and to develop suitable scales for measuring acceptance. A questionnaire was devised composed of statements representing some feature of the article to be judged and administered to 400 soldiers. Four issue items were judged. The data were analyzed for the features that best predicted acceptance for each item and for common factors running through all four items. Two additional rating scales were then developed and used to judge other articles. An optimal design for such questionnaires was discussed and their generality to a variety of items was suggested.
T. I. R 2
- 16,188
Hoger, D.T. & Plutzhath, F.L. DESIGN AND STUDY OF CORRELATION INSTRUMENTATION FOR SPEECH ANALYSIS AND SYNTHESIS. Contract AF 19(604) 4128, AFRC TN 59 566, Rep. 2, July 1959, 48pp. Radio Corporation of America, Camden, N.J.
- 16,188
This is one of several papers reporting research on a system of speech processing and covers studies leading to selection of an optimum analog instrumentation for processing output signal of a Vocoder. The operations involved are first defined, then the system is treated in detail. Estimated size, weight, power consumption, and cost are included. Preliminary research on an optical system is also presented.
G. I.
- 16,190
Gaylord, R.H., Farina, A.J. & Spector, F. OPERATIONAL ANALYSES OF THE NAVAL PERSONNEL SYSTEM: PART I. DEVELOPMENT OF A PERSONNEL SYSTEM MODEL. FINAL REPORT. Contract NMR 2872(00), AIR 33 59 FR 218, Dec. 1959, 55pp. American Institute for Research, Pittsburgh, Penn.
- 16,190
This paper reports the first of a series of analyses of the Navy Personnel System and was concerned with the development of a Personnel System model consisting of both a functional analysis of the system and a conceptualization of the system's major processing elements. The report contains 1) a discussion of a functional analysis and of the basic approach of the study, 2) a presentation of a conceptual model of Personnel Processing in detail, and 3) details of a mathematical model of the Personnel System. Long-range research plans for extending the analysis of the Personnel System were included in the appendix.
I. R 5
- 16,196
Vaccaro, J., Jr. DESIGN REPORT ON HORIZONTAL DISPLAY. Proj. TED ADC AE-73002.2, Rep. NADC AI 5950, July 1959, 18pp. USN Air Development Center, Johnsville, Penn.
- 16,196
A design concept evaluation of three prototype horizontal displays of the Army-Navy Instrumentation Program (ANIP) is described. The primary purpose of the horizontal display is to provide a visual display that will orient the position of an aircraft with respect to its destination, or target, in a manner easily assimilated by the pilot. Navigational information in pictorial rho-theta form, relative bearing of a fixed geographically oriented radio transmitter, magnetic heading of the aircraft, readout counters for distance-to-go and time-to-go are presented. Results of functional tests and visual inspection tests made in the laboratory are presented.
T. I. R 11
- 16,196
Raby, T.B., Harleston, B.W. & Eyde, Lorraine D. RESEARCH INVOLVING COMMUNICATION PROCESSES IN TASK ORIENTED GROUPS. Proj. NMR 494(15), Tech. Rep. 2, Nov. 1959, 12pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.
- 16,198
This annual report describes investigations accomplished or started in the year just past on communication processes in task-oriented groups. Five broadly defined subfunctions of group performance serve as a set of research topics: vigilance, phasing, storage, patterning, and addressing. These topics are described and defined in relation to the on-going investigations.
R. 3
- 16,199
Peckham, R.H. & Hart, W.M. NEURAL INTEGRATION AT THE RETINAL LEVEL AS EVIDENCED BY FLICKER FUSION MEASUREMENTS. Am. J. Ophthalmol., Nov. 1959, 48(5) Part II, 594-600. (Bethesda, Md.).
- 16,199
The use of flicker measurements was used in this experiment to assess retinal functions. Flicker stimuli were presented to the right and left eye separately in a constant order which appeared random to the subject. Each change in flicker rate was preceded by a warning signal and the subject responded by sounding or failing to sound a buzzer. Stimuli were presented in two ranges: from 22 to 34 per second and from 30 to 46 per second. Records from 38,000 trials on 334 eyes were obtained. The thresholds of critical fusion frequency for low contrast foveal flicker were established by psychometric methods. The results were described in forms of clearly defined probability functions and used in an analysis of the inferred theoretical behavior of the retina.
G. I. R 5
- 16,205
Smith, S.L. HEADING ESTIMATION. Contract AF 33(600) 37882, Tech. Memo. TM 222, July 1959, 16pp. Mitre Corporation, Lexington, Mass.
- 16,205
In this study ten subjects (airmen and civilians) were required to make heading estimations for simulated radar trails (5/16, 1/8, and 1 1/2 inches in length), using four different response modes (adjusting a dial so that an arrow painted on its surface pointed in the same direction as radar trail; dial was placed to the right and to the left; reading out numerical heading estimates with and without an external reference). Response times and errors were analyzed for effect of response mode on speed and accuracy of heading estimates. Individual differences were pointed out.
T. G. I. R 15
- 16,213
Newell, A. & Simon, H.A. THE SIMULATION OF HUMAN THOUGHT. Contract AF 49(368) 700, Proj. RAND, Res. Memo. 2506, Dec. 1959, 41pp. The Rand Corporation, Santa Monica, Calif.
- 16,213
The authors describe a method for studying human problem-solving, give an example of its application, and discuss the theory of problem-solving which emerges. A theory of central processes is constructed in the form of a program. The sufficiency of the theory for predicting problem-solving behavior is demonstrated by realizing it in a computer. The theory is tested against human processes by comparing the trace generated by the program with the protocol of a human subject. The theory which emerged is "mediational" encompassing "Gestalt" processes.
R 17

16,221

ITIL Avionics Laboratory. INVESTIGATION OF MEDIA AND DESIGN OF A CONSOLE FOR REAL-TIME DATA PRESENTATION PHASE III REPORT. DESIGN OF A REAL-TIME FLIGHT-SAFETY MONITOR CONSOLE. Contract AF 04(611)4574, Nov. 1959, 48pp. ITIL Avionics Laboratory, San Fernando, Calif.

16,221

This report contains the results of design studies and cost analyses of a console for the presentation of real-time inflight telemetered vehicular and physiological data. One section is devoted to details of a redesign of the physiological panel to allow for a more complete evaluation and a reduction or combination of individual parameters. Philosophies and standards to which the console is designed are discussed; some typical system designs which will be incorporated into the panel are presented; and the estimated cost of the console is given. Line drawings, the pre-engineering sketch, and circuit block diagrams are included.

I.

16,225

Bjorksten Research Laboratories, Inc., Madison, Wisc. DEVELOPMENT OF IMPROVED FLIGHT HELMET LINER. Contract AF 33(600) 34149, Proj. 6336, Task 63619, WADC TR 59 435, Oct. 1959, 17pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

16,225

Various low-density plastic foam systems were evaluated for suitability for a padding helmet liner providing maximum comfort with greatest protection against shock and impact. Means of fabricating uniform and reproducible liners by injection of fluid foam into molds were studied. A liner was developed which meets specification requirements for comfort, protection, ease of application, and durability and which can be produced by techniques adaptable to production processing.

I.

16,226

Burnstein, E. STUDIES IN SELECTION LEARNING II: THE EFFECT OF INFORMATIVE AND UNINFORMATIVE CUES ON THE ACQUISITION AND RETENTION OF INTENTIONAL ITEMS. Grant AF 49(638) 367 & National Science Foundation Grant G 4951, Oct. 1959, 9pp. Research Center for Group Dynamics, University of Michigan, Ann Arbor, Mich.

16,226

To investigate the effectiveness of the selection cue on acquisition and retention under conditions of selection learning, 22 Ss were required to learn certain items preceded by selection cues. Items to be learned were interspersed among items to be ignored, the two differentiated by the selection cue. Performance was compared both for acquisition and for retention of material learned with selection cues relevant to material being learned (informative) and selection cues not relevant (non-informative).

T. G. R 7

16,231

Bittini, Marcella & Nicoletti, I. BASIC RESEARCH IN THE FIELD OF VISION. PART I. ON THE VARIABILITY OF THE ELECTRICAL RESPONSE OF THE HUMAN EYE TO STIMULI OF DIFFERENT COLOR. Contract AF 61(052) 17, Tech. Note 2 58, April 1958, 8pp. Istituto Nazionale di Ottica, Arcetri, Firenze, Italy.

16,231

In this study, Part I of a two part study, the variability of ERG responses to blue, green, yellow, and red stimuli was studied. The ERG responses were recorded from a silver electrode attached to contact lenses worn by the subject. The subject was dark adapted for one half hour before each experimental session. A discussion and examination of the types of waves elicited by the four stimuli and the variability of the waves followed.

T. G. I. R 3

16,232

Resitani, Lucia R. & Nicoletti, I. BASIC RESEARCH IN THE FIELD OF VISION. PART II. ELECTRORETINOGRAPHIC RESEARCH ON THE PARAMETERS WHICH DEFINE THE EFFICIENCY OF A LIGHT STIMULUS. Contract AF 61(052) 17, Tech. Note 2 58, April 1958, 16pp. Istituto Nazionale di Ottica, Arcetri, Firenze, Italy.

16,232

The aim of this study, Part II of a two-part report, was to investigate whether for a given value of the parameters, duration and total time of variation of illuminance and wavelength, the scotopic b-wave is affected by changes in the derivative of luminance with respect to time. Two stimuli, one characterized by a slow rise of the luminance and the other by a sequence of short flashes, were used. The role of total energy, duration, color, total time of variation of the luminance, and total time derivative of the luminance were discussed in terms of their relation to the height of the scotopic b-wave at high luminance levels.

T. I. R 8

16,233

Altman, P.L., Gibson, J.F., Jr., Wang, C.C., Dittmer, Dorothy S., et al. HANDBOOK OF RESPIRATION. Contract AF 33(616) 3972, Proj. 7158, Task 71801, WADC TR 58 352, Aug. 1958, 403pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Div. of Biology & Agriculture, National Academy of Sciences-National Research Council, Washington, D.C.).

16,233

Data are presented on respiration for man, other animals, and plants. Tables, graphs, charts, and diagrams are used to present the information. The material is organized into 14 categories. Contents of this report have been made available to and were authenticated by some 400 leading investigators in the fields of biology and medicine.

T. G. I. R many

16,237

Christie, A.W. & Harris, A.J. THE LIGHTING OF PEDESTRIAN CROSSINGS. Municipal J., Public Works Engineer & Contractors' Guide, July 1952, 1-4. (Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England).

16,237

This article deals with some problems and also some experiments on the lighting of pedestrian crossings. Visibility requirements at such crossings are discussed briefly. Experiments using warning signs such as the beacon globe, flashing lights, and various sizes, shapes, and colors of signs are reviewed. Finally, the use of floodlighting—angle of light, color of light and its relation to the "zebra" markings of the crossing—are reviewed.

I.

16,238

Christie, A.W. & Moore, R.L. STREET LIGHTING FROM THE POINT OF VIEW OF TRAFFIC AND SAFETY. Public Lighting, Conf. Issues, 1958, 23(102), 242-257. (Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England).

16,238

The work of the Road Research Laboratory, Department of Scientific and Industrial Research, England, on street lighting is described. Accident data before and after lighting improvements for 64 sites are analyzed. Some data on changes in both speed of driving and accidents are also given. Investigations carried out to discover whether further changes are desirable in various aspects of the recommended street lighting practice are described. These include a study of the effect of changes in road surface on light distribution, lantern arrangements, and siting of street columns supporting the lanterns. Finally, an experimental low-cost lighting system for use on main traffic routes outside built-up areas is considered.

T. G. I. R 5

16,239

Christie, A.W. THE ROAD SURFACE AND THE LIGHTING ENGINEER. *J. Instn. Mch. Engrs.*, 1957, 84(5), 153-160. (Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England).

16,239

The effectiveness of street lighting depends not only on the lighting system used but also on the light-reflection characteristics of the road surface. The problem of choosing suitable combinations of road surface and street lighting systems are considered herein with special reference to main road lighting.

G. I.

16,240

Christie, A.W. ROAD SURFACES AS REFLECTORS OF LIGHT, FROM THE POINT OF VIEW OF STREET LIGHTING. *Chem. & Ind.*, 1953, 468, 468-475. (Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England).

16,240

The progress of research on the reflection properties of road surfaces in relation to the design of street lighting equipment is reviewed, some of the data now available are given, and the various problems which are being investigated are discussed. Major topics treated in the paper are: 1) building up the surface brightness in a complete lighting installation, 2) lighting terms and definitions, 3) complex nature of the luminance factor of a road surface, 4) experimental determination of reflection characteristics, 5) properties of the road surface which affect light areas, 6) dry and wet weather effects, 7) color and lightness of lights, and 8) relations between type of surface and type of lighting.

T. G. I. R 6

16,241

Christie, A.W. "THE ROAD SURFACE AS A FACTOR IN STREET LIGHTING". Presented at: Road Engineering Division Meeting, 20 May 1954, Road Paper 45, Oct. 1954, 506-531. *Institution of Civil Engineers*, Westminster, London, England.

16,241

The theory of vision in lighted streets is examined in simple terms in order to show that the effectiveness of the lighting is determined to a large extent by the reflecting properties of the road surface. Three main types of lantern light distribution are described and their use is discussed. The results of studies of bright patches on a number of surfaces are shown in relation to estimation of the effectiveness of lighting installations and in improving their design. Some methods used to improve the nonskid properties of roads are related to their effect on lighting. The effect of surface texture on the reflection of light from wet surfaces is also examined.

G. I. R 4

16,242

Beckman, E.L. ESCAPE FROM DITCHED AIRCRAFT. IV. EVALUATION OF THE FACTORS WHICH AFFECT SURVIVAL IN A DITCHING ACCIDENT IN CURRENT OPERATIONAL AIRCRAFT WITH RECOMMENDATIONS FOR INCREASING THE RATE OF SURVIVAL. *FPR*, 1094, March 1959, 25pp. *Flying Personnel Research Committee*, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

16,242

The ditching accident in naval carrier operations is considered in this paper. The Royal Air Force Institute of Aviation Medicine has carried out an extensive series of investigations into the factors which affect survival from a ditching accident. The methods by which these factors limit survival are reviewed and their significance discussed. Manual escape procedures are assessed and the use of an ejection seat to assist escape from a sinking aircraft is evaluated. A research and engineering development program is proposed.

T. G. I. R 11

16,243

Cole, J.N., Von Gierke, H.E., Kyrazis, D.T., Eldred, K.M., et al. NOISE RADIATION FROM FOURTEEN TYPES OF ROCKETS IN THE 1,000 TO 130,000 POUNDS THRUST RANGE. Proj. 7210, Task 71705, WADC TR 57-354, Dec. 1957, 54pp. *USAF Aero Medical Lab.*, Wright-Patterson AFB, Ohio.

16,243

Detailed noise characteristics were measured on 14 types of rockets, with both solid and liquid propellants, in the thrust range from 1,000 to 130,000 lbs. Near field and far field levels on static fired and vertical launched rockets were measured under essentially free field conditions. Measurement and data reduction methods were described. Final results were given as near field sound pressure spectra, far field directivities, acoustic power spectra, and pressure-time histories. This noise environment was studied as a function of nozzle configurations and of flame front action in the jet stream. A formula for over-all acoustic power level output of rockets and an approximate generalized power spectrum dependent upon nozzle diameter and jet flow characteristics were given.

G. I. R 9

16,244

Christman, R.J. NOISE REDUCTION IN AIR FORCE CONTROL TOWERS. Proj. 4513, Task 45170, WADC TR 58-123, Oct. 1958, 41pp. *USAF Rome Air Development Center*, Griffiss AFB, N.Y.

16,244

Recommendations are presented for the design of an Air Force Control Tower to provide for reduction of high-level airborne noise. Based upon noise spectra such as might be produced by J-79 equipped aircraft (F-104 or B-58) or rocket engines of the 130,000 lb. thrust class, the recommendations are aimed at providing noise levels low enough to permit satisfactory verbal communications. Specific recommendations are included on the design of such tower features as the roof, windows, walls, doors, and floors.

G. I. R 17

16,245

Buss, W. & Waite, J.V. IMPROVED DEPLOYMENT OF AIR FORCE PERSONNEL PARACHUTES. Proj. 6068, Task 61491, AFFTC TN 59-20, Oct. 1958, 15pp. *USAF 6511th Test Group (Parachute)*, El Centro, Calif.

16,245

To develop a deployment system for Air Force parachutes which will safely deploy and recover a parachutist at high speeds, the performance of six proposed methods was compared with the quarter bag deployment system presently used. Two were eliminated during bench tests; the other four were subjected to drop tests from the whirli-tower and from aircraft using a 200 lb. torso dummy. Data obtained were airspeeds, opening times, snatch forces, and opening forces.

T. I.

16,246

Brown, J.L. REVIEW OF THE CONE-TO-ROD EFFICIENCY RATIO AS A SPECIFICATION FOR LIGHTING SYSTEMS. Contract AF-33(616)-22616, Proj. 7186, Task 71544, WADC TR 57-448, Aug. 1957, 21pp. *USAF Aero Medical Lab.*, Wright-Patterson AFB, Ohio. (Columbia University, New York, N.Y.).

16,246

The need for systems of illumination that afford maximum stimulation of the eye at low luminances has led to the widespread use of red light. The theoretical basis for the advantage of red light is reviewed. Several methods for the practical specification of illumination which are based on a cone-to-rod luminous efficiency ratio are analyzed and compared in terms of the actual physical significance of the numerical values which they yield. The general problem of specification is discussed in relation to a number of underlying practical problems, such as the luminance level at which a given system must be used, the nature of visual tasks for which it is provided, and those for which it must be preserved. The use of the cone-to-rod luminous efficiency ratio is recommended for experimental testing.

G. R 27

16,247

Brown, L.R. SOME STATISTICAL METHODS FOR DETECTION OF MISSTANDARD TEST ADMINISTRATION. NRC IN 30 34, Jan. 1959, 24pp. NRC Research Lab., Lockheed AF, Tex.

16,247

This paper was concerned with the improper testing procedures used by the Armed Forces Recruiting Stations. These statistical methods for detecting falsely derived passing scores on the Army General Classification Test and the Armed Forces Qualification Test were presented. Tests were administered to 1200 airmen and the scores were manipulated to simulate various patterns of false scores. The Kolmogorov-Smirnov technique, the Sign Test, and a test for significant differences between standard deviations were applied to the test distributions to determine which sample of scores might be rejected due to their distribution in relation to significance levels established by normal chance variation.

T. G. R 11

16,248

Brown, L. Jr. & Israel, J.G. ON ADAPTIVE CONTROL SYSTEMS. Contract DA 30 069 ORD 1960, ONR Rep. 1308 10 & Res. Rep. R 720 39, P28 663, April 1959, 84pp. Micro-wave Research Institute, Polytechnic Institute of Brooklyn, Brooklyn, N.Y.

16,248

Methods of realizing control systems that exhibit adaptation are considered. A philosophy is first developed for such systems by considering the behavior of a human being acting as a controller in situations that require adaptation. Two major problems are defined: identification and excitation. Three specific techniques for solving the identification problem are described: 1) the heuristic series expansion of the impulse response, 2) representation of the impulse response as the sum of a set of preselected exponential functions, and 3) the impulse response expansion in a series of orthonormal functions. A solution to the excitation problem appropriate to each technique is described.

G. I. R 13

16,249

Banner, R.H. THE EFFECTS OF STRESS ON UROPEPSIN EXCRETION. Proj. 7229, Task 71742, NRC IN 57 427, Dec. 1957, 11pp. USAF Army Medical Lab., Wright-Patterson AFB, Ohio.

16,249

Uropepsin changes under simulated flight stress were studied using 23 subjects under conditions of 120 hours cabin confinement, elevated temperatures, prolonged positive g forces, and visual and auditory stimuli deprivation. Urine samples were obtained at varying schedules for each of the test conditions. The method for analyzing uropepsin was described at length.

T. G. R 15

16,253

Fluhr, F.R. DIGITALIZED PICKOFF DISPLAY CONVERTER. Proj. NE 051 100 C24.33, BuShips S 1600, NRL Prob. Y01 04, NRL Rep. 5261, March 1959, 7pp. USN Research Lab., Washington, D.C.

16,253

Due to the increasing complexity of the Naval Data Handling System, a more efficient data processing method is required. Thus, the Pickoff Display Converter, a digitalized machine, which allows the operator to generate derived position coordinates and insert them into the computer memory, has been offered. Mode functions provided are the direct and differential modes of operation. The Digitalized Pickoff Display Converter would also be capable of working with a Fast-Scan type of display.

T. R 3

16,259

Kestige, W.R. THE EFFECT OF HUMID, CLOTHING AND IMMOBILIZATION ON THE MAINTENANCE OF THE BODY TEMPERATURE IN WATER. NRP 60477, 25 97, Oct. 1959, 8pp. Scientific-Sat-Sat-Commission, NRC, London, England.

16,259

To investigate the effects of immersion in water on the human body, studies were made of 12 healthy young men. Immersions were made in a laboratory tank at water temperatures of 15 and 5 degrees C on every second day and at higher temperatures every day for a period of 20 minutes. During immersions the men either sat still or walked (swimming movement) and were clothed or naked; the water was either undisturbed or stirred for the sitting condition. The rate at which men lost heat was found by measuring body temperatures. Metabolic rates, alveolar air measurements, and ECG records were obtained. From the data, certain recommendations were made to be given to men about immersion in water after shipwreck.

T. R 8

16,260

Kraft, J.A. APPROACHES TO THE MEASURE OF FLIGHT CROWN CONFIDENCE SCORES AND FAILURE. Presented at: Annual Meeting of the Aero Medical Association, 24-26 March 1958, 24pp. Military Operations Research Engineering Div., Lockheed Aircraft Corporation, Marietta, Ga.

16,260

Briefly reviewed are recent advances in flight systems and the problems of human factors which accompany long endurance flights. The need to study problems associated with the tolerance of humans to high and sustained g forces, tolerance to sustained cosmic, ultraviolet, and x-ray bombardments, as well as others is mentioned and the need for further simulated environmental studies is stressed. Described is the Lockheed Human Factors Research Laboratory which contains a mock-up simulating a space restricted flight station. The experimental program and performance tasks are described and the physiological and clinical measures are discussed.

I. R 19

16,266

Stevens, S.S. INTRODUCTION: A DEFINITION OF COMMUNICATION. J. Acoustic Soc. Amer., Nov. 1959, 22(6), 689-690. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

16,266

Because the word communication has so many different meanings, a broad, operational, and behavioristic definition is offered. The definition is discussed in relation to information theory.

16,269

Wilcox, R.H. A MEASURE OF COHERENCE FOR HUMAN INFORMATION FILTERS. Psychometrika, Sept. 1957, 22(3), 269-274. (USN Research Lab., Washington, D.C.).

16,269

Developed here is a coherence measure which is a quantitative measure of the extent to which a man avoids random activity during filtering operations. Due to the great rate of information a processing system receives, man or machine, only a certain amount can be handled. Filtering as performed by a human being can be coherent or at least in part random. The quantitative method presented here measures the extent to which a human filter avoids random activity in the selection of informational items during periods of overload.

I. R 3

16,271

USA Electronic Proving Ground. EXPLORATORY TEST OF CMA PICTORIAL POSITION INDICATOR FINAL REPORT. USMPC SCG 930 190, Task 16 56 0081, June 1958, 40pp. USA Electronic Proving Ground, Ft. Huachuca, Ariz.

16,272

Needle, H.M. RADAR BEAM CODING TECHNIQUES. Proj. 4004, Task 40143, RADC TR 57 343, Dec. 1957, 11pp. USAF Air Development Center, Griffiss AFB, N.Y.

16,271

To determine the operational characteristics and capabilities of a breadboard model of the CMA Pictorial Position Indicator (an aircraft instrument that projects a continuous display of an aircraft's position and ground track on a map it receives the data information from the distance and bearing indicators of the Tactical Air Communications and Navigation System and it may be either lap held or rack mounted), to evaluate it as an airborne navigation aid, and to determine the desirability of a user test, exploratory tests were conducted in fixed-wing and in rotary-wing aircraft. In addition, accuracy, wear up time, continuous use capabilities, and installation and maintenance problems were determined. Recommendations were included.

T. I. R 8

16,273

Taylor, C.W. (Princ. Investigator). THE SECOND (1957) UNIVERSITY OF UTAH RESEARCH CONFERENCE ON THE IDENTIFICATION OF CREATIVE SCIENTIFIC TALENT. Held at Alpine Rose Lodge, Brighton, Utah, Aug. 17-22, 1957, 250pp. University of Utah Press, Salt Lake City, Utah.

16,273

As part of a long-range attack on the problem of the nature and identification of creative scientific talent, a conference was held at the University of Utah of persons selected on a national basis. This volume contains the texts of the various papers given at the conference plus discussions pertaining to it. There are 15 papers included in addition to committee reports on predictors and criteria.

T. G. I. R 103

16,275

Rosenberg, I. AIRCRAFT TESTS, SEPARABLE BACK PACK. Proj. 6015, AFPC TR 58 16, Sept. 1958, 15pp. USAF 6011th Test Group (Parachute), El Centro, Calif.

16,275

A separable back pack parachute assembly was designed and was subjected to high speed wind blast to determine the speed, up to 560 knots, at which the pack would prematurely open. The components of the assembly consisted of a packed parachute pack, universal harness, lap belt, and an 1800-cubic-inch survival kit.

T. I.

16,277

Chang, S.H. SPEECH ANALYSIS FINAL SCIENTIFIC REPORT. Contract AF 19(604) 2198, AFPC TR 58 107, Feb. 1958, 31pp. Electronics Research Lab., Northeastern University, Boston, Mass.

16,277

A summary is presented of studies directed toward the specification of important parameters of speech in speech-band compression systems. In the first chapter, the present status of the Formoder (Formant-Moment Coder) is described. This experimental speech-band compression system makes use of from five to seven narrow-band parametric channels to convey the information of speech. The principal assumptions, the instrumentation, and some results of this approach are discussed. In chapter two a study of the automatic identification of turbulent sounds is described. Experimental results that lead to possible separation of unvoiced stops and fricatives are reported.

T. G. I. R 11

16,278

Discussed here is a radar beam coding technique designed for tracking radar used for landing aircraft. In particular, data transmission using a digital system is considered. The radar coding and transmitter encoding used are explained. The accuracy of the technique is determined by the code which is transmitted. The radar performance determines the number of bits which a system is capable of sending. A bench test using an AR/APG-30 as a radar transmitter was employed to test the beam coding technique.

G. I.

16,279

Gris, H.L. TEST OF RADIO COMMUNICATIONS DURING RADAR GROUND CONTROLLED APPROACH (GCA). Proj. 4651, RADC TR 57 343, Dec. 1957, 14pp. USAF Directorate of Flight and Air-Weather Testing, Wright-Patterson AFB, Ohio.

16,279

The problem of providing the pilot with a means of communicating with the ground communications approach controller (GCA) during final approach was investigated. A method using the standard equipment of the aircraft was devised that allowed the pilot to transmit signals to the GCA controller during the approach. Sixty-six tests were conducted with eight different types of aircraft, jet and reciprocating, on two frequencies, 218.9 and 336.8 MCS, at ranges from 0.2 miles to six miles out on final path approach. Recommendations concerning the use of the system were offered.

T. I.

16,280

Dobson, R.M. CONSECUTIVE AIRDROP DELIVERY OF PERSONNEL AND EQUIPMENT FROM THE C-123B AIRCRAFT AND SUITABILITY OF THE STATIC LINE RETRIEVER SYSTEM. OPERATIONAL TEST REPORT. Proj. 995HF 30, AFPC TR 58 80, June 1958, 16pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

16,280

The results of operational testing of consecutive airdrop delivery of paratroops and A-21 containers with supplies from the C-123B aircraft and of the suitability of the static line retriever system as installed in the aircraft were described. Paratroop jumps and airdrop of personnel dummies were made both preceding and following drop of the A-21 containers. The static line retriever system was found capable of retrieving dummies weighing approximately 400 lbs. Minor modifications to this equipment were suggested.

T. I.

16,282

Mathery, W.G. & Hardt, H.D. THE DISPLAY OF SPATIAL ORIENTATION INFORMATION. Contract WOMB 1670(00), Rep. D228 421 001, Aug. 1959, 41pp. Bell Helicopter Corporation, Fort Worth, Tex.

16,282

These experiments are the first of a series aimed at determining the variables making up an effective display for presenting spatial orientation (attitude) information to the pilot of an aircraft. Variables studied were: 1) method of encoding the ground plane (content), 2) size of display, 3) shape of display, and 4) S enclosed or not enclosed within cockpit type of exposure (internal reference). A static display (stimuli projected on a screen) was used in which the S pressed an appropriate button to indicate his judgment of the relationship between plane and ground as seen in each stimulus projection. Response times and errors were recorded and analyzed for differences among the variables.

T. G. I.

16,283

Wilkerson, L.E. A STUDY TO DETERMINE HOW WELL RATE CAN BE DISCRIMINATED AND CONTROLLED. Contract NMR 1670(00), Rep. D228 420 004, Dec. 1958, 35pp. Bell Helicopter Corporation, Fort Worth, Tex.

16,283

To determine how well a person can control and discriminate rates of movement, 16 flight-naïve and eight flight-experienced Ss were tested. They were presented with two different symbols, a line and a circle, which could be either expanded or contracted to show rate of change. The task was to control the symbol according to a prescribed pattern of increasing, holding, and decreasing rate of change. Four different control sensitivities were used for each of the symbols. Both position data and rate data were analyzed for accuracy of performance for each condition. The findings were discussed in relation to helicopter pilot performance and ways of encoding rate information in displays.

T. G. I. R 5

16,284

Wilkerson, L.E., Fox, G.A. & Matheny, M.G. THE EFFECT OF SCALE FORM ON THE SPEED AND ACCURACY OF SCALE READING. Contract NMR 1670(00), Rep. D228 420 003, Oct. 1958, 22pp. Bell Helicopter Corporation, Fort Worth, Tex.

16,284

To evaluate three types of displays—circular-moving pointer, linear-fixed pointer, and linear-moving pointer, 36 Ss were given ten presentations of each display and required to record the reading following a one-half second exposure. The size of numbers, graduation mark separation, interval values, and pointer width were the same for all three scales. Frequency of errors in reading each of the scales as well as for segments of the scales were examined. Magnitude of errors was also analyzed. The results were discussed relative to the number of fixations possible with the exposure time used.

T. G. R 10

16,285

Walter, N.E. THE DERIVATION OF A COUPLING NETWORK FOR THE DYNAMIC SIMULATOR PLATFORM. Contract NMR 1670(00), Rep. D228 430 007, Aug. 1959, 19pp. Bell Helicopter Corporation, Fort Worth, Tex.

16,285

An interim solution to the problem of scaling dynamic simulator platform motions (as in helicopters) is presented which derives the filter network between the airframe computer and the platform servo system to give minimum acceleration error subject to the constraint that the platform motion is confined to limited values. The constants of this optimal coupling filter are given as a function of the expected rms velocity for the various degrees of freedom of the system.

I. R 2

16,287

Fox, G.A., Hardt, H.D. & Matheny, M.G. DETECTION OF SMALL CHANGES IN THE SIZE OF THE SQUARES IN A GRID LINE DISPLAY. Contract NMR 1670(00), Rep. D228 420 002, Feb. 1959, 22pp. Bell Helicopter Corporation, Fort Worth, Tex.

16,287

To determine how much changes in the size of the squares in a grid line display would have to be made to be detected by a human observer, three standard grid patterns of different size were presented and each compared with itself and eight variations in size. Comparisons were made by 36 Ss who reported whether the squares in the second display looked larger, smaller, or the same as the previous display. The results were analyzed using the normal graphic method and were discussed with reference to a proposed altitude display for helicopters.

T. G. I.

16,288

Fedderson, W.E. THE EFFECT OF VARIATIONS IN CONTROL SYSTEM DYNAMICS UPON TRACKING PERFORMANCE. Contract NMR 1670(00), Rep. D228 430 001, Oct. 1958, 28pp. Bell Helicopter Corporation, Fort Worth, Tex.

16,288

Two experiments were performed to illustrate the hypothesis that the "function determining operator performance in a tracking situation is the rate of movement of the display element in response to a control input rather than the value" of the control-display ratio or system lag. Twenty-four Ss served in each of 24 conditions for both studies. Experiment I investigated compensatory tracking of a display along the vertical dimension of a cathode-ray tube (crt); Experiment II studied tracking of angular rotation of the same display (three-inch fluorescent winged-symbol on the face of a 17-inch crt). Voltage difference between Ss' control output and cam output was recorded to measure error amplitude and direction.

T. G. I. R 6

16,294

Dunlap, J.W. THE ANALYSIS AND PREVENTION OF MOTOR VEHICLE ACCIDENTS AMONG AIRMEN. FINAL REPORT. Contract DA 49 007 MD 876, Dec. 1959, 4pp. Dunlap and Associates, Inc., Stamford, Conn.

16,294

A summary report of a study of accident analysis and prevention was given. The results of an interview study of a representative sample of 138 airmen drivers who became involved in personal injury accidents while driving privately-owned motor vehicles and 100 airmen not so involved were presented. The results of the interview study provided the basis for the development and trial of a specially-designed countermeasure to reduce injury-producing accidents among airmen. The countermeasure was described and the results of a year's trial were summarized.

16,295

Margaria, R., Gualtierotti, T. & Spinelli, D. EFFECT OF STRESS ON LOWER NEURON ACTIVITY. Exp. Med. Surg., June-Sept. 1958, 16(2-3), 166-176. (Contract AF 61(514) 637, AFOSR TN 58 537).

16,295

Monosynaptic reflexes were studied to investigate stress. A mixed nerve in the sciatic area was used, thus conduction speed of both motor and sensory fibers and central delay together with the end-plate delay were calculated. The following conditions of stress were studied: hypoxia; hypoglycemia; muscular fatigue due to prolonged physical effort; action of drugs: caffeine, barbiturates; alcohol; and lack of sleep. The results obtained fell into two categories which involved the central mechanism and the peripheral part of the reflex. The observations were discussed as well as the action of insulin in stress conditions. The problem of distinguishing stress from fatigue and injury is still apparent.

I. R 12

16,296

Madson, R.A. HIGH ALTITUDE BALLOON DUMMY DROPS. PART I. THE UNSTABILIZED DUMMY DROPS. Proj. 7218, Task 71719, WADC TR 57 477, Part I, Oct. 1957, 40pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

16,296

As part of a study on high altitude escape problems, the characteristics of instrumented dummies carried aloft to predetermined altitudes were studied during the free fall in unstabilized situations. Altitudes were varied from approximately 90,000 to 30,000 feet. The attitudes assumed by the dummies, type of spin or tumble occurring, and angular velocities recorded on the accelerometers were studied. Further tests to develop a method of stabilizing a man descending from high altitudes were recommended.

T. G. I. R 1

16,301
Shelanski, M.V. & Gabriel, K.L. CUTANEOUS TOXICITY EVALUATION OF AIR FORCE DEVELOPMENT MATERIALS - II. Contract AF 33(616) 5072, Proj. 7159, Task 71802, WADC TR 57-742, Nov. 1957, 16pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Industrial Biology Research and Testing Laboratories, Philadelphia, Penn.).

16,301
To determine the primary irritant effect and the sensitization index of various materials (two hydraulic fluids, two impregnated cloths, three engine oils, one plastic coated natural rubber sheeting, and two synthetic base stocks for high temperature fluids), the prophetic patch test method was used on laboratory animals and volunteer human Ss. The fabrics tested were cotton duck impregnated with copper cellulose complex leaving either 0.08 or 0.35 percent copper in the fabric. These data should serve as criteria for establishing safe handling procedures and limits of application of these materials when utilized by personnel.
T. R 5

16,302
Stanley, J.R. LIGHT INTENSITY LEVEL REQUIRED FOR GROUND PHOTOGRAPHY OF AN AIRBORNE FLASHING LIGHT. Contract AFDCM 80-4, Proj. 5080 50580, APGC TN 58 1, Jan. 1958, 9pp. USAF Air Proving Ground Center, Eglin AFB, Fla.

16,302
To determine the minimum light intensity necessary for photographing ballistic trajectories, a variable intensity flashing-light source was photographed using ground-based cameras. The light source used was a GE FI-118 Edgerton lamp (strobe light) operated from capacitors charged by a 450 volt battery. One ground and two airborne missions were conducted. The ground mission, a functional check of the light unit, was conducted in an altitude chamber at 20,000 feet altitude and -18 degrees F temperature. The airborne missions were conducted during clear weather, between darkness and midnight, and at 40,000 feet altitude. Capacitor values tested ranged from 6.2 to 97.0 microfarads.
T. I.

16,304
Lichte, W.H. STUDIES OF THE EFFECT UPON AIMING-POINT IDENTIFICATION OF CERTAIN CHART VARIABLES. DEVELOPMENT REPORT. Contract AF 18(600) 1209, Proj. 7738, Task 27014, AFPTIC TN 58 3, Jan. 1958, 29pp. USAF Operator Lab., Randolph AFB, Tex.

16,304
An exploratory study and three experiments were conducted to determine how scale, amount of information, and aspect-angle information of charts affected navigator performance as measured on use of 0-15 photographs by means of aiming-point identification test and a new city recognition test.
R 15

16,305
Lathrop, R.G. & Berridge, H.L. A HUMAN FACTORS STUDY OF THE TRANSISTORIZED DIGITAL COMPUTER FOR BOMBING AND NAVIGATION (TRADIC). APGC Proj. 510451, APGC TN 58 22, Sept. 1958, 33pp. USAF Human Factors Office, APGC, Eglin AFB, Fla.

16,305
This study was designed to obtain data concerning human reaction towards the TRADIC presentation of in-flight data, the confidence of the operators in the TRADIC presentation, the confidence of the operators in their ability to operate the TRADIC equipment effectively, and the compatibility of the man-machine relationships. The TRADIC is a transistorized research model digital computer designed for airborne use. Questionnaires, divided into two types of information, personal information and 30 questions relative to TRADIC, were administered to experienced, qualified navigators. Results were discussed and recommendations were made.
T. I. R 2

16,307
Reveal, R., Jr. & Ruch, F.L. AN APPLICATION OF THE CRITICAL-INCIDENT TECHNIQUE TO AIR FORCE COMBAT LEADERSHIP. Contract AF 33(038) 23295, Proj. 7731 (505 039 00 01), Res. Rep. AFPTIC TN 58 8, Feb. 1958, 47pp. USAF Office for Social Science Programs, Lackland AFB, Tex.

16,307
This study reports the use of the critical-incident technique to secure descriptions of specific behaviors associated with effective officer combat leadership as observed by fellow officers. From 562 protocols of standardized interviews with 624 Far Eastern Air Force officers on 17 overseas bases in 1951, 1034 statements describing leadership behavior were extracted by two teams of three analysts each. These statements were classified with adequate reliability (estimated above .80) in 32 categories. These categories may be interpreted as one statement of critical requirements for effective leadership of such combat officers.
T. R 28

16,308
Sturrock, P.E. & Kitzes, G. AN ESTIMATION OF EXPOSURE TO CARBON MONOXIDE BY BREATH ANALYSIS. Proj. 7159, Task 71803, WADC TR 57 291, March 1958, 13pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

16,308
This study was designed to develop a rapid semiquantitative method of screening subjects for possible carbon monoxide (CO) poisoning. A colorimetric indication gel for carbon monoxide developed by the National Bureau of Standards was used as the indicator in this study. Preliminary investigations yielded a method of obtaining a normal "lungful" of air from the subjects. The correlation between breath-CO concentration determined by the colorimetric-indicating method and blood-CO concentration was determined in a series of experiments using 32 smokers and nonsmokers. The blood-CO analysis was performed by the monometric Van Slyke procedure. The advantages and disadvantages of the method were discussed.
T. G. I. R 10

16,315
Westen, R.J. & Peterson, R.O. DEVELOPMENT AND APPLICATION OF METHODS FOR DERIVING GENERALIZABLE COURSE CONTENT FROM ELECTRONIC EQUIPMENT. Contract AF 18(600) 1351, Proj. 7729, Task 37300, AFPTIC TN 58 8, Feb. 1958, 9pp. USAF Maintenance Lab., Lowry AFB, Colo.

16,315
Materials previously reported on this project concerning the development of training courses for maintenance and servicing of Air Force electronic equipment are summarized briefly. On the assumption that various electronic maintenance specialties require common skills and knowledge, various methods to determine this information are tested for two types of aircraft (F-86D and F-102A). From lists of the common skills and knowledge, experimental core-training programs are derived and performance measures devised for evaluation of trainee competence. A job-oriented approach proved more useful than an equipment-centered one.
R 6

16,316
Waite, J.V. & Buss, W. MULTI-STAGE PERSONNEL PARACHUTE. Proj. 6068, Task 61496, AFPTIC TN 58 19, Oct. 1958, 13pp. USAF 6511th Test Group (Parachute), El Centro, Calif.

16,316
One of the hazards encountered by a parachutist while free falling following a high altitude bailout is uncontrolled tumbling and spinning which may impair his physical and mental capacities. To avoid this it was proposed to use the parachutist's main canopy as a stabilization device to permit rapid descent at high altitude. Several methods of deploying the main canopy in a streaming condition to provide sufficient drag were developed and tested. Modifications were made to the parachute assembly and a method of anchoring the suspension lines within the pack was devised. Tests were made with an articulated dummy.
Y. I.

16,317

Zander, A., Wolfe, D.M. & Curtis, T.T. EFFECTS OF AUTHORITY STRUCTURE UPON GROUP ADAPTABILITY AND FLEXIBILITY. FINAL REPORT. Contract AF 41(657) 43, Proj. 7723, Task 77462, AFTRC TR 58 9, Dec. 1957, 125pp. Research Center for Group Dynamics, Institute for Social Research, University of Michigan, Ann Arbor, Mich.

16,317

This study was designed to explore the effects of authority structure on small group adaptability and flexibility. The study involved 196 high school seniors in 49 groups of four members each. Each group was homogeneous with respect to IQ, height, and age. Five different authority structures were used with ten groups participating in each of the first four and nine groups in the fifth. The experimental method is fully described and the findings are discussed. Included are criticisms and recommendations for further studies in small and large groups.

T. I. R 9

16,318

Stevens, S.S. (Dir.). PERIODIC STATUS REPORT XXIX. PERIOD COVERED: 16 NOVEMBER 1956 - 15 MAY 1957. Contract N0NR 1066(15), Proj. NR142 201, Rep. PNR 76, May 1957, 13pp. Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.

16,318

This status report of research conducted by the Harvard University Psycho-Acoustic Laboratory under contract with the Office of Naval Research, USN, covers the period from November 1956 to May 1957. Seven completed research studies are listed in the form of an annotated bibliography and four studies in progress are summarized. The subjects covered are primarily in the areas of either audition or psychophysics. A list of reports, and their Psycho-Acoustic Navy Report numbers, is included at the end of the report.

R 47

16,320

National Science Foundation. QUARTERLY REPORT OF GOVERNMENT SPONSORED RESEARCH PROJECTS IN PSYCHOLOGY, PSYCHIATRY & CLOSELY RELATED AREAS. June, 1953, 48pp. National Science Foundation, Washington, D.C.

16,320

This is the fourth quarterly report of government sponsored projects in psychology and related areas covering the period ending June 30, 1953. The content is as follows: the agency supporting the research, identification of each project, the title of the project, the name of the contractor and of the principal investigator, and the present termination date of the project. A list of the agencies that have contributed project data and the name of the responsible individual for administration of the project are included.

16,322

von Békésy, G. HUMAN SKIN PERCEPTION OF TRAVELING WAVES SIMILAR TO THOSE ON THE COCHLEA. J. Acoust. Soc. Amer., Sept. 1955, 27(5), 830-841. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (Rep. PNR 175).

16,322

A model of the cochlea was devised using a section of the skin (arm of S) as a sense organ. The development and final design were described in detail. The model was then used to study human skin perception of traveling waves; frequency localization, inhibition phenomena; and pitch and place of perception. Differences and likenesses between perception by the skin and by the ear were pointed out.

G. I. R 15

16,323

von Békésy, G. SIMPLIFIED MODEL TO DEMONSTRATE THE ENERGY FLOW AND FORMATION OF TRAVELING WAVES SIMILAR TO THOSE FOUND IN THE COCHLEA. Proc. Nat. Acad. Sci. Wash., Dec. 1956, 42(12), 930-944. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (Rep. PNR 187).

16,323

To investigate what happens to sound waves that travel in a direction in which the mechanical properties of the medium are changing continuously, a model was constructed and is described. The model consists of a series of pendulums in which the length of the pendulum is continuously graduated and in which the pendulums may swing completely free or be coupled in varying degrees of strength; this is a simplified model of the cochlea. Energy flow and formation of traveling waves similar to those in the cochlea are demonstrated and discussed. The use of the model for investigating pathological cases of hearing loss is also indicated.

I. R 12

16,331

Doyle, W. RECOGNITION OF SLOPPY, HAND-PRINTED CHARACTERS. Group Rep. 54.12, Dec. 1959, 13pp. Lincoln Lab., Massachusetts Institute of Technology, Lexington, Mass.

16,331

This report describes a pattern recognition scheme particularly intended to handle noisy and distorted data by computing machines. The sample is subjected to tests at the conclusion of which a single decision is made on the basis of experience obtained from prior processing of labelled samples. The method was applied to hand-printed English capitals but it is evidently general. Results are given for some trials made on the IBM 709.

T. I. R 5

16,338

Howell, W.C. & Briggs, G.E. AN INITIAL EVALUATION OF A VIBROTACTILE DISPLAY IN COMPLEX CONTROL TASKS. Contract AF 33(616) 3524, Proj. 9 (610 6190), Task 50706 & OSURF Proj. 813, Tech. Rep. (813) 5, Oct. 1959, 16pp. Ohio State University Research Foundation, Columbus, Ohio.

16,338

Three experiments were completed which explored the accuracy human operators can achieve in both simple and complex control tasks when input and output information are displayed by way of the tactual sense modality. Tracking performance was first compared on three compensatory displays, two visual and one vibratory. The vibratory display was then studied under two levels of aiding in a second-order control system. In the third study a vibratory display was studied in which apparent movement (phi effect) was used to indicate system error. The use of such vibrotactile displays as a substitute for visual displays under conditions where the visual sense is degraded or in periods of high g stress is discussed.

G. I. R 7

16,339

Fry, E.B., Bryan, G.L. & Rigney, J.W. TEACHING MACHINES: AN ANNOTATED BIBLIOGRAPHY. Contract N0NR 228(02), Proj. NR 153 093, Tech. Rep. 28, Nov. 1959, 106pp. University of Southern California, Los Angeles, Calif.

16,339

This is the first of two reports concerned with a study of the potentialities of teaching machines for technical training in the navy. The report consists of: 1) an introduction which contains summarizing statements about the references in the bibliography, tables which summarize facts about work in this area (e.g., frequency per year of teaching machine studies, frequency of different categories of articles), and a descriptive summary of devices which have been developed; 2) the annotated bibliography; and 3) a catalogue of commercially developed teaching machines. Included in the references are discussions of programming, developmental and descriptive studies, training experiments, field surveys, and theoretical discussions.

T. R 109 (approx.)

16,350

Clark, D.L. DETECTION OF SIGNALS IN NON-GAUSSIAN NOISE. Group Rep. 47.36, Dec. 1959, 16pp. Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, Mass.

16,350

This paper considers the problem of detecting signals in highly complicated noise. On the basis of the assumption that the effects of non-Gaussian amplitude densities can be considered separately from the effects of complicated spectral densities, a simple model is introduced that is capable of generating a family of non-Gaussian amplitude density functions with dependence on the spectral density minimized. The model and the parameters by which it is characterized are chosen on an intuitive basis to facilitate calculation of the performance of simple detection schemes and to permit measurement in the laboratory of detectors whose analysis becomes hopelessly involved.

R 6

16,351

Botha, E. A FURTHER APPLICATION OF BEHAVIORAL THEORY TO EXPERIMENTS ON THE ROLE OF PREFERENCE IN PERCEPTION OF SIZE. *J. Soc. Res.*, 1957, 51-64. (University of Cape Town, Cape Town, Union of South Africa).

16,351

Certain predictions about behavior and perception, based on the postulate that size perception is a function of specific acquired habits, were tested in experiments with school books, representing liked or disliked subjects, as stimuli. Three different situations were used: 1) free choice, 2) homework, and 3) free time preparation. In both first and third conditions, the Ss were shown, in rapid succession, photographs, of the same size, of a book representing a liked and disliked book; the task was to report the larger of the two. In the second test, one photograph showed a book of invariant size and the second one was varied until the S reported them as identical; questions were asked about homework practices. Mothers' and teachers' reports were studied in relation to the findings. T. R 1

16,353

Bradley, J.V. STUDIES IN RESEARCH METHODOLOGY: II. CONSEQUENCES OF VIOLATING PARAMETRIC ASSUMPTIONS - FACT AND FALLACY. Proj. 7184, Task 71561, WADC TR 58 574 (II), Sept. 1959, 33pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

16,353

"Methods of investigating the effects of assumption-violation are examined. Particular attention is given to methodological and other bias operating in favor of the conclusion that parametric tests are extremely insensitive to violations of theoretical assumptions. Fallacious arguments advanced in support of this conclusion are discussed. Using a new method, the effect of non-normality upon the probability levels and power of the critical ratio test is investigated."

T. G. R 81

16,354

Black, J.W. VOICE COMMUNICATION STUDIES FINAL REPORT. Contract N6ONR 22525, Rep. 398, Sept. 1959, 15pp. Ohio State University Research Foundation, Columbus, Ohio.

16,354

This report brings together the titles of technical reports (listed in chronological order), names of research personnel, and topics of emphasis for research in voice communications conducted by the Ohio State University Research Foundation over a ten-year period, 1949-1959. The reports are related to seven topics as follows: voice intelligibility, dimensions of voice, problems in listening, hearing oneself (sidetone), the language of voice communication, problems in hearing, and the evaluation of equipment.

R 99

16,356

Annaby, D.H. & Cook, K.G. DESIGN STANDARDS FOR MAN-MACHINE TASKS IN SIGNAL CORPS SYSTEMS. Contract DA 36 039 SC 78326, Proj. 3 99 00 110, Dec. 1959, 51pp. Applied Psychology Corporation, Arlington, Va.

16,356

This study is concerned with the development of a method whereby the human functions (particularly in non-routine tasks) in man-machine systems can be classified and analyzed. Attempts to derive basic processes through classificatory methods and/or models utilizing concepts from a single theoretical framework are discussed in the first portion of the report. A model utilizing concepts from the theories of symbolic functioning and information was constructed and examined in terms of its ability to specify the demands made upon man in any man-machine system. The next steps in this research study are delineated.

T. I. R 1

16,357

Dunlap and Associates, Inc. HUMAN FACTORS REVIEW OF RADIO SET AM/GRC 53 FINAL REPORT. Contract DA 36 039 SC 73253, Proj. 3 99 00 100, Task 17B, Sept. 1959, 6pp. Dunlap and Associates, Inc., Stamford, Conn.

16,357

The Radio Set AM/GRC-53() is reviewed in terms of the human factors involved in the control panels of the Radio Transmitter T-682()/GRC, the Radio Receiver R-880()/GRC, and the Electrical Filter Assembly F-399()/GRC. General comments are made about the design of these items in relation to their operational aspects and suggestions are made for minor modifications of the present design and more radical changes for future models.

16,359

Missler, E.H. THE MATHEMATICAL ANALYSIS OF HEAT TRANSFER AND TEMPERATURE RELATIONS IN THE HUMAN BODY. PROGRESS REPORT NO. 1: 1 MARCH 1959 - 15 DECEMBER 1959. Contract DA 49 007 MD 2003, Rep. 3, Dec. 1959, 7pp. University of Texas, Austin, Tex.

16,359

Two mathematical models having many of the characteristic properties of the human thermal system have been developed. One of the models is used for making steady state calculations, the other for transient state calculations. The models are described briefly in expository form in this report. The equations for both models have been coded for the IBM 650 computer to facilitate calculations. Computed results have been compared with experimental data reported in the literature.

R 7

16,362

Raven, B.H. A BIBLIOGRAPHY OF PUBLICATIONS RELATING TO THE SMALL GROUP. Contract NONR 233(54) (NR 171 350), Tech. Rep. 1, Nov. 1959, 128pp. Department of Psychology, University of California, Los Angeles, Calif.

16,362

The bibliography presented here was taken from a bibliographic card system developed by the author to maintain coverage of literature in this area. A punch-card coding system was developed to handle the material and was described in the appendix. The bibliography was presented in alphabetical order followed by an index based on the punched card system used.

R 1451

16,363
Plant, Jane. A LOOK AT HUMAN ENGINEERING IN THE SOVIET
UNION. Co. 1959, 21pp. Douglas Aircraft Co., Inc.,
El Segundo, Calif.

16,363
The author examined some 13 issues of a Russian
Journal of Military Aviation published in 1957-1958.
Inferences were made concerning Soviet policies and
attitudes toward human engineering. Two tentative con-
clusions were drawn: 1) the Russians seem to place far
greater emphasis on the contribution to air safety of
the role of thorough, disciplined training than to engi-
neering of the aircraft itself; and 2) the Russians prob-
ably are, in fact, directing considerable attention to
the relationships between men and the machines with which
they work.
R 37

16,370
Kelley, C.R., Bowen, H.M., DeGroot, Sybil G., Frank, P.,
et al. RELATIVE MOTION II: THE NATURE OF RELATIVE MOTION
SITUATIONS. Contract N61339 316, Tech. Rep. NAVTRADEV
CEN 316 1, Nov. 1959, 107pp. USN Training Device
Center, Port Washington, N.Y. (Dunlap and Associates,
Inc., Stamford, Conn.).

16,370
This study was undertaken to broaden our knowledge of
the nature of relative motion situations from physical-
mathematical and psychological standpoints. Relative
motion was defined as the change in the relative position
of two moving objects which can be perceived or under-
stood in terms of more than one frame of reference. The
psycho-perceptual and mathematical aspects of relative
motion were delineated and systematized yielding guide-
lines for selecting a suitable frame of reference for
operator tasks. One experiment was carried out to deter-
mine whether the shape of an aircraft contributes to the
accuracy with which its motion is observed in a relative
motion situation. Recommendations are included.
T. G. I. R 36

16,380
Furchtgott, E. & Friedman, M.P. EFFECT OF HUNGER AND
SATIETY ON ODOR SENSITIVITY. Contract DA19 129 QM 844,
Proj. 7 84 15 007, Rep. 13 (Final), July 1959, 17pp.
USA Quartermaster Food and Container Institute for the
Armed Forces, Chicago, Ill. (University of Tennessee,
Knoxville, Tenn.).

16,380
To test the effects of hunger on odor and taste sensi-
tivity, a series of experiments was performed in which the
amount of practice in making threshold determinations and
the control of food intake on test days were varied. Odor
and taste thresholds were determined 1) before and after
lunch, 2) after a 1150-calorie lunch on one day and on the
following day after a fast since a standard breakfast, and
3) following seven practice trials on each of four days
after an 1800-calorie lunch and four more days when lunch
was withheld; 20 subjects were used. The effect of the
experimental treatments on threshold sensitivity was stud-
ied by analysis of variance technique.
T. R 14

16,382
Durkee, M.T., Rubinstein, S. & Swenson, M.A. AN ENGINEER-
ING STUDY OF HUMAN RESCUE EQUIPMENT, CAPSULE TYPE. Con-
tract AF 33(600) 29970, Proj. 6067, Task 61586, WADC TR
56 8, Nov. 1959, 180pp. USAF Aeronautical Accessories
Lab., Wright-Patterson AFB, Ohio. (Radioplane, Northrop
Aircraft, Inc., Van Nuys, Calif.).

16,382
The problem of human rescue by high-performance air-
craft was studied to determine the most feasible capsule-
type rescue system for installation in current and pro-
jected fixed-wing aircraft. Several types of rescue
systems were studied and evaluated. The development
history of the proposed rescue system is discussed.
Preliminary aerodynamic analysis and a dynamic analysis
of the proposed system were presented.
T. G. I. R 24

16,384
Gordon, E.B., Mitt, M.D., Ray, H.W. & Metherbee, J.K.
THE EFFECTS OF SELECTED COUNTERMEASURE AND COUNTER-
COUNTERMEASURE TECHNIQUES ON SYSTEM PERFORMANCE. FINAL
REPORT. Contract AF 33(616) 3739, Dec. 1959, 54pp.
Batelle Memorial Institute, Columbus, Ohio.

16,384
The primary objective of this study was to determine,
by a laboratory method, the effects of two types of elec-
tronic countermeasures (ECM) (noise and sweep-spot jam-
ming) on air-defense-system performance, both with and
without the use of an electronic counter-countermeasure
(Dicke fix). It was also wished to ascertain the degree
of relation among several criteria potentially useful in
ascertaining ECM effectiveness, such as the General Mills
measure of receiver-sensitivity degradation. By the use
of an analog computer, ECM and radar simulation equipment,
human subjects, and a digital-computer intercept model,
one sub-system within the total air-defense environment
was simulated and 15 different experimental conditions
studied and evaluated.
T. G. I.

16,385
Gerathewohl, S.J. PSYCHOLOGICAL PROBLEMS OF SELECTION,
HOLDING, AND CARE OF SPACE FLIERS. Nov. 1959, 13pp.
USA Medical Services, Washington, D.C.

16,385
This paper presents a discussion of psychological re-
quirements for the selection of space fliers based on an
evaluation of selection methods used for somewhat similar
jobs. For example, the methods used to select combat
pilots were studied for their applicability to the present
problem. Problems involved in training and management of
the holding or waiting period between time of induction
and first flight are discussed. The maintenance of in-
terest and motivation in the astronaut, as well as the
importance of personal characteristics such as ability to
resist social pressures, are also discussed.
R 22

16,386
Gibbs, C.B. SERVICE PROBLEMS OF SIMULATOR DESIGN. RNP
60/966, OES 342, Sept. 1959, 3pp. Operational Efficiency
Sub-Committee, RNPAC, London, England. (Applied Psy-
chology Research Unit, MRC, Cambridge, England).

16,386
The problem of simulator design for command link
missiles is analyzed. It is argued that the perceptual
and not the motor aspects of control are of critical im-
portance in simulation and current projection techniques
are examined in the light of this assumption. The math-
ematical problems and certain other problems of atmos-
phere and other effects are analyzed. Some recommenda-
tions are presented for the proper use of present
trainers.

16,388
Johnson, G.E., Serrano, J., Jr. & Levy, E.Z. APPLICATION
OF SKIN RESISTANCE IN PSYCHOPHYSIOLOGICAL STUDIES. Proj.
7222, Task 71745, WADC TR 59 688, Dec. 1959, 17pp. USAF
Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

16,388
The usefulness of measuring changes in skin resistance
as a device to detect the impairment of consciousness in
personnel whose work requires maximum alertness was in-
vestigated during isolation, in flight, under accelera-
tion, under the influence of drugs, and other conditions.
The methodology of measurement and assessment are dis-
cussed and both the promise and limitations are pointed
out. Necessary studies are indicated which could lead
to the use of this method as an operational tool.
G. I. R 8

16,390

Morris, Allene. PATTERN TARGET ANALYSIS. PART I. A THEORY. PART II. A PSYCHOPHYSICAL EXPERIMENT. Contract N00S 72092, Index No. NS-714 100, SIO Ref. 59 62, Nov. 1959, 29pp. Visibility Lab., Scripps Institution of Oceanography, University of California, San Diego, Calif. (USN Electronics Lab., San Diego, Calif.).

16,390

A psychophysical experiment was conducted 1) to determine the visual detection thresholds for targets of various shapes and internal pattern configurations as observed under various luminance conditions, and 2) to define the effective visual stimulus. The data were analyzed with respect to earlier results from the Tiffany study on target visibility and prediction curves for patterned target visibility were obtained. A theory of pattern target analysis was evolved on the basis of the experimental data and is described in detail. G. I. R 3

16,391

Morris, Allene. PREDICTING THE DETECTION RANGE OF A TARGET IN A MOVING FIELD OF VIEW. Contract N00S 72092, Index No. NS 714 100, SIO Ref. 59 69, Dec. 1959, 20pp. Visibility Lab., Scripps Institution of Oceanography, University of California, San Diego, Calif. (USN Electronics Lab., San Diego, Calif.).

16,391

This paper reviews major references that report experimental data on visual thresholds for static and moving targets. The visibility of a stationary target varying with exposure time is compared to that of a target moving at various angular velocities relative to the observing eye in an effort to determine possible equality in terms of effective stimulus energy. The particular concern is with the prediction of the detection range of a target in a moving field of view from existing data. R 76

16,394

Savage, L.J. SUBJECTIVE PROBABILITY AND STATISTICAL PRACTICE. Contract AF 49(638) 391, AFOSR TN 59 1161, Oct. 1959, 45pp. USAF Mathematical Sciences Directorate, Office of Scientific Research, Washington, D.C. (University of Chicago, Chicago, Ill.).

16,394

This is a printed version of a lecture given to a meeting of statistics seminars at the University of London. The author argues that the concept of subjective probability is "capable of suggesting and unifying important advances in statistical practice." The author develops his arguments through defining subjective probability in terms of an idealized person; a discussion of Bayes' theorem and the likelihood-ratio principle as these relate to concepts of significance and confidence level and a discussion of the theory of precise measurement are also included. Illustrative examples are given for each of the above topics. The author believes that ultimately every topic in statistics should be reviewed in light of the concept of subjective probability. G. R 116

16,395

Sampson, P.B., Coleman, P.D. & Eikin, E.H. THE FEASIBILITY OF USING THE EYE AS A SOURCE OF CONTROL SIGNALS IN TRACKING. Contract N00R 494(16), NR 144 122, Dec. 1959, 41pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

16,395

The idea that eye movements could be made to produce signals that could be used for machine control purposes was considered from the point of view of its feasibility. Topics relevant to the problem included 1) suggestions for applications, 2) techniques for obtaining eye movement signals, 3) tracking characteristics of the eye, and 4) human factors considerations in the design and use of an eye movement control device. T. R 43

16,398

Sampson, H. SERIAL ADDITION AS A FUNCTION OF STIMULUS DURATION AND PACING. *Canad. J. Psychol.*, 1958, 12(3), 179-183. (University of Canterbury, Christchurch, New Zealand).

16,398

Results from previous studies raised questions as to whether some source of disturbance in addition to speed of pacing affected performance in paced serial addition tasks. Two experiments were designed to answer whether the value of longer stimulus durations within pacing intervals is lost 1) if changes in stimulus durations are presented unsystematically while pacing rates are increased systematically and 2) if changes in pacing rates and stimulus duration occur systematically. Twenty Ss participated in two experiments in which a serial addition task was presented under five pacing conditions with nine on-off ratios and when pacing and stimulus durations were varied. Results were discussed as they allow for increased adequacy of account of factors influencing performance under these conditions. T. G. R 4

16,399

Sampson, H. STIMULUS DURATION AND PACED PERFORMANCE. *Canad. J. Psychol.*, 1958, 12(1), 7-12. (Canterbury University College, Christchurch, New Zealand).

16,399

To investigate the role of stimulus duration in paced performance, serial addition performance was studied under these conditions: 1) pacing constant, on-off ratios varied; 2) "on" constant, "off" varied and "off" constant, "on" varied; 3) on-off ratio constant, pacing varied. In the first three experiments, 30 Ss were used. Results were presented in terms of analysis of variance of percents correct under the five experimental conditions. In experiments four and five, in which various pacing intervals were presented randomly, 25 Ss participated. Results of the four experiments were discussed as they relate to the problem of stimulus duration in paced performance as well as problems connected with variable pacing. T. G. R 4

16,409

Fry, G.A. & Enoch, J.M. HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION: SEVENTH INTERIM TECHNICAL REPORT. Contract AF 30(602) 1580, Proj. 1115, Task 15001, RADC TN 58 298, & OSURF Proj. 696, MCRL T.P. (696) 10 266, Jan. 1958, 36pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

16,409

This is a review of work completed from November 1957 to January 1958 on a research program relating the physical characteristics of photographic images to the performance of the photo interpreter. Abstracts of reports concurrently submitted are included along with discussion of the completed simulator program and progress on the ophthalmograph program. A discussion of the problems encountered when the comparative cover technique is employed on aerial photographs which have undergone a line-scan transformation is presented. G. I. R 7

16,410

Fry, G.A. & Enoch, J.M. HUMAN ASPECTS OF PHOTOGRAPHIC INTERPRETATION: SECOND INTERIM TECHNICAL REPORT. Contract AF 30(602) 1580, Proj. 1115, Task 15001, RADC TN 57 152 & OSURF Proj. 696, Oct. 1956, 60pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

16,410

This is an interim report on a research program aimed at defining the range of values, from minimal to optimal, of visual performance for each of the various physical photographic parameters. In addition, methods of optimizing viewing conditions of photointerpreters are to be investigated. To date, a simulator and modified ophthalmograph unit have been constructed. Pilot studies have been completed on both instruments and are reported here. The work for the next quarter is outlined. T. G. I. R 5

16,411

Forbes, A.R. SURVEY OF THE EFFECTS OF BUFFETING AND VIBRATION ON HUMAN BEHAVIOR. FPRC Memo. 105, Aug. 1959, 20pp. Flying Personnel Research Committee, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

16,411

A review of the literature on the effects of flight through turbulent air, with particular reference to the effects of buffeting and vibration on the performance of the aircrew, is presented. The results of the few flight studies which have been conducted are reviewed along with the results of laboratory studies of the effects of sine-wave vibrations on the human organism. Special attention is given to those studies dealing with behavioral aspects of the problem.

R 58

16,413

Burns, W. REPORT TO THE ROYAL NAVAL PERSONNEL RESEARCH COMMITTEE ON THE ACTIVITIES OF THE HEARING SUB-COMMITTEE. RNP60/974, No. S. 19, Nov. 1959, 8pp. Hearing Sub-Committee, RNP60, London, England.

16,413

This report presents a brief review of the main activities of the Hearing Subcommittee and its predecessors followed by a list of its publications. The review covers: 1) auditory problems in Asdic operations; 2) protection in hearing; 3) standards of hearing for naval aircrew; 4) technical aspects of audiometry and documentation; 5) hearing problems related to diving; 6) medical care of hearing protection from high intensity noise; and 7) future work of the Subcommittee.

T. R. 44

16,417

Tregerman, L., Pericone, C., Maue, E., McBride, W., et al. INSTRUMENTATION OF THE INTEGRATED MAPPING SYSTEM. FOURTH INTERIM TECHNICAL REPORT. Contract DA 44.009ENG 3766, Proj. 8 35 11 540, Rep. SME AA 37, Nov. 1959, 11pp. Fairchild Camera and Instrument Corporation, Syosset, N.Y.

16,417

This interim report covers activity of the fourth quarter year period of a research and development program aimed toward the development of equipment which will obtain from a stereoscopic exercise of profiling several useful output products required in the production of topographic maps. The work of the period covered in this report consists mainly of the design and detailing of a line drop device and the addressing controls; these items are discussed in detail. An outline of the work planned for the next reporting period is presented.

I.

16,418

Askren, W.B. MAN FUNCTIONS IN SPACE FLIGHT. Paper presented to the Panel on Psychology, of the Armed Forces-NRC Committee on Bio-Astronautics, Washington, D.C., Dec. 1959, 10pp. USAF Wright Air Development Division, Wright-Patterson AFB, Ohio.

16,418

Duties typical of those to be assigned to future space crews are described in the form of an activity analysis for a three-man crew on a hypothetical 72-hour moon trip. Major activities are thus shown to be navigation, flight control, energy management, in-flight maintenance, and the like. The duties are further analyzed to determine the criteria that should be used in selecting personnel for a space flight of this type.

16,422

Allen, Patricia S., Bennett, E.M. & Kealer, Dorothy K. FORCED-CHOICE RANKING AS A METHOD FOR EVALUATING PSYCHO-PHYSIOLOGICAL FEELINGS. ONE OF A SERIES OF REPORTS PERTAINING TO THE EVALUATION OF MAN'S MINIMUM LIFE-SPACE REQUIREMENTS. Contract AF 33(516) 3068, Proj. 7222, Task 71747, WADC TR 58 310, Dec. 1959, 123pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio. (Bio-Mechanics Lab., Tufts University, Medford, Mass.).

16,422

The importance of adequate seating to personal comfort and hence efficiency of crew members, especially on prolonged flight, led to evaluation of design characteristics. The purpose of the present study was to develop reliable and efficient equipment evaluation techniques. The present investigation was focused on subjective meanings of comfort-discomfort or feeling states as these might relate to such things as boredom, excitement, etc. Multiple forced-choice ranking methods were employed to assess comfort inducing or inhibiting characteristics of aircraft seats. Twenty-four SS assessed six seats.

T. G. I. R 46

16,423

Danaker, J.W., Eberhard, J.W. & Colman, K.W. PRE-DICTION OF OPERATOR EFFECTIVENESS IN DYNAMIC IN-TRAFFIC CONTROL SIMULATION (TECHNICAL REPORT). Contract FAA/BRD 27, Proj. N, Rep. 30, Nov. 1959, 110pp. Courtney and Company, Philadelphia, Penn.

16,423

This study was undertaken to develop a program for selecting simulator pilot operators to staff dynamic air traffic control simulators. On the basis of the results of two activity analyses of such systems and supervisor opinions regarding job requirements, operator performance rating scales were developed. The data collected using the scales were combined to form a composite criterion for use in the validation of 13 predictor variables (Civil Service Examination, ten tests comprising the Employee Aptitude Survey, age, and years of education). Validation studies were conducted in two separate operational settings. Operational implications of the findings are discussed.

T. G. I. R 16

16,425

Wood, W.D. & Bators, B.L. A COMMUNICATION CHANNEL WITH LEARNING. Contract AF 30(602) 1890, Proj. 4519, Task 45541, RADC TR 59 363, Sept. 1959, 17pp. Pikewood Corporation, Albuquerque, N.M.

16,425

This technical note covers initial work on a generalization of information theory to include learning by the receiver. Assuming that the receiver can recognize the elements of the message set but is unfamiliar or inexperienced with their probabilities of occurrence, a modified "entropy" concept can be defined using subjective "probabilities" for measuring the element of surprise to the receiver. The entropy of the message set as seen by the receiver is proved to be greater than or equal to the true entropy of the message set and intuitively satisfactory examples of learning steps are shown to reduce this difference.

I. R 1

16,429

Pfaffmann, C. THE AFFERENT CODE FOR SENSORY QUALITY. Amer. Psychologist, May 1959, 14(5), 226-232. (Brown University, Providence, R.I.).

16,429

This paper reviews some experiments on taste in which the methods of electrophysiology have been used to study the sensory process. Sensation itself is not studied; rather, the investigator "taps in" on the "basis of sensation" by recording and amplifying the nerve impulse traffic in the sensory fibers "en route" to the brain. The general implication of the findings for the theory of afferent coding is discussed.

T. G. I. R 21

- 16,433
Ramo-Woolridge Corporation, Los Angeles, Calif. PROCEDURE PLAN HUMAN FACTORS METHODOLOGY. Contract DA 36 039 SC 80078, Proj. 75 0000, USAEPG SIG 922 17, Sept. 1959, 26pp. USA Electronic Proving Ground, Fort Huachuca, Ariz.
- 16,433
This paper describes the development of operating procedures for an automatic data processing subsystem which consists of 1) an analysis of system requirements and of preliminary man-machine procedures to meet these requirements, and 2) an evaluation of these preliminary procedures in a field test situation. A method was presented for analysis of operator requirements. The field test methodology was described. Problems involved in selection of personnel for programming and for maintenance were discussed briefly.
I.
- 16,435
Stern, I.S. THE USE OF AUTOMATIC DATA PROCESSING SYSTEMS AND COMMUNICATIONS NETWORKS TO STRENGTHEN REPAIR PARTS CONTROL. Thesis 123, April 1959, 105pp. Industrial College of the Armed Forces, Washington, D.C.
- 16,435
This paper presents the various problems of repair parts and the control functions closely related to repair parts support to the nation's military forces. The presentation is followed by a description of the automatic data processing system and communications networks and their application to the problems involved in repair parts control systems. A series of recommendations is included.
I. R 82
- 16,436
Nowlis, V. METHODS FOR THE OBJECTIVE STUDY OF DRUG EFFECTS ON GROUP FUNCTIONING. Contract NONR 668(12), Proj. NR 171 342, Tech. Rep. 6, Sept. 1959, 36pp. Dept. of Psychology, University of Rochester, Rochester, N.Y.
- 16,436
The feasibility and potential outcome of drug research on subjects in small face-to-face groups is discussed. Three kinds of questions about the effects of psychoactive drugs on social behavior are presented and some of the methods relevant to each are reviewed: 1) what effects, if any, does a specific drug have upon any or all aspects of observable social behavior? 2) what effects does a drug have upon certain empirical relations in the domain of individual social behavior? and 3) what effects does a drug have upon empirical relations based on group characteristics?
R 91
- 16,437
Nareff, M.J. PASSENGER PHLEBITIS - A COMPLICATION OF LONG DISTANCE AERIAL TRAVEL. 1959, 14pp. USAF Aerospace Medical Center, Lackland AFB, Tex.
- 16,437
A series of eight cases of "passenger phlebitis" was presented. All followed long flights in military transport aircraft with varying seat configurations. Pathogenic mechanisms were discussed. The occurrence of previous thrombovascular disease in five of the cases indicated predisposition and the need for caution when these passengers fly. Symptoms that would lead to the suspicion of "passenger phlebitis" were outlined and implications for passenger instructions concerning prolonged immobility in flight were suggested.
I. I. R 8
- 16,446
Marrs, J.L. A POSSIBLE CRITERION FOR VISUAL RECOGNITION THRESHOLDS. Contract NOBS 72092, Index No. NS 714 100, SIO Ref. 59 65, Nov. 1959, 18pp. Visibility Lab., Scripps Institution of Oceanography, University of California, San Diego, Calif.
- 16,446
A theoretical analysis of the detection and recognition capability of an ideal mosaic detector is described. The relationship between detection and recognition for this idealized mosaic is used to hypothesize a criterion for the threshold of visual recognition. A brief psychophysics experiment was performed as a first test of this hypothesis. The degree of success and the limitations of the test are discussed.
G. I.
- 16,447
Harvey, O.J. PERSONALITY CORRELATES OF CONCEPTUAL FUNCTIONING AND CHANGE ACROSS SITUATIONS. Contract NONR 1147(07), Tech. Rep. 3, ca. 1958, 30pp. University of Colorado, Boulder, Colo.
- 16,447
Working from the assumption that once a concept is formed the individual is motivated towards its maintenance, the author performed a series of experiments in which the results of various attempts to alter existing opinions or concepts were related to certain personality correlates. Nine experiments were performed using nine personality measures to study: 1) relative effectiveness of gradual and absolute approaches in changing weak and strong concepts, 2) effects of extreme anchor discrepancies, 3) reciprocal effects of the group and three types of leaders, 4) effect of proximal and remote anchors, 5) relationship of certain personality characteristics to concept shift, 6) displacement reactions to nondirectional criticism from source of power, 7) reaction to negative information about self, etc. T. R 9
- 16,449
Girard, F. MEDICAL AND HUMAN ENGINEERING ASPECTS OF FLIGHT IN RYAN VTOL AND STOL AIRCRAFT. Rep. 239, May 1959, 19pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France.
- 16,449
A short historical outline including brief descriptions of the VTOL (vertical take-off) aircraft which have been constructed and tested by the Ryan Aeronautical Company is given. The major aspects of the principal medical and human factors of these aircraft in hovering and transitional flight are discussed. Principal attention is given to problems of the control system.
T. I. R 5
- 16,450
Gulliksen, H. & Messick, S. (Eds.). PSYCHOLOGICAL SCALING: THEORY AND APPLICATIONS. Contract NONR 1856 (15), 1959, 210pp. John Wiley & Sons, Inc., New York, N.Y. (Princeton University, Princeton, N.J. & Educational Testing Service, Princeton, N.J.).
- 16,450
The chapters of this book were originally presented as papers at a conference designed to bring together investigators applying scaling techniques in widely different fields. The conference was organized around the following five general topics: 1) properties of category scales and quantitative estimation scales and their implications for the nature of psychological judgments under varying conditions; 2) problems in psychophysical scaling; 3) discussion of scaling in the context of attitude measurement; 4) choice and the measurement of utility, game theory and decision-making situations; and 5) various aspects of multidimensional scaling.
T. G. R 172

16,455

Colman, K.W., Wallace, W.H., Danaher, J.W., Clark, W.C., et al. HUMAN FACTORS IN AIR TRAFFIC CONTROL SYSTEMS DESIGN. SUMMARY REPORT PART 2. Contract FAA/BRD 27, Proj. N, Rep. 32, Nov. 1959, 30pp. Courtesy and Company Philadelphia, Penn.

16,455

This report summarizes briefly the tasks performed during the period August 1958 through November 1959 on a research program on human factors in air traffic control systems design. Technical memoranda and reports which give complete details of work accomplished are listed. Major human factors assistance given is discussed under three tasks: 1) development and evaluation of air traffic control systems (program planning and information requirements); 2) design of air traffic control data processing and display systems (Data Processing Central and Automatic Ground/Air/Ground Communication System); 3) simulation of air traffic control systems. I. R 51

16,457

Abma, J.S., Huffman, Lois L. & Mason, L.J. THE FURTHER DEVELOPMENT AND EVALUATION OF AURAL READING DEVICES FOR THE BLIND. SUMMARY REPORT. Contract V1005 M.1961, June 1959, 75pp. Battelle Memorial Institute, Columbus, Ohio.

16,457

This report gave an account of engineering and evaluation activities on a project undertaking the development of a direct translating aural reader for the blind. Experience in using five prototype devices (optophones) during the years 1957-1958 indicated the desirability of a number of mechanical and electronic modifications which are described in detail. Plans for further developments were discussed. Evaluation activities included the investigation of various training techniques using ten blind subjects. Seven of the subjects were new to the program in September 1958, and three advanced subjects were retained from the previous group. Progress of the two groups was compared. Continuation of the evaluation of the optophone reading devices was recommended. I. G. I. R 2

16,460

Bartow, J.E., Krassner, G.H. & Riehs, R.C. DESIGN CONSIDERATIONS FOR SPACE COMMUNICATION. IRE Trans., Dec. 1959, CS-7(4), 232-240. (USA Signal Research and Development Lab., Fort Monmouth, N.J.).

16,460

With the advent of artificial earth satellites, the use of such vehicles for communication purposes has been the subject of considerable study by both military and commercial organizations in the communications field. This paper describes the problems involved in space communication, the assumptions that must be made, and the technical limitations which determine the communication system that should be used for a particular time frame. Some characteristics for an optimum system are stated and some technical characteristics of the first successful satellite communication system are given. G. I. R 4

16,466

Bell, C.G., Stevens, K.N., House, A.S., Heinz, J.M., et al. RESEARCH ON SPEECH SYNTHESIS. FINAL REPORT. Contract AF 19(604) 2061, AFRC TR 60 101, Dec. 1959, 15pp. Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.

16,466

To increase understanding of the speech communication process, the experiments described in this paper sought to discover relations between 1) symbols used to describe language, 2) configurations and acoustic excitations of the vocal tract as functions of time, and 3) properties of the acoustic signals radiated from the vocal tract. The studies reported (largely by citation) were concentrated mostly on experiments with speech synthesizers and on the direct analysis of speech. A large part of the work reported on speech analysis was done with a digital computer. Related research activities were also mentioned. I. R 53

16,467

Skinner, I.D. THE EFFECT OF LIMITED RESOURCES ON DECISION BEHAVIOR IN TWO-CHOICE SITUATIONS. M.A. Thesis, Aug. 1959, 39pp. University of Texas, Austin, Tex.

16,467

This study was designed to determine whether a relationship exists between the maximum number of trials allowed for a problem and the number of these trials a subject is willing to use for purposes of sampling. Subjects, 108 students run in groups of four, were given decision-making problems of varying length and were faced with the choice of making an early decision with high probability of error or of spending more available time gathering information having fewer trials left to recoup losses. Results were discussed as they related to other studies of decision-making, especially those related to probability learning. T. G. I. R 16

16,468

Chase, R.A. & Parke, Carol. BIBLIOGRAPHY: STUTTERING. Jan. 1959, 7pp. Communications Lab., Dept. of Biometrics Research, New York State Department of Mental Hygiene, New York, N.Y.

16,468

This bibliography on stuttering includes books and articles from English language periodicals covering a period from 1920 to 1958. Most of the references, however, are from the past 20 years. The arrangement is alphabetical by author. R 129

16,474

Bergere, S.P. WORKING BIBLIOGRAPHY PICTORIAL NAVIGATION DISPLAYS. Q 54, M 5773, July 1959, 8pp. Man-Machine Information Center, Washington, D.C.

16,474

This report consists of a list of 70 citations of investigations of various aspects of pictorial navigation displays published between 1947 and 1959. Unclassified, classified, and confidential reports are included. R 70

16,476

Lamb, L.E. (Ed.). THE FIRST INTERNATIONAL SYMPOSIUM ON CARDIOLOGY IN AVIATION, CONDUCTED AT THE SCHOOL OF AVIATION MEDICINE 12-13 NOVEMBER 1959. Nov. 1959, 430pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

16,476

This symposium was held for the purpose of consolidating, integrating, and evaluating the data that have been collected concerning the cardiovascular system in aviation. Two panel discussions and 22 papers are reported in full. The papers are grouped under the following major topics: 1) aerospace flight and the normal cardiovascular system; 2) cardiovascular techniques; 3) cardiovascular disorders in aircrew personnel; 4) ECG studies (includes Canadian evaluation, prognostic implications of the ECG, and findings on 67,375 US Air Force pilots); 5) limits of cardiovascular normality for flying; and 6) the national program for study of cardiovascular disease. T. G. I. R 380 (approx.)

16,480

Simons, D.G. MANHIGH II. USAF MANNED BALLOON FLIGHT INTO THE STRATOSPHERE. Contract AF 29(600) 802, AFMOC TR 59 28, June 1959, 327pp. USAF Missile Development Center, Holloman AFB, N.M.

16,480

Gardner, R.A. PERCEPTION OF RELATIVE FREQUENCY AS A FUNCTION OF THE NUMBER OF RESPONSE CATEGORIES. Proj. 6X95 25 001 02, Task 02, Rep. 408, Dec. 1959, 10pp. USA Medical Research Lab., Fort Knox, Ky.

16,480

The purpose of the flight described in this voluminous report was to put man and his balloon capsule into conditions equivalent to space flight to study reactions of both. A chronological report of preflight and inflight proceedings is given; the report is profusely illustrated. A running account of the flight is given including the pilot's comments during flight. A series of individual reports included data on ballasting and valving effects, meteorological aspects, cosmic ray monitoring, radiation effects on the pilot, communication and telemetry, nutritional aspects, hematological experiments, and reports from both the flight surgeon and the tank scientist.

T. G. I. R 51

16,480

Choice behavior in an uncertain situation where the only basis for choice was the perceived relative frequency of events in a series was studied. The number of available response categories, or choices, was varied independently of the number of stimulus-event categories in the series by adding dummy-choices (choices that could not result in hits) on the response panel. The data were analyzed to ascertain whether increasing the number of response categories tended to increase the response bias in favor of the most frequently presented category. An interpretation of the multiple-choice effect in decision-making was offered.

T.

16,481

Pribram, K.H. CEREBRAL MECHANISMS AND DECISION PROCESSES. FINAL REPORT. Contract DA 49 007 MD-763, Dec. 1959, 9pp. Stanford University, Stanford, Calif. (Institute of Living, Hartford, Conn.).

16,489

Korbel, H. DEVELOPMENT OF A NEW OPTICAL LANDING GUIDE. FINAL REPORT. Proj. 16, Rep. NS OOC OGI, Dec. 1959, 26pp. USN Material Lab., New York Naval Shipyard, N.Y.

16,481

This report summarized the second stage of a research program of neuropsychological research. In the first stage, two major psychological categories were distinguished through neurobehavioral analysis: discriminative and preferential. In the second stage, tests of the validity of these distinctions were made and problems of "preference" were studied by use of techniques developed in decision theory. Tests of the distinction between discrimination and preference were accomplished in the laboratory. Brain lesions were then made to determine whether differential effects could be obtained. A theoretical discussion of the results was presented.

R 13

16,489

Optical glidepath indicators, consisting of a light source and a large mirror, both located on the landing field, have proved to be effective in guiding pilots of aircraft during landings. The design, construction, and testing of a louver device which would replace the mirror are described. Among its advantages over the mirror are lower size and weight, lower cost, and greater flexibility in design. As an example of the last, the louver guide may be buried in the center of the runways rather than located to one side. Construction drawings of the Louver Landing Guide are included.

G. I.

16,482

Wolin, B.R. METHODOLOGY NOTE: ON THE DESIGN AND REDESIGN OF SYSTEMS. Contract AF 19(604) 2635, AFRC TR 59 70, SDC FN 2600, Nov. 1959, 33pp. System Development Corporation, Santa Monica, Calif.

16,490

Emanuel, A.F. & Mauch, H.A. THE DEVELOPMENT OF A READING MACHINE FOR THE BLIND. SUMMARY REPORT. Contract V 1005 M 1943, June 1959, 6pp. Mauch Laboratories, Inc., Dayton, Ohio.

16,482

This paper discusses some characteristics of complex, man-computer information processing systems and an approach to the design and improvement of such systems. The contents stem directly from experience of a group performing research and development on the SAGE Air Defense System and represent an attempt to abstract from this experience those techniques that have proved useful in answering such questions as 1) does or will a system have problems? 2) what are they? 3) where is the basic source of any problem? and 4) how does one go about solving them? Major sections deal with contingency analysis, specific design techniques, and optimizing man-computer relationships.

16,490

This report described a reading machine development program (for the blind) in which an attempt is being made to improve the output of the direct translation type reading machine in order to reduce reading speed limitations and learning difficulties while retaining features of low cost and portability. A mechanical model of the human speech mechanism was built and evaluated in an effort to produce a speech-like output. A further effort was made in this same regard to develop a collection of speech sounds (word fragments) for the construction of artificial words resembling speech. A word synthesizer is being developed which will compose artificial words from the word fragments. Future plans for the solution of scanning problems were discussed.

16,486

Laboratory for Electronics, Inc. STUDY, DESIGN, AND DEVELOPMENT OF NAVIGATION DISPLAY FOR HELICOPTERS. FINAL REPORT. Contract AF 33(600) 34034, Oct. 1959, 78pp. Laboratory for Electronics, Inc., Boston, Mass.

16,491

Connelly, R.E. EVALUATION OF THE AIR FORCE INTEGRATED FLIGHT INSTRUMENT SYSTEM AND ENGINE PARAMETER INDICATOR. Task 61978(3) & (4), WADC TR 59 414, Dec. 1959, 11pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

16,486

The study, design, and development program summarized in this report had as its prime purpose the over-all improvement in helicopter instrument flight. Three aspects of the program were described: 1) investigation of kind and type of instruments required and wanted by experienced helicopter pilots and of the way in which the instruments should be grouped; 2) investigation of the advantages to be gained by incorporating Doppler radar to improve the guidance displays for the pilot of a manually controlled aircraft; and 3) investigation of a Doppler-controlled automatic-stabilization system using the autopilot.

I. R 14

16,491

Flight tests were conducted to determine: 1) acceptability of changes incorporated in the production integrated flight instruments (consisting of sensing units, air data computer system, coupler, flight director, and flight instruments) as the result of previous tests; 2) acceptability of the miniaturized air speed and altitude indicators as stand-by instruments for use with the integrated flight instruments; and 3) performance and desirability of the engine parameter indicator. In addition to the above evaluations, 17 specific recommendations were made for development of future weapon systems.

I.

16,492
Goldbell, J.C. UNDERSTANDING-ESCAPE PROGRAM: DESIGN, DESIGN AND CONCEPT FORCE TESTS FOR-1 AND FOR-1 CONCEPT TESTING AROUND A SHOOTING SUBSTANCE. DESIGN REPORT NO. 8. Proj. NOC ME 6807, Rep. NOC ED 5011, Jan 1958, 13pp. USAF Air Development Center, Johnsville, Penn.

16,493
To determine the waterflow effect tending to close the canopy of a sinking aircraft and to investigate the positions maintained during pilot egress, tests were conducted at Key West, Florida, during November 1958. A single-place fighter aircraft (F4U-1) and a two-place trainer aircraft (T-28) were secured alternately to the aft deck of a submarine which was used as a research platform. Canopy force tests were conducted in full down and nose down positions with canopy removal testing. Human egress tests included both the above positions with canopy open and canopy jettisoned. On the basis of the test results, recommendations were made concerning equipment and escape procedures.
T. G. I. R 7

16,494
Clark, C.C. & Woodling, C.M. CENTRIFUGE SIMULATION OF THE X-15 RESEARCH AIRCRAFT. Proj. NOC ME 6816, Tech. Rep. NOC ME 6816, Rep. 9 & NOC ME 6816, Dec. 1958, 13pp. USAF Air Development Center, Johnsville, Penn. (USAF Air Development Center, Johnsville, Penn. & National Aeronautics and Space Administration, Washington D.C.).

16,495
Three centrifuge simulation studies were made to determine human tolerance to oscillating accelerations of the amplitude and duration which might be expected under conditions of operation of the X-15. In the third program, 31 recording channels were used to characterize computer aircraft response, including cockpit displays; 13 to characterize pilot control actions and his electrocardiogram; 12 to characterize the centrifuge response; and 8 to characterize switch positions. Pilot performance in terms of tolerance of g-impact, blackout, physiological and bodily reactions, and reactions were reported. The restraint system and cockpit instruments were described in some detail. A fourth program was contemplated.
G. I. R 17

16,496
Davis, E. Tassell, E. & Goldstein, E. THE PERIPHERAL NERVOUS SYSTEM, WITH REFERENCE TO THE EAR. Cold Spring Harbor Symposia on Quantitative Biology, 1952, Vol. 143-156. (Cold Spring Harbor for the Deaf, St. Louis, Mo.).

16,497
To answer the question "How does the movement of a typical segment of the cochlear partition initiate nerve impulses?" the relevant facts concerning the mechanical stimulus, the structure and the known electrical activities of the sense organ, the nerve fibers connected to them, and the nerve impulses generated in these fibers are examined for relationships among these facts. A theory of the action of the ear as a mechano-neural transducer is presented and discussed.
T. R 20

16,498
Tufts University. SELECTED REFERENCES IN SYSTEMS RESEARCH. PRELIMINARY DRAFT. Contract N00014-59-1-0013, Dec. 1959, 13pp. Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.

16,499
This is a dittoed list of 194 titles in systems research covering the period 1947-1958.
R 194

16,499
Miller, G.C., Wagner, R.L., Tansil, R.C., Riley, D.L., et al. INVESTIGATION OF MEDIA AND DESIGN OF A CONSOLE FOR REAL-TIME DATA PRESENTATION: DESIGN I REPORT: DIRECTION OF DATA PRESENTATION AND SELECTION OF PARAMETERS. Contract AF 64(615)604, July 1958, 13pp. Industrial Information Laboratories, Milroy, N.J. (ITT Laboratories, San Francisco, Calif.).

16,500
A group of parameters for real-time monitoring of high performance aircraft, sub-orbital, and orbital vehicles was formulated to provide information for flight safety control. Both aircraft and aircraft functionality were considered. A definition and purpose of real-time monitoring were followed by an outline of the definition and definition of flight operation of high performance aircraft, the potential role of real-time monitoring in the operation of such aircraft, console criterion and its application, and parameter selection in terms of malfunctions that could occur in the measurement of complex conditions. The art of data presentation was considered in terms of methods and of taking full advantage of the sensory system of the human. Viscular and physiological malfunctions were presented. T. R 48

16,501
Bryant, G.L. & Schuster, J.M. AN EXPERIMENTAL COMPARISON OF NOISE SHOCKING TRAINING TECHNIQUES. Contract N00014-59-1-0013, Dec. 1959, 13pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

16,502
The purpose of this study was to compare the relative effectiveness of guidance (direction of the students' trouble shooting activities during training) as compared with explanation (justification and clarification of reason for each step). Trainees, each at his own pace, worked on 60 trouble shooting problems under one of the following conditions: 1) no guidance, no explanation; 2) partial guidance, no explanation; 3) complete guidance, no explanation; 4) partial guidance, explanation; or 5) complete guidance, explanation. Ten criterion problems were then administered and performance was compared for students trained under the various conditions. Differences were tested for significance. Implications of results for training of trouble shooters by the U.S. Navy were discussed and a sample problem described. T. I. R 9

16,503
Carlsen, L.D. & Bortner, R.J.K. THERMAL STRESS AND PHYSIOLOGICAL STRAIN. Contract AF 19(604) 1467, Proj. 7952 13, AAL IN 57 13, June 1957, 13pp. USAF Arctic Aeromedical Lab., Fort AFB, Alaska. (Dept. of Physiology and Biophysics, and Meteorology, University of Washington, Seattle, Wash.).

16,504
Major considerations in the evaluation of environmental stress and the resulting physiological strain are discussed. Emphasis is placed upon the fact that these are essential elements common to all investigations of environmental stress, which is defined as the tendency of the environment to cause a change in the individual. Strain is defined as the change in the homeotherm brought about by stress. Items are listed and discussed about which information must be given on environmental stress at various temperatures and for various conditions. The type of data needed for adequate evaluation is considered. Various charts and graphs are included.
G. R 19

16,505
Buchanan, D.A. ACCURACY OF SPEED ESTIMATION BY ESS OPERATORS. Contract AF 19(604) 2635, AFRC IN 59 67, SOC FM 282, Nov. 1959, 17pp. System Development Corporation, Santa Monica, Calif.

16,506
This study had three purposes: 1) to determine how accurately experienced operators can estimate the speed of SAGE-displayed radar data tracks, 2) to evaluate the use of a Special Experimental Display Generation Program (SEDD) in obtaining this type of information, and 3) to assess the utility of a specific application of SEDD in the study of effects of other variables in speed estimation. Thirteen Ss (13) were tested on 64 trials. Estimates on speed made by the Ss were subtracted from true speeds and recorded as error scores. Constant and average errors were compared to obtain relative variability of the scores. Individual differences among operators and possible explanations for low reliability of data were discussed in the context of contribution of the present study to methodology and directions of future studies. T. G.

16,300
Kilmer, W.L. SOME METHODS FOR INCREASING THE RELIABILITY OF COMPLEX DIGITAL COMPUTATION SYSTEMS. Contract AF 33(616) 1953, Proj. GPC 102, Task 2, Rep. TA 30 303, Tech. Rep. 1, March 1958, 34pp. Electronics Research Lab., Montana State College, Bozeman, Mont.

16,308
First in a series of studies on methods and devices for making digital communication systems more reliable, this report contains two main sections. The first part generally concerns the logical problem of how to make digital computer transfer of communication systems more reliable and is nothing more than a brief comparison of the most outstanding methods that have been presented in the literature thus far. The second part is an account of a theoretical scheme that has been especially devised to complement the methods referred to in Part I. The principle purpose and value of the scheme are discussed.
R 20

16,309
Fitchner, S.L. MORE CIRCULAR METHODS FOR ESTIMATING RELIABILITY: AN EXPERIMENTAL APPROACH. Proj. 1450, Res. Mem. 2249, June 1958, 3pp. Rand Corporation, Santa Monica, Calif.

16,310
An exploratory analysis is presented of the problem of a priori reliability estimating by means of the Monte Carlo method. The method permits integrating into one analysis the effects on the system output of environmental and operational stresses, of time-dependent deterministic events, and of randomly occurring catastrophic events. The problem considered here is that of predicting non-catastrophic failures. The utility of the method, the validity of the results, the unbiased nature of derived estimates, and the requirements for input data are demonstrated. To exhibit the use of a general model, the performance of a hypothetical component circuit is examined and an estimate of its reliability obtained.
T. G. I. R 7

16,335
Fuchs, L.A. & Hutchins, B.S. UNDERWATER RESEARCH TO SAVE PILOTS. Ca. 1958, 4pp. USAF Air Development Center, Dayton, Ohio.

16,336
The Navy's Underwater Research Program was described in this paper. The major purposes of the program were to determine the basic parameters governing pilot escape in a water-crash situation and to recommend methods to reduce fatalities and permit safe egress from the ditched aircraft. Jet aircraft were the focus of the study. Summary information was presented on the following aspects of the problem which have already been experimentally studied: 1) flotation time, 2) sink rate, 3) sinking attitude, 4) cockpit differential pressures, 5) impact decelerations, 6) egress from cockpit, and 7) underwater seat ejections.

16,343
Keating, D.A. DESIGN PARAMETERS FOR THE ENGINEERING OF CLOSED RESPIRATORY SYSTEMS. Proj. 6373, Task 6312D, WADC TR 59 766, Dec. 1959, 15pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

16,343
Design data essential to the engineer engaged in the design of closed respiratory systems (ones in which the occupant rebreathes his usable exhaled oxygen) have been compiled in a compact form for ready engineering reference. Stress was placed upon requirements of man in a high altitude or space-vehicle environment. The data presented can be considered as guidelines since man is an everchanging mechanism and each is different within his species and as a foundation of design requirements for closed ecological systems of increasing complexity.
T. R 21

16,344
Kennedy, C.F., Jr., Hunscey, E. & Wroe, E., III. AN EXPERIMENTAL ANALOG-SIMULATED FLIGHT SIMULATOR. Contract 34(616) 45 (Amendment 3), Tech. Rep. MATRAVEN 45 2, Dec. 1959, 214pp. IBM Training Device Center, Fort Washington, N.Y. (Servomechanism Lab., Massachusetts Institute of Technology, Cambridge, Mass.).

16,345
A demonstration system is described which was designed, built, and tested to determine the feasibility of combining analog and digital elements in a computer suitable for solving, in real time, a set of non-linear differential equations such as those pertaining to aircraft flight. A description of the special equipment designed for input-output to and from the simulated computer is presented along with a discussion of the results and conclusions of the demonstration. Four applications are included which describe the equations, the program, the error analysis system, and the results of the integration formula study.
T. G. I. R 16

16,356
Mantel, D.L. CLOSED-CIRCUIT RESPIRATORY AND ENVIRONMENTAL CONTROL SYSTEMS. ca. 1959, 14pp. IBM Air Development Lab., Natick, Philadelphia, Penn.

16,356
A closed-circuit respiratory and environmental system using potassium superoxide (K_2O_2) as the stored oxygen supply was tested using six U.S. Navy enlisted personnel and an eight-day confinement period. The system tested and the confinement chamber were described in detail. Continuous monitoring of gases in the closed system (oxygen evolved, carbon dioxide removed, carbon monoxide, hydrogen sulfide, sulfur dioxide, and trichloroethylene) and measurements of temperature and relative humidity were made. Upon completion of the eight days and removal of the Se, the space was subjectively tested for odors. Other life support equipment currently under evaluation were listed.
T. I. R 4

16,407
Guer, D.B. & Williams, C.M. LOGARITHMS OF FACTORIALS FROM 1 TO 2000. WDC 4500 (15th Edition), Rep. SCR 156, Dec. 1959, 36pp. Sandia Corporation, Albuquerque, N.M.

16,457
A table of logarithms, to the base ten, of factorial n is given for values of $n(1)/2000$ to 15 decimal places. The table has applications in acceptance sampling for attributes, among other uses. The logarithms of the factorials are also available on magnetic tape number 128 for the Sandia Corporation IBM 704 Data Processing Machine.
T. R 11

16,562
DeFlorez Company, Inc., Englewood Cliffs, N.J. THE APPLICATION OF POINT SOURCE PROJECTION TECHNIQUES TO GROUND OPERATION TRAINING. Contract W38 1628(00), Tech. Rep. NAVTRADEVEN 1628 10, June 1959, 30pp. IBM Training Device Center, Fort Washington, N.Y.

16,562
This report describes the results of a study to determine if a satisfactory visual presentation can be obtained with point light source techniques for application to a multi-vehicle ground reconnaissance trainer. The scope and important elements of the problem were determined from analysis of the training task. It is recommended that point source visual displays be investigated further in such ground-level tasks where the trainee follows predetermined general routes such as roads and where terrain contour is not essential, for example, driver training devices.
I. R 3

16,543
Gallie, C.F. THE EFFECTS OF ELECTRIC SHOCK ON MAN. May 1956, 13pp. RECEIVING OF HEALTH & SAFETY, Atomic Energy Commission, Washington, D.C. (University of California, Berkeley, Calif.). (Reprinted from RFE Trans. on Medical Electronics, May 1956, PAGE 3).

16,545
Gallie, C.F. MATHEMATICAL SOLUTIONS FOR PSYCHOLOGICAL PROBLEMS. A TECHNICAL REPORT. Contract N0R 1206 (15). National Science Foundation Grant G 642, June 1956, 34pp. Princeton University, Princeton, N.J. & Educational Testing Service, Princeton, N.J.

16,543
A review of what is known about the quantitative effects of electric currents on man is presented. Experimental studies on human beings and on animals are reviewed. The discussion begins with the first tingling sensations resulting from barely perceptible currents, proceeds with reactions produced by currents of increasing intensity, and includes various causes of electrocution. The paper concludes with mention of effects caused by high-frequency currents, burns and blisters, and the necessity for prompt application of approved methods of resuscitation for victims of severe electric shock accidents.
T. G. I. R 10

16,545
The value of the mathematics-deductive approach to various psychological problems is discussed with particular emphasis on 1) the usefulness of matrix algebra for expressing a large number of psychological theories and for comparing the theory (observation equations) with data, and 2) the generality of multidimensional scaling as an approach to a variety of psychological problems. The discussion of each illustrative problem stresses the close tie between the mathematical statement and the psychological statement for every variation in psychological assumptions there must be a matching variation in the mathematical equations.
T. G. I. R 90

16,545
Cottenger, T.E. TASK CLASSIFICATION: AN APPROACH TO FACILITATING ORIENTATION ON HUMAN BEHAVIOR. Proj. 7123, Task 7123, WDC TR 59 234, Jan. 1959, 13pp. USAF Aeronautical Lab., Wright-Patterson AFB, Ohio.

16,545
Wright, W.E. & Taylor, L.E. TASK CLASSIFICATION STUDY. Contract AF 33(616) 1996, Proj. 1978, Task 15570, WDC TR 59 234, Dec. 1959, 13pp. Electronics Engineering Department, General Dynamics Corporation, Rochester, N.Y.

16,545
This report outlines the general philosophy and approach to a basic venture in the study of human learning-task classification. It is proposed that a rational classification be developed for the tasks human beings have to learn. Each task category would be set up in such a way that a specified set of common principles of learning referring to basic variables would operate in essentially the same way in all task situations subsumed under it. In this way the actual and hypothesized effects of various basic and task variables and their interactions would be set forth. The characteristics and supporting arguments for this classification, methodological problems involved in its development, and the problem of evaluation are discussed.
T. R 3

16,545
The activities, findings, and conclusions of a research and development study program concerned with the automatic detection and isolation of system performance faults to the system module level are described in this report. Simple ordering scheme and sequential methods are considered. Recommendations for the basic system components of an Automatic Fault Locator, applicable to complexes at SAC Radar Sites and other ground electronic systems, are presented.
T. G. I.

16,566
Chapman, L.V. A KINETIC, DIRECTION-PLACING PULSE-PLACEMENT PROGRAM. Proj. 7216, Task 7172, WDC TR 57 371, Nov. 1957, 6pp. USAF Aeronautical Lab., Wright-Patterson AFB, Ohio.

16,566
Wilson, C.L. (Ed.). PROJECT DESIGN CANDIDATE EVALUATION PROGRAM. Proj. 7154, Task 7152, WDC TR 59 505, Dec. 1959, 13pp. USAF Aeronautical Lab., Wright-Patterson AFB, Ohio.

16,566
A device is described for conveniently and inexpensively plotting event rates from time-based data records, such as heart rate from ECG and discharge frequency from volleys of nerve impulses. Principles of design, construction of a prototype, and photographic duplication of copies in quantity are discussed. The use of a program for plotting nerve impulse frequencies is illustrated.
T. G. I. R 2

16,566
A battery of physiological, psychological, and biochemical tests served as a basis for Project Mercury candidate recommendation. Data were yielded on physiological limitations of high transverse g, anthropometric measures, intelligibility measures, effects of noise and vibration on performance, body responses to heat stress, physical fitness tests, and psychological evaluation tests. The final candidate recommendation meeting was described. Methods used to correlate biomedical data statistically and a list of possibly significant correlations were discussed. Recommendations for future experimentation and evaluation programs were included.
T. G. I. R 30

16,553
Ashcraft, L.L. & McPuer, D.T. THE DETERMINATION OF LATERAL HANDLING QUALITY REQUIREMENTS FROM AIRFRAME-HUMAN PILOT SYSTEM STUDIES. Contract AF 33(616) 5661, Proj. 1365 13553, WDC TR 59 135, June 1959, 80pp. USAF Flight Control Lab., Wright-Patterson AFB, Ohio.

16,600
von Beckh, H.J. MULTI-DIRECTIONAL G-PROTECTION DURING EXPERIMENTAL SLED RIDS. Reprint from Proceedings Xth International Astronautical Congress, London, England, 1959, 671-682. USAF Aeronautical Lab., Holloman AFB, N.M.

16,583
This report represents one phase of an effort aimed at the use of airframe-human pilot system studies as the basis for derivation of vehicle dynamic handling qualities, specifically, lateral qualities. Tentative criteria are derived for certain roll/aileron transfer function qualities by applying existing pilot dynamic response data to servo analysis studies of the airframe-pilot system. The criteria are examined in the light of existing pilot opinion data and limited regions of validation are established. For those regions where no data exist, the tentative criteria can provide an interim basis for design and a guide to future testing.
T. G. I. R 57

16,600
Described was a device which acts as a multi-directional g-protection. A catapult sled track with the sled propelled by one or two MAI ejection-seat catapults was used. The anti-g platform was in the form of an isosceles triangle which was pivoted on its apex by a vertical axis which was fixed on the structure of the sled and allowed free rotation through 360 degrees. Two accelerometers, placed in positions corresponding to the animal's (rat) spinal and transverse-to-spine direction, were used to obtain acceleration data. The favorability of such a free moving platform was discussed as was the need to extend studies to primates and human subjects.
G. I. R 5

16,604
Stedke, R.F., Forrest, J., Carter, M.V. & Wade, E.A. COMFORT EVALUATION OF THE G-2241 FILM SEAT (WHEEL). ONE OF A SERIES OF STUDIES PREPARING TO THE DESIGN EVALUATION OF FILM AND CHIN SEATING EQUIPMENT. Contract AF 33(616) 3042, Proj. 7212, Task 7224, WDC 72 28 JCA, Nov. 1959, 14pp. (DNR Research Medical Lab., Wright-Patterson AFB, Ohio. (McDonnell Lab., Dept. of Sociology, Tufts University, Medford, Mass.).

16,604
Certain design characteristics of the G-2241 Film Seat (wheel) were evaluated for adequacy in the maintenance of human comfort. Tests were carried out using 18 Ss of variable weight and stature wearing anti-g suits. Each S was required to remain in the seat until his discomfort reached a point where he felt compelled to leave or until a period of seven hours had been completed. Questionnaires were presented hourly during the sitting period to follow the S's comfort and opinion of the seat; a posttest required a rating of the seat's comfort. The data included time of voluntary sitting, comfort ratings (both hourly and final), and subjective comments on the seat. Recommendations for design improvements were made.
T. G. R 2

16,605
Slinski, C.J. SENSITOMETRIC APPROACH TO THE SELECTION OF FILMS FOR POSSIBLE RADAR SCRE USE. Proj. 6272, Task 6224, WDC 57 317, Sept. 1957, 34pp. (DNR Research Medical Lab., Wright-Patterson AFB, Ohio.)

16,605
This report presents a sensitometric technique that can be utilized for selection of radar film emulsions. Components of a complete radar system were investigated to determine the separate and compound effects of phosphor light emission on the sensitivities of film emulsions. Sensitometric curves illustrating the results are presented in the report. Further investigation into each individual portion of the radar system is recommended.
G.

16,612
Smith, K.U. & Stoen, R. THE ELECTRONIC HANDWRITING ANALYSER AND NOTION STUDY OF WRITING. J. Appl. Psychol., 1956, 4(5), 302-306. (University of Wisconsin, Madison, Wisc.).

16,612
This study applies precise methods of action analysis to the investigation of writing skill. An Electronic Handwriting Analyser is described that permits separate and automatic measurement of the component movements of manipulation and travel in the writing task. Preliminary results obtained from ten Ss on the writing of single numbers and script letters are presented and discussed in terms of differences in duration of the two component movements and the nature of individual differences obtained. The significance of the technique used in the general study of motor coordination in relation to growth, aging, learning, and other psychological factors is discussed.
T. I. R 8

16,613
Smith, M.M., Smith, K.U., Stanley, R. & Harley, M. ANALYSIS OF PERFORMANCE IN TELEVIEWED VISUAL FIELDS: PRELIMINARY REPORT. Persp. Mot. Skills, Sept. 1956, 6, 195-198. (Princeton University, Princeton, N.J. & University of Wisconsin, Madison, Wisc.).

16,613
Observations of a preliminary nature are described dealing with the nature of writing performance when the S observes his own behavior on closed-circuit television. Samples of writing obtained with three different horizontal angular displacements of the visual field are described. The use of closed-circuit television as an instrument for analysis of the spatial and temporal organization of perception, motion, and other aspects of behavior in relation to the visual environment is discussed.
I.

16,616
Rundell, Lucia & Nuss, G.M. F. ON THE FACTORS WHICH AFFECT THE CONTRAST ENHANCEMENT IN A FIGURE WITH "GHOST PERCEPTIVE CONCEPT" AND A PRACTICAL APPLICATION OF SUCH A FIGURE. J. Opt. Soc. Am., 1959, 49(1), 49-50.

16,616
This paper was concerned with a figure with "ghost perceptive contours" and deals with the factors responsible for and the effect of luminance and viewing angle on contrast enhancement. Monocular viewings of the figures were made at varying luminance. To investigate the effect of viewing angle, the figure was uniformly illuminated and surrounded by a field of dim luminance. After-images were examined as well as observations under intermittent illumination. Conclusions were drawn and some practical implications concerning the perception of contrast were noted and discussed.
G. I. R 13

16,622
Adams, K. ON THE NUMBER PRESENTATION PROBLEM AND THE PROBLEM OF THE OPTIMIZED, NOISE-FREE AUTOMATIC CONTROLLER. Contract AF 47(638) 584, AFSC DX 59 1120, Tech. Note 400 2, Oct. 1959, 14pp. College of Engineering, New York University, New York, N.Y.

16,622
Solutions of the Wiener prediction problem in the sampled, nonstationary case and the problem of minimizing a generalized loss-function defined for a sampled, noise-free automatic controller are presented. The concept of orthogonal projection is fundamental for the solutions of both problems and is shown to account for the structural resemblances of the final results. On the other hand, the principal difference between the two problems is also emphasized by the methods used.
R 6

16,623
Adams, R.G. PROBABILITY APPLICATIONS IN MILITARY OPERATIONS RESEARCH: THE PRACTICE IN ONE ORGANIZATION. Rep. AFSC 507, Nov. 1959, 12pp. North American Aviation, Inc., Columbus, Ohio.

16,623
This paper demonstrates the application of probability theory in military operations research. It gives a complete account of the growth of military operations research in industry, the functions performed for management and the biases that arise. Probability techniques are discussed and include the frequency interpretation of probability. A number of probability statements and theorems are presented and important distribution functions are described and illustrated. Case studies are presented and show the probability applications to weapon system requirements. The report is concluded by an evaluation of the accuracy and reliability of probability determinations.
T. G. R 21

16,628
Foley, P.J. THE EXPRESSION OF CERTAINTY. Amer. J. Psychol., Dec. 1959, 64(4), 614-615. (Defence Research Medical Labs., Toronto, Ontario, Canada). (DNR Proj. 76, Rep. 766, POC D77 94 2021, HR 167).

16,628
To evaluate the meanings of expressions of certainty, 38 subjects were asked to give five statements a value from one (X will not occur) to ten (X will occur). The statements rated were: "1) I am sure X will occur; 2) I suppose X will occur; 3) I am certain X will occur; 4) I think X will occur; and 5) I am positive X will occur." A frequency-distribution showing the number of subjects who assigned values to each statement was shown. From the results obtained, conclusions concerning the meaningfulness of these phrases were drawn.
I. R 1

16,629

Flight Safety Foundation, Inc. AVIATION CRASH INJURY RESEARCH FINAL REPORT. Contract NOR 401(21) & Contract NOR 2380(00), Sept. 1959, 3pp. Flight Safety Foundation, Inc., Phoenix, Ariz.

16,640

Greenberg, E.G. & Sachs, A.E. MATRIX INVERSION, ITS INTEREST AND APPLICATION IN ANALYSIS OF DATA. J. AM. STATIST. ASS., Dec. 1957, 54, 733-746. (University of North Carolina, Chapel Hill, N.C.). (OR Rep.-1957:7).

16,629

A final report on the undertakings and activities of the aviation crash injury research program was presented. The objectives and tasks of the program were cited and the accidents investigated were reported. Evaluations of aircraft and aircraft components of the DC-3, the Army L-20 Beaver, Army L-17, and the XM-40 Army utility helicopter were made. A new Helicopter Accident Injury Report Form was developed and made available to the U.S. Army, Federal Aviation Agency, and interested state groups. A crash survival design manual was developed and a training program in crash-injury accident investigation was initiated.

16,640

This paper is concerned with the inversion of a class of matrices with special patterns as well as the numerical inversion of matrices in general. It also provides some special methods for the inversion of matrices for special and general cases. Some of the types of matrices considered are diagonal matrices of type r , type r diagonal inverse matrix, generalization of matrix partitioning in inversion, and non-patterned matrices. These results will be applied to problems in analysis of data where such matrix inversion is applicable.

R 12

16,630

Flanagan, J.L. NOTE ON THE DESIGN OF "PHONIC-SPEECH" SPEECH SYNTHESIZERS. J. ACOUST. SOC. AM., Feb. 1957, 29(2), 306-313. (USAF Cambridge Research Center, Cambridge, Mass. & Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.). (AFRC IN 57 560, Scientific Rep. 13).

16,643

USA Food Acceptance Branch. TOLERABILITY OF FOOD ACCEPTANCE MEASUREMENT UNDER NORMAL FEEDING CONDITIONS PART I. BASIC RESULTS OF CONSUMPTION SURVEY. TECHNICAL REPORT. Proj. 7 64 15 007, ORNL Rep. 30 59, Nov. 1959, 3pp. USA Food Acceptance Branch, On Food & Container Institute for the Armed Forces, Chicago, Ill.

16,630

Electrical speech synthesizers that are analogs of the human speech-producing mechanism from a terminal point of view are discussed; such synthesizers are basically lumped-constant electrical networks having transmission characteristics similar to the transmission properties of the vocal tract. The synthesis of vowel sounds by such networks is considered. A comparison is made between cascade and parallel connections of simple electrical resonators for producing vowel sounds on the basis of which yields sounds having formants of proper amplitude. G. I. R 15

16,643

To examine consumption and reasons for non-consumption of A rationing, a study, reported in three parts, was conducted. The first report cited was conducted to assess the adequacy of the methods and procedures used in the pilot and final phase of the study. The final phase was conducted at four installations in four separate parts of the country with procedures and materials the same for all parts. Three questionnaire forms were used with five foods studied at each meal. The results were examined in terms of percent of food taken and percent of food eaten. The variability and reliability of consumption in terms of different food classes and other variables were discussed.

T.

16,631

Duncan, D.E. A SIMPLE BAYES SOLUTION TO A COMMON MULTIPLE COMPARISON PROBLEM. Contract AF 48(638)261 & Contract NOR 850(06), Waco. Series 223, April 1959, 3pp. Institute of Statistics, University of North Carolina, Chapel Hill, N.C.

16,644

Wayne-George Corporation, Boston, Mass. HIGH-SPEED ELECTROMECHANICAL GOGGLES. Contract AF 33(616) 5287, Proj. 6332, Task 77655, WDC-TR 59 114, May 1959, 21pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

16,631

The multiple comparison problem with which this paper is concerned arises often in connection with n random samples drawn from n normal populations with means μ_1, \dots, μ_n and a common variance. The problem is that of making $n(n-1)/2$ simultaneous two-sided symmetric t -tests of the $n(n-1)/2$ hypotheses $H_{ij}: \mu_i = \mu_j$, $i, j = 1, \dots, n$, $i < j$. A comprehensive Bayes analysis leading to a simple solution with well-defined properties that appear to be appropriate to an appreciable class of practical problems has been made. The more mathematical aspects of this analysis and solution are presented herein.

T. G. I. R 23

16,644

High-speed electromechanical shutter goggles to be used to protect the eyes of the wearer from burns or flash blindness caused by a high intensity flash are described. The shutters of the goggles are actuated by disposable explosive diaphragm motors which are controlled by a small transistorized electronic package carried by the pilot. The shutters are closed in less than 500 microseconds after onset of the flash. They also have the feature of being compatible with some helmets and oxygen masks.

I.

16,633

Coombs, M.C., Salaman, R.G. & Cottrell, D.E. A RESEARCH STUDY AND ENGINEERING INVESTIGATION OF A DIGITAL TELEVISION SYSTEM FINAL REPORT. Contract DA 36 039 SC 74928, DA Proj. 3 22 00 400, SC Proj. 0353 PH 59 91 (4442), SC Specification 58 ECL/D 4442 (57/4483), Colorado Research Corporation Proj. 23 21, June 1959, 61pp. Colorado Research Corporation, Broomfield Heights, Colo.

16,648

Smith, O.W. DISTANCE CONSTANCY. Contract AF 33(038) 22804 & NOR 401 (24), Sept. 1956, 5pp. Cornell University, Ithaca, N.Y.

16,633

This study was designed to investigate the feasibility of a digital TV. It was desired to develop optimum system standards which would produce an acceptable picture for a variety of military applications using a minimum bit rate. The work was directed towards the application of such a system to intercommunications, briefing, and observing hazardous operations in military operations. New scanning methods and methods of digital modulation were developed. These include the Difference Signal Modulation, and Pulse Code Modulation methods. Recommendations for future projects were presented.

T. I. R 14

16,648

To investigate the distance constancy problem which requires the judgment of a far extent as longer or shorter than a near standard extent, 23 Ss were required to make such judgments. The standard stimulus (a white sheet of oilcloth 54 inches wide and 10 feet long) was viewed at 25 ft. in front of the S; the variable stimulus, at 125 ft., was exposed in lengths which were multiples of three. An approximation method was used to determine the S's mean match of equality. Data from 23 Ss were analyzed to determine whether distance constancy holds under these conditions.

R 3

16,647

Smith, G.W. THE EFFECTS OF MOVING OF TWO STRIPS ON JUDGMENTS OF OBJECTIVE VELOCITY. Contract NMR 401 (14). Sep. 1956, 13pp. Cornell University, Ithaca, N.Y.

16,649

The effects of windows of two different sizes on judgments of objective velocity were investigated. Two windows, one of which was twice the linear dimension of the other, were used; identical movement patterns were viewed through the windows. The task was to adjust the speed of the variable so that the physical velocity of its surface was judged equal in terms of ft./sec. to the speed of the standard under the following conditions: 1) large window for both variable and standard fields; 2) small window for both fields; 3) small window was standard and the large was variable; and 4) the reverse of (3). Match judgments of 22 Ss were obtained for analysis.
T. 2 3

16,650

Smith, G.W. & Gibson, J.J. APPARATUS FOR THE STUDY OF VISUAL TRANSLATORY MOTION. Contract AF 33(688) 22804 & NMR 401 (14), Sept. 1956, 6pp. Cornell University, Ithaca, N.Y.

16,650

Specifications were given for an apparatus to be used in the investigation of perception of visual motion. The apparatus was constructed and described in detail. The authors suggest its use in investigation of the following problems: 1) effects of variables such as velocity of the standard and mode of observation employed in comparison on accuracy of reproduction of velocity; 2) constant errors in velocity perception; 3) improvement of velocity discrimination and absolute judgments of velocity; 4) of "upper" threshold for visual speed; 5) of recognition of forms as dependent on speed; and 6) of apparent direction of motion as dependent on shape and orientation of framing window.
I. R 2

16,651

Smith, E.K., Anastasio, F.J., Kalustyan, B.C., Snyder, R.B., et al. THE APPLICATION OF POINT SOURCE PROJECTION TECHNIQUES TO AIR-TO-SURFACE ATTACK TRAINING. Contract NMR 1628(00), NAVTRADEVEN TR 1628 7, June 1959, 57pp. USN Training Device Center, Port Washington, N.Y. (The Defcoz Company, Inc., Englewood Cliffs, N.J.).

16,651

The results of an investigation to determine if a satisfactory visual presentation can be obtained with point light source techniques for application to an air-to-surface attack trainer are described. An analysis of the training task used to determine the skills to be developed and the cues required for its performance is included. An actual system was developed which will provide some training in the task. Its limitations are indicated along with the need for further evaluation by persons fully conversant with the training task.
I. R 9

16,653

Smith, E.K., Anastasio, F.J., Kalustyan, B.C., Snyder, R.B., et al. THE APPLICATION OF POINT SOURCE PROJECTION TECHNIQUES TO SURFACE VESSEL OPERATION TRAINING. Contract NMR 1628(00), NAVTRADEVEN TR 1628 9, June 1959, 47pp. USN Training Device Center, Port Washington, N.Y. (Defcoz Company, Inc., Englewood Cliffs, N.J.).

16,653

The results of an investigation to determine if a satisfactory visual presentation can be obtained with point light source techniques for application to a destroyer docking trainer were described. An analysis of the training task was made showing the skills to be developed and the cues required for its performance. Point source projection systems were developed and were considered capable of providing some valuable training in shiphandling and destroyer docking. The limitations of the system were discussed.
I. R 4

16,656

Reed, I.S. STATISTICAL ERROR CONTROL OF A REALIZABLE BINARY SYMMETRIC CHANNEL. Contract AF 19(604) 2200, Group Sep. 47.26, Nov. 1959, 13pp. Lincoln Lab., Massachusetts Institute of Technology, Lexington, Mass.

16,656

To determine the statistical confidence that one may have in error-correction machines which are based on error correction codes, a method was developed to measure the statistics of a channel as the message is being received. It is demonstrated how the statistics of a channel can be measured as the message is being received and how the levels of acceptance or rejection are established. A phone line channel was used to carry out the procedure, however it is felt that the method can be generalized to other channels.
I. 2 3

16,657

Grade, P. THE ASYMPTOTIC POWER OF THE KOLMOGOROV TESTS OF GOODNESS OF FIT. Contract AF 49(636) 261, AFOSR TR 60 55, Memo. Series 243, Dec. 1959, 9pp. Dept. of Statistics, University of North Carolina, Chapel Hill, N.C.

16,657

The purpose of this paper was to investigate the asymptotic power against sequences of alternatives which converge to the hypothesis distribution $H(n)$ against sequences of alternatives $G_n(n)$ for which $\sum_{n=1}^{\infty} |H(n) - G_n(n)|$ tends to a limit. The one-sided Kolmogorov test for goodness of fit is used with the application of Boole's "naïve" procedure. Although the one-sided test is used and demonstrated with examples, the two-sided tests can also be applied.
T. C. A 19

16,658

Fostley, J.A. THE DESIGN OF COMPLEX MANAGEMENT-CONTROL SYSTEMS. Contract AF 49(688) 700, Proj. RAND, Res. Memo. 2483, Nov. 1959, 21pp. The Rand Corporation, Santa Monica, Calif.

16,658

This report discusses the need to apply data-automation technology in Air Force operations. The application of automation to the new control and support systems with which the Air Force is currently involved is stressed. The problems encountered in the system design involve the policies and procedures that must be followed by organizations, persons, and automatic devices in working towards the objective of the system. It also includes selecting and programming data-processing equipment.

16,661

Norton, J.R., Taylor, C.L., Davis, H., Haase, R.H., et al. TECHNICAL STUDIES IN CARGO HANDLING - VII. THE HUMAN OUTPUT FUNCTION, ITS CONCEPT AND MEASUREMENT. Contract NMR 233(07), Rep. 59 75, Dec. 1959, 19pp. Dept. of Engineering, University of California, Los Angeles, Calif.

16,661

It is not yet possible to measure directly on the human muscle involved the total physiological energy cost to a human of the performance of a task. An approximation of direct measure is discussed in this report. Total physiological energy cost is here termed the Human Output Function (HOF); it is differentiated from the mechanical work involved, defined as force times a distance or torque times an angle, which is only a part of total energy cost. An equation is developed for use with Lauru's force plate as an indirect measure of HOF. Preliminary design analyses for a force plate for laboratory analyses of cargo handling tasks are presented.
T. I. R 10

16,643

Murriase, Nina K. DEVELOPMENT OF CONDUCTIVE CLOTH PLASTIC ELECTRODE FOR USE IN MEASURING SKIN RESISTANCE. Proj. 7222, Task 71747, WADC TR 58 284, Oct. 1958, 11pp. USAF Medical Lab., Wright-Patterson AFB, Ohio.

16,643

The design and development of a conductive cloth plastic electrode for use in studies of galvanic skin resistance changes is described. The conductive cloth electrode proved to be more effective than a lead electrode due to its flexibility, comfort over extended periods of time, light weight, and better continuous contact with the skin. The concept of placing electrodes inside socks is presented as it was developed for skin resistance studies of Se who were active over extended periods of time. The sock electrodes were worn continuously for periods up to seven days without discomfort and the GSR waveform was relatively free of movement artifacts. G. I. R 5

16,648

Kanac, J. VARIABILITY OF FOOD ACCEPTANCE BEHAVIOR UNDER NORMAL FEEDING CONDITIONS. PART 2. REASONS FOR NON-CONSUMPTION. INTERIM REPORT. Proj. 7 94 15 007, ONR/AF Rep. 38 59, Dec. 1959, 24pp. USA Food Acceptance Branch, ON Food & Container Institute for the Armed Forces, Chicago, Ill.

16,648

To obtain the reasons given by soldiers for not eating a food, a test was conducted at 17 Army installations located in four widely separated areas of the country. Three questionnaire forms were used and these differed only in the order in which the reasons for nonconsumption of foods were listed. Two mess halls were chosen at each of the four installations to be surveyed each day for all three meals, with approximately 32 soldiers in each of the mess halls. The soldiers completed a questionnaire at each meal. The results were examined in terms of: 1) soldiers not eating all that they had taken, 2) those not taking a food, and 3) the most salient reasons given for not doing so. I. R 2

16,672

Getthard, J.W. & Haces, R.M. (Eds.). INFORMATION REQUIREMENTS FOR THE CONTROL OF COMBAT FORCES. Summary of the Proceedings of a Conference sponsored by Working Group VI-Visual Displays, National Academy of Sciences, Washington, D.C., June 24-26, 1959, Contract W48 2300(06), March 1960, 21pp. Armed Forces-REC Vision Committee, OR, Washington, D.C.

16,671

This was a report on the proceedings of the Conference on the Information Requirement for the Control of Combat Forces. Representatives of the several services presented requirements for displays of data used in making command decisions. The matter of automation in decision-making and the degree of desirability of automation in the defense forces, bomber forces, Army, and Navy were discussed. A roster of the attendants at the conference was also included in the report. I. R 1

16,672

Swartz, M.F., Obermayer, R.W. & Muckler, F.A. SOME THEORETICAL LIMITS OF MAN-PERISCOPE VISUAL PERFORMANCE IN AN ORBITAL RECONNAISSANCE VEHICLE. Contract AF 33(616) 5472, Fyng. Rep. 10,978, Dec. 1959, 132pp. Martin Company, Baltimore, Md.

16,672

An analytic human engineering evaluation of the man-periscope method of presenting visual information to the orbital reconnaissance operator was given. The objective of the report was to establish theoretical limits of visual performance as a function of 1) minimum-resolvable object-length, 2) area viewed, 3) time-to-view, and 4) display scale-factor. From a review of the literature, 13 parameters were selected and examined as to their interrelationships and their effects on the four dependent variables for five representative orbital altitudes. The derived data were then extrapolated to an orbital altitude range of 113 to 22,289 miles. T. G. I. R 44

16,674

McCollum, I.M. PSYCHOLOGISTS IN INDUSTRY IN THE UNITED STATES. Ann. Psychol., 64, 1958, 704-706. (San Diego State College, San Diego, Calif.).

16,674

The author discusses the increasing role of the psychologist in industry today and considers the areas in which he is active and some of his functions in his work. The general areas considered include: personnel selection; personnel development; human factors in design; productivity management; and miscellaneous. The author makes note of the fact that those who do not critically think of themselves as "industrial psychologists" are actually part of the industrial picture. This group includes the psychologist concerned with human factors and product design for human use. R 6

16,677

Mathen-Dunn, M. (Ch.). PROCEEDINGS OF SEMINAR ON SPEECH COMPRESSION AND PROCESSING. AFOSR TR 59 159, Volume 1, Sept. 1959, 230pp. USAF Electronics Research Directorate, AFOSR, Cambridge, Mass.

16,677

This is the first of two volumes of reports which were delivered at the Seminar on Speech Compression. The reports included in Volume I are: "Basic Factors in Speech Perception and Applications to Speech Processing"; "Effects of Multiple, Narrow Pass Band Filtering on the Intelligibility of Speech"; "Some Aspects of Intonation and Speech"; "The Effective Use of Digital Simulation for Speech Processing"; "Experiments with a Dynamic Analog of the Vocal Tract"; "Some Progress with Vocoder-Type Systems"; "A Twelve-Channel Transistorized Vocoder"; "The Formoder as a Tool for Speech Studies"; and "A Digitalized Continuous-Analysis Speech Compression System." T. G. I. R many

16,677

Savage, I.P. CONTRIBUTIONS TO THE THEORY OF RANK ORDER STATISTICS: COMPUTATION RULES FOR PROBABILITIES OF RANK ORDERS. Contract W48 2300(03), Task NR 042 200, Tech. Rep. 9, Sept. 1959, 4pp. University of Minnesota, Minneapolis, Minn.

16,679

The problems involved in the computations of the probabilities of rank orders are noted. This paper presents two rules which may be employed to facilitate the computation of probabilities of rank order for one-sample and two-sample cases. An example for the application of the rules is presented for both the one-sample rule and the two-sample rule. R 3

16,681

Richter, D.L. TWO-STAGE EXPERIMENTS FOR ESTIMATING A COMMON MEAN. Contract AF 49(638) 251, Tech. Note 59 793, Mimeo. Series 231, June 1959, 15pp. Institute of Statistics, University of North Carolina, Chapel Hill, N.C.

16,681

In this paper the investigator treats the problem of estimating the common mean μ of two populations using a fixed number n of observations. The paper is broken down into three parts with Chapter I setting forth the problem and, in Chapters II and III, the asymptotic minimum value of n is derived. The results are indicated and the reasons for the results are discussed. R 3

16,684

Rees, F.M., Speth, A. & Jotila, S. STUDY OF SYSTEM RELIABILITY. Contract AF 19(604) 2432, AFRC IN 58 306, SRI Rep. SE 507 5867 1, Tech. Rep. 1, June 1958, 18pp. Syracuse University Research Institute, Syracuse, N.Y.

16,684

This was a report on the major work done over the first year of this project. The three major areas of study were: 1) study of tolerance in systems, 2) redundant component networks, and 3) equilibrium between disturbance and recoveries. Topological rules for obtaining network functions were outlined and a method for a systematic study of tolerance was devised. A number of redundant component networks were discussed and a method to determine the reliability of one class of redundant component connections was developed. The concept of the equilibrium probability associated with a "self-recovery system" was introduced. A basic linear integral equation was developed and the properties of such processes were investigated.

R 2

16,685

Kelson, R.T. AN EMPIRICAL STUDY OF ARRIVAL, SERVICE TIME, AND WAITING TIME DISTRIBUTIONS OF A JOB SHOP PRODUCTION PROCESS. Management Sciences Res. Proj. Res. Rep. 60, June 1959, 41pp. University of California, Los Angeles, Calif.

16,685

This paper is concerned with intermittent production systems producing specified job lots to customer orders on essentially general purpose equipment. The three important elements which contribute to the flow time of work of such a job are processing time, transport time, and waiting time. From empirical data the nature of the arrival and service time distributions for the machine centers of a typical job shop during an experimental time period was studied and the correspondence of the assumptions of existing waiting-time theoretical models were examined.

T. G. R 13

16,688

Sex-Jacobsen, C.M. & Sykes, G. "BLACK-OUT" AND UNCONSCIOUSNESS REVEALED BY AIRSCENE TESTING OF FIGHTER PILOTS. RES Laboratory, Oslo, Norway.

16,688

To verify earlier work, 50 pilots from various United States Air Force bases were tested with airborne EEG recordings. The EEG tracings were supplemented with EKG recordings, respiration rates, and flight patterns. The role of "pilot error" as a source of aircraft accidents as well as "black-out" and unconsciousness under heavy g-load was discussed.

16,699

Smith, E.K., Anastasio, F.J., Kalustyan, B.C., Snyder, R.E., et al. THE APPLICATION OF POINT SOURCE PROJECTION TECHNIQUES TO AIR-TO-SURFACE OBSERVATION TRAINING. Contract NCR 1626(03), NAVTRADECEN TR 1628 8, June 1959, 39pp. USN Training Device Center, Port Washington, N.Y. (deFlores Company, Inc., Englewood Cliffs, N.J.).

16,689

The results of an investigation to determine if a satisfactory visual presentation can be obtained with point light source techniques for application to an air-to-surface observation trainer were described. An analysis of the training task and the skills and cues required for its performance were included. A system was devised and described. It was recommended that this system be evaluated experimentally.

I. R 9

16, 690

Schless, H.S. A BIBLIOGRAPHY OF PUBLICATIONS IN THE THEORY OF GAMES. Contract AF 19(604) 4873, AFRC IN 59 797, Scientific Rep. 1, Oct. 1959, 97pp. Electronics Research Lab., Northeastern University, Boston, Mass.

16,690

The present bibliography was compiled from a range of sources which include the Mathematical Reviews from 1944 to the present; Operations Research; Annals of Mathematical Statistics; and existing bibliographies from the works by J.C.C. McKinsey, D. Blackwell and M.A. Girshick; Abraham Wald, R.D. Luce and M. Raiffa; and also from the listings in Contributions to the Theory of Games II, Annals of Mathematical Studies, no. 40, Princeton University Press.

16,691

Smith, E.K., Anastasio, F.J., Harar, S., Kalustyan, B.C. et al. STUDY OF POINT LIGHT SOURCE PROJECTION SYSTEM COMPONENTS. Contract NCR 1626(03), NAVTRADECEN TR 1628 1, March 1959, 211pp. USN Training Device Center, Port Washington, N.Y. (deFlores Company, Inc., Englewood Cliffs, N.J.).

16,691

This report is first in a series designed to investigate the usefulness of the point light source in presenting the visual displays required for various training devices. The basic components of the system—the point source of light, the display-object, and the screen—were described. Variations in system parameters were studied intensively to determine their interrelationships and their effects on the qualities of the visual displays obtained. Values of system parameters which achieve optimum visual display qualities were then related to the basic components of the system to establish desirable attributes of these components. Useful technical information was furnished in the appendices.

T. G. I.

16,692

Stavid-Engineering, Inc., Plainfield, N.J. RESEARCH DIRECTED TOWARD INSTALLATION, TESTING, DEVELOPMENT, AND MODIFICATION OF EXPERIMENTAL DATA PROCESSING EQUIPMENT. FINAL ENGINEERING REPORT. Contract AF 19(604) 3503, AFRC IN 59 355, Nov. 1959, 92pp. USAF Electronics Research Directorate, AFRC, Bedford, Mass.

16,692

This report summarizes the work performed under the project designed to provide technical and engineering support necessary to the operation of a complex data processing system used as a tool in human research studies. Description of the equipment involved is provided and layout and logic diagrams are also included. Also described are the outstanding factors encountered in providing maintenance. A proposed study is offered to provide greater flexibility and adaptability and to overcome some of the limitations imposed by existing equipment.

I. R 12

16,693

Smith, M.E. APPLICATIONS OF A POSTERIORI PROBABILITY TO THE ANALYSIS OF THE FREQUENCY OF DEMAND AND TO THE EFFICIENT MINIMIZATION OF A FUNCTION. Management Sciences Research Project, Res. Rep. 56, Sept. 1958, 15pp. University of California, Los Angeles, Calif.

16,693

Following an outline of the philosophy and method of a posteriori probability, two distinct problems are considered: 1) the analysis of the frequency of demand and 2) a method of efficient computational minimization of a function that depends on the cost of the computation involved in evaluating the function.

T. G. R 10

16,694

Winzen Research, Inc., Minneapolis, Minn. **MACHIGH I.**
AFMDC TR 59 24, June 1959, 36pp. **USAF Aeromedical**
Field Lab., Mollman AFB, K.M.

16,694

The report presented is on the Machigh I operation which was the first of a series of manned balloon probes into the upper atmosphere. A description of the man-operated capsule is given as well as a detailed report on the procedure of the operation. Described are the aerostat and flight control, oxygen and capsule pressurization, air regeneration and temperature control, instrumentation and communication system. An evaluation of the operation and recommendations for improvement are given.

T. G. I.

16,697

Susskind, C. **PROCEEDINGS OF THE THIRD ANNUAL TRI-SERVICE CONFERENCE ON BIOLOGICAL EFFECTS OF MICROWAVE RADIATING EQUIPMENTS** 25, 26, 27 AUGUST 1959. **RADC TR 59 140**, Aug. 1959, 337pp. Printing Dept., **University of California, Berkeley, Calif.**

16,697

This is a report of the proceedings of the Third Annual Tri-Service Conference. A number of studies were conducted to investigate the biological effects of microwaves. Included in the report were the following studies: biological effects of microwave energy at 200 mc upon the eyes of selected mammals; temperature regulation in laboratory animals irradiated with 3 cm microwaves; some effects of ultra-high frequency energy on primate cerebral activity; theoretical considerations pertaining to thermal dose meters; electrical substitutes for human tissues; some recent developments in pulsed energy sleep; a microwave medical safety program in an industrial electronics facility; and studies on the effects of 2450 mc radiation on the eye of the rabbit.

T. G. I. R many

16,698

Sterns, A.A., Frank, M.R., Kent, D.C., Newman, M.M., et al. **MEASUREMENTS OF THE PULMONARY DIFFUSING CAPACITY FOR OXYGEN DURING EXERCISE.** *Ann. Rev. Respiratory Diseases*, Dec. 1959, 50(6), 806-824. (Cardiopulmonary Lab., USN Hospital, St. Albans, N.Y. & Dept. of Physiology, State University of New York, Brooklyn, N.Y.).

16,698

To test the interpretation that pulmonary diffusing capacity reflects the area and permeability of the alveolar-capillary "membrane," measurements were made under circumstances thought to affect primarily area or permeability. Selected patients who had resections of lung tissue, others with interstitial fibrosis and sarcoid disease, and "normal" patients (most were young men) were tested using the method of Lillien-thal, Riley, Proenamel and Franke. Values of pulmonary diffusing capacity were compared for the several groups. Observations on effects of age and severity of exercise were also made.

T. G. R 38

16,700

Wolin, B.R. **DESCRIPTION OF SIMULATED SAGE OPERATOR POSITION.** Contract AF 19(604) 2635, AFMRC TR 59 68, SDC FN 14 283, Nov. 1959, 31pp. **System Development Corporation, Santa Monica, Calif.**

16,700

The apparatus described here was designed to be used to test various arrangements and types of switches, buttons, and knobs for insertion of instructions from SAGE consoles to SAGE computers. The apparatus was constructed from parts salvaged from a SAGE console. The subject receives the visual stimulus from an image projected on the rear of a ground glass screen at his position. A detailed account of the apparatus and its operations is given. A number of suggested improvements are also included in the report.

T. G.

16,705

USA Food Acceptance Branch. **FOOD PREFERENCE SURVEY CONDUCTED IN 1958 INTERIM REPORT 10.** Proj. 7:84 15 007, **OMCRAF Rep. 23 59**, June 1959, 9pp. **USA Food Acceptance Branch, ON Food & Container Institute for the Armed Forces, Chicago, Ill.**

16,705

In continuation of a program of food preference surveys of Army men initiated in 1949, data were obtained on 27 foods for the first time, and also on a number of foods previously surveyed, to determine whether attitudes had changed over several years. From 1000 to 1250 respondents were chosen from each of four posts selected as being representative of the Army. Each respondent filled in a questionnaire about the specific foods, rating each on a nine-point scale, or checking a "not tried" box. Mean preference ratings and percent not tried were given for each food along with the earlier rating when available.

T. R 15

16,706

von Békésy, G. **NEURAL VIBRATIONS AND THE SIMILARITY BETWEEN SOME SENSATIONS PRODUCED BY TONES AND BY SKIN VIBRATIONS.** *J. Acoust. Soc. Amer.*, Oct. 1957, 29(10), 1059-1069. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.). (Rep. FMR 200).

16,706

Some similarities and differences between skin sensations and hearing were investigated. The volley principle was used to design experiments on how the skin perceives the pitch and locus of a vibrator. The various experiments were concerned with: 1) pitch sensation on the skin, 2) summation of vibratory stimuli with different frequencies, 3) fusion frequency for vibrations of the skin, 4) rotating skin sensations analogous to the rotating tone in hearing, 5) apparent size of the sensation, and 6) modification of sensation according to sensitivity of skin.

G. I. R 6

16,714

Brown, B.P. & Johnson, H.I. **MOVING-COCKPIT SIMULATOR INVESTIGATION OF THE MINIMUM TOLERABLE LONGITUDINAL MANEUVERING STABILITY.** **NASA TN D 26**, Sept. 1959, 46pp. **National Aeronautics & Space Administration, Washington, D.C. (Langley Research Center, Langley Field, Va.).**

16,714

Tests were made on a moving-cockpit simulator (normal acceleration and pitch simulator) to determine the minimum tolerable maneuvering stability. Quantitative measurements of the effects of force gradient, position gradient, aircraft damping, and pitching-motion cues with respect to a formation flying task were presented.

G. I. R 3

16,715

Carter, C.V. & Huff, M.W., Jr. **THE PROBLEM OF ESCAPE FROM SATELLITE VEHICLES.** Presented at: Fourteenth Meeting of the Flight Test Techniques and Instrumentation Panel, May 11-15, 1959, Athens, Greece, **AGARD Rep. 242**, May 1959, 15pp. **Advisory Group for Aeronautical Research & Development, NATO, Paris, France.**

16,715

Certain problems associated with the design of escape systems for manned satellite vehicles are presented. An escape system is defined here as an alternate vehicle that can be utilized in the event the primary vehicle becomes uninhabitable. Specific problems considered are escape 1) prior to take-off, 2) during boost at high dynamic pressure, 3) during exit from and entry to the atmosphere, and 4) during orbit. Design procedures are presented that can be employed to determine a satisfactory escape system configuration.

G. R 7

16,727

George Washington University. WORK PROGRAM FOR FISCAL YEAR 1960. PERSONNEL MANAGEMENT: TRAINING METHODS, MOTIVATION, MORALE, AND LEADERSHIP. Proj. 095 50 000. June 1959, 90pp. Human Resources Research Office, George Washington University, Washington, D.C.

16,727

Task statements and summary charts are presented to outline work to be done in 1960. Twelve studies in the training methods division include training for electronics repair and trouble shooting. The divisions and representative studies are as follows: Army Human Research Unit: studies of armor, performance in task gunnery; Leadership: combat training and effects of isolation on performance; Infantry: training for combat proficiency; Air Defense: job analysis and training for missile operations personnel; Aviation: training for air surveillance, integrated contact, instrument training; Director's Office: a study of methods for training and motivation research.

16,734

Knapp, R.R. THE EFFECT OF ENVIRONMENTAL FACTORS ON THE PERFORMANCE OF MARINE CORPS PERSONNEL. PILOT STUDY: THE USE OF PERFORMANCE TESTS AND QUESTIONNAIRES TO DIFFERENTIATE BETWEEN TYPES OF BODY ARMOR - A PRELIMINARY INVESTIGATION. Res. Proj. Task NM 41-03 09, II, 267-292, June 1959, USN Medical Field Research Lab., Camp Lejeune, N.C.

16,734

A preliminary investigation was undertaken to determine the feasibility of using performance tests and questionnaires to differentiate between various types of body armor and load-carrying systems in terms of changes in efficiency of performance and of user acceptability. Ten Marine Corps Ss performed a field problem of one hour's duration requiring relatively strenuous exercise under five conditions: one control with no weight carried, over that of rifle, helmet, and field clothing; and four experimental wherein the weight carried was varied from 16 to 36 lbs. Performance tests were given before and after the exercise and the questionnaires after exercise. Difference scores between pre- and post-exercise tests were subjected to analysis of variance for differences among conditions. T. I. R 7

16,741

Maddox, R.L. (Proj. Officer). ANGLE-OF-ATTACK INFORMATION FOR INSTRUMENT FLIGHT. FINAL PROJECT REPORT. Proj. TMAD 59 6, Oct. 1959, 13pp. USAF Instrument Pilot Instructor School, James Connally AFB, Tex.

16,741

To investigate the uses that can be made of angle-of-attack information during instrument flight, 26 flights totaling 76 hours were flown by 12 pilots with the Project Officer. A typical simulated instrument flight included instrument take-off, climb to altitude, cruising flight, holding, Instrument Landing System approach, missed approach, and radar approach to a full stop landing. Prior to flight, pilots were briefed on the principles of angle-of-attack, on operation of the indicating system, and on reference indices (previously worked out) to be used. Notations of pilot reaction and control of aircraft were made during flight and a post-flight debriefing was conducted. Findings were discussed under each phase of the flight.

I.

16,744

Mooney, C.M. RECOGNITION OF SYMMETRICAL AND NON-SYMMETRICAL INK-BLOTS WITH AND WITHOUT EYE MOVEMENTS. Canad. J. Psychol., 1959, 13(1), 11-19. (Defense Research Medical Labs., Toronto, Ontario, Canada). (Proj. D77 94 35 29 (HR 162), Rep. 142 2).

16,744

The present study was based on the hypothesis that memorability, as measured by subsequent recognizability, of novel visual configurations is enhanced by visual inspection rather than a single brief glance. Twenty-four Ss participated in an experiment of factorial design, permitting six replications. Each S was tested twice; two series of ink-blot were used, 16 symmetrical and 16 non-symmetrical, one test presenting one series at .07 sec. exposure allowing a single brief glance, the other test presenting the other series at a five second exposure allowing visual inspection. There were 32 presentations (16 initial and 16 subsequent appearances) in each test. Two kinds of errors, non-recognitions and false recognitions, were analyzed.

T. G. I. R

16,756

Robinet, Joan C. (Ed.). BIBLIOGRAPHY ON AEROMEDICAL RESEARCH WITH ABSTRACTS. Dec. 1959, 104pp. USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio.

16,756

The following areas are covered in a bibliography on aeromedical research: engineering psychology, training psychology, biacoustics, biophysics, physiology, and engineering. Abstracts are included.

16,763

Siebert, W.M. PROCESSING NEUROELECTRIC DATA. Tech. Rep. 351, July 1959, 121pp. Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Mass.

16,763

This technical report consists of three chapters, each prepared by a different group of scientists. Each chapter consists of discussions concerning certain measures for the data processing of neuroelectric activity. The study treats the nervous system as a communications system. These chapters are concerned with: 1) quantification of neuroelectric activity, 2) evoked responses, and 3) two techniques for the processing of EEG data. The appendix includes the description of random processes, mathematical statistics, and a description of computers. G. I. R many

16,764

Slater, L.E. (Proc. Ed.). PROCEEDINGS OF THE PILOT CLINIC ON THE INSTRUMENTATION REQUIREMENTS FOR HUMAN COMFORT AND SURVIVAL IN SPACE FLIGHT. OHIO STATE UNIVERSITY, COLUMBUS, OHIO. OCTOBER 26-27, 1959. April 1960, 165pp. Foundation for Instrumentation Education and Research, New York, N.Y.

16,764

To help emphasize the need for new and improved instrumentation in bio-astronautics, a clinic was held which covered the following areas: the survival of man in space, necessary measurements, measurement techniques, and the integration of man into space systems. T. G. I.

16,785

Hegenwald, J.R., Jr., Maddox, J.F. & Penrod, P.R. X-15 RESEARCH AIRCRAFT EMERGENCY ESCAPE SYSTEM. AGARD Rep. 243, May 1959, 36pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France.

16,785

The design and development of an emergency escape subsystem which is compatible with the configuration and mission profiles of the X-15 Research Airplane are described. Requirements, component descriptions, performance characteristics, diagrams, and photographs are included. An open ejection seat in conjunction with a full pressure protective garment best satisfies the requirements. G. I.

16,790

Bryan, G.L., Rigney, J.W., Bond, N.A., Jr., LaPorte, H.R., Jr., et al. THE ROLE OF HUMANS IN COMPLEX COMPUTER SYSTEMS: PROGRAMMING. Contract NMR 228(02), Proj. Desig. NR 153 093, Tech. Rep. 25, Jan. 1959, 74pp. Dept. of Psychology, University of Southern California, Los Angeles, Calif.

16,790

This research was undertaken to develop and organize information about the role of humans in programming digital computers. Programming practices and problems were discussed and special attention was paid to the selection, training, and utilization of programmers. Information was collected by visiting computer centers engaged in business, scientific, and military data-processing. Interviews, questionnaires, and direct observations were among the techniques used. A list of 50 summary statements was presented in the concluding section of the report.
T. G. R 4

16,792

Boardman, L.J. SOME RECENT ADVANCES IN RADIOACTIVE SELF-LUMINOUS AIDS TO NIGHT MILITARY ACTIVITY. Proj. M3 674 100, NRL Prob. M5 01, BuShips S 1825, NRL Rep. 3241, Dec. 1958, 12pp. USN Research Lab., Washington, D.C.

16,792

The characteristics and properties of some recently developed radioactive self-luminous sources of light excited by the radioactive isotope krypton-85 are described. Of particular interest are the railway switch light, the hand lanterns, and flashlights. Also discussed are uses such as deck and personnel markers and exit and emergency signs. The ability of the eye when fully dark adapted to read or work in a dark room with these light sources has been determined as well as the distances that such sources are visible in the dark. Radioactive hazards are discussed.
T. G. I. R 6

16,800

Anast, J. ADVANCED COCKPIT INSTRUMENTATION. Presented at: Joint Meeting of the Flight Test Panel and Aeromedical Panel, Athens, Greece, 11-15 May 1959, Rep. 235, 21pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France. (Lear Incorporated, Grand Rapids, Mich.).

16,800

This report described development work by the U.S. Government and Lear, Incorporated on an integrated cockpit instrumentation system to meet the changing requirements of high-altitude, high-speed flight. The primary effort had been in the development of all-attitude instrumentation systems to meet the demands of all-weather flight. The Standard and Phase II GI (Vertical Gyro Indicator) Systems were discussed and their limitations indicated. Other indicators (Three-Axis, Two-Axis Flight-Director, and Three-Axis Flight-Director) were described. Application of the integrated display to helicopters, command and remote standby instrumentation, and verticality errors were discussed.
1.

16,801

Hartshorne, F.A. (Supervisor). A PREDICTION OF AN/FPS-3 RELIABILITY. Contract AF 30(602) 1623, Proj. 4526, Task 45155, RADC TN 58 19 & Rep. R 2 57, Oct. 1957, 60pp. Government Service Dept., RCA Service Company, Inc., Camden, N.J.

16,801

To provide a specific example demonstrating the random sampling technique of reliability prediction for complex systems, the AN/FPS-3 Search Radar equipment was analyzed. The random sampling technique is an attempt to advance the art of reliability prediction by reducing time and cost factors. Through this approach the mean life (mean time between random failures) and probability of survival values for the overall AN/FPS-3, tower groups, and building groups equipments are estimated. The concepts, terminology, and premises associated with reliability prediction are presented.
T. G. R 5

16,802

Hardy, J.D., Clark, C.C. & Gray, R.F. ACCELERATION PROBLEMS IN SPACE FLIGHT. Proj. TED ADC AE 1412, Task M3 005.12 0005.6, Rep. 4 & Rep. NADC MA 5909, Oct. 1959, 34pp. USN Aviation Medical Acceleration Lab., Johnsville, Penn.

16,802

The present state of knowledge in the area of acceleration and its effect on man is discussed with particular reference to space flight. The terminology used is first specified in such a way as to eliminate descriptive terms. The problem of weightlessness is treated briefly followed by a more detailed discussion of exposure to high levels of acceleration for long periods of time, methods of experimentation, and the various means of protection that have been used. The use of water immersion to protect man against the effects of high acceleration is discussed together with presentation of some experimental findings.
G. I. R 30

16,804

Enoch, J.M., Fry, G.A. & Townsend, C.A. MODIFICATION OF SEARCH BEHAVIOR WITH SPECIAL EMPHASIS ON FEEDBACK ENHANCEMENT TECHNIQUES. Contract AF 30(602) 1560, Proj. 1763, Task 39855, RADC TN 59 368 & CSURF Proj. 696, TP(696) 25, July 1959, 35pp. Mapping and Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

16,804

To determine the degree to which natural visual search tendencies may be modified, eye movement photographs were made for a group of eight subjects as they searched for designated symbols on complex display material (experimental serial maps). Four conditions of search were investigated and compared: 1) free search, 2) forced pace automatic scanning, 3) and 4) a boustrophedonic search pattern with and without the addition of an after-image for enhancement of feedback. Durations of fixations, extents of eye movement, patterns of eye movements, and uniformity of coverage were examined for the effect of these conditions of search with special emphasis on the potential uses of feedback enhancement.
T. G. I. R 11

16,805

Eichmeier, J. & Rheinstein, J. INVESTIGATION OF THE POSSIBLE INFLUENCE OF ATMOSPHERIC IONS ON HUMAN REACTION TIME FINAL TECHNICAL REPORT 1959. Contract DA 91 591 EUC 1035, Dec. 1959, 51pp. Institut für Technische Elektronik, Technische Hochschule, Munich, Germany.

16,805

A series of experiments investigating the effect of artificially generated atmospheric ions upon push-button reaction time were conducted. Variables studied included the level of ionization and method of exposure (absorption through skin and breathing through the mouth or nose), and locality of experimentation. In addition, some work was done toward establishing the fact that the results were actually due to artificially generated atmospheric ions. The possibilities of the elimination of atmospheric small ions in a sealed room were examined and improvement of the small-ion counter equipment was considered.
T. G. I. R 166

16,806

Doelling, N., Pearsons, K.S. & Bolt Beranek and Newman, Inc., Cambridge, Mass. ACOUSTICAL EVALUATION OF A B-58 RUN-UP PEN AT CONVAIR-FORT WORTH. Contract AF 33 (616) 3938, Proj. 7210; Task 71798, RADC TN 57 389, Oct. 1958, 57pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio.

16,806

Noise measurements were made at Convair, Fort Worth, in order to obtain an acoustical evaluation of the run-up pen as an aircraft noise suppressor. Data were presented that show noise reduction, in db, in each quadrant of the pen and were related to hearing protection provided to personnel in adjacent pens. The noise characteristics of the B-58 aircraft were also presented.
T. G. I. R 4

16,807

Clark, C.C. & Gray, R.F. A DISCUSSION OF RESTRAINT AND PROTECTION OF THE HUMAN EXPERIENCING THE SMOOTH AND OSCILLATING ACCELERATIONS OF PROPOSED SPACE VEHICLES. Proj. TED ADC AE 1412, Task NR 005.12 0005.6, Rep. 3 & Rep. MADC MA 5914, Dec. 1959, 50pp. USN Aviation Medical Acceleration Lab., Johnsville, Penn.

16,807

This paper discusses the need for "packaging" the crew during rocket travel to reduce or prevent the body distortions and involuntary control motions which would otherwise occur in response to acceleration. Simulation of space flight by human centrifuge is described. Acceleration effects of vehicle design with specific reference to the X-15 research aircraft and three proposed orbital vehicles are discussed along with various experimental methods for protection against these effects. Water immersion with lung pressurization as a method to prevent body distortions is discussed. It is pointed out that as protection against short term effects of acceleration is developed, increased study of long term effects will be needed.

T. G. I. R 8

16,809

Chipman, J.S. STOCHASTIC CHOICE AND SUBJECTIVE PROBABILITY. Contract NMR 2582(00), Task NR 042 200 & Proj. AF 49(638) 33, Tech. Rep. 2, Sept. 1958, 40pp. School of Business Administration, University of Minnesota, Minneapolis, Minn.

16,809

An axiom in the theory of behavior under uncertainty (that a numerical probability can be attached to every uncertain event) is examined in this paper. Two basic concepts are considered: 1) the stochastic nature of choice, and 2) the characterization of events in terms of the nature and amount of information associated with them. A model is presented of the preference structure of choice and evidence from a choice or decision experiment is presented and compared with the model. Further assumptions needed in order to obtain a good theory to describe the behavior observed in the experiment are proposed.

T. G. I. R 35

16,810

Chang, S.S.L., Harris, B., Hauptschein, A., Hoffman, D., et al. EVALUATION AND OPTIMIZATION OF DIGITAL COMMUNICATION SYSTEMS. SUMMARY SCIENTIFIC REPORT JANUARY 15, 1958 TO JUNE 15, 1958. Contract AF 19(604) 1964, AFRC TN 58 363, June 1958, 93pp. Research Div., College of Engineering, New York University, New York, N.Y.

16,810

An evaluation and comparison of digital communication systems are summarized and a number of suggestions presented for improving the performance of such systems in the presence of interference and propagation anomalies. In particular, the theories of null-zone reception and communication feedback are emphasized and certain coding concepts are considered. A critical review of work accomplished on this study is included with an outline of promising areas for future investigation.

T. G. I. R 37

16,811

Chang, S.H. & McHugh, P.G. AN EXAMPLE AND EXTENSION OF CAPACITY CALCULATION OF A CERTAIN DISCRETE CHANNEL WITH MEMORY. SCIENTIFIC REPORT 2. Contract AF 19(604) 3053, AFRC TN 59 569, Aug. 1959, 24pp. Electronics Research Project, Northeastern University, Boston, Mass.

16,811

The capacity of a certain binary channel with finite memory has been studied and reported in a previous document. This document illustrates the method of capacity calculation by devising a channel that possesses two types of imperfections: 1) distortion due to memory and 2) contamination due to noise. This example demonstrates the relative effects of noise and memory, the increase of capacity by tolerating a greater interdigital interference and the use of pulse weighting to counteract the effect of memory. The method of calculation is further extended from the binary channel to the m-nary channel.

G. I.

16,812

Chambers, B.M. TRANSFER OF TRAINING AMONG COMPONENTS OF A COMPLEX VELOCITY CONTROL TASK. ADC Proj. 7737, Task 27052 & Task NR 005.15 1003.1, Repts. 3 & MADC MA 5920, Dec. 1959, 20pp. USN Aviation Medical Acceleration Lab., Johnsville, Penn.

16,812

To test the application of the "transfer of training among task components" principle to the learning and performance of complex rate control task, tests were conducted on six experimental groups of airman, who were given specific practice on parts of the task, and three control groups. The portions of the task practiced were the most difficult, the moderately difficult, the easiest, or combinations of these. One control group received whole-task practice and the other two had no practice. Then each subject in all groups received eight test trials on the total task. Deviations between pre-test and post-test performance scores were used to evaluate transfer of training effects.

T. G. I. R 12

16,813

Charipper, B.A. SHIP CONTROL X TRACKING IN THE HORIZONTAL PLANE WITH A CONTACT ANALOG DISPLAY. Contract NMR 2512(00), Proj. P59 125, Tech. Rep. SPD 59 083, Aug. 1959, 12pp. Electric Boat Div., General Dynamics Corporation, Groton, Conn.

16,813

To determine how well operators of a simulated submarine can follow a prescribed path in the horizontal plane (course dimension only) using a contact analog roadway, five inexperienced Ss were required to perform this task for five sessions. The roadway was approximately 137.4 scale ft. wide and 100 scale ft. below the submarine. The contact analog was mounted in the Electric Boat Submarine Simulator which provided the vestibular/kinesthetic cues of roll and the equations of motion of a SKIPJACK class submarine traveling at 16 knots. On the fifth day, photographic records were taken at one-second intervals of the position relative to the white center line of the roadway.

T. G. I. R 7

16,814

Herthol, R.P. ERRORS IN VISUAL SIZE-MATCHING IN THE FLEXIBLE GUNNERY TASK. Proj. 512 024 0001, Res. Note FG 52 2, July 1952, 14pp. USAF Human Resources Research Center, Lackland AFB, Tex.

16,814

To examine the possibility that certain size-matching (or equating of visual stimuli) tasks that appear quite simple may have hidden complexities that cause performance to be inadequate, a paper-and-pencil test consisting of 78 representations of aircraft centered in the sights of a gunnery, some correct, some under- and some over-framed, was devised and administered to two groups of gunnery trainees. One group had received 12 weeks of training, the other had not yet started training. The task chosen for investigation was one called "framing" (measuring the apparent wingspan of a target plane with the RETICLE of a sight) in aerial gunnery. Number of errors were analyzed for differences due to training and to banking angle of aircraft factors in perceptual organization that may cause errors were discussed.

T. R 2

16,815

Kupferberg, S. STATISTICAL ESTIMATION AND TEST OF HYPOTHESES AS APPLIED TO NON-DETERMINISTIC MODELS. Contract AF 33(616) 3274, IAWR Rep. 58 7, Aug. 1958, 125pp. Institute for Air Weapons Research, University of Chicago, Chicago, Ill.

16,815

The application of the classical statistical theory to problems of estimating and testing which may arise from nondeterministic machine models is discussed. For the case in which the underlying distributions are either normal or exponential, point estimators and confidence intervals for the mean and standard deviation are described along with tests for their equality. Various problems in determining sample size to meet necessary criteria are discussed. A table and some charts not readily available in the literature are included to aid in sample size determination. Various functions that may be evaluated by these techniques are mentioned.

T. G. R 11

16,809

Huber, C.F. INFORMATION CAPACITY OF INFORMATION SYSTEMS. AFSC TR 57 106, Dec. 1957, 12pp. Naval Communications & Information Lab., AFSC, Bedford, Mass.

16,898

Miller, A.J. PHYSICAL FITNESS FOR STRENUOUS WORK IN RELATION TO THE SUBSISTENCE SITUATION IN A COLD ENVIRONMENT. Prof. M.T. April 1948, 7pp. Naval Medical Center, Wright-Patterson AFB, Ohio.

16,820

Use is made of the channel capacity formula $C = B \log_2(1 + S/N)$ in comparing the relative effectiveness of increasing bandwidth or signal power on the channel capacity of an information system. Two cases are treated: 1) constant noise-per-unit bandwidth and 2) constant channel noise.

16,824

Huber, C.F., Lucier, R.C. & Flood, R. HUMAN FACTORS AFFECTING CONSOLE DESIGN IN THE FIELDAR SYSTEM. FINAL REPORT. Contract DA 36 039 SC 73047, DA Proj. 3 28 01 28, WDC 36 EIC/D 4437, Rep. AD0041, July 1959, 12pp. Institute for Cooperative Research & House School of Electrical Engineering, University of Pennsylvania, Philadelphia, Penn.

16,824

The role of human factors in systems development in general with particular reference to their position and treatment in the Army FIELDAR system is studied. After a general discussion of the need for human factors personnel in all large system development projects, the relative emphasis on human factors by several Army technical services is examined. The console design of the FIELDAR system is considered upon and specific problems are discussed along with recommendations for improvement in design. Finally, some suggestions for the use of immediate and long range studies by human factors personnel are made.

16,825

Handerson, P. PERSONNEL RESEARCH AND EQUIPMENT DESIGN IN ELECTRONICS MAINTENANCE. Tech. Note. 116, April 1959, 17pp. Clapham & Stuart Experimental Establishment, Ministry of Supply, London, England.

16,825

This memorandum presents a brief survey of the literature on problems of electronics maintenance. Personnel selection and training are covered briefly with major emphasis placed upon design of equipment for maintenance. Features of design which will facilitate the work of maintenance personnel, thus leading to more effective use of manpower, are recommended.

I. R 22

16,826

Masley, M.C. & Toogler, M.L. (Leaders). STUDY OF COMMUNICATION IN HIGH-LEVEL AMBIENT NOISE FIELDS. FINAL REPORT. PHASE I NOISE ANALYSIS AND EQUIPMENT PERFORMANCE. Contract DA 36 039 SC 64469, SIGEL CMB Profs. 1323 & 8430, Spec. SOL 1502, File 94 PH 91(4327), May 1955, 146pp. Radio Corporation of America, Camden, N.J.

16,826

This was the first report on Phase I of a research program designed to obtain design information leading to significant improvements in Signal Corps voice communication systems used in the high-level noise environments encountered in many armored vehicles and helicopters. In this first phase, the noise spectra in armored vehicles and helicopters were determined and analyzed; the performance of present Signal Corps equipment in high-level sound fields was evaluated; and a system was synthesized to provide the improved performance required. Interim measures for improvement of present equipment were recommended.

T. G. I.

16,828

To evaluate the role of physical fitness in relation to a simulated survival situation, 18 men, divided into four groups, lived outdoors under simulated survival circumstances. The maximum temperature experienced was 10 degrees F and the minimum was -40 degrees F, the weather conditions becoming progressively more severe until the test was terminated at ten days for three groups and six and one-half days for one group. Caloric intake for the ten-day group was 4000, 3000, and 900 respectively; the last group had no food. The "Pack test" of physical fitness was administered to each 5 before and after the test. Weight losses were recorded and observations made on morale.

16,831

Wynne, M. HUMAN FLOW THROUGH A COMMUNICATIONS NETWORK. Contract DA 31 022 ORD 1989, Proj. 3999 G1 004, TR 0081 & 1001, Tech. Rep. 13, Feb. 1959, 23pp. Electrical Engineering Research Lab., University of Illinois, Urbana, Ill.

16,831

Memorable having branches which are communication channels of limited capacity but capable of transferring information within this limit in either direction are considered. The first part of the paper shows the calculation of terminal capacities (amount of information which can be transferred from one vertex to another) in the given information network. The second part defines the capacity matrix which represents the terminal capacities between every pair of vertices in a network. Properties of this matrix are given. Finally a synthesis of information networks from a given capacity matrix is shown. Possible extensions of its mathematical properties are outlined.

I. R 3

16,835

USC Special Devices Center. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS REVISED 1 JANUARY 1959. NAVJG P 530 1, Revision 5, Jan. 1959, 195pp. USC Special Devices Center, Fort Washington, N.Y.

16,835

This volume is a Special Devices Guide. It contains a bibliography of human engineering reports sponsored by the Special Devices Center in addition to an enumeration of existing training devices of various kinds together with information about these devices.

I. R 350 (approx.)

16,837

Pattishall, E.G. & Banghart, F.M. (Prof. Dir.). PROCEEDINGS OF THE SECOND TRI-SERVICE CONFERENCE ON BIOLOGICAL EFFECTS OF MICROWAVE ENERGY 8, 9, 10 JULY 1958. Contract AF 18(600) 1792, AFSC TR 58 54, Sept. 1958, 264pp. Div. of Educational Research, University of Virginia, Charlottesville, Va.

16,837

The papers included here represent the research conducted on the biological effects of microwave energy. These papers were presented at the 1958 Tri-Service Conference on Biological Effects of Microwave Energy. Leaders from the fields of biology, physics, medicine, engineering, and psychology contributed papers which included "Physical Characteristics of Microwaves as Related to Biological Effects"; "Discussion of Long-Range Development Plans in the Air Force"; "Molecular Response Characteristics to Ultra High Frequency Fields"; "New Concepts in Personnel Protection"; "The Pathology of Hyperpyrexia"; and "Radio Frequency Hazards Aboard Naval Ships."

T. G. I.-R Army

16,888

Purinton, R.A. & Foster, H.C. SYSTEM PROBLEMS IN SOLVING AN AIR TRAFFIC CONTROL PROBLEM FOR THE NEW YORK AREA. Contract AF 19(604) 2272, AFMTC IN 57 730 & Tanager Instruments Corporation Rep. 528 1, Dec. 1957, 36pp. Tanager Instruments Corporation, North Hollywood, Calif.

16,889

The air traffic control problem relative to the New York City area is examined in detail with a view to later investigate the feasibility of high speed electronic computation to expedite terminal area traffic flow. The major divisions of the report are as follows: 1) description of air traffic control--basic aspects of air traffic, flight rules and procedures, airspace structure of New York area, air route traffic control center, and other procedures; 2) air traffic movements--distributions for various time periods, types of operations and of aircraft, directional flow, and densities of holding lines; 3) aircraft performance characteristics--normal flight and speed change responses; 4) meteorological factors; 5) capacity of system; 6) communications, etc.

T. G. I. R 48

16,890

Rosenblatt, F. PERCEPTION SIMULATION EXPERIMENTS (PROJECT WIDA). Contract AFMTC 2282(59), Rep. VG 1196 G 3, June 1959, 34pp. Cornell Experimental Laboratory, Inc., Buffalo, N.Y.

16,891

The PERCEPTION is a theory of a new brain model. It is a minimally constructed "nerve net" consisting of logically simplified neural elements and has been shown to be capable of learning to discriminate and recognize perceptual patterns. This paper reports a series of digital simulation experiments which were carried out on the perception using the IBM704 computer. Both "forced learning" and "spontaneous learning" performances were investigated and some insight gained into conditions under which different systems break down or deviate from typical biological learning phenomena.

G. I. R 8

16,891

Pollon, R.A., Jr. PRINCIPLES OF INFORMATION ENGINEERING. DA Proj. 503 G6 C11 & OND Proj. T83 C538, Memo. Rep. 1193, Feb. 1959, 13pp. USA Ballistic Research Labs., Aberdeen Proving Ground, Md.

16,891

The problem of efficient utilization of information is one of growing importance, both in system design and system utilization. The relation of information utilization to information theory and the practical use of communication systems are examined in this report and some of the guiding principles of information engineering explained.

16,892

Prichard, A.C. SPEECH SECURITY FOR TACTICAL OPERATIONS. DA Task MR 3 55 00 200, USASDL TR 2044, May 1959, 7pp. USA Signal Research & Development Lab., Fort Monmouth, N.J.

16,892

Technical and systems aspects of speech scrambling are considered. A system used during World War II, known as the time division of speech system, is described and its usefulness considered in the light of present day requirements for tactical message security. Recommendations are included for further development.

16,894

Pottishall, E.C. PROCEEDINGS OF THE SERVICE CONFERENCE ON BIOLOGICAL EFFECTS OF MICROWAVE RADIATION, 12-16 JULY 1957. Contract AF 19(604) 1164, Proj. 57 13, AFMTC IN 38 31, Sept. 1957, 122pp. Sumner Publications, Inc., Washington, D.C. (University of Virginia, Charlottesville, Va.).

16,894

The series of papers presented here was given at a meeting of scientists interested in the biological effects of microwave radiation. The major purpose of the meeting was to effect an understanding of activities and accomplishments in radiation biology. Summaries of the work in the three services are presented along with plans for further research. The appendices contain several additional reports and two bibliographies: 1) biological effects of radio frequency waves, 1940-1957, and 2) microwaves and their biological effects.

T. G. I. R 285

16,897

Gordon, C.M. & Malt, Y. ENLIGHTENMENT OF A UNILATERALLY COLOR-BLIND SUBJECT. From "Second Symposium on Physiological Psychology, IBM School of Aviation Medicine, Pensacola, Fla., March 19-21, 1958." IBM Symposium Rep. ACR 38, 177-184. IBM Physiological Psychology Branch, IBM, Washington, D.C. (Columbia University, New York, N.Y.).

16,897

An S whose color-mixtures and hue-discrimination functions show that her right eye is normal and her left eye is dichromatic has been examined. The color characteristics for each eye are described in some detail. The results of tests on 1) sensitivity loss and 2) the seeing of wavelengths above 560 mμ as yellow are considered theoretically. Certain proposals are set forth to account for some discrepancies in theory and test results.

G. I. R 14

16,898

Wolf, E. RECIPROCITY INEQUALITIES, COHERENCE TIME AND BANDWIDTH IN SIGNAL ANALYSIS AND OPTICS. Contract AF 19(604) 1717, AFMTC IN 57 353 & Rep. RM 126, June 1957, 21pp. Division of Electromagnetic Research, Institute of Mathematical Sciences, New York University, New York City, N.Y.

16,898

This paper is concerned with establishing a rigorous reciprocity relation of the Heisenberg type between the coherence time and the bandwidth of polychromatic radiation. Following upon an observation by Gabor that the usual formulation of the reciprocity inequality relating the effective duration of a signal and its effective bandwidth is unsatisfactory for signals that are intrinsically real, a modified version is presented. It is shown that this formulation is restricted to signals with zero mean value and there is no evidence of inequality. A definition of the coherence time of light is proposed and investigated for reciprocity inequality of the required type.

K 13

16,892

van Oosterom, T. MEASUREMENTS ON THE RELATION BETWEEN MAGNITUDE AND DURATION AND ON THE RATE OF APPLICATION OF THE CONTROL FORCES ACHIEVED BY PILOTS IN SIMULATED MANOEUVRES. Presented at: Fourteenth Meeting of the Flight Test Techniques and Instrumentation Panel, Athens, Greece, 11-15 May 1959, Rep. 241, 26pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France. (National Aeronautical Research Institute, Amsterdam, Holland).

16,892

To obtain data on desirable control characteristics of aircraft, the following measurements were made on 27 military and civil pilots on: 1) maximum control forces which could be exerted at various positions of the controls with respect to the pilot's seat; 2) forces that could be maintained during various periods of time with the controls in the optimum position; and 3) rate of increase of pedal forces. To gain basic information for establishing structural strength requirements, a second series of measurements were made on 135 Ss. The maximum rate of increase of the control forces, maximum control force that can be achieved, and the shape of the curves giving control force as a function of time in sudden maneuvers were determined.

T. G. I. R 7

16,860

Smith, J.E.R. & Katz, Isaac. THE RELIABILITY OF STATISTICAL INFERENCE UNDER RESTRICTIONS. Contract AF 19(600) 1000, Group Rep. 50 6, Apr. 1959, 15pp. Lincoln Lab., Massachusetts Institute of Technology, Lexington, Mass.

16,861

To determine for a very simple queueing system how large a sample is required for a given degree of accuracy in measures of system efficiency, an IBM 704 electronic computer was programmed to simulate a one-server queue with random arrivals at an average rate of 60 customers per unit time. Service time was constant at one unit (system load 60) with a first-come-first-served discipline. The measure of efficiency used was the conditional waiting-time distribution. System load was varied over 100 units with 25 sample distributions for each load (from 0.25 to 0.95), each based on 4000 and 1000 non-core units. For each load and sample size the 25 distributions were based on either 100,000 or 25,000 observations.
G. R. 4

16,866

Smith, G.P., Bradford, C.E., Jones, L.J. & Mickey, M.R. PROTECTION OF STRUCTURES FROM CHEMICAL, BIOLOGICAL AND RADIOLOGICAL (CBR) CONTAMINATION. EBCR Rep. 30, June 1959, 127pp. USA Chemical Corps Engineering Command, Army Chemical Center, MD.

16,866

Basic technical information is presented on items of equipment and techniques developed by the Chemical Corps for obtaining Chemical, Biological, and Radiological (CBR) protection in permanent structures. The various chapters cover basic design considerations for providing CBR protection to permanent structures, details on the operation of a CBR protective structure, and equipment needed and available to provide CBR protection. The various CBR consulting services available throughout the Chemical Corps are described.
T. G. I. R 24

16,867

Smith, E.E., Anastasio, F.J., Zolostov, B.C., Snyder, R.B., et al. METHODS OF PERCEIVING MOVING OBJECTS IN POINT LIGHT SOURCE VISUAL DISPLAYS. Contract W39 1628(00), INTERAGENCY IN 1628 5, June 1959, 61pp. IBM Watson Research Center, Fort Washington, N.Y. (The DePoy Company, Inc., Englewood Cliffs, N.J.).

16,867

The results of an investigation to discover and analyze methods and systems whereby moving objects may be presented in point source projected visual displays were described. An analysis was made of the nature of movement in the real world as a frame of reference for movement to be produced in the world of visual displays. Various solutions to the problem were devised and were examined critically for the degree of applicability to typical tasks. Recommendations for the display requiring moving object presentation were made.
I. R 2

16,868

Simonnard, M.A. TRANSPORTATION-TYPE PROBLEMS THEORETICAL FOUNDATION AND COMPUTATIONAL ASPECTS OF THE SIMPLEX METHOD OF SOLUTION. FUNDAMENTAL INVESTIGATIONS IN METHODS OF OPERATIONS RESEARCH. INTERIM TECHNICAL REPORT 11. Contract DA 19 020 ORD 2684, Projs. DA 599 01 004, ORD TB 0631, OCR 968 (Rev.) 2, CR 7125, OCR Rep. 968:24, Jan. 1959, 83pp. School of Industrial Management, Massachusetts Institute of Technology, Cambridge, Mass.

16,868

A class of linear programming problems is discussed. These problems are very simple extensions of the classical Hitchcock-Koopman transportation problem; the latter is included as an important special case. Only the simplex method of solution of linear programming problems is considered. A number of points that are particular to the classical "transportation problem" are derived from the very simple nature of the matrix of the coefficients in the constraints. This theoretical foundation allows a justification of the well-known "stepping-stone" algorithm. All the results are then extended to the general problem.
I. R 32

16,864

Subba, M. ON THE GEOMETRICAL SIGNIFICANCE OF THE MOMENTS OF ORDER STATISTICS AND OF DEVIATIONS OF ORDER STATISTICS FROM THE MEAN IN SAMPLES FROM GAUSSIAN POPULATIONS. Contract W39 264(50), Proj. 642 263, CR 9 59 W39 264(50) RE, Sept. 1959, 15pp. Columbia University, New York, N.Y.).

16,864

This is a mathematical investigation of the distribution of $E_{r/n}$ (the r th largest observation in a random sample of n observations from a normal population with zero mean and unit variance) and that of $E_{r/n} - \bar{x}$ (the deviation of the r th order statistic from the sample mean, $\bar{x} = \sum_{i=1}^n x_i/n$) from the point of view of the moments of these distributions. The geometrical significance of the moments of these distributions are assessed.

16,865

Willing, D.E. NOTES OF TRACKING CONTINUOUS INFORMATION. FWC 1048, April 1959, 10pp. Flavin Personnel Research Committee, London, England.

16,865

This study was done to determine the amount of information transmitted by experienced Ss in a pursuit tracking task. Nine Ss tracked using a low-friction joystick, a horizontally moving target whose course was random visual noise at different amplitudes and lead-lag. Error scores were obtained and information rates were computed. Information rate was then evaluated as a function of frequency bandwidth and course amplitude.
T. G. I. R 16

16,867

McIntosh, R. & Parrishall, E. THE AIR FORCE AND THE APPLICATION OF COMPUTERS TO MEDICINE AND BIOLOGY. Mil. Med., March 1958, 122(3), 178-180. (USAF Aviation Medicine Branch, AEC, Baltimore, MD. & Div. of Educational Research, University of Virginia, Charlottesville, Va.). (AEC-TR 58 50).

16,867

This paper reports the first organized attempt to explore the applicability of computers to medicine and biology. The Air Force Research and Development Command, which has had a leading role in encouraging such applications, sponsored a series of national conferences between outstanding representatives from the fields of computer technology and the medical sciences. From already existing computer applications, two areas of importance were suggested: 1) the speeding up of mathematical calculations inherent to a particular biological problem and 2) simulation of a biological system by an electrical system. Other possible applications such as use of rapid data handling machinery for storing clinical and laboratory information in hospitals were discussed.
I.

16,874

Joyce, M. & Mallett, F. NAVIGATION TECHNIQUES AND DISPLAYS FOR INTERPLANETARY SPACE FLIGHT. FINAL REPORT. Contract AF 33(616) 5524, Proj. 9(610 6190), Task 50786 & CSURF Proj. 813, Rep. 813, Dec. 1959, 75pp. Ohio State University Research Foundation, Columbus, Ohio.

16,874

This report represents a continuation of work on a research study of navigational techniques and displays for interplanetary space flight. It adds 82 items to a general bibliography reported earlier; surveys unclassified literature relating to midcourse optical navigation for interplanetary flight (215 items); and carries on various investigations as follows: 1) an initial evaluation of a vibrotactile display in complex control tasks, 2) midcourse optical navigation on interplanetary space flight (Appendix II), 3) use of navigational information for in-course corrections on orbits (Introductory, Appendix III).
G. I. R 299

16,875
Jones, H.B. SIMPLEX THEORY. Mon. Series 3, June 1959, 104pp. School of Aviation Medicine, Pensacola Air Station, Fla.

16,875
This monograph develops and describes an approach to a correlation matrix called "solar correlational analysis" in which the analyst looks for correlation patterns, for structural wholes, and for an empirical theory to integrate his structural solution. One structural pattern, the simplex (a sequence of stages each one of which is studied within the next like sections in a telescope) is developed further. The history of the simplex form in the study of learning is reviewed. The string model as a way of reconstructing the training process or the manner in which stages of training are put together is presented with models taken from naval air training. A final chapter is devoted to the operations involved in simplex analysis.
T. I. R 24

16,876
Jones, L.V., Rock, R.D., Shaffer, E.M. & Johnson, E.S. PREFERENCE FOR FOOD COMBINATIONS. Contract DA 19 129 W 1003, File P 1113, Rep. 5 (Final), Jan. 1959, 31pp. NSA Communication Food & Correlation Institute for the Armed Forces, Chicago, Ill. (University of North Carolina, Chapel Hill, N.C.).

16,876
The power of a model for the prediction of choice of simple menus consisting of three food items was evaluated in a field trial with 307 army enlisted personnel. Predictions based on individual food items and for pairs of constituents were derived. Data for both types of preferences were added to account for the major variance in the preference scale values of the menu. The results are interpreted with regard to the value of preference data for individual foods in predicting acceptability of menu, interactive effects in preference for food combinations, and the predictive value of preference data for food pairs. Use of the model in optimizing institutional menus is suggested.
T. I. R 10

16,878
Imanishi, E.C. & Wiedemann, A. FEASIBILITY STUDY OF PERSONNEL CLOSURES. FINAL REPORT. Contract DA 44 009 ENG 3556, Proj. 8 12 75 CCI & ARF Proj. D161, Aug. 1959, 72pp. Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill.

16,878
A theoretical and experimental study was conducted to determine the most suitable device, or devices to be used for personnel shelter closures exposed to the environment of a nuclear explosion. Various types of materials and several different methods of application were evaluated. Material selection was based on the attenuation that a shock wave underwent in passing through the material as well as on ultimate strength and weight of the material. Closure systems selected as most feasible were membrane-type doors; double-diaphragm doors with either air, dirt, or water fillings; and a flat-plate door constructed with a honeycomb core.
T. G. I. R 3

16,882
Harris, J.D. AUDITORY FATIGUE FOLLOWING HIGH FREQUENCY PULSE TRAINS. Proj. NM 22 03 20.02 01, Rep. 306, XVIII (1), Jan. 1959, 1-8. USN Medical Research Lab., New London Submarine Base, Conn.

16,882
To explore temporary threshold shifts and possible auditory damage from brief repetitive high-frequency sound, large groups of young men were exposed to high intensity pulse trains at 2.5 kc and examined continuously for subsequent acuity changes at four kc. Duty cycle varied from 1:4 to 100 percent tone-on, train length from 1 to 25 minutes, and SPL from 90 to 120 db. A new unit, the NOX, representing total cumulative fatigue over a ten-minute interval, was invented to describe the results. These data specified the damage risk criteria and levels of ear protection necessary for such auditory situations.
T. G. R 13

16,884
Hardy, J.D. (Chm.). PANEL ON ACCELERATION (PANEL 5) OF THE ARMED FORCES-NSA COMMITTEE ON BIO-ASSEMBLIES. Minutes of First Meeting, Natick Mass., 14-24 July 1959, 12pp. National Academy of Sciences - National Research Council, Washington, D.C.

16,884
These minutes of the first meeting of a Panel on Acceleration define the mission of the Panel as being "to review and report upon the research and development problems concerned with the biological effects of mechanical forces which may be of interest in the area of bio-astronautics." The principal areas of interest and the problems of concern to the Panel are listed. The discussions in these minutes are primarily concerned with descriptions of present and proposed facilities and uses of human acceleration devices and motion simulators. Recommendations for future work are included.

16,884
Erskine, D.C. & Phillips, M.D. INTEGRATED AIRBORNE CN CONTROL AND DISPLAY EQUIPMENT PROGRAM. Contract AF 33(600) 30475, NSC TR 59 271, June 1959, 81pp. NSA Wright Air Development Center, Wright-Patterson AFB, Ohio. (Radio Radio Div., Radio Aviation Corporation, Ann Arbor, Mich.).

16,884
This is the final report of a research program designed to develop and demonstrate the operational feasibility of an integrated communication-navigation-identification (CNI) control subsystem for present-day high-performance aircraft which would reduce the total amount of critical cockpit area required and relieve the pilot of some of his tasks. The development of the subsystem was described in detail and test results comparing it with present CNI controls were discussed. Possibilities of controlling the subsystem from the ground by data link were studied as a move toward further reducing pilot load. The feasibility of an integrated control subsystem for use in any high-performance aircraft was discussed in relation to the present development.
T. G. I.

16,895
Clark, M.C., Courtney, D. & Colman, H.M. CAPABILITIES AND LIMITATIONS OF THE PILOT OPERATING IN A TERMINAL AREA WITHOUT TOWER CONTROL. (TECHNICAL REPORT). Contract FAA/MD 27, Proj. M, Rep. 31, Nov. 1959, 95pp. Courtney and Company, Philadelphia, Penn.

16,895
This study examines the factors that contribute to the ability of pilots to maintain separation and establish high landing rates at uncontrolled airfields for possible application to the more complex situation where the air traffic controller has become a necessity. The information in the report is based on an analysis of the relevant psychological literature, air observations at controlled and uncontrolled airfields using a typical light aircraft, and ground observations of typical "fly-ins" by several private pilots at uncontrolled airports. The major analyses are devoted to the pilot's perceptual and psychological capabilities and to additional factors such as regulations, airfield and aircraft characteristics, and the control loop.
T. R 104

16,896
Cheatham, T.E., Jr. & Lett, M.H. SIMULATION LANGUAGE SYSTEM TWO (SL-2). Contract AF 33(600) 35190, Tech. Memo. 58 2, Feb. 1958, 16pp. OMCA, Technical Operations, Inc., Washington, D.C.

16,896
This report describes the development of a program system called "Simulation Language System Two" (SL-2) in response to the needs of digital computer programs for simulating certain aspects of real world situations. These needs are discussed in relation to SL-2. An example of the use of this program is given.
I.

16,897

Chang, S.S.L., Harris, B., Hauptschein, A., Hoffman, D., et al. EVALUATION AND OPTIMIZATION OF DIGITAL COMMUNICATION SYSTEMS. FINAL SCIENTIFIC REPORT. Contract AF 19(604) 1964, AFRC IN 59 110, Feb. 1959, 23pp. Research Div., College of Engineering, New York University, New York, N.Y.

16,897

Work on a contract calling for evaluation of digital communication systems and their optimization under practical criteria and constraints is summarized. The work accomplished includes: 1) an analysis of the effects of noise in the feedback channel of communication systems; 2) a general theory of digital communication systems with fading, interference, and feedback; 3) the extension of null-time reception to systems employing envelope detection of a pulsed carrier, including frequency shift keying systems; and 4) the performance of an experimental null-time reception system with unidirectional and decision-feedback channels. Suggestions for future research are given. T. G. I. R 24

16,898

Chang, S.S.L., Harris, B., Hauptschein, A., Hoffman, D., et al. EVALUATION AND OPTIMIZATION OF DIGITAL COMMUNICATION SYSTEMS. FOURTH SCIENTIFIC REPORT. Contract AF 19(604) 1964, AFRC IN 57 971, Jan. 1958, 111pp. Research Div., College of Engineering, New York University, N.Y.

16,898

This progress report describes work accomplished on the evaluation and optimization of digital communication systems. Two main classes of systems, unidirectional and bidirectional, are being considered. The first problem considered here is that of transmitting information through a noisy unidirectional channel in finite time with the least error. A large portion of this report pertains to the bidirectional or feedback systems: the effect of truncation of the decision processes of a cumulative decision feedback system is considered; the advantages of cumulative decision feedback are discussed; a coded information-feedback system is devised; and experimental data are obtained from a model of an uncoded, non-feedback, null-reception system. T. G. I. R 15

16,899

Chang, S.S.L., Harris, B., Hauptschein, A., Morgan, K., et al. EVALUATION AND OPTIMIZATION OF DIGITAL COMMUNICATION SYSTEMS. PART II. THIRD SCIENTIFIC REPORT. Contract AF 19(604) 1964, AFRC IN 57 769(II), Oct. 1957, 124pp. Research Div., College of Engineering, New York University, New York, N.Y.

16,899

A study of n-station communication networks has been initiated, and various techniques for analyzing and rating networks are summarized. Linear programming is shown to be a general method for the synthesis of optimal networks which are subject to linear constraints on demand and capacity, transportation and flow techniques being simply special cases of linear programming. General expressions are developed for the information rate and reliability of n-station networks, and illustrative examples of the method are presented for series and parallel networks. The application of the null-reception and decision feedback concepts to the scatter-multipath problem is considered further. T. G. I. R 22

16,902

Burch, G.E. & Gerathewohl, S.J. SOME OBSERVATIONS ON HEART RATE AND CARDIODYNAMICS DURING WEIGHTLESSNESS. Reports Control Symbol CSCRD 16 5, Nov. 1959, 28pp. USA Biocastroautics Research Unit, Redstone Arsenal, Ala.

16,902

A survey was made of the efforts made during the last decade to determine the biomedical effects (cardiovascular functions in particular) of subgravity and zero-g. Animals and men were exposed to short and moderate periods of weightlessness and their behavior, respiration, and cardiovascular functions were recorded during aircraft and rocket trajectories. The obtained records were discussed and a generalized survey of the cardio-dynamic effects was given in tabular form. These findings were discussed in relation to the ability of man to tolerate space flight. T. G. I. R 18

16,903

Beckner, D.M. & Harabedian, A. HUMAN PERFORMANCE AS A FUNCTION OF THE JOINT EFFECTS OF DRIVE AND MOTIVATION. Contract NMR 6053(00), Proj. NR 145 120, Dec. 1959, 62pp. Human Factors Research, Incorporated, Los Angeles, Calif.

16,903

To investigate the joint effects of the Hall-Spence motivational construct, D or generalized drive, and incentive motivation, K, on human performance, an effort was made to produce variations in K by giving one-half the Ss (experimental group) an opportunity to obtain a three-try (three) dependent upon their performance on a nine-choice disjunctive reaction time (RT) task and not giving the other half a similar opportunity. Two levels of D were produced by giving one-half of the Ss conditioning trials in which a 1000 cps tone was paired with an electric shock and then the tone was presented to all Ss on all test trials. Thus, there were four experimental groups. Speed and accuracy (information transmission) on the RT tasks were analyzed for differences among the various DK groups. T. G. I. R 18

16,908

Seaphart, F.W. (Principal Investigator). BIOLOGICAL FACTORS IN SPACE FLIGHT. Contract AF 18(600) 1792, AFRC IN 58 58, Nov. 1958, 41pp. Division of Educational Research, University of Virginia, Charlottesville, Va.

16,908

This report presents the results of a working group conference concerned with planning biological experiments that would provide data from which the feasibility of a manned space flight could be determined. The major considerations treated were 1) behavioral factors, 2) instrumentation factors, 3) ecological factors, and 4) physiological effects of the space environment. In each area the problems were defined and a suggested research program outlined. T.

16,913

Abramson, L. A MODIFICATION OF THE WALD SEQUENTIAL PROBABILITY RATIO TEST AS APPLIED TO RADAR DETECTION. Contract AF 15(604) 1572, AFRC IN 58 395 & Tech. Rep. T 10/133, Aug. 1958, 30pp. Electronics Research Lab., Columbia University, New York, N.Y.

16,913

For a fixed false alarm probability, α , and a fixed miss probability, β , the Wald sequential probability ratio test (SPRT) minimizes the average time, T , to decide between signal-plus-noise and noise alone. Since the SPRT is designed to detect a fixed signal although the true signal may vary over a large range, a modification of the SPRT was investigated which results in a smaller maximum T at the expense of a larger minimum T . The modification consists of performing a preliminary SPRT and, depending on its outcome, then performing one of two more SPRT's, after which a decision is made. The special case of a constant signal with additive independent Gaussian noise is considered. T. R 2

16,918

Van Horn, J.M., Peltz, F.D., Summerall, C.P., Jr., & Chin, T. AUTOMATIC DATA PROCESSING INPUT-OUTPUT EQUIPMENT STUDY VOLUME I OF FINAL REPORT. Contract DA 36 039 SC 78010, Proj. DA 3 28 01 201, July 1959, 284pp. Melnar, Inc., Falls Church, Va.

16,918

This volume covers one phase of a study of automatic data-processing input-output equipment. Included in this phase are 1) functional requirements of military applications which were generated by analysis of available Army applications, and by personal contact with members of the Army involved in such applications; 2) operational requirements of the applications areas discussed under the four categories of G-1 through G-4, plus a category of non-field applications; 3) equipment and techniques not necessarily available at present but considered suitable; and 4) detailed discussion and evaluation of techniques to fill gaps in current equipment. T. G. I.

15,920

USN Aviation Safety Center. INTEGRAL EJECTION SEAT STUDY. June 1959, 16pp. USN Aviation Safety Center, Norfolk Air Station, Va.

15,920

The ejections from USN aircraft for the period 1 January to 30 June 1959 are reported. Tabular and graphic presentation of the data are made with no interpretation. The complete analysis of the emergency use of the ejection seat will be published in the yearly summary.

T. G. I.

16,922

USCG Civil Engineering Div. THE USE OF RETRO-REFLECTIVE MATERIALS FOR AIDS TO MARITIME NAVIGATION. Rep. 34, Nov. 1959, 47pp. USCG Civil Engineering Div., Headquarters, Washington, D.C.

16,922

This report provides technical information on the performance of these retro-reflective materials (materials having the property of reflecting light directly back on itself) recommended for use as aids to maritime navigation. The best methods and configurations for the use of these materials are discussed. The following topics are treated in detail: 1) types of material available, 2) theoretical performance of retro-reflectors, 3) visual ranges of retro-reflective materials, 4) colors to be used, 5) materials for use on buoys, and 6) retro-reflective materials.

G. I. R.3

16,928

Smith, E.M., Anastasio, F.J., Harac, S., Kalustyan, B.C., et al. THE APPLICATION OF POINT SOURCE PROJECTION TECHNIQUES TO AIR-TO-AIR GUNNERY TRAINING. Contract N628(00), NAVTRADEVEN TR 1628 6, March 1959, 39pp. USN Training Device Center, Port Washington, N.Y. (The deFlores Company, Inc., Englewood Cliffs, N.J.).

16,928

This report describes the results of a study made to determine if a satisfactory visual presentation can be obtained with point light source techniques for application to an air-to-air gunnery trainer. It includes an analysis of the training task to determine the skills to be developed and the cues required for its performance. A proposed point source projector is described along with several limited-scope evaluation experiments. The need for further evaluation is discussed.

I. R. 3

16,929

Smith, E.M., Anastasio, F.J., Harac, S., Kalustyan, B.C., et al. THE APPLICATION OF POINT SOURCE PROJECTION TECHNIQUES TO HELICOPTER LOW-ALTITUDE NAVIGATION TRAINING. Contract N628(00), NAVTRADEVEN TR 1628 3, March 1959, 43pp. USN Training Device Center, Port Washington, N.Y. (The deFlores Company, Inc., Englewood Cliffs, N.J.).

16,929

This report described the results of a study to determine if a satisfactory visual presentation can be obtained with point light source techniques for application to a helicopter low-altitude navigational trainer. The scope and important elements of the problem were determined through interviews with pilots as well as from the requirements of the contract specification. A promising point source projection system for the stated training problem was described and recommended for experimental evaluation.

T. I. R. 4

16,931

Shaffer, E.M. & Plesner, R.A. BAYES ESTIMATION OF PROPORTIONS: THE EFFECT OF STIMULUS DISTRIBUTION AND EXPOSURE TIME. AFOSR TR 59-1111 & Rep. 23, Dec. 1959, 17pp. Psychometric Lab., University of North Carolina, Chapel Hill, N.C.

16,931

To evaluate predictions from the decision theory model of the behavior of individual Ss in a typical psychophysical experiment, the solution (known as a Bayes strategy) was mathematically derived for the task described below. Twenty-three Ss were required to estimate the percentage of ones in random matrices composed of ones and zeros in varying proportions. The two types of information were experimentally varied by using different stimulus distributions and exposure time. The stimulus distributions were not told to the Ss, who thus had to learn stimulus probabilities during the course of the experiment. Subject estimates were compared with those derived from the model.

T. R. 17

16,933

Schwartz, L.S. (Dir.). EVALUATION AND OPTIMIZATION OF DIGITAL COMMUNICATION SYSTEMS. FIFTH SCIENTIFIC REPORT. Contract AF 19(604) 1964, AFOSR TR 58 578, Nov. 1964, 65pp. College of Engineering, New York University, New York, N.Y.

16,933

The problem of transmission of information over a bidirectional communication system with noise in the forward and feedback channels is discussed. A system that prevents nonconservation of message length is described and the results of analysis are summarized. A technical description is given of a model of communication decision-feedback system with noise in the forward and feedback channels. This system prevents nonconservation of message length by reserving, for a given block of message units, a fixed correction interval for repetition of ambiguously received messages. Several correction procedures are analyzed and compared. Comparisons are also made with unidirectional and ideal decision-feedback systems.

G. I. R. 14

16,943

Michel, E.L. & Langevin, R.W. ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS PART 2. CONTINUOUS EXPOSURE OF HUMAN SUBJECTS TO INCREASED OXYGEN TENSION FOR SEVEN DAYS. Proj. TED NAM AE 1403 Part 2, Rep. NAM ACEL 384, Sept. 1958, 11pp. USN Air Crew Equipment Lab., NAMC, Philadelphia, Penn.

16,943

In an attempt to define human limitations to higher than normal oxygen percentages for space flight, six volunteers were confined for a seven-day period (168 hours) in an altitude chamber at 10,000 feet (523 mm Mercury) simulated altitude breathing 80 percent oxygen. This is the equivalent of breathing 55 percent oxygen at sea level since the partial pressure in both cases is 418 mm Mercury. Prior to the study, each subject was evaluated by means of medical history and physical examination. During the study, measurements were made of vital capacity, pulse rate, respiratory frequency, and observations were made as to appearance and activity in general. Follow-up medical and physical examinations were made.

R. 12

16,946

Laurent, A.G. ORDER STATISTICS AND STATISTICAL INFERENCE FOR A MODEL WITH RELIABILITY FUNCTION $S(t) = \exp[1-t \cdot \exp(t)]$. Contract N628(00), (NR 042 201), Tech. Rep. 4, Nov. 1959, 71pp. Department of Mathematics, Wayne State University, Detroit, Mich.

16,946

This paper discusses the use of order statistics in problems of statistical inference that arise under the assumption that the phenomena under study are correctly represented by the Reliability Function $S(t) = \exp[1-t \cdot \exp(t)]$, where t is a "reduced" variable. The motivation for the study of the present models arose from a consideration of situations where an aging process takes place and the future performance of the system depends on its age. Expected values, variances and covariances of the order statistics, tables of expected values, and uses of the tables are presented. Minimum variance unbiased estimates of the parameters, confidence limits and tests of hypotheses are described.

16,979

Kreider, M.B. & Impletro, P.F. OXYGEN CONSUMPTION AND BODY TEMPERATURE DURING SLEEP IN COLD ENVIRONMENTS. *J. Appl. Physiol.*, Sept. 1959, 14(5), 765-767. (USA Environmental Protection Research Div., ON Research & Engineering Command, Metic, Mass.).

16,979

To investigate the effect of cold on heat exchanges of the body during nighttime sleep, six young soldiers slept at the following ambient temperatures 25.5 to 26 degrees C (78 to 80 degrees F), 15 to 18.5 degrees C (60 to 65 degrees F), and -22 to -34.5 degrees C (-25 to -30 degrees F). Rectal and skin temperatures were recorded and mean weighted skin temperatures were calculated at 10, 20, 30, 40, 50, and 60 minutes intervals every night; oxygen consumption was measured at six-minute intervals on occasional nights. Observations were made as to periods of wakefulness and restlessness during the night. The obtained values were discussed in relation to limits of body cooling compatible with substantially continuous sleep.

G. I. R 10

16,980

Kokchev, N.Kh. PSYCHOPHYSIOLOGY OF CAMOUFLAGE AND RECOGNITION. *ATI 106 731*, Sept. 1942, 290pp. *US Central Air Documents Office*, Dayton, Ohio. (Lenina Gosudarstvennogo Universiteta, Instituta Psikologii, Morskogo, Russia).

16,980

The object of this book is to analyze the actual meaning of "human factor" under war conditions in the sphere of perception and to point out methods for a better and more advantageous utilization of this factor. The various chapters are 1) contrast sensitivity and the resolving power of the eye, 2) visual stereoperception, 3) visual perception of movements, 4) perception of color, 5) visual perception under conditions of poor illumination, 6) aural perception, 7) tactile, moving, and labyrinth perceptions, and 8) olfactory perceptions. A final portion of the book has not been translated from the Russian due to poor condition of the copy.

T. G. I. R 20

16,985

Ronchi, Lucia & Toraldo di Francia, G. ON A POSSIBLE IMPROVEMENT OF CONTRAST PERCEPTION BY MEANS OF A SYSTEM WHICH CORRECTS THE CHROMATIC ABERRATION OF THE EYE. *Atti della Fondazione Giorgio Ronchi*, Nov.-Dec. 1959, XIV(6), 618-626. (Istituto Nazionale di Ottica, Arcetri, Firenze, Italy).

16,985

The effect of correction for chromatic aberration of the eye on the readability of printed letters was investigated. The contrast between letters and background on a standard acuity chart (Armaignac) was varied systematically and responses before correction were compared to responses after correction by a spectacle lens of chromatic aberration. Conditions yielding improved contrast perception under correction were discussed.

T. G. I. R 11

16,986

Ronchi, Lucia. BLUE-GREEN RESPONSES AT MESOPIC LUMINANCES. *Atti della Fondazione Giorgio Ronchi*, July-Aug. 1959, XIV(4), 384-391. (Istituto Nazionale di Ottica, Arcetri, Firenze, Italy).

16,986

The response of the eye, when stimulated by blue-green light, at mesopic ranges of luminance was investigated. Both electroretinographic and psychophysical measurements were made of the response when the two lights (blue and green) impinged on the retina simultaneously. The results were discussed in terms of retinal mechanisms at work and some practical implications were noted.

R 9

16,987

Potom, V.V. SOME HUMAN ENGINEERING ASPECTS OF SEVERAL UNCONVENTIONAL AIRCRAFT. Presented at: Fourteenth Meeting of the Flight Test Techniques and Instrumentation Panel, Athens, Greece, 11-15 May 1959, Rep. 244, 12pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France. (USAF Rotary Wing Engineering Section, Edwards AFB, Calif.).

16,987

Interest by the military services, notably the US Army, in the potential of relatively high speed (compared to helicopters) aircraft that have the capability of vertical take-off and landing (VTOL), has been sufficient to finance the development of experimental testbeds of several types of VTOL aircraft. Several of these aircraft have been flown sufficiently to permit observations to be made on subjective or human engineering characteristics such as control, noise, downwash effects, etc. These characteristics, which are readily apparent to the pilot and strongly affect his opinion of the aircraft, are the subject of this report.

I. R 5

16,989

Ittelson, W., Landau, M. & Proshansky, H. THEORY AND RESEARCH IN BEHAVIORAL SCIENCE. Contract AF 49(638) 33, AFOSR TX 58-1108, Presented at: Interdisciplinary Behavioral Sciences Research Conference, University of New Mexico, Albuquerque, N.M., June-Aug. 1958, 28pp. *USAF Behavioral Sciences Lab.*, Wright-Patterson AFB, Ohio. (Brooklyn College, Brooklyn, N.Y.).

16,989

This paper is concerned with an analysis of the following aspects of contemporary behavioral sciences: 1) the breaking of traditional boundaries among disciplines, 2) the development of conceptual frameworks that cut across boundaries, and 3) an intensification of research effort involving new organizational forms.

R 2

16,994

Armour Research Foundation of Illinois Institute of Technology. INVESTIGATION AND STUDY OF ERROR DETECTION AND CORRECTION FOR DATA LINK ERROR DETECTION AND CORRECTION SUMMARY REPORT. Contract AF 30(602) 1729, Proj. 4519, Task 45232, RADC TR 58 20, Dec. 1957, 17pp. *Armour Research Foundation of Illinois Institute of Technology*, Chicago, Ill.

16,994

A summary is presented of work accomplished on a study and investigation of the application of error detection and correction techniques to data communication systems for the purpose of enhancing the reliability of these systems. The discussion for increasing the reliability of binary communications is based upon techniques described in current literature and includes definitions and discussions of error reduction, error detection, and error correction techniques.

R 59

16,995

Becker, H.D. & Lawton, J.G. THEORETICAL COMPARISON OF BINARY DATA TRANSMISSION SYSTEMS. Contract AF 30(602) 1702, Proj. 4519, Task 45232, RADC TR 58 918 Rep. CA 1172 S 1, May 1958, 69pp. *Cornell Aeronautical Laboratory, Inc.*, Buffalo, N.Y.

16,995

An analytic study and comparison of certain ground-air communication links is presented. Systems employing frequency-shift keyed (FSK) modulation are first examined and an analysis leading to an optimum detector for a two-state FSK system is presented. The performance of carrier (on-off) keyed FSK and phase-shift keyed (PSK) binary systems operating in an environment of additive, white, Gaussian noise are analyzed and compared on the basis of the error probability attained as a function of the received signal-to-noise ratio. Finally, an analysis of modulation methods directed at minimum bandwidth PSK systems is presented. Recommendations for future investigation are presented.

G. I. R 125

16,955

Mortimer, N. DETERMINISTIC THEORIES. Contract AF 49 (630) 33, AFOSR TN 58 1113, Aug. 1958, 64pp. University of California, Los Angeles, Calif.

16,953

An analysis of the notions of a deterministic theory and of a deterministic system and an investigation of some of the properties of these notions are presented. The investigations are conducted within metamathematics in the wider sense, construed as including the apparatus of set theory. Definitions of the concept of deterministic theory, the derivative concept of a deterministic system, and several related concepts are given. An inquiry is then made as to whether two specific theories (classical particle mechanics and Newtonian celestial mechanics), often alleged to be deterministic, actually are so. Theorems relating determinism with various other concepts that have been associated with it in the literature are presented. Finally, explicit definability and determinism are discussed. R 30

16,954

Palovsky, G. REPORT ON THE ENGINEERING BIOLOGY OF HANDLING WASTES RESULTING FROM A CLOSED ECOLOGICAL SYSTEM HANDLING AIR CONTAMINANTS RESULTING FROM A CLOSED ECOLOGICAL SYSTEM. Progress Report. Contract AF 18(603) 71, AFOSR Rep. 58 259, July 1957, 16pp. College of Engineering, New York University, New York, N.Y.

16,954

In a closed ecological system, in which humans are present and are required to carry on sedentary work in a confined space for an extended period of time, the atmosphere must be suitable for life and conducive to work. An examination of present knowledge of the control of temperature, humidity, air motion, foreign matter, micro-organisms, and the balancing of the carbon dioxide and oxygen ratios is made singly and in relationship with each other. This examination is related to problems of ventilation and air conditioning. R 29

16,957

Beranek, L.L., Smith, C.P., Fant, C.G.M., Stevens, K.N., et al. SPEECH COMPRESSION RESEARCH FINAL REPORT. Contract AF 19(604) 626, AFOSR TR 57 166, Feb. 1957, 51pp. Acoustics Lab., Massachusetts Institute of Technology, Cambridge, Mass.

16,957

Speech communications research during the period 1953-1956 by this laboratory is discussed. Following a discussion of the general speech-compression problem, the various items of research are described and their relation to the over-all program is indicated. These items include 1) a prototype speech-compressor system, 2) an alternate synthesizer, and 3) studies on speech production and reception. G. I. R 56

16,958

Sargent, F., II, Sargent, Virginia W., Johnson, R.E. THE PHYSIOLOGICAL BASIS FOR VARIOUS CONSTITUENTS IN SURVIVAL RATIONS. PART III. THE EFFICIENCY OF YOUNG MEN UNDER CONDITIONS OF MOIST HEAT. APPENDICES OF METHODS AND ORIGINAL DATA. Contract AF 18(600) 80, Proj. 7156, Task 71805, WADC TR 53 484, Vol. II, April 1958, 1513pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (University of Illinois, Urbana, Ill.).

16,958

From June 22, 1955 through July 27, 1955, 100 volunteer airmen served as subjects in a study of survival rations in moist heat at Camp Atterbury, Indiana. The original data collected during the 36-day period of study are detailed in these appendices. In addition, special studies are reported on renal osmotic regulation and chemical analysis of sweat. A method for analyzing ketone bodies in blood, urine, and sweat is described together with a full report of alterations in ketone body metabolism observed during the 1954 winter study at Camp McCoy and the 1955 summer study at Camp Atterbury. T. G. R 173

16,971

Geckill, M.V. (Ch.). HEALTH, MEDICAL AND DRUG FACTORS IN HIGHWAY SAFETY. From Proceedings of the Second Highway Safety Research Correlation Conference, Washington, D.C., April 5-6, 1954, Publ. 328, Sept. 1954, 224pp. Committee on Highway Safety Research, National Academy of Sciences - National Research Council, Washington, D.C.

16,971

These proceedings from the conference on health, medical, and drug factors in highway safety are presented both in summary form and in full. Approximately 20 papers are presented on the following major topics: 1) health and self-medication as traffic accident causes; 2) diabetes, epilepsy, heart attacks, and convulsive therapy on an ambulatory basis as possible traffic accident causes; 3) fatigue, low oxygen, and combustion products as traffic accident causes; and 4) blood alcohol level and extent of traffic accident hazard. Working group recommendations and discussion by the conference are included. T. G.

16,972

Freeman, H.F. & Rosenberg, I. HIGH ALTITUDE AND HIGH AIRSPEED TESTS OF STANDARD PARACHUTE CANOPIES. Proj. 6068, AFOSR TR 58 32, Oct. 1958, 121pp. USAF Flight Test Center, AFOSR, El Centro, Calif.

16,972

To determine the opening characteristics of five standard personnel parachute canopies at various altitudes and air speeds, test drops were made with a dummy weighing approximately 200 lbs. Three different pressure altitudes (7,000, 14,000, and 20,000 ft.) were used with increasing velocity increments at each altitude until destruction occurred. Force and events as a function of time were recorded for each of 660 tests. The effects of altitude, airspeed, and parachute design on opening characteristics were reported. T. G. R 2

16,973

Fierston, S. AUTOMATIC VOICE DATA LINK. Proj. 4360, Task 46604, AFOSR TR 58 126, March 1958, 54pp. USAF Special Systems Lab., AFOSR, Bedford, Mass.

16,973

The automatic voice data link vocally reads out commands to six aircraft under control using digital outputs from the intercept computer (Airmap) and return-to-base computers. It was developed to provide a device for reducing operator errors in the use of multiple intercept computers, such as the Airmap, without requiring additional equipment in the controlled aircraft. A general description, operation, and circuit analysis were given. T. I.

16,974

Crain, K.J. THE SPECIFICATION AND DESCRIPTION OF SURFACE COLORS. Proj. 8501, Task 85002, WADC TN 58 333, Dec. 1958, 35pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

16,974

An attempt is made to provide all the information needed for the specification and description of surface colors. Analysis is made of colors in terms of the CIE chromaticity diagram and the method for converting from this system of notation (CIE) to the Munsell (and vice versa) is given. In addition, procedures are described for the estimation of degree of perceptible difference between colors. T. G. R 14

16,996

Green, D.M. DETECTION OF SIGNALS IN NOISE AND THE CRITICAL BAND CONCEPT. Contract AF 19(604) 2277. AFOSR TR 58 51 & Tech. Rep. 82, April 1958, 78pp. Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

16,996

An attempt was made to use behavioral data as a basis for a mechanistic and mathematical description of the auditory frequency analysis process. The critical band theory is used as an interpretive device in discussing the research. An analytic review of research from the areas of masking, frequency discrimination and loudness is presented and two new experimental studies are reported in detail. The first of these concerns detection of multiple component signals in noise. A model extending the critical band theory is considered in analyzing the results. The second study applies ideas developed in the first to a situation where the signal is a sample of noise. Two parameters of the signal are investigated: bandwidth and duration. A general model of the receiving mechanism is proposed. G. I. R 29

16,998

Ingram, M.T. THE ENGINEERING BIOTECHNOLOGY OF HANDLING WASTES RESULTING FROM A CLOSED ECOLOGICAL SYSTEM SKIN EXCRETIONS PROGRESS REPORT. Contract AF 18(603) 71, AFOSR Rep. 58 270, Oct. 1957, 8pp. College of Engineering, New York University, N.Y.

16,998

This report presents a review of skin excretions and offers a range of values, as reported by various research studies, for the various chemical components of sweat. Comments are offered as to unknown quantities as well as to possible effects of skin excretions upon occupants of a closed space. Lines for future investigations are listed. R 8

16,999

Kurze, A.A., Marks, K.L. & Schermerhorn, J.G. A NEW HORIZON IN COMMUNICATION THEORY - THE POLYPHASE CONCEPT. Proj. 4518, RADC TN 58 6, Jan. 1958, 38pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

16,999

This report attempts to explain the significance of the polyphase concept and its application to communications engineering which, to date, has been treated from a single-phase concept only. The polyphase concept is shown to be of sufficient scope and power to penetrate into every domain constituting communication theory and to provide new applications to old problems such as information theory, modulation, antennas, detection, and circuitry. Further outlined are the possibilities of the application of the polyphase concept to such areas as multiplexing, high-power generation, and interference suppression. T. G. I. R 24

17,076

Bradley, J.V. & Wallis, R.A. SPACING OF PUSH BUTTON ON-OFF CONTROLS. *Engng. Industr. Psychol.*, Winter 1959, 1(4), 107-119. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio & Antioch College, Yellow Springs, Ohio).

17,076

To investigate human factors which limit the degree to which an instrument may profitably be miniaturized, 36 Ss were tested on panels on which controls varied in diameter (three ways), orientation (two ways), and spacing (six ways). Each S was tested for all 36 possible combinations. Performance was compared in terms of time scores and touching errors as functions of spacing. Results were related to previous studies of degradation of performance as this related to crowding of knobs. Recommendations were made for optimal placement of push buttons. T. G. I. R 14

17,077

Meranda, P.F., Farrington, A.R. & Clarke, M.V. PREDICTION OF PERFORMANCE OF TEXTILE WORKERS. *Engng. Industr. Psychol.*, Winter 1959, 1(4), 120-127.

17,077

This study was an extension of a study conducted to determine the merits of the Activity Vector Analysis (AVA). The AVA is a self concept personality assessment instrument used to predict success of line workers in the textile industry. The 230 Ss were rated by an interviewer and by an analyst of the AVA. The criteria of success was a job proficiency rating and actual job status. Comparisons between predicted and foreman's ratings and between predicted and actual job outcomes were made. The merits of the AVA as compared to personal interviews were ascertained and discussed. T. R 1

17,078

Seminara, J.L. SPEED AND ACCURACY OF MATCHING TACTUALLY CODED RELATED PAIRS OF ITEMS. *Engng. Industr. Psychol.*, Winter 1959, 1(4), 128-133. (Missile Systems Div., Lockheed Aircraft Corp., Van Nuys, Calif.).

17,078

The use of tactual cues to perform a common simple operation was investigated. The speed and accuracy of matching related pairs of simulated plugs and receptacles on six Ss were determined. The same task was conducted with the aid of visual cues. These two types of performance were compared and evaluated. T. G. I. R 8

17,079

Buel, W.D. STABILITY OF PREFERENCE INDICES IN FORCED-CHOICE RATING SCALE ITEMS. *Engng. Industr. Psychol.*, Winter 1959, 1(4), 134-137.

17,079

To check the assumption made in forced-choice scale construction that preference indices (PI's) determined from responses to items in checklist form remain stable when those items are matched on similarity of PI and dissimilarity of discrimination index (DI) and are responded to in forced-choice form, 11 Ss evaluated men on 143 items on a five-point scale. For each item PI's and DI's were obtained and a forced-choice scale was constructed. The same Ss rated the same men on the new instrument three months after the initial study. Results were discussed as they provided a test of the assumption stated above. R 3

17,080

Mukherjee, B.N. LEARNING EFFICIENCY IN A PSYCHOMOTOR TEST AS A FUNCTION OF INITIAL SKILL. *Engng. Industr. Psychol.*, Winter 1959, 1(4), 138-142. (Bureau of Educational & Vocational Guidance, Patna, Bihar State, India).

17,080

To investigate relations between different measures of learning derived from successive performance on a simple psychomotor task and initial level of ability in the task, 16 subjects were divided into four groups on the basis of scores made on trial tests on a two-hand coordination test. Learning curves based on time scores were correlated with initial performance level. Results of this investigation were compared with findings from similar investigations. T. G. R 8

17,155
Neftman, W.R. HEURISTIC PROGRAMS, COMPUTER SIMULATION, AND HIGHER MENTAL PROCESSES. *Psych. Sci.*, Oct. 1959, 4(4), 330-335. (Carnegie Institute of Technology, Pittsburgh, Penn.).

17,155
This section includes 1) a note which discusses the methodological basis for research into higher mental processes--the heuristic computer program--and describes some current developments; and 2) an index of statistical programs available in the following areas in the statistical library of the ILLIAC: matrix operation, other algebraic routine, multivariate analysis, and analysis of variance and covariance.
R 15

17,339
Glanville, M.H. SAFETY IN TRANSPORT. I. SAFETY ON THE ROAD. *J. Royal Soc. Arts*, May 1954, CII(4926), 496-519. (Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England).

17,339
This paper treats the road safety problem with particular reference to Great Britain. The magnitude of the problem of road accidents at present and possible future trends in both traffic and accidents are discussed. The broad issue of road safety is then discussed as 1) the equipment used (the road and the vehicle), 2) the human element (the pedestrian and the driver), and 3) properly devised and applied sanctions for both 1) and 2).
T.G.

17,340
Brown, V. SAFETY IN TRANSPORT. II. SAFETY IN THE AIR. *J. Royal Soc. Arts*, May 1954, CII(4926), 520-533. (Ministry of Civil Aviation, London, England).

17,340
Factors in achieving air safety are treated in the following order: airworthiness; crashworthiness; airling operation, maintenance, and inspection; accident investigation; the passing of information among government departments, designers, manufacturers, and operators; statistics; and publicity. A final comment is given on what the government of the United Kingdom is doing to overcome the hazards of flying.
G. I. R 6

17,341
Wilson, G.R.S. SAFETY IN TRANSPORT. III. SAFETY ON THE RAILWAYS. *J. Royal Soc. Arts*, May 1954, CII(4926), 534-549. (Ministry of Transport and Civil Aviation, London, England).

17,341
The working principles and methods which underlie the high standard of safety characteristic of railway travel are discussed with particular reference to Great Britain. Major topics treated are as follows: government regulation; railway safety in 1874; railway signalling (block system--double and single lines, signals and interlocking, modern signalling controls, track circuits, continuous track circuiting and multi-aspect signals); railway brakes (nonautomatic, automatic, modern improvements, vacuum, and air brake systems); observance of signals (automatic train control, warning control, and stop control on urban electric railways); and derailments (breakages and failures, examinations). Future developments are discussed.

17,462
Walters, R.H. A NON-PARAMETRIC APPROACH TO THE GRAPHICAL ANALYSIS OF TRENDS. *Canad. J. Psychol.*, June 1959, 13(2), 84-85. (University of Toronto, Toronto, Ontario, Canada).

17,462
When the responses of a group of Ss over a series of trials on a task are examined, and when the data do not meet the requirements of a parametric analysis, a nonparametric analysis should be used. Such an approach is described and the procedure is illustrated with reference to an actual experiment.
R 2

17,463
Lambert, M.E. & Fillenbaum, S. A PILOT STUDY OF APHASIA AMONG BILINGUALS. *Canad. J. Psychol.*, March 1959, 13(1), 20-34. (McGill University, Montreal, Quebec, Canada & University of North Carolina, Chapel Hill, N.C.).

17,463
Studies on the effects of aphasia among people who use more than one language were reviewed and three generalizations (primacy, habit strength, and affective) about such effects of speech were discussed. Both classical and new cases of polyglot aphasics were analyzed to determine if any relation exists between language learning contexts and the nature of aphasic disorder and to what extent these data fit the general principles. Some tentative conclusions were derived in support of the learning context principle.
T. R 6

17,516
Mead, L.C. A PROGRAM OF HUMAN ENGINEERING. *Ann. N.Y. Acad. Sci.*, Jan. 1951, 51(Art. 7), 1125-1134. (Tufts University, Medford, Mass.).

17,516
A review is given of the manner in which the field of human engineering arose and the term itself is defined and discussed in relation to other areas of endeavor. A program of human engineering as it appeared at the time of writing (1951) is outlined in terms of objectives and types of studies undertaken. Some illustrative examples of results obtained from human engineering research are presented.
R-11

17,517
McFarland, R.A. PROBLEMS RELATING TO AIRCREWS IN AIR TRANSPORT DESIGN. *Ann. N.Y. Acad. Sci.*, Jan. 1951, 51(Art. 7), 1146-1158. (Harvard School of Public Health, Boston, Mass.).

17,517
The main thesis of this paper is that improvements in safety and efficiency in airline operations center around the design of equipment to comply with the human characteristics of the operators. A number of illustrations relating aircrew duties to design features are given. The value of advance analysis of a system in terms of human factors is stressed.
T. G. R 16

Reels, L.S., Jr. SOME CONSIDERATIONS OF ARSENICAL
NUTRITION. Ann. N.Y. Acad. Sci., Jan. 1942, 25(Part 7):
1159-1163.

The effect of World War II in producing constructive progress of research among medical personnel, representative of the allied countries, and individual laboratories to solve previously unsolved problems is discussed. The progress emerging from this effort is being hastened, producing a field that, perhaps, may displace in the effect of the relationship between man and machine. The writer feels it is hard to find what about that conflict is unsolved problems at the 24th are to be solved. Some aspects of progress might be given as illustration of such progress.

Karpis, E.A. 1900-1935. U.S. Prison & Jail
 and Immigration. Vol. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833,

Human-machine engineering, the psychology and control of light machines to create system man-machine conditions, is discussed in two papers of human engineering. Physiological and psychological effects of light and the relation between light and human efficiency are indicated and discussed.

L. G. I. K 14

Seltz, C.D. SEPTIC ORBIT. Ann. Ent. Soc. Am.
 Ent., Jan. 1921, 52 (Art. 7), 1274-1275. (See Social
 Disease Center, Part Washington, D.C.).

The issues for better cockpit lighting are felt to be as follows: 1) no standard (indirect?) lighting system appears possible; 2) a general principle of cockpit lighting seems attainable; 3) a comprehensive study of requirements for the various types of aircraft and operational situations is necessary; 4) indirect lighting has the lesser promise of providing a general principle of lighting; and 5) fluorescent, floodlighting, and a combination of the two deserve serious consideration.

Riftman, M. THE BASIC PATTERNS OF HUMAN LOCOMOTION.
Ann. N.Y. Acad. Sci., Jan. 1961, 51 (Art. 7), 1207-
1212. (Department of Anatomy, College of Physicians
and Surgeons, Columbia University, New York, N.Y.).

The efficient management of normal motor activities and the substitution of prosthetic devices for the normal mechanisms depend upon an understanding of the fundamental factors which underlie human movement. The locomotor mechanism, its fundamental features, its control, and the methods by which these factors can be studied are discussed.

Blankart, H.M., & Cooper, W.W. AN EVALUATION OF SURGICAL PROCEDURES USED IN A PERMANENT STAGE OF RAT-TOOTH EXOSTOSIS. *Ann. N.Y. Acad. Sci.* Jan. 1966, 21 (Part. 7), 1223-1238. School Engineering Dept., University of California, Berkeley, Calif. & Orthodontic Surgery Sect., University of California, San Francisco, Calif.

A critical review of experimental techniques that have been used for studies of human perception of all significant psychomotor features (1) of three salient kinesthetic features: 2) differentiated types of postural activity, 3) static posture, and 4) dynamic posture, and 5) body motion patterns, and 6) body motion patterns. These features include: 2) static posture, 3) static posture, and 4) static posture, and 5) static posture, and 6) static posture. The information and symbols of data gathered by the use of these methods should contribute to a better understanding and use of these procedures for improvement of cases of psychomotor learning.

CHAMBERLAIN, J. H. 100 YEARS OF THE CHAMBERLAIN
FAMILY IN THE U. S. A. 1800-1900. CHAMBERLAIN, J. H. 1800-1900.
CHAMBERLAIN, J. H. 1800-1900. CHAMBERLAIN, J. H. 1800-1900.
CHAMBERLAIN, J. H. 1800-1900. CHAMBERLAIN, J. H. 1800-1900.

The basic functional requirements of lower extremity prostheses are discussed with reference to recent force control research findings. The nature and significance of the many important functional characteristics as related to prostheses are discussed and related to their incorporation in leg design.

Tajiri, Gen. & Electric, A.C. - APPLIED FOR PATENTED
MACHINES OF MIXING OF THE SPINNING, AND AND SAND
CLOTHING, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588,

A method of kinematic analysis of the motions of shovels, arms, and hand is described. The six steps involved are discussed in detail: 1) measurement and calibration of the standard experimental S, 2) fitting of the S with visual landmarks, 3) cinematography of the S performing the activities under study, 4) obtaining the Cartesian earth coordinates of the visual landmarks from selected frames of the developed film and correcting these coordinates for parallax, 5) analysis of the coordinate data to yield the onset and angle of the idealized kinematic system, and 6) obtaining angular velocities and accelerations of the members of the kinematic system from the serial frames.

42. H. G. HUMAN ENGINEERING PROBLEMS IN SERVICE TESTING OF PROSTHETIC DEVICES. Ann. N.Y. Acad. Sci., Jan. 1951, 51 (Art. 7), 1266-1271. (College of Engineering, New York University, New York, N.Y.).

Some of the psychological considerations that enter into the selection of amputee pilot wearers of prosthetic devices which are to be service tested are reviewed. Attention is directed to issues and problems arising in connection with experimental design in a human engineering problem of this kind. Also considered are difficulties that arise with the development and utilization of a research team consisting of professionals from several diverse areas. Values and limitations of such a cross-disciplinary approach are indicated.

R 1

17,774
O'Brien, E.C. **MECHANISMS OF DUST REMOVAL FROM SURFACES.** *ASBESTOS*, 1959, 2(1), 54-74. (Turner Brothers Asbestos Co. Ltd., Rochdale, Lancs., England).

17,775
The problem of removing the dust from a job surface as to achieve the given factor is considered. Following a discussion of the state of research on this problem is reviewed. While considerable work has been done in the field of "mechanical" dust removal, it is suggested to consider the prospects of such the use of 11, and 12, especially (called here "thermochemical" models) for the estimation of the progress of such job is presented. Considerations based on these models are also discussed. Satisfying as a method for study of this problem is considered for further experimentation.
G. I. R 2

17,776
Morley, E.R. **THE CONTROL OF FINE DUST REMOVAL FROM SURFACES.** *ASBESTOS*, 1959, 2(1), 54-74. (Turner Brothers Asbestos Co. Ltd., Rochdale, Lancs., England).

17,777
This paper first considers the different types of dusts associated with the electroplating industry and then discusses the techniques of collecting and scrubbing them. The substances from which dusts arise are chrome, copper, cadmium, zinc, and tin chloride. These are cleaned by specially designed scrubbers. The steam from the hot water scrubbers is handled by exhaust ducts. Also, the removal of polishing dust is briefly described.
G. I. R 2

17,778
Wiles, G.H. **AIR CONSERVATION IN INDUSTRY.** *ASBESTOS*, 1959, 2(1), 54-74. (Wiles Ltd., Gillingham, Surrey, England).

17,779
This paper is aimed at emphasizing "the attractive feasibility of internal recirculation from dusty processes, providing adequate dust removal means are incorporated." Three types of apparatus for air cleaning are considered: electrostatic precipitator, disintegrator scrubber, and dry filter. Because of economic considerations only the dry filtration technique is considered in detail. Some types described include the "Box Carister" and paper absolute. Average total costs for recirculating air are calculated and presented. Finally, the feasibility of recirculating is considered.
T. I. R 1

17,780
Bastlin, M.P. **DUST CONTROL IN THE ASBESTOS TEXTILE INDUSTRY.** *ASBESTOS*, 1959, 2(1), 54-74. (Turner Brothers Asbestos Co. Ltd., Rochdale, Lancs., England).

17,781
The highlights of the Merewether and Price study, which examined 363 people from various age groups of the asbestos industry (for incidence of fibrosis) and made engineering recommendations regarding equipment, plant, and methods to be used, are presented as background information for evaluating the present conditions in the industry. The remainder of the report describes and discusses the methods of dust suppression now utilized. These include exhaust hoods, damping troughs, and oil emulsion treatments for the weaving operations; mechanical mixing of various grades of fiber; automatic dispensing of the fiber; better enclosure of all machines; and mechanical means for removal of dust from machines.
T. I. R 2

18,000
Kobayashi, T., Kikuchi, J.M., Kikuchi, R.M., & Kikuchi, F.L. **ADAPTATION OF HUMANS TO NOISE AND VIBRATION FROM NOISE CONTROL.** *ASBESTOS*, 1959, 2(1), 54-74. (Turner Brothers Asbestos Co. Ltd., Rochdale, Lancs., England).

18,001
An investigation was made of the effects of noise and vibration on humans. The subjects were exposed to noise and vibration from a machine. The results showed that the subjects were able to adapt to the noise and vibration. The subjects were able to work for a period of one year without any adverse effects. The results showed that the subjects were able to adapt to the noise and vibration. The subjects were able to work for a period of one year without any adverse effects. The results showed that the subjects were able to adapt to the noise and vibration. The subjects were able to work for a period of one year without any adverse effects.
G. I. R 2

18,002
Kobayashi, T., Kikuchi, J.M., Kikuchi, R.M., & Kikuchi, F.L. **ADAPTATION OF HUMANS TO NOISE AND VIBRATION FROM NOISE CONTROL.** *ASBESTOS*, 1959, 2(1), 54-74. (Turner Brothers Asbestos Co. Ltd., Rochdale, Lancs., England).

18,003
The human factors problems in helicopter design are discussed with primary emphasis on those factors affecting operation and control. There are two main parts of the report, one dealing with the stability of the vehicle and the other with the display of information to the pilot for instrument conditions operation. The latter is part of the research being carried out under the Army-Navy Instrument Program.
G. I. R 1

18,004
Montana, D.M. **RADAR EVALUATION BY MEANS OF AERIAL PHOTOGRAPHY.** *ASBESTOS*, 1959, 2(1), 54-74. (USAF Research & Development Center, Griffiss AFB, N.Y.).

18,005
A method for evaluating the accuracy with which the space position of a target can be determined through the use of ground radar is described. The principles discussed include vertical aerial photography and the Church Direction Cosine Method of tilt analysis. It is recommended that personnel responsible for the evaluation of ground radar equipment consider this report a practical tool to serve their needs.
I. R 2

18,006
Riecken, H.W. **A PROGRAM FOR RESEARCH ON EXPERIMENTS IN SOCIAL PSYCHOLOGY.** *ASBESTOS*, 1959, 2(1), 54-74. (USAF Research & Development Center, Griffiss AFB, N.Y.).

18,007
Sources of unintended variance in data collection in experimental social psychology are identified and discussed. The particular task undertaken is the examination of the particular features of the social situation in which data are collected and the processes of negotiation between investigator and subject through which they come to understand how to behave in the situation. Some problems for research in this area are proposed.

18,005
Bach, J. & McFadden, R.J. NOTES ON A CONSTRUCTIVE
FRAMEWORK FOR A THEORY OF ORGANIZATIONAL DECISION MAKING.
Contract AF 49(638) 33, AFOSR TN 58-1114, Providence, RI:
Interdisciplinary Behavioral Sciences Research Conference,
University of New Mexico, Albuquerque, N.M., Jan-August
1958, 72pp. Michigan State University, East Lansing, Mich

18,005
This is a preliminary statement of the first phase in
a three-phase study: a definitional framework of concepts
held to be pivotal in any rigorous theory of organiza-
tional decision-making. The explicit development of such a
theory and its empirical testing are future projects.
The definitional framework comprises some 91 definitions.
These are grouped into four related categories, with a
section devoted to each category as follows: a pool of
preliminary concepts, decision behavior, conflict and
cooperation, and decision-making in organizations.
R 20

18,006
Bogert, J.E. THE RELATIVE EFFICIENCY OF PRESENT THE
LONG-DURATION "BURST" AND "CONTINUOUS SCATTER" LONG
DISTANCE COMMUNICATION TECHNIQUES. AFOSR TN 58-156,
June 1958, 27pp. USAF Communications Sciences Lab.,
AFOSR, Bedford, Mass.

18,006
The transmission efficiencies of the "burst" and "con-
tinuous" very high frequency long-distance communication
techniques are compared using available data from the
literature. For the same effective radiated power, an
estimate is made of the teletype capacity which is a-
vailable for 99 percent of a year's hours at an average
character error rate of 1:1000. It is concluded that,
at the present time, the continuous technique yields a
high reliability-capacity product in the lower vhf re-
gion.
G. R 27

18,007
Norman, R.D. ORGANIZATION OF AND REACTIONS TO THE INTER-
DISCIPLINARY PROGRAM IN THE BEHAVIORAL SCIENCES SUPPORTED
BY THE AFOSR AT THE UNIVERSITY OF NEW MEXICO. Contract
AF 49(638) 33, AFOSR TN 58-1099, 1958, 66pp. University
of New Mexico, Albuquerque, N.M.

18,007
An organized or systematic approach to interdisciplinary
research in the behavioral sciences is discussed.
The Interdisciplinary Program in the Behavioral Sciences
consisted of two eight-week programs held at the Univer-
sity of New Mexico during the summer of 1957 and 1958.
The present report is organized into three major sec-
tions: 1) a general description of the program--its
purpose and organization, selection of participants,
etc.; 2) reactions to some general aspects of interdisci-
plinary programs; and 3) observations on the functioning
of the New Mexico effort specifically. A list of 43
research studies developed during the two conferences
is appended.
T.

18,008
Lichte, W.H., Miller, J.G. & Borresen, C.R. THE INFLU-
ENCE OF CHART SCALE AND AMOUNT OF INFORMATION ON AIMING-
POINT IDENTIFICATION BY EXPERIENCED SUBJECTS. Contract
AF 18(600) 1209, Proj. 7738, Task 27014, AFFTRC TN 58-2,
Jan. 1958, 24pp. USAF Operator Lab., Randolph AFB, Tex.
(University of Missouri, Columbia, Mo.).

18,008
As a first step in determining what kinds of charts
are most helpful to the navigator in preparing for and
carrying out his scope-reading and bombing tasks, an
experimental study was made of the influence of chart
scale and amount of information on aiming-point identi-
fication. A series of charts varying in chart scale and
amount of information was constructed for experimental
use with six groups of Ss; a seventh group used a con-
ventional chart. The Ss were B-47 navigators. After a
period of chart study, the Ss indicated target locations
on O-15 scope photographs. Errors were analyzed for
effect of the chart variables.
T. R 1

18,011
Sestini, Marcello. A METHOD FOR INCREASING THE EFFEC-
TIVENESS OF BRIEF SIGNALS BEFORE THE BACKGROUND.
Atti della Fondazione Giorgio Ronchi, Nov.-Dec. 1959,
11(6), 611-618. (Accademia Nazionale di Scienze, Lettere,
Firenze, Italy).

18,011
The threshold illumination from a stimulus target
extending 12 minutes visual angle and lasting 60 msec.
was measured when the stimulus was presented either in
the dark or against an illuminated background. Each
stimulus (blue or green) was seen against a background
of the same color and was brighter than this background.
Comparisons were made between threshold data obtained
with rectangular and triangular targets having equal
energy and duration and different time distribution
luminance. Two observers made many observations. Im-
plications of the findings for radar displays were dis-
cussed.
G. I. R 12

18,011
Vogtman, J.M. AIR FORCE COMMUNICATIONS EQUIPMENT: A
LOOK INTO THE FUTURE. Proj. 4519, RADC TN 58-96, March
1958, 11pp. USAF Rome Air Development Center, Griffiss
AFB, N.Y.

18,012
In an attempt to stimulate new ideas in the develop-
ment of communications equipment for the United States
Air Force, this report looks into the future, proposes
some new components, and applies them to the problem of
automatic switching equipment specializing in antennas
and transmission lines and new transmitter techniques.
It attempts to extrapolate technical advances, now in
their research stage, to equipment in the future.
I.

18,013
Young, M.P. & Wall, G.F. MAN-MACHINE FACTORS IN THE NRL
NUCLEAR REACTOR CONTROL SYSTEM. Proj. NR 401 000, Task
NR 401 001, NRL Prob. V02 03, NRL Rep. 5270, March 1959,
20pp. NSN Research Lab., Washington, D.C.

18,013
One important problem in the design of a research re-
actor is the allocation of control responsibility among
men and automatic equipment so as to achieve the maximum
in safety, flexibility, and continuous operation. This re-
port presents the man-machine considerations which led to
the defining of the operator's task in the control system
of the nuclear reactor at the U.S. Naval Research Laborato-
ry and how these considerations were implemented in the
original design. It is felt that the basic operating pro-
cedures described here may be modified to meet require-
ments of future reactor research programs.
T. I. R 1

18,014
Zajonc, R.B. & Swoke, W.H. REDUNDANCY IN TASK ASSIGNMENTS
AND GROUP PERFORMANCE. Psychometrika, Dec. 1959, 24(4),
361-369. (University of Michigan, Ann Arbor, Mich.).

18,014
The problem of combining abilities of group members to
maximize the performance of the group as a whole is exam-
ined in terms of redundancy in task assignments. In par-
ticular, ways of distributing a given number of items of
information among a given number of individuals to ob-
tain the maximum probability of each item being recalled
by at least one individual are studied. It is shown that
there exists an optimal distribution scheme which is in-
dependent of the amount of material originally given, the
size of the group, and individual differences in ability.
The model presented is not restricted to recall and may,
with slight modifications, be applied to other behavior
such as learning, problem solving, or decision-making.
G. R 10

18,018

Brierty, W.B. ENVIRONMENTAL CRITERIA FOR EQUIPMENT DESIGN. Presented at: Fourth Annual USA Human Factors Engineering Conference, Army Chemical Center, Md., 9,10, 11 Sept. 1958, 40-41. USA Research Office, Office of the Chief of Staff, Washington, D.C.

18,018

The Department of the Army policy that relates to the attainment of the capability to conduct military operations in any world area is discussed with specific reference to equipment design and testing. The point is made that with increasing complexity of equipment and the great variety of tactical, strategic, and operational environments possible, the present philosophy of testing needs to be examined critically. Present activities in such a review are discussed.

18,019

Goldberg, B. INFRARED BINOCULARS AND HUMAN ENGINEERING. Presented at: Fourth Annual USA Human Factors Engineering Conference, Army Chemical Center, Md., 9,10,11 Sept. 1958, 51-60. USA Research Office, Office of the Chief of Staff, Washington, D.C.

18,019

A background of basic information about active infrared radiation and image converter systems is presented and followed by a consideration of infrared binoculars, their use, and the human engineering problems that are still associated with them. Uses include locomotive driving and repair, missile erection and launching, construction operations, vehicle repair and bridge building, and helicopter landing in darkness. Some of the problems discussed are bulk, weight and balance, discomfort due to unequal magnification, limited field-of-view, and limited depth focus.
G. I.

18,021

Hughes Aircraft Company. UHF AIR/GROUND SCATTER COMMUNICATION SYSTEM STUDY. Contract AF 19(604) 2160, Rep. 2160 F, Oct. 1957, 114pp. Communication Systems Lab. & Systems Development Labs., Hughes Aircraft Company, Culver City, Calif.

18,021

This air/ground scatter communication study was undertaken to assess the significance of research findings on scatter propagation in terms of their application to military ultra-high frequency air/ground voice communications. The results stem from contact with qualified people in propagation research, systems engineering, and communications operations as well as from a careful review of the literature. Six background studies (UHF tropospheric scatter propagation, other propagation possibilities, airborne and ground antennas, modulation, equipment and operational considerations) are presented and a specific UHF Transhorizon Communication System is proposed and described.
T. G. I. R 80 (approx.)

18,022

Hurwitz, H.M.B. THE CHANGING ROLE AND STATUS OF THE SCIENTIST AND ACADEMIC IN AMERICAN SOCIETY: INTERIM REPORT. Contract AF 49(638) 33, AFOSR TN 58 1107, 1957, 38pp. Birkbeck College, University of London, London, England.

18,022

This report is concerned with the broad issue of the changing role and status of the scientist and academic in American society. It involves a longitudinal study of their professions. There are three sections: 1) A discussion is presented of the "sciconad", a neologism which serves to designate a newly emerging socio-economic occupational class. The sciconad is an individual with professional, specialized training in one of the sciences, yet one who functions within an organizational setting. 2) Several suggestions are presented for further study of the problem. 3) A series of appendices reveal the extent to which relevant information has been obtained to date on the problem under study.
R 70

18,023

Sauer, R.P. FUNDAMENTAL CONCEPTS IN THE THEORY OF SYSTEMS. Contract AF 33(616) 2797, Proj. 7060, WDC TR 57 624, Nov. 1957, 137pp. USAF Aeronautical Research Lab., Wright-Patterson AFB, Ohio. (System Research, University of Chicago, Chicago, Ill.).

18,023

This report presents approaches to various areas embraced by the theory of systems. Section I is an expository discussion of digital processes containing a brief historical account of routine computational procedures in classical mathematics, the Post-Turing theory of algorithms, and the abstract ideas of digital analysis. Sections II "Discrete Linear Mechanisms" and III "Continuous Mechanisms" present a treatment of the basic theory of pulsed and continuous servomechanisms. Section IV contains an extensive development of weighting functions from the point of view of functional analysis. In Section V, a class of mechanisms known as finite automata is analyzed.
G. I. R 18

18,024

Alford, R.W. & O'Clair, F.R. INVESTIGATION OF THE RELIABILITY OF RECOMMENDATIONS RESULTING FROM A FLIGHT TEST EVALUATION. AFIC TN 58 21, May 1958, 38pp. USAF Flight Test Center, Edwards AFB, Calif.

18,024

To investigate the reliability of USAF Flight Test Center (AFIC) test recommendations in detecting and eliminating operational problems, an opinion survey of 45 pilots and 106 maintenance personnel was accomplished. The pilots completed a survey form requiring evaluation of 176 cockpit features. These features were largely based on recommendations which had been made by the AFIC at a previous time. Acceptability levels of items where modification had been accomplished, partially accomplished, and not accomplished were analyzed. Maintenance personnel were asked to evaluate specific training inadequacies and assign rank order maintainability ratings to aircraft in each of several areas. Responses were analyzed in relation to test predictions.
R 4

18,029

Shambaugh, G.F. & Pratt, J.J., Jr. DEVELOPMENT OF INSECT REPELLENTS FOR PERSONAL USE: I. DIETHYLTOLUAMIDE. Proj. 7.65 01-002, Pesticides Section Rep. 1, May 1959, 15pp. USA Chemicals & Plastics Div., QM Research & Engineering Command, Natick, Mass.

18,029

This summary of the research and development on diethyltoluamide was assembled from several published and unpublished sources. It is intended for use by the Continental Army Command in evaluating this repellent as an acceptable troop use item. A report was made on laboratory and field tests on skin and clothing, stability with packaging, effect on textiles and plastics, cosmetic acceptability, toxicology, commercial availability, and cost.
T. R 13

18,030

Slote, L. THE ENGINEERING BIOTECHNOLOGY OF HANDLING WASTES RESULTING FROM A CLOSED ECOLOGICAL SYSTEM THERMAL ENERGY EXCHANGE WITH SPECIFIC APPLICATION TO WASTE HANDLING IN A CLOSED ECOLOGICAL SYSTEM. PROGRESS REPORT. Contract AF 18(603) 71, AFOSR TR 58 268, July 1957, 7pp. College of Engineering, New York University, New York, N.Y.

18,030

The variation in the total surface temperature of a perfect heat conducting or spinning biosatellite for a given orbit and for various conditions of irradiation is analyzed. The results of the analysis are applied to the problem of using thermal energy sources in connection with processes for cracking of human waste and for the purification of urine by freezing in a closed ecological system.
T. R 5

18,031

Saith, H., Maffei, M.L. & Mortenson, F.A. PHILOSOPHY AND GUIDELINES FOR RELIABILITY PREDICTION OF GROUND ELECTRONIC EQUIPMENTS (AN INTERIM ENGINEERING REPORT). Contract AF 30(602) 1623, Proj. 4526, Task 45155, RADC TN 58 20, Oct. 1957, 85pp. USAF Reliability Technology Section, RADC, Griffiss AFB, N.Y. (Government Service Dept., Radio Corporation of America, Camden, N.J.).

18,031

The basic concepts of reliability prediction of ground electronics equipments are stated and the methods which have yielded accurate predictions as evidenced by field experience are described. Detailed engineering data developed for the techniques are included along with descriptions of other important aspects of reliability improvement and prediction which require further exploration and development.
T. G.

18,033

Stevens, M.E. A SURVEY OF AUTOMATIC READING TECHNIQUES. NBS Proj. 1205 20 5712, NBS Rep. 5643 & RADC TN 58 21, Aug. 1957, 86pp. US Data Processing Systems Div., National Bureau of Standards, Washington, D.C.

18,033

This report presents the results of a survey and evaluation of current developments in automatic reading techniques. In addition to a study of available literature, inspections of devices in operation or under development and detailed discussions with personnel engaged in studies of character recognition techniques were made. The results are discussed under the following headings: 1) areas of applicability of automatic reading techniques, 2) critical factors in automatic reading problems, 3) controlled solutions to reading problems, 4) automatic reading techniques, and 5) further prospects for development.
T. I. R 56

18,034

Giles, C.G. THE SKIDDING RESISTANCE OF ROADS AND THE REQUIREMENTS OF MODERN TRAFFIC. Road Paper 52, Presented at: Road Engineering Division Meeting, London, England, 23 Oct. 1956, 33pp. Institution of Civil Engineers, Westminster, London, England. (Road Research Lab., Dept. of Scientific & Industrial Research, London, England). (Proc. Instn. Civ. Engrs., Feb. 1957, 6, 216-249).

18,034

The problems to be considered in insuring that in wet weather the skidding resistance of roads is adequate for the demands of modern traffic are examined. Standards for meeting the full performance of vehicles in braking, cornering, and accelerating, and the extent to which requirements are modified by the manner of driving are discussed. Methods of measuring skidding resistances of surfaces are reviewed with an interpretation of test results. Investigations on the relation between skidding resistance and risk of skidding accidents are considered. As a guide to meeting requirements, a table of suggested sideways-force coefficients is presented.
T. G. I. R 14

18,035

Wever, E.G. THE COCHLEAR POTENTIALS AND THEIR RELATION TO HEARING. Ann. Otol., Rhinol., Laryngology, Dec. 1959, 68(4), 975-989.

18,035

The view that cochlear potentials constitute one of the essential links in the chain of events from the entrance of sounds into the ear to the arousal of auditory sensations is defended in this paper. A comparison of the threshold acuity of animals as determined by behavioral methods with the pattern of cochlear potentials recorded from the same animals is made, using available data from the literature. A number of features that bring out certain systematic relations between the cochlear potentials and auditory acuity are presented and discussed.
G. R 23

18,037

Grime, G. THE PERFORMANCE OF HEAD-LAMP BEATING BEAMS. Proc. Instn. Mech. Engrs. Automobile Division, 1954-5, (3), 108-16. (Road Research Laboratory, Department of Scientific & Industrial Research, Harmondsworth, Middlesex, England).

18,037

This paper is largely concerned with work done at the Traffic and Safety Division of the Road Research Laboratory, Great Britain, on the question of improvement of vehicle headlighting, and thus visibility, on the road. The work falls into three parts: 1) surveys to determine the magnitude of the dazzle (glare) problem and the state of aim and maintenance of headlights in use, 2) the development of methods of testing headlights and forecasting their performance from curves of light distribution, and 3) consideration of methods of improving visibility and reducing dazzle.
T. C. I. R 7

18,038

Grime, G. & Giles, C.G. THE SKID-RESISTING PROPERTIES OF ROADS AND TYRES. 1954, 19pp. Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England. (Reprinted from Proc. Instn. Mech. Engrs. Automobile Div., 1954-5, (1), 19-30).

18,038

This paper is concerned almost entirely with skidding on wet roads. The main facts are given concerning the importance of wet-weather skidding in relation to accidents, and then methods of measuring the slipperiness of road surfaces are considered. Typical results for British roads are given and considered in relation to such factors as types of surfacing and surface texture. It is then shown that the non-skid properties of tires depend for their effectiveness upon the type of road surface as well as on the tread pattern. The results of experiments with a number of different patterns are discussed.
T. G. I. R 11

18,040

Smeed, R.J. ACCIDENT RATES. ca. 1953, 11pp. Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England. (Reprinted from Internat. Road Safety & Traffic Rev.).

18,040

A large amount of vehicular accident information from different countries has been brought together and analyzed in an effort to arrive at an understanding of the way accident frequency varies with the quantities to which it can be related. The variables discussed are: 1) number of vehicles, 2) type of accident, injury, 3) number of vehicles involved, 4) accidents at junctions, 5) rural vs. city areas, 6) traffic flow, and 7) distance traveled.
T. G. R 13

18,041

Smeed, R.J. SOME STATISTICAL ASPECTS OF ROAD SAFETY RESEARCH. J. Royal Statist. Soc., 1949, CXII(1), 1-23. (Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England).

18,041

This paper surveys some aspects of road-accident statistics and draws attention to some of the matters into which investigation is required. Accident rates in different countries are compared and the trend of accident rates in Great Britain are considered along with the economic cost of road accidents. Some of the available evidence of the success of various accident prevention methods are then discussed.
T. G. I. R 18

18,042
Glarville, W.H. SPEED ON THE ROAD AND RELATED EFFECTS. *Trans. Roy. Inst.*, 1956, 26(163), 1-17. (Road Research Lab., Department of Scientific & Industrial Research, Harmondsworth, Middlesex, England).

18,042
This paper deals with problems of safety as related to driving speeds. In general, consideration is given to what happens up to speeds of 100 mph. The human operator as a road user and driver, how he reacts to speed, and how accurately he judges speed are considered first. The efficiency of brakes, distances required to stop and how it varies with speed are considered. These considerations are then linked to the question of the car/road combination. The energy stored up in the moving car, the forces required to stop the car, and protective devices for crash injury are discussed.
T. G. I.

18,043
Charlesworth, G. & Coburn, T.M. THE INFLUENCE OF ROAD LAYOUT ON SPEEDS AND ACCIDENTS IN RURAL AREAS. Presented at Public Works and Municipal Services Congress, Harmondsworth, Middlesex, England, Nov. 1956, 21pp. Road Research Lab., Dept. of Scientific & Industrial Research, Harmondsworth, Middlesex, England.

18,043
This paper presents information on the effect of certain items of road layout on speed and accidents on rural roads. The estimates of the effect of road curvature, gradients, carriageway width, and amount of traffic on mean speeds are presented for use in assessment of the value of road improvements. Formulae relating the speed exceeded by the fastest 15 percent of cars and the fastest five percent of cars to mean speed are derived for use in selecting the speed value to be used for design purposes. A comparison of accident rates per vehicle mile on different roads is made to show benefits obtained from various types of road improvement.
T. G. I. R 14

18,055
Barr, N.L., Huttman, T.A., Jr. & Parker, J.F., Jr. THE VISIBILITY OF AIRPORT RUNWAYS. Proj. NM 001 056.07.03, BUAER Proj. TED PTR AC223, Nov. 1954, 46pp. *USN Medical Research Institute*, Bethesda, Md.

18,055
This report was designed to provide a theoretical demonstration of the influence of the brightness difference between runway and surrounding terrain on runway visibility and to provide airport engineers with means of determining the precise influence of any given runway surface material or terrain cover on the visibility of the runway. Photometric measurements of reflectivity and inherent contrast of runway and surrounding terrain surfaces of 30 airports, along with tables and graphs relating brightness differences between runways and surrounding terrain to runway visibility, were presented.
T. G. I. R 8

18,058
Braunstein, M. & Anderson, N.S. A COMPARISON OF READING DIGITS ALOUD AND KEYPUNCHING. Rep. RC 185, Nov. 1959, 13pp. *IBM Research Center*, Yorktown Heights, N.Y. (University of Michigan, Ann Arbor, Mich. & University of Maryland, College Park, Md.).

18,058
To compare talking to keypunching for relatively untrained operators, five experimental Ss with no prior training in keypunching were studied. After a few practice sessions on the keypunch, the Ss were required to read digits for five minutes into a tape recorder and then to key digits for five minutes on a summary punch. Three series were performed. A preference survey was made by asking the S to either read or keypunch three sheets of 25 digit numbers as they preferred. Errors, reading, and punch rates (calculated from errors and time) were analyzed for relative speed and accuracy of the two methods.
T. G.

18,062
Baker, Alma S. BIBLIOGRAPHY OF INFORMATION THEORY. SUPPLEMENT. July 1954, 30pp. Engineering Library, Documents and Research Information Section, Raytheon Manufacturing Company, Waltham, Mass.

18,062
This bibliography covers material on general information theory, exclusive of speech and television information theory. The period covered is mainly from January 1953 to July 1954. The bibliography is arranged alphabetically by author. A total of 221 items is included and 60 periodicals are represented.
R. mny

18,063
Bellman, R. & Kalaba, R. ON COMMUNICATION PROCESSES INVOLVING LEARNING AND RANDOM DURATION. Reprinted from "1956 IRE National Convention Record, Part 4," 1956, 16-21. *The Institute of Radio Engineers, Inc.*, New York, N.Y. (The Rand Corporation, Santa Monica, Calif.).

18,063
A brief resume is given of previous papers showing that certain aspects of the fundamental problem of determining the utility of a communication channel in conveying information may be viewed as problems within the framework of multi-stage decision processes of the stochastic type, and as such may be treated by the theory of dynamic programming. In this paper, the treatment of communication problems involving the use of a channel whose statistical properties are not completely known is shown. Also those channels involving processes of random duration are discussed. Both are special cases of still more general problems in prediction.
G. R 15

18,065
Beckman, E.L., McNutt, D.C. & Rawlins, J.S.P. ESCAPE FROM DITCHED AIRCRAFT. III. AN INVESTIGATION INTO THE FEASIBILITY OF USING THE STANDARD MARTIN-BAKER EJECTION SEAT SYSTEMS FOR UNDER WATER ESCAPE FROM DITCHED AIRCRAFT. FPRC 1093, July 1959, 21pp. *Flying Personnel Research Committee*, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

18,065
The feasibility of using the ejection test as a method of escape from ditched aircraft at sea was investigated. The physical forces which would act upon the pilot when using the ejection seat in water were measured in a test tank. Subsequent to the above measurements an evaluation of the human tolerance to these forces was undertaken in a lake approximately 30 ft. deep. Finally, the hazards involved in ejecting through the canopy underwater were evaluated. Functioning of the auxiliary systems of the ejection seat were also undertaken. Recommendations were made for modifying the present ejection seat systems to improve their performance under water.
T. G. I. R 8

18,076
Hartline, H.K. RECEPTOR MECHANISMS AND THE INTEGRATION OF SENSORY INFORMATION IN THE EYE. *Rev. mod. Physics*, April 1959, 31(2), 515-523. (The Rockefeller Institute, New York, N.Y.).

18,076
This paper deals with an analysis of the first steps of the visual process. The inherent properties of the receptor are discussed in terms of the type of processing of information from the outside world. The next step in the processing of sensory information concerns the distribution of light over the entire population of visual receptors where neural integration begins. Inhibitory interaction is described and its function ascribed to enhancement of contrast effects. Thus, patterns of afferent nervous activity are greatly modified to accentuate significant features of information about the environment.
G. I. R 29

18,077
Hartline, H.K. THE MODIFICATION OF SENSORY INFORMATION BY NEURAL INTERACTION IN THE EYE, AND ITS RELATION TO VISION. IRE Trans., June 1959, RE-6, 84-85. (The Rockefeller Institute, New York, N.Y.).

18,077
The spatial and temporal modifications of sensory information produced by "integrative" neural processes in the retina of the eye are discussed briefly. The modifications produced by neural integration in the eye appear to be distortions, but are more properly to be considered the accentuation of significant features of the stimulus pattern to which the organism must respond appropriately if it is to survive and flourish.
R 9

18,084
Greek, D.C. CHECKLIST OF HUMAN ENGINEERING DESIGN PRINCIPLES. Rep. MD 58 334, Jan. 1959, 86pp. Missile Div., North American Aviation, Inc., Columbus, Ohio.

18,084
This checklist presents, in a single, easily referenced document, design principles compatible with human engineering ideals and appropriate to missile systems. The data are, however, applicable to any man-machine system design with information for both the design engineer (recommendations on hardware) and the human engineer (a guide and memory aid to use in evaluating compliance with basic human engineering principles). There are seven major sections: visual displays, controls, aural equipment, panel layout, workspace characteristics, maintainability, and safety. A subject index is included.

18,092
Raifsnider, M.H. RADAR AIR TRAFFIC CONTROL DEMONSTRATION FOR AIR TRAINING COMMAND. WADC TN 55 605, Oct. 1955, 10pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

18,092
A demonstration of the previously developed Radar Controlled Formation Break-Up and Descent Procedure was attempted on 22 July 1955, using F-86D and B-47 aircraft of the Air Training Command. Eight planes of each type participated in the demonstration. Initial radio contact with the two flights was made over Indianapolis, Indiana, and the aircraft were monitored by Flight Test Radar while enroute to Madison, West Virginia. The attempt was made to land the high performance aircraft at the rate of one every 30 sec. Actual landing rates were reported and discussed in terms of ways to improve performance.
I.

18,099
Northrop Aircraft, Inc. A METHOD FOR PREDICTING WEAPON AND SUPPORT SYSTEM MAINTAINABILITY. Rep. NAI 57 848, Sept. 1957, 93pp. Operational Plans Development Section & Weapon Systems Analysis Department, Northrop Aircraft, Inc., Hawthorne, Calif.

18,099
This is a progress report of a study of means to develop more maintainable aircraft. An analytical method of determining a suitable "yardstick" in the form of a maintainability index is described. To illustrate its usefulness, it has been applied to the communication and navigation, control surfaces, and landing gear systems of the T-38 aircraft. The collection of data and problems involved are discussed. A methodology is developed for determining aircraft availability considering various operational factors (estimated annual hours to be flown, size of maintenance crew, etc.) with curves presented relating maintainability index to these factors. Problems of indirect maintenance are also discussed.
T. G. R 24

18,106
Dentzig, G.H., DeHaven, J.C., Cooper, I., Johnson, S.M., et al. A MATHEMATICAL MODEL OF THE HUMAN EXTERNAL RESPIRATORY SYSTEM. Contract AF 49(638) 700, Proj. RAMP, Res. Memo. 2519, Sept. 1959, 100pp. The Rand Corporation, Santa Monica, Calif.

18,106
The thesis that a part of the human physiological system can be simulated by a suitably constructed mathematical model was examined. As a test case, the external respiratory function was chosen. Based on the known physiological and chemical aspects of this system, a mathematical model was constructed. The model used derives from a class of mathematical programming methods that were originally developed for representing complex military and industrial activities. The value of some 30 different molecular species as determined by the model were compared with observed values.
T. I. R 21

18,109
Dunning, G.M. BIOLOGICAL EFFECTS OF A NUCLEAR ATTACK. Rep. TID 5563, Sept. 1959, 28pp. US Radiation Effects of Weapons Branch, Division of Biology and Medicine, Atomic Energy Commission, Washington, D.C.

18,109
The biological effects of an assumed nuclear attack of 1453 megatons (total yield) on the United States, 2500 megatons on the Northern Hemisphere outside the continental United States (one-half being fission and one-half fusion and all surface bursts) are considered in this paper. Principal factors discussed are 1) shorter-term hazard (excluding immediate blast, thermal and radiation effects) of external gamma radiations and internal radiation by ingestion of contaminated food and water; and 2) long-term hazards such as leukemia and bone tumor, life shortening, and genetic effects.
R 23

18,110
Dunham, C.L. RADIOACTIVE FALLOUT--A TWO-YEAR SUMMARY REPORT. Rep. TID 5550, May 1959, 110pp. US Technical Information Service, Atomic Energy Commission, Washington, D.C.

18,110
This summary report on radioactive fallout presents information gathered through a two-year period, 1957-1959, as a continuation of the congressional hearings of 1957. It covers such topics as 1) public information program; 2) present state of knowledge on biological effects; 3) Atomic Energy Commission's research program on fallout; and 4) a report on progress made on "unresolved questions" from the 1957 hearings on "clean" nuclear weapons, distribution of fallout, "safe" levels of radiation, and the like. Standards for radiation protection are also discussed. There are seven special papers appended which spell out some of these topics in detail.
T.

18,112
Dellinger, J.H. (Chm.). PAPERS PRESENTED AT THE FALL 1955 RTCA ASSEMBLY MEETING, SEPTEMBER 29-30, HOTEL STATLER, WASHINGTON, D.C. Paper 180 55/AS 173, Oct. 1955, 131pp. Radio Technical Commission for Aeronautics, Washington, D.C.

18,112
Papers presented at an assembly of the members of the Radio Technical Commission for Aeronautics are given here along with summary reports of discussions. Two technical and two symposia were held; the latter dealing with the "decision gate" factors in automatic instrument approaches and the validity of the SC31 communication philosophies; the former with factors limiting the accuracy and utility of pictorial displays and a variety of specific problems in navigation systems, altitude measurement, the ATC Radar Beacon system and TACAN. The problems of a "common system" for various types of carriers underlay many of the papers.
G. I.

18,115

Connally, M.E. COMPUTERS FOR AIRCRAFT SIMULATION. Contracts NSOR 07895 & N61339 45, Rep. 7591 R 2, Dec. 1959, 112pp. Electronic Systems Lab., Massachusetts Institute of Technology, Cambridge, Mass.

This report is the concluding work on a one-year study of the equations of motion and the computing techniques used in the aerodynamics computer section of Operational Flight Trainers. A review of the characteristics of basic 60 cps, 400 cps, and DC analog computing techniques is presented with emphasis on the relative applicability of these techniques to the unique requirements of the OFT problem. It is concluded that 400 cps techniques would give more than acceptable performance and would offer substantial advantages with respect to cost, size, maintenance and power consumed. In conclusion, several suggestions are made concerning OFT acceptance procedures, the matching of the OFT to the actual aircraft, and standardization.

18,128

Campbell, D.T. SYSTEMATIC ERROR ON THE PART OF HUMAN LINKS IN COMMUNICATION SYSTEMS. Information & Control, Dec. 1958, 1(4), 334-369. (Department of Psychology, Northwestern University, Evanston, Ill.).

18,128

To the human being considered as a potential link in a communications system are attributed constant errors or biases over and above random imperfection of performance. The psychological research literature was searched for an inventory of recurrent bias tendencies. This review enumerates 21 such bias tendencies and puts them into two major groups: those found in the duplicatory transmission task and those characteristic of the reductive coding task.

R 140

18,132

Ludvig, E. & Miller, J.W. THE EFFECTS ON DYNAMIC VISUAL ACUITY OF PRACTICE AT ONE ANGULAR VELOCITY ON THE SUBSEQUENT PERFORMANCE AT A SECOND ANGULAR VELOCITY. Contract NMR-586(00), Proj. NR 142 023, Proj. NM 001 110 501.09, Rep. 9, June 1955, 10pp. USN School of Aviation Medicine, Pensacola Air Station, Fla.

18,132

It has been previously shown that visual acuity deteriorates as the angular velocity of the test object, relative to the observer's eye, is increased; also substantial improvement has been shown, with practice, at high angular velocities and a lesser amount at low angular velocities. This study was designed to demonstrate whether or not there is transfer of training from low to high (20 degrees/sec. to 110 degrees/sec.) angular velocities of test object and also of the converse situation. The Ss were 200 naval aviation cadets; 20 successive dynamic acuity thresholds were determined for each angular velocity with half the Ss tested first on the low and half on the high velocity condition.

T. G. R 9

18,134

Lockhead, G.R. & Klemmer, E.T. AN EVALUATION OF AN 8-KEY WORD-WRITING TYPEWRITER. Rep. RC 180, Nov. 1959, 26pp. IBM Research Center, Yorktown Heights, N.Y.

18,134

A typewriter was described which utilizes only eight keys and which types entire words with the simultaneous depression of key combinations. Letters of the alphabet and numbers can also be typed in this way. The time required to learn 160 multiple-finger patterns (words) and the speed and accuracy with which they could be typed were investigated. Three Ss performed a sequence of different tasks: initial learning of the words to criterion of three perfect repetitions; speed trials, learning the letter and number code, re-learning the 100 words, and typing textual material. Time required to learn the patterns, error rates, and speed rates were analyzed with some discussion concerning types of error patterns involved in multiple key-press responses.

T. G. R 3

18,136

Lindsay, J.R. (Chm.). PROCEEDINGS OF THE FIRST CONFERENCE ON VESTIBULAR PHYSIOLOGY AND SPATIAL DISORIENTATION, SCHOOL OF AVIATION MEDICINE, USAF. 24-25 JUNE 1958. 90pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Department of Surgery-Otolaryngology, University of Chicago, Chicago, Ill.).

18,136

This conference was composed of individuals actively engaged in vestibular research to 1) provide a platform for mutual exchange of information and ideas, 2) delineate problem areas for future research, and 3) specify performance characteristics for a research-type vestibular chair for the School of Aviation Medicine. The meeting was purely educational in nature and this document contains notes recorded during the conference. Discussions were organized around the following indicated problems--clinical and spatial disorientation; approaches to research in basic vestibular physiology, neuro-anatomy, and neurophysiology; assessment of vestibular sensitivity; basic visual and perceptive mechanisms; rotating devices; and research in spatial disorientation.

T. G.

18,137

Lindquist, S.E., Neff, W.D. & Schuknecht, H.F. STIMULATION DEAFNESS: A STUDY OF HEARING LOSSES RESULTING FROM EXPOSURE TO NOISE OR TO BLAST IMPULSES. J. comp. physiol. Psychol., Oct. 1954, 47(5), 406-411. (Laboratories of Physiological Psychology and Otolaryngology, University of Chicago, Chicago, Ill.).

18,137

To investigate temporary hearing losses produced by exposure to noise and permanent losses produced by blast impulses, behavioral tests of hearing were made and intracochlear damage was assessed post-mortem. The Ss were adult cats, one ear of each being surgically destroyed in order to confine testing to one ear. Audiograms at frequencies from 62.5 to 10,000 cps were obtained by a conditioning method. One group of animals was then exposed to intense noise for 15, 30, and 60 minutes, in varying order. The other group was exposed to blasts of noise produced by the firing of a .32 caliber pistol. Hearing tests were then made at intervals until either complete recovery or a deficit level remained over a period of several weeks. The animals were then killed; the cochleas were examined for inner ear damage. G. I. R 13

18,130

Lehninger, H.V., Laug, E.P., McConnell, H.J., Chapman, R.D., et al. EFFECT OF FALLOUT CONTAMINATION ON PROCESSED FOODS, CONTAINERS, AND PACKAGING. OPERATION PLUMBBOB. Proj. 38.1 I, Rep. WT 1496, May 1959, 19pp. US Civil Effects Test Group, Food & Drug Administration, Department of Health, Education, and Welfare, Washington, D.C.

18,138

The effect of a comparatively low level of fallout on the protective qualities of 18 packaging materials was examined. The materials were mounted in six-inch squares on plywood board and placed, along with samples of whole-sale or bulk containers holding processed foods, at two-mile intervals along an arc, approximately 25 miles from Ground Zero. Three exposure boards were used at each station: one held clean materials, one slightly soiled with dirt, and one streaked with oil. Samples which received the largest amount of fallout were examined. Readings of radioactivity were made in the field and also in the laboratory. Various decontamination procedures were then tested for efficiency.

T. I. R 1

18,143

Konecki, E.B. PHYSIOLOGICAL FACTORS IN SPACE FLIGHT. Engineering Paper 739, March 1959, 17pp. Missiles and Space Systems Engineering, Douglas Aircraft Company, Inc., Santa Monica, Calif.

18,143

This presentation delves into some of the more fundamental physiological factors involved in life in a closed ecological system for missions lasting months and possibly years. In particular, the possible reduction of vital payload through lowering metabolism is discussed. Following a discussion of vital human needs, a comparison is made between those of the male and the female and the suggestion is made that "women in space" is preferable to man. Other means of reducing metabolism discussed are through lowering temperature and the practice of yoga. Research in all these methods is recommended.

T. G. R 8

18,151

Jarger, J., Shedd, Joyce L. & Harford, E. ON THE DETECTION OF EXTREMELY SMALL CHANGES IN SOUND INTENSITY. A.M.A. Arch. Otolaryng., Feb. 1959, 69, 200-211.

18,151

A unique method for the clinical assessment of differential intensity discrimination is described. Short (200 msec.) one-db intensity increments are superimposed, at five-second intervals, on a pure tone of constant amplitude at a sensation level of 20 db. The patient responds to the momentary changes in loudness. Findings on selected individual cases are reported to show how the test scores vary with different kinds of hearing loss. Results obtained on 75 patients with various types of hearing loss are reviewed.

T. G. I. R 26

18,153

Humphreys, C.M., Imalis, O. & Gutberlet, C. PHYSIOLOGICAL RESPONSE OF SUBJECTS EXPOSED TO HIGH EFFECTIVE TEMPERATURE AND ELEVATED MEAN RADIANT TEMPERATURES. Abstract of article in: Am. Soc. Heat. & Vent. Eng. Trans., 1946, 52(1290), 153-166.

18,153

To determine the physiological effect of a four-hour exposure to "effective temperatures" ranging from 80 to 95 degrees, "relative humidity" ranging from 30 to 70 per cent, and "mean radiant temperatures" elevated to 40 degrees above air temperature, 36 Ss were studied under simulated ship's boiler room conditions. The Ss wore Navy clothing and rotated in light activities. The data collected were body temperatures (rectal and oral), pulse rate, weight before and after test, weight of consumed water and expelled urine, blood pressure, dry and wet bulb temperatures, globe thermometer reading, and air velocity. The resulting relationships were shown graphically.

T. G.

18,155

Howe, R.M. & Schetzer, J.D. A STUDY OF THE COMPUTER SECTION OF FLIGHT SIMULATORS. FINAL REPORT. Contract AF 33(616) 2121, EO R66B 421 PO 3A, Proj. 2164, Rep. 2164 1-F, March 1954, 71pp. Engineering Research Institute, Department of Aeronautical Engineering, University of Michigan, Ann Arbor, Mich.

18,155

A study of the computer section of flight simulators used for training aircraft crews is reported. The chapter titles are: "Summary of the Flight Equations: Present and Proposed Electronic Methods Used in Their Solution"; "Improvement of Reliability and Ease of Maintenance Automatic Testing Circuits"; "Comparison of Aircraft Dynamic Performance with Flight Simulators"; and "Summary of Simulator Activity in the Air Force, Navy, and Aircraft Industry." Specific recommendations for the computer sections of future training type simulators are offered.

G. R 7

18,166

Healy, J.W. (Ed.). RESEARCH AND DEVELOPMENT ACTIVITIES IN THE FIELD OF RADIOLOGICAL SCIENCES JANUARY-MARCH, 1959. QUARTERLY PROGRESS REPORT. Contract W 31 109 ENG 52, Rep. HW 60137, UC 41, TID 4500, April 1959, 36pp. Hanford Atomic Products Operation, Richland, Wash.

18,160

Presented are summaries of the studies and research conducted in the field of radiological sciences from January through March 1959. The areas of study include biology, physics and instrumentation, and chemistry and separations processes. A summary and the status of the research program in the area are also presented.

T. G.

18,162

US Technical Information Service. PROCEEDINGS OF THE 1958 ATOMIC ENERGY COMMISSION AND CONTRACTOR SAFETY AND FIRE PROTECTION CONFERENCE HELD AT ATOMIC ENERGY COMMISSION HEADQUARTERS BUILDING, GERMANTOWN, MARYLAND, JUNE 24-25, 1958. Rep. TID 7569, May 1959, 121pp. US Technical Information Service, Atomic Energy Commission, Washington, D.C.

18,162

A number of reports which were delivered at the 1958 conference are presented. The major purpose for the meeting was to promote maximum interchange of experience in the area of accident control and prevention. Some of the reports are: "Metal Fire and Explosion Research"; "Spontaneous Ignition, Safety Personnel Requirements in Nuclear Energy Plants"; "Shipping of Radioactive Materials at the National Reactor Testing Station"; etc. A panel discussion is also included in the reports.

T. G. I.

18,166

US Technical Information Service. WORKS OF THE ALL-UNION CONFERENCE ON MEDICAL RADIOLOGY. EXPERIMENTAL MEDICAL RADIOLOGY. Translation Series, AEC TR-3661 (Book 1), Aug. 1959, 277pp. US Technical Information Service, Atomic Energy Commission, Washington, D.C.

18,166

Presented are some 80 reports which make up the body of two books on medical radiology and experimental medical radiology. These reports are translations of the works reported at the All-Union Conference on that topic. Some of the reports are: "Biochemical Changes in the Organism on Exposure to Ionizing Radiation," "Effect of Ionizing Radiation on Infection and Immunity," "Heart and Skeletal Muscles During Radiation Sickness," "Structural Changes in Tissue of Irradiated Animals," "Permeability of Erythrocytes to Phosphates Under Normal Conditions and in Burns," and others.

18,168

Tamler, E., Merg, E., Jampolsky, A. & Nawratzki, I. ELECTROMYOGRAPHY OF HUMAN SACCADIC EYE MOVEMENTS. A.M.A. Arch. Ophthalmol., Oct. 1939, 62, 657-661.

18,168

The results of an electromyographic study of saccadic eye movements (rapid versions) performed during a previously reported study of coactivity of human extraocular muscles are reported here. Photographic records of the saccade are analyzed for activity of the agonist, inhibition of the antagonist, coactivity of the extraocular muscles, and durations of different degrees of excursion. The evidence is examined with reference to the question as to whether the saccadic eye movements are or are not ballistic.

T. I. R 7

18,169

Tamler, E., Jampolsky, A. & Marg, E. ELECTROMYOGRAPHIC STUDY OF FOLLOWING MOVEMENTS OF THE EYE BETWEEN TERTIARY POSITIONS. *A.M.A. Arch. Ophthalmol.*, Nov. 1959, 62, 804-809.

18,169

A study of coactivity of extraocular muscles (simultaneous increased contraction of muscles which are normally antagonistic in their primary field of action) during following movements of the eye between tertiary positions was attempted using multiple channel electromyography. Movements between tertiary positions were defined as horizontal movements in upper and lower fields of gaze and vertical movements in right and left fields. The target was a small light. While no coactivity was found in tertiary plane movements, the type of muscle activity that was found was discussed in this paper.

I. R 9

18,171

Taylor, C.W. (Princ. Investigator). THE THIRD (1959) UNIVERSITY OF UTAH RESEARCH CONFERENCE ON THE IDENTIFICATION OF CREATIVE SCIENTIFIC TALENT. JUNE 11-14, 1959. 334pp. *University of Utah*, Salt Lake City, Utah.

18,171

An almost verbatim transcription is presented of the third in a series of conferences involving a sustained attack on the nature of creative scientific talent. The participants presented reports of their research efforts in the above field. The first group of reports is on criteria of creativity, the second on predictors of creativity, the third on training and development, and the fourth on other external conditions that might influence creativity and thus alter any attempted predictions. Committee reports on each of these areas plus one on an overview of the entire movement of research and implementation are included.

R 264

18,176

Schwab, R.S. THE STUDY OF FATIGUE IN NORMALS AND PATIENTS WITH NEUROLOGICAL AND PSYCHIATRIC DISORDERS. FINAL REPORT. 1947-1957. Contract NSORI 76/VIII, Rep. NR 113.14, Oct. 1958, 21pp. *Harvard University*, Cambridge, Mass.

18,176

This is a final report of a long term study of fatigue in normal Ss and in those with psychiatric difficulties and neurologic disorders. Subjective feelings of tiredness and objective deficit or impairment are considered separately throughout the report. Situations where fatigue of both types are encountered in both military and civilian settings are listed and the source of subjects is defined. Studies conducted with various equipments and tests are discussed: step-test and hanging-bar test; and electronic ergography. A summary of results from each of the above is given. Finally, the problems of differential diagnosis and the methods found most successful are treated.

18,177

Schuknecht, H.F. & Neff, W.D. HEARING LOSS AFTER EXPERIMENTAL INJURY TO APEX OF THE COCHLEA. *Federation Proc.*, March 1951, 10(1, Part 1), 1p. (Division of Otolaryngology and Laboratory of Physiological Psychology, University of Chicago, Chicago, Ill.).

18,177

This study was undertaken to obtain further information as to the degree of localization of low tones in the cochlea. An operative method was developed by which a small circumscribed lesion could be made in the apical turn of the cochlea. Audiograms of experimental animals were determined by avoidance conditioning procedure before and after making the cochlea lesion. The cochlea were sectioned and graphic reconstructions were made after the post-operative testing.

18,182

Scharf, B. & Stevens, J.C. THE FORM OF THE LOUDNESS FUNCTION NEAR THRESHOLD. Rep. PMR 232, ca. 1959, 4pp. *Psychological Labs., Harvard University*, Cambridge, Mass.

18,182

The form of the loudness function near threshold was investigated by two methods: ratio production and magnitude estimation. In the former, the S adjusted a 1000-cycle tone to sound either half as loud or twice as loud as a "standard" 1000-cycle tone. The level of the standard was set at five different values between 10 and 50 db. Sixteen Ss were tested. In the latter method, the S assigned numbers proportional to the apparent loudness of a 1000-cycle tone presented at six different levels. A standard stimulus (at about 10 db) was identified as "10" at the beginning of one series; in another, the standard (of about 20 db) was called "20." The results were presented graphically.

G. R 7

18,184

Schlossberg, H. THE PSYCHOLOGICAL LABORATORY OF BROWN UNIVERSITY. *Amer. J. Psychol.*, Dec. 1958, LXXI, 768-776. (Brown University, Providence, R.I.).

18,184

This note describes the planning, construction, and use of the Walter S. Hunter Laboratory of Psychology at Brown University. Floor plans are included and some advice is proffered to departments constructing new laboratories.

I.

18,191

Ring, F., Jr. (Compiler). SIXTH HOT LABORATORIES AND EQUIPMENT CONFERENCE. INTERNATIONAL AMPHITHEATRE, CHICAGO, ILLINOIS, MARCH 19-21, 1958. Rep. TID 7556, April 1959, 167pp. *US Technical Information Service Extension*, Atomic Energy Commission, Oak Ridge, Tenn.

18,191

This report contained 18 papers dealing with various operational and design aspects of Hot Laboratories and related equipment. A panel of seven men representing extensive Hot Laboratory operating experience in several types of laboratories throughout the country answered questions (concerning design and operations) which were asked by members of the conference. Questions and answers were presented here.

T. G. I. R 30 (approx.)

18,193

Reitkel, W.A. DECISION MAKING--A PRIMARY EXECUTIVE RESPONSIBILITY. Publ. L60 34, Sept. 1959, 21pp. *Industrial College of the Armed Forces*, Washington, D.C.

18,193

This lecture describes the role of the executive as a decision maker and this is explained in terms of the role of the organization and the meaning of an executive which are defined and elaborated upon. A question and answer period follows the text of the lecture.

I.

18,196

Ratliff, F., Miller, W.H. & Hartline, H.K. NEURAL INTERACTION IN THE EYE AND THE INTEGRATION OF RECEPTOR ACTIVITY. *Ann. N.Y. Acad. Sci.*, Nov. 1958, 74(Art. 2), 210-222. (The Rockefeller Institute for Medical Research, New York, N.Y.).

18,196

The complexity of the nervous center in the retina and the interplay of excitatory and inhibitory influences yielding patterns of optic nerve activity are discussed. This paper examines two important processes in this integrative action: 1) the enhancement of differences in neural activity from differently illuminated regions of the retina, and 2) the enhancement of neural responses to temporal changes in intensity. Both processes are studied in an invertebrate eye and in the more complex retinas of vertebrates and related to the detection and signalling of information about contrast.

G. I. R 25

18,197
Rath, G.J., Ruenick, A. & Savage, Terry R. THE FORMATION OF ABSTRACTS BY THE SELECTION OF SENTENCES. Rep. NC 164, June 1959, 15pp. IBM Research Center, Yorktown Heights, N.Y.

18,197
Two studies on the formation of abstracts by selection and rating of key sentences in an article were reported. The first compared sentence selection by men and machines. Six Ss picked the 20 most representative sentences from each of ten scientific articles and rated them in order of importance. The same articles were analyzed according to five auto-abstracting programs on the IBM 704 and the score for each sentence prepared. Intersubject differences, intermachine program differences, and the man-machine differences with respect to sentence selection were compared. The second study investigated the reliability of humans in preparing abstracts by the above method by asking five Ss to prepare abstracts on the same material at two different times and comparing the results. T. G. R 4

18,200
Motterman, J.M. & Trumbull, R. NOTE ON SELF-REGULATING SYSTEMS AND STRESS. Behav. Sci., Oct. 1959, 4(4), 324-327. (Princeton University, Princeton, N.J. & USN Office of Naval Research, Washington, D.C.).

18,200
Some comments are made concerning the use of the servosystem analogy as a conceptual framework for theorizing and research in stress. Some speculations are presented which bear upon certain assumed underlying processes--detection, identification, and response availability--in such a frame of reference.
R 7

18,201
Newquist, E.A., Cassidy, M.D., Lindblom, C.W. & Sullivan, P.J. DEVELOPMENT OF AN EJECTABLE-NOSE ESCAPE CAPSULE. Contract AF 33(600) 35430, Proj. 1362, Task 13438, WADC TR 59 493, June 1959, 209pp. USAF Aircraft Lab., Wright-Patterson AFB, Ohio. (Lockheed Aircraft Corporation, Burbank, Calif.).

18,201
The results of a study made to develop an optimum ejectable-nose escape capsule for use in single place high performance type aircraft are presented. The speed and altitude ranges for which the capsule will provide safe escape are given. Capsule construction and the devices necessary for stabilization, separation, deceleration, descent, and alighting are described. Trajectories of the capsule and fuselage afterbody are plotted and the accelerations on the pilot are shown for the most critical case and compared to human limits. Environment and survival problems are discussed. Weight and volume requirements are estimated and compared with conventional escape systems.
T. G. I. R 21

18,202
Nall, M.L. SELECTION, TRAINING, AND EVALUATION OF RADAR OBSERVERS AND BOMB-NAVIGATION SYSTEM OPERATORS. WORKING BIBLIOGRAPHY. Contract NONR 2718(00), M 1451, Q 11, March 1959, 5pp. Man-Machine Information Center, Documentation Incorporated, Washington, D.C.

18,202
A bibliography of 44 items is listed alphabetically by author which are relevant to the selection, training, and evaluation of radar observers and bomb-navigation system operators. The period covered is from 1943 to 1956.
R 44

18,266
Welter, N.E. & Feddersen, W.E. THE SCALING OF PLATFORM MOTIONS TO A PARTICULAR VEHICULAR SYSTEM AND THE DETERMINATION OF MOTION THRESHOLDS. Contract NONR 1670(00), Rep. D228 430 005, Jan. 1959, 13pp. Bell Helicopter Corporation, Fort Worth, Tex.

18,266
Effective utilization of the moving platform potential as applied to instrumentation, controls, and training research necessary to the operation of helicopters leads to the requirement that the motions of the platform should be scaled to meet the requirements of any given helicopter system. An approach is summarized by which such scaling will be accomplished. In addition, the psychophysical procedures to be used in the determination of displacement thresholds as they relate to the human's perceptual capabilities are described.
G.

18,268
White, J.C. ATMOSPHERIC CONTROL IN THE TRUE SUBMARINE. Rep. NRL Progress, Dec. 1958, 1-16. (USN Electrochemistry Branch, NRL, Washington, D.C.).

18,268
Accomplishments in submarine habitability of a 30-year-old program are reviewed. The direction and progress of efforts toward atmospheric control in the true submarine (capable of indefinite periods of submergence) are discussed. Present problems and their status are treated under the following subjects: effects of nitrogen, oxygen supply, humidity control, carbon dioxide removal, control of hydrogen, carbon monoxide removal, trace contaminants, aerosols, and gas detection and analysis. The development of an integrated system of atmospheric control is also treated.
I.

18,271
Wilcox, W.J., Jr. THE RELIABILITY AND RELEVANCE OF A MODIFIED CRITICAL INCIDENTS PERFORMANCE EVALUATION SYSTEM. Contract W7405 ENG 26, Rep. K 1392, Oct. 1958, 50pp. Union Carbide Nuclear Company, Oak Ridge, Tenn.

18,271
To estimate the reliability and relevance of a modified critical incidents performance appraisal form, performance appraisals on a group of 160 monthly salaried employees were obtained. Two ratings were obtained on 101 persons for use in estimating reliability. The rates was rated by his immediate supervisor. Department heads ranked the employees on the basis of over-all job performance.
T. I. R 46

18,280
Noid, J. SIGNIFICANCE OF REGRESSION EQUATIONS DERIVED FROM SERIALY CORRELATED DATA, AND A PROCEDURE OF SELECTING OPTIMAL PREDICTORS. Contract AF 61 (052) 374, Tech. Note 1, ca. 1959, 20pp. USAF Geophysics Research Directorate, AFCCDD, Bedford, Mass.

18,280
The significance of statistical parameters derived from serialy correlated data is discussed and a proposal is made for a procedure to follow in selecting optimal predictors. It is suggested that this procedure will be more efficient than some of those in operational use.
R 8.

16,284
Matheny, W.G. & Hardt, H.D. FURTHER STUDY IN THE DISPLAY OF SPATIAL ORIENTATION INFORMATION. Contract NMR 1670 (00), Rep. D228 421 002, Aug. 1959, 13pp. Bell Helicopter Corporation, Fort Worth, Tex.

18,284
Presented was the seventh of a series of studies designed to arrive at the variables which influence an operator's perception of his orientation when presented with information as to the attitude of his aircraft by means of a representation of the earth's plane. Two referents, the aircraft and the ground plane, were encoded and some relationship between them was displayed to the subject. The subject's task was to report the relationship in terms of pitch and bank. Four sets of variables were used on the 15 subjects tested.
T. I.

18,385
von Békésy, G. CURRENT STATUS OF THEORIES OF HEARING. *Science*, May 1956, 123(3201), 779-793. (Psycho-Acoustic Lab., Harvard University, Cambridge, Mass.).

18,385
Considered here is the current status of theories of hearing. Four major theories of hearing are discussed with emphasis on the various vibration patterns of the basilar membrane and the elastic properties of the membrane. Described are the mechanical models of the cochlea designed by the author to investigate the problem of vibration patterns.
G. I. R 3

18,386
Morgan, K.Z. (Chm.). MAXIMUM PERMISSIBLE BODY BURDENS AND MAXIMUM PERMISSIBLE CONCENTRATIONS OF RADIONUCLIDES IN AIR AND IN WATER FOR OCCUPATIONAL EXPOSURE. Handbook 69, June 1959, 95pp. US National Bureau of Standards, Department of Commerce, Washington, D.C. (Oak Ridge National Lab., Oak Ridge, Tenn.).

18,386
This report, made by the National Committee on Radiation Protection (NCRP), is an abridgment of the International Commission on Radiological Protection (ICRP) Internal Radiation report. It is both a revision and extension of the earlier reports of NCRP and ICRP made necessary by new data and methods in this area. The first section discusses the basic rules and recommendations concerning exposure to ionizing radiation. The second states the assumptions and restrictions which apply to the maximum permissible values in the main table. This table, for each radionuclide, presents the organ of reference, maximum permissible burden in the total body, and maximum permissible concentrations for a 40-hour and a 168-hour week.
T.

18,393
Rudner, R.S., Moore, O.K. & Anderson, S.B. LOGICAL ANALYSIS, THE SENTENTIAL CALCULUS, AND HIGH-SPEED COMPUTER TECHNIQUES IN SMALL GROUP RESEARCH. Contract NMR 49403, Aug. 1953, 32pp. Department of Psychology, Tufts University, Medford, Mass.

18,393
This report discusses possible and actual uses of logical analysis, the sentential calculus, and high-speed computers in small-group research. Particular attention is given to those aspects of group performance and theory construction that have to do with tasks analogous to those found in command and control spaces in the United States Navy ships.
T. R 25

18,394
Raza, F.M. AN INTRODUCTION TO PROBABILITY THEORY DISCRETE SCHEMES. RADC-TN 59 129, Aug. 1959, 67pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

18,394
This article surveys the fundamental notions of probability through the use of set theory concepts at a nonprofessional level. The elementary concepts of set algebra and the basic operations on sets are defined and illustrated. Included are the mathematical notations used frequently in conjunction with these definitions and the Venn diagrams used to illustrate the operations as well as the properties of sets. Some treatment is given to the "function" relationship of elements in a set, to the role of sample space, and to a number of specific problems involving different choices and probability conditions.
I. R 6

18,490
Vaughan, W.S., Jr. & McGrath, J.E. A COMPARISON OF TWO DIVERSE METHODOLOGICAL APPROACHES TO RESEARCH ON COMPLEX SYSTEMS. Contract NMR 2525 (00), Rep. 2, HSR RM 59/22 SM, Nov. 1959, 16pp. Human Sciences Research, Inc., Arlington, Va.

18,490
This paper describes some general methodological biases frequently seen in systems research and their research consequences. The two approaches chosen to represent diverse methodology are those of strict empiricism and pure mathematics—variable hunter, tracker and model builder, solution grinder. A plea is made for integration of these methodological approaches.
I.

18,540
Blackwell, H.R. COMMENTS ON "SUBLIMINAL PROJECTION." *J. Communication*, ca. 1956, 68-76. (Vision Research Lab., University of Michigan, Ann Arbor, Mich.).

18,540
Comments are made upon the contemporary interest in the use of advertising slogans that are optically projected as additions to regular motion picture and television programs for such short durations that they are considered to be "subliminal," that is, below the threshold of vision. The basic nature of psychophysical discrimination data and the methods used to collect such data are discussed with reference to the credibility of the belief that subliminal projections offer possibilities or threats of effective control of human behavior.
G. R 3

18,541
Blackwell, H.R. THE EFFECTS OF CERTAIN PSYCHOLOGICAL VARIABLES UPON TARGET DETECTABILITY. FINAL REPORT. Contract NOBS 72038, ERI Rep. 2455 12 F, June 1958, 28pp. Institute for Research in Vision, Ohio State University, Columbus, Ohio.

18,541
Four studies were made of the effects of psychological variables upon visual detection thresholds for simple circular targets. The variables (knowledge of time of occurrence; of target size, duration, location, and frequency; and observer criterion) represented differences that exist between laboratory and field conditions. The effect of these differences in each case was expressed in terms of the contrast factor, that is, the factor by which target contrast must be multiplied in order to compensate for the presence of the difference. Cautions were given concerning practical use to be made of the factors as given here.
T. G. R 7

18,542

Blackwell, H.R. A GENERALIZED METHOD FOR SPECIFICATION OF INTERIOR ILLUMINATION LEVELS ON THE BASIS OF PERFORMANCE DATA. SUMMARY DESCRIPTION. *Illum. Engng.*, June 1958, 1(11), 588-589. (Dept. of Psychology & Ophthalmology & Vision Research Lab., University of Michigan, Ann Arbor, Mich.).

18,543

A summary description of a generalized method for specifying the interior illumination requirements of practical visual tasks on the basis of visual performance criteria is presented. These are basically two components of the method: visual performance graphs for standard circular targets, and a device for equating various practical visual tasks to standard circular targets. Specification curves and sample illumination levels for practical visual tasks are given.
G. I. R 5

18,544

Blackwell, H.R. THE FACTORS OF SPECIFYING THE QUANTITY AND QUALITY OF ILLUMINATION. *Illum. Engng.*, Feb. 1958, 1(2), 93-97. (Institute for Research in Vision, Ohio State University, Columbus, Ohio).

18,545

Three principal areas that have been used for establishing illumination specifications are compared: of space and their characteristics: luminance, photometric, visual comfort, and visual performance. A proposal is made that basic visual tasks (or brightness discrimination) be identified and complete information relating performance of each of these tasks to quantity and quality of illumination be obtained. The next step would be to develop means of identifying practical visual tasks with one or another of the basic visual tasks.
R 5

18,546

Blackwell, H.R. DEVELOPMENT AND USE OF A QUANTITATIVE METHOD FOR SPECIFICATION OF INTERIOR ILLUMINATION LEVELS ON THE BASIS OF PERFORMANCE DATA. *Illum. Engng.*, June 1957, 1(6), 317-323. (Institute for Research in Vision, Ohio State University, Columbus, Ohio).

18,547

An eight-year program of research is reported here which has led to the development of a general method by which illumination levels may be determined for various practical tasks, based on visual performance criteria. The method is described in its most general form along with the procedures recommended for current use. The following sections indicate the nature of the contents: characteristics of visual performance, laboratory performance data for standard disc targets, field factors, the visual task evaluator, the standard visual performance curve, the standard lighting specification procedure, evaluation of sample visual tasks, and future development of the method.
T. R 24

18,548

Blackwell, H.R. USE OF PERFORMANCE DATA TO SPECIFY QUANTITY AND QUALITY OF INTERIOR ILLUMINATION. *Illum. Engng.*, June 1955, 1(6), 286-299. (Institute for Research in Vision, Ohio State University, Columbus, Ohio).

18,549

Descriptions of methods or ways of using basic visual performance data to specify the quantity and quality of illumination are presented. Brightness discrimination data is used to illustrate the method. General conclusions with respect to illumination specifications are compared with those in the literature.
T. G. R 9

18,547

Blackwell, H.R. & Kriegerstein, A.B. THE EFFECTS OF SIZE AND SHAPE OF VISUAL DETECTION FOR CONTINUOUS POINT TARGETS AT VARIOUS BACKGROUND LUMINANCE. FINAL REPORT. Contract NBS 72038, ERI Proj. 2455, Rep. 2455 11 F, June 1958, 18pp. Institute for Research in Vision, Ohio State University, Columbus, Ohio.

18,548

A summary of experimental studies on the effects of target size and shape upon detection by the human eye are presented. The temporal forced-choice variant of the method of constant stimuli was used. The target was presented foveally with an exposure duration of 0.25 sec. at 5.52 ft.-l. background luminance. Targets were of uniform luminance differing in size from 1 to 4.00 square min. and in shape over a wide range of target types: rectangles, multiple-angled figures, and single geometrical figures. The data were analyzed as a function of size and an effort was made to derive empirical methods for analyzing the form factor. General theoretical formulations were made in terms of the classical contribution theory of detection.
T. G. I. R 11

18,549

Blackwell, H.R. & Lee, G.T., Jr. A STUDY OF VISUAL PERFORMANCES OF THE HUMAN EYE BY WHITE LIGHT. FINAL REPORT. Contract NBS 72038, ERI Proj. 2455 9 F, June 1958, 18pp. Institute for Research in Vision, Ohio State University, Columbus, Ohio.

18,550

To examine the meaningfulness of the classical distinction between the absolute and the difference thresholds for luminance changes and to study the possibility that the human eye can be "photoretrained" with white light, the value of the threshold luminance increment was measured for each of a number of background luminance levels and for a totally dark background. Target and background were white light targets subtended one and 45 min. of arc, and exposure duration was 0.01 sec. Threshold luminance increments were analyzed as a function of background luminance and expressed in terms of the two objectives as stated above.
T. G. I. R 10

18,551

Blackwell, H.R. & McGready, D.M., Jr. FOCAL CONTRAST THRESHOLDS FOR VARIOUS DURATIONS OF SINGLE PULSES. FINAL REPORT. Contract NBS 72038, ERI Proj. 2455, Rep. 2455 13 F, June 1958, 31pp. Institute for Research in Vision, Ohio State University, Columbus, Ohio.

18,552

Visual detection thresholds were determined for circular targets as a function of the level of background luminance, target size, and target exposure duration. The temporal forced-choice variant of the method of constant stimuli was used, the data being analyzed by a variant of the probit analysis. Two highly experienced observers made 81,000 observations in 162 sessions. Background luminance varied from zero to 100 ft.-l., target diameter from 0.002 to 51.2 min. of arc, and exposure duration from 0.001 to one sec. Tabular and graphical data from smoothed curves of the functional relations between all principal variables were obtained.
T. G. I. R 9

18,553

Blackwell, H.R. & Moldauer, Ann B. DETECTION THRESHOLDS FOR POINT SOURCES IN THE NEAR PERIPHERY. FINAL REPORT. Contract NBS 72038, ERI Proj. 2455, Rep. 2455 14 F, June 1958, 18pp. Institute for Research in Vision, Ohio State University, Columbus, Ohio.

18,554

The effect of the extent to which a target falls eccentric to the fixational center upon the threshold contrast was studied. Visual detection thresholds for the foveal center and for 32 locations in the peripheral retina within a radius of 12 degrees from fovea were obtained on two observers. Nine levels of background luminance (zero to 75 ft.-l.) were used with a circular target (one min. of arc), exposure duration of 0.01 sec., and the temporal forced-choice variant of the method of constant stimuli. The data were analyzed separately for each of eight meridians.
T. G. I. R 14

18,551

Ward, C.J., P.E. & Taylor, J.E. VARIATIONS IN SPATIAL SENSITIVITY WITHIN THE HUMAN FIELDS. FINAL REPORT. Contract NRC 7238, HRL Proj. 2425, Rep. 2425 10 F, June 1954, 8pp. Institute for Research in Vision, Ohio State University, Columbus, Ohio.

18,552

Spatial sensitivity curves were measured at each of three foveal locations in each of three human eyes, utilizing a circular target subtending one min. of arc. Target exposure duration was 0.1 sec.; an artificial pupil of 4.34 mm diameter was used; the method was the temporal frequency method of variation of contrast. The data were analyzed for effect of location and of individual eyes. An interpretation of the findings was obtained.

T. G. R. 24

18,553

Flacher, F.E. ASSUMED SIMILARITY MEASURES AS MEASURES OF TEAM EFFECTIVENESS IN SURVEYING. Contract NRC 07135, Tech. Rep. 6, Feb. 1953, 2pp. Bureau of Research and Service, College of Education, University of Illinois, Urbana, Ill.

18,552

This is one of a series of studies on group effectiveness; it attempts to determine in one way how much importance the interpersonal relations within a group have in determining total team effectiveness. Student surveying parties, comprising three to four men each, were assigned 71% to participate. Accuracy of work as noted by the instructor was used as the criterion. Interpersonal perception was measured by means of "Assumed Similarity" scores derived from responses to a personality questionnaire. Three scores were used here: assumed similarity of self to most preferred co-worker, to the non-preferred co-worker, and between the preferred and rejected co-workers. Various hypotheses were tested by relating the scores to the criterion.

T. R 10

18,553

Cook, J.J., Hartmann, W. & Ehart, Mary G. INVESTIGATION OF THE CHARACTER AND PROPERTIES OF ASSUMED SIMILARITY MEASURES. Contract NRC 07135, Tech. Rep. 7, Feb. 1953, 1pp. Bureau of Research and Service, College of Education, University of Illinois, Urbana, Ill.

18,553

This is one of a series of studies on group effectiveness. A technical analysis of the instrument (personality questionnaire) from which "Assumed Similarity" scores were derived in earlier studies (see 18,552) is summarized. In addition to the reliability report, the extent to which assumed similarity is a general attitude and to what extent it depends instead on the content of test items, and the extent to which assumed similarity is measured in four ways reflects the same general quality are studied by statistical procedures.

T. R 8

18,554

Fiedler, F.E., Hartmann, W. & Ehart, Mary G. CORRECTION AND EXTENSION OF THE RELATIONSHIP OF INTERPERSONAL PERCEPTION TO EFFECTIVENESS IN BASKETBALL TEAMS. Contract NRC 07135, Suppl. to Tech. Rep. 3, Feb. 1953, 7pp. Bureau of Research and Service, College of Education, University of Illinois, Urbana, Ill.

18,554

This was one of a series of studies on group effectiveness. Additional data were presented here on an earlier study on interpersonal perception relations to effectiveness of basketball teams. In the early study, interpersonal perception was measured by means of "Assumed Similarity" scores designed to indicate how similar one person considers himself to be to others, or how similar he considers two other persons to be. High school teams (14) were measured at the beginning of the season and 12 at the end of a season with a criterion measure of proportion of games won by a certain date. Additional analyses of the reliability of the criterion were presented.

T. G. R 1

18,555

Brace, R.E. HUMAN STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF CLARK UNIVERSITY. XXVII. COMPLETE SPATIAL SENSITIVITY IN THE PERIPHERAL REGION OF THE HUMAN EYE. Ann. N.Y. Acad. Sci., April 1947, 23, 254-257. (Columbia Research Lab., Washington, D.C.).

18,555

To determine the limits within which spatial sensitivity curves in the peripheral retina of the human eye, monocular sensitivity thresholds were measured for test flashes appearing on the side and in the temporal portion of the peripheral retina (30 degrees from the fovea) by a method of modified limits. Twelve circular areas (from 0.460 to 0.920 min. of visual angle in diameter) were used with intensity of the flash varied in constant logarithmic steps. Data from three Ss were analyzed by plotting logarithm of threshold intensity against logarithm of the radius of stimulus area and noting departure from perfect summation.

T. G. R. 24

18,558

Bryan, G.L., Rigney, J.W., Swenson, D.M. & Axelrod, W. ANALYSIS OF OFFICER ELEMENTS IN COMBAT INFORMATION CENTER DUTIES. Contract NRC 228(02), Proj. NR 153 093, Tech. Rep. 14, Oct. 1954, 9pp. Electronics Personnel Research, University of Southern California, Los Angeles, Calif.

18,558

This report is one of a series to be concerned with the development of standards for the qualification of officers in Combat Information Center duties. The nature of the problem is discussed in the first portion; the remainder is devoted to an explanation and description of three job analysis methods that were developed. These methods are based on complementary viewpoints for describing a job and are designed to yield complementary results. Specific forms and instructions are appended.

18,559

Bryan, G.L. (Principal Investigator). AN EVALUATION OF A METHOD FOR SHIPBOARD TRAINING IN OPERATIONS KNOWLEDGE. Contract NRC 228(02), Proj. NR 153 093, Tech. Rep. 18, Sept. 1956, 36pp. Electronics Personnel Research, University of Southern California, Los Angeles, Calif.

18,559

Conflicting requirements and restrictions of the shipboard environment which limit the effectiveness of training programs were discussed. A study undertaken to evaluate a possible training method that would supplement current procedures was described. The standard multiple-choice item was modified by developing short verbal explanations to accompany each alternative which were then concealed by paper tabs that could be easily removed. A series of test items was administered to three groups as follows: 1) only one response was allowed, 2) responses continued until the keyed (correct) answer was located, and 3) same as the second group except that the explanations were added opposite each alternative. Suggestions for use of a trainer based on the findings were presented. T. I.

18,560

Bryan, G.L., Rigney, J.W. & Van Horn, C. AN EVALUATION OF THREE TYPES OF INFORMATION FOR SUPPLEMENTING KNOWLEDGE OF RESULTS IN A TRAINING TECHNIQUE. Contract NRC 228(02), Proj. NR 153 093, Tech. Rep. 19, April 1957, 23pp. Electronics Personnel Research, University of Southern California, Los Angeles, Calif.

18,560

To determine the relative effectiveness of three different kinds of explanations when employed in a multiple-choice trainer format (see 18,559), a selection of items from among those used in the previous study was made. For each item three kinds of explanations were written: 1) correct definition or description of chosen alternative, 2) principal reason why alternative was correct or incorrect, and 3) probable operational consequences of the course of action represented by the alternative. The tests were administered to three groups of Ss, one group responding to only one type of explanation. A criterion test was given one week later. Differences between the two tests were analyzed.

T. I. R 7

18,568

Cooper, F.S., Liberman, A.N., Harris, Katherine S., & Grubb, Patti M. SOME INPUT-OUTPUT RELATIONS OBSERVED IN EXPERIMENTS ON THE PERCEPTION OF SPEECH. Presented at Second International Congress on Cybernetics, Moscow, Sept. 3-10, 1956, 12pp. Association Internationale de Cybernetique, Moscow, Belgium. (Haskins Laboratory, New York, N.Y.)

18,569

Some ten years of work on the perception of speech sounds are reviewed in terms of such perceptual relationships as the inter-sensory transfer between the auditory patterns of words and their spectrographic pictures, and the very close relationship that seems to exist between the perception of speech sounds and the articulatory gestures involved in their production. It is felt that these considerations provide the rationale for a further experimental approach to the problem of characterizing the phonemes of language in measurable terms.

18,580

Farley, M.E. (Chm.). THE SAFETY THE MOTORIST GETS. Rep. SP 163, June 1959, 37pp. Society of Automotive Engineers, Inc., New York, N.Y.

18,580

Four papers dealing with the question of what automotive engineers are doing to assure safety in the modern American automobile are included in this report. The specific aspects of the automobile that are treated are: 1) the chassis, 2) the body, 3) electrical-accessory, and 4) over-all car appraisal. Various phases of product development to meet the changing requirements of traffic conditions and the human factor in the vehicle-driver complex are discussed. Quality control methods that are used to assure that the safety designed in is actually built into the car are discussed thoroughly.

18,613

Brown, R.H. SPATIAL EFFECTS IN HUMAN VISUAL RESOLUTION. *J. Gen. Psychol.*, 1946, 35, 77-86. (USN Research Lab., Washington, D.C.)

18,613

To determine how spatial effects operate in the visual resolution of a simple test object, foveal intensity thresholds were measured with white light for the resolution of a narrow bar on a dark background. The length of the bar subtended 7.92, 17.2, 28.0, or 51.0 min. of visual angle at the eye; each bar length was also varied in width from 0.129 to 5.06 min. of visual angle. Threshold data were analyzed as functions of visual angle subtended by the bar. The results were interpreted quantitatively by considering stimulus length a parameter in an equation for intensity discrimination.

18,619

Pritchard, B.S. & Blackwell, H.R. PRELIMINARY STUDIES OF VISIBILITY ON THE HIGHWAY IN FOG. FINAL REPORT. Grant-47B, Proj. 2557, Rep. 2557 2 F, July 1957, 44pp. Engineering Research Institute, University of Michigan, Ann Arbor, Mich.

18,619

A program of studies was reported which was intended to lay the foundation for an understanding of the problem of improving visibility on the highway in fog. The major effort was devoted to measurements of the precise optical properties of natural (and artificial) fogs, including transmittance and the polar distribution of light. Two new measurement devices were described and data gathered by means of these devices were presented. Two general methods for improving the design of street lights for use in fog were described and evaluated on a scale-model simulator. The usefulness of the simulator was discussed.

T. G. I. R 12

18,637

Hoffman, F.G. HIGHWAY SAFETY: A REVIEW AND FORECAST. Presented at First SAE David Macgregor Memorial Lecture, Chicago, Ill., Oct. 14, 1947, 22pp. Society of Automotive Engineers, New York, N.Y.

18,637

The problem of safety on streets and highways is discussed in this paper. An historical review of the aspects of the problem before development of the automobile and of changing conditions since that event is presented. Vehicle design and highway design are considered together with an analysis of safety data. A postwar program for improving safety is described and the results examined in light of future needs.

G.

18,674

Lewis, D. DEVICES FOR STUDYING INTERFERENCE IN PSYCHOMOTOR PERFORMANCE: III. THE DOUBLE-DISK PURSUIT APPARATUS. Contract NSORI 57, SOC Proj. 20 M 1, SOC TR 57 2 13, ca. 1950, 18pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

18,674

The aim was to induce a decrement in rotary pursuit performance following interpolated practice. Three increasingly complex pursuit devices Koerth-type rotor and two models of the Double-Disk Pursuit Apparatus (the second provided a variable pursuit pattern) were employed to this end. In general the interpolated tasks required performance in reverse of the original. Time-on-target was the measure of performance. Means for all Ss on each trial in the three blocks of trials (original, interpolated, and relearning) were presented for each device.

G. I. R 6

18,676

Travis, R.C. MEASUREMENT OF ACCOMMODATION AND CONVERGENCE TIME AS PART OF A COMPLEX VISUAL ADJUSTMENT. Contract W33 038 AC 14559, Rep. 2, May 1947, 20pp. Tufts University, Medford, Mass.

18,676

Accommodation and convergence time of 50 college students were measured in five experimental situations (two trials of ten fixations for each): left eye, right eye, both eyes, near stimuli only, and far stimuli only. S focused the stimulus, reported the number beside the break in the circle, operated the lever to expose the next stimulus--all as quickly as possible. The data were obtained from the successive refixations of near and far, all near, or all far stimuli. Means, standard deviations, ranges, and reliability coefficients were computed. Two additional studies were carried out: 1) on the effects of practice; and 2) on the separate roles of acuity, perceptual speed, and motor speed in the above experimental task.

T. G. R 16

18,677

Kappauf, W.E., Smith, W.M. & Bray, C.W. A METHODOLOGICAL STUDY OF DIAL READING. APPENDIX I. Contract W 33 038 AC 14480, Rep. 3, Aug. 1947, 42pp. Dept. of Psychology, Princeton University, Princeton, N.J. (University of Illinois, Urbana, Ill.).

18,677

A procedure for testing dial reading accuracy was developed. It consisted of simultaneous presentation of 12 dials and scoring of the dial reading performance in terms of errors and average time. Six Ss were used to test the procedure in a preliminary study of dial size, design, reading attitude, S differences, and practice effects. Sizes were 2.8, 1.4, and 0.7 in. diameter; graduation was by tens, fives, and units; all scales were 0 to 100. Analysis of the time and error data was aimed at improvements in procedure.

T. G. I. R 8

18,678

Williams, S.J., Moyer, R.A. & Forbes, T.W. (Chm.). HIGHWAY SAFETY RESEARCH CORRELATION CONFERENCE. WASHINGTON, D.C., JUNE 5-6, 1952. Gpp. National Academy of Sciences-National Research Council, Washington, D.C.

18,678

The results of a conference aimed at formulating an interdisciplinary outline of a broad research program on human factors in relation to physical factors of the vehicle and the highway as causes of traffic accidents were reported. The topics discussed included: driver attitudes, motivation, and competence; visual requirements; vehicle and highway design.

18,679

USN Special Devices Center. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS. NAVEXOS P 530 B, Rev. Nov. 1950, 13pp. USN Special Devices Center, Port Washington, N.Y.

18,679

This bibliography categorizes the entries broadly into the following topics and subtopics: learning--training methods, mass training, criterion studies; motor skills--general, positioning reactions, transfer; perception--general, vision, audition; voice communications--general, speech intelligibility, measurement, training; extreme environmental factors; systems analysis--surface, subsurface, aircraft, airships, radar equipment; controls and displays--general, displays, controls; training devices--general, gunnery, flight; research tools; human engineering in general. R 275 (approx.)

18,680

Lewis, D.; Smith, P.N. & McAllister, Dorothy E. RETRO-ACTIVE FACILITATION AND INTERFERENCE IN PERFORMANCE ON THE MODIFIED TWO-HAND COORDINATOR. Contract N00R 166(00), Proj. NR 783 002, SDC Proj. 20 M LE, SDC TR 166.00 2, Dec. 1951, 19pp. USN Special Devices Center, Port Washington, N.Y. (State University of Iowa, Iowa City, Iowa).

18,680

This study was concerned with the retroactive effects of different levels of interpolated learning in the performance on the Modified Two-Hand Coordinator. Six groups of ten Ss (female) were trained in the standard coordinator task to a given performance level; five then received practice on the reversed task until each had attained a different proficiency level; the sixth served as controls. Relearning was the same for all groups. Three measures of performance were obtained: time on target (sec.), number of errors, and persistence of errors (sec.). These were examined by simple analyses of variance. T. G. I. R 6

18,681

Hamilton, C.E. & Blackwell, H.R. THE EFFECT OF AN HORIZON-LINE LUMINANCE GRADIENT UPON TARGET DETECTABILITY IN ITS VICINITY. FINAL REPORT. Contract N00S 72038, Rep. 2455 8 F, April 1957, 41pp. Vision Research Labs., Engineering Research Institute, University of Michigan, Ann Arbor, Mich. (Institute for Research in Vision, Ohio State University, Columbus, Ohio).

18,681

This report summarized three series of experiments concerned with the effects of an horizon-line luminance gradient upon the detectability of targets in its vicinity. Targets were viewed foveally against nonuniform background fields of photopic luminances, peripherally against nonuniform fields of scotopic luminances, and against uniform fields which ranged from photopic to scotopic. Trained Ss of 20/20 acuity observed. Viewing was binocular and unrestricted. Targets were one-sec. duration. The temporal forced-choice procedure was used. A "considerable range" of target sizes and shapes and background luminances were tested. The discussion included a detailed analysis based on the veiling luminance concept. T. G. I. R 3

18,699

Flory, L.D. COMMUNICATION BETWEEN THE SCIENTIST AND THE MILITARY. ORO SP 75, Nov. 1956, 26pp. Operations Research Office, Johns Hopkins University, Baltimore, Md.

18,699

The present article is aimed at promoting better understanding and cooperation between the scientist and the military. This problem of perfecting communications between men of widely different environment, training, motivation, etc. is first discussed historically, as it developed out of the rapidly changing technology in the military sciences. Next the numerous administrative and organizational problems attending research are presented and exemplified. Finally, the conditions surrounding the civilian scientist in the military and the civilian scientist in research contracts with the military are examined and compared. Areas of misunderstanding are pointed up and some suggestions for improved relations are given. R 18

18,703

Mand, Barbara. FLEXIBILITY IN INTELLECTUAL PERFORMANCE. Contract N00R 694(00), Proj. NR 151 113, Ph.D. Thesis, April 1958, 142pp. Educational Testing Service, Princeton, N.J.

18,703

Individual differences in flexibility in problem-solving were investigated. The primary hypothesis was that such flexibility was different from ability. Tests of problem-solving flexibility were developed that paralleled the traditional mental abilities tests in content. These flexibility and ability tests plus personality and interest tests were administered to a group of high school students selected from college preparatory courses. Reliabilities were computed for most of the tests. The major relationships examined were between the flexibility and ability tests, among the flexibility subtests, between these and other measures of flexibility, and between the flexibility and the personality and interest tests. T. G. I. R 56

18,714

Ely, J.H., Bowen, H.M. & Orlansky, J. MAN-MACHINE DYNAMICS. CHAPTER VII OF THE JOINT SERVICES HUMAN ENGINEERING GUIDE TO EQUIPMENT DESIGN. Contract AF 33(616) 419, Proj. 7180, Task 71501, WADC TR 57 582, Nov. 1957, 113pp. USAF Aero Medical Lab., Wright-Patterson AFB, Ohio. (Dunlap and Associates, Inc., Stamford, Conn.).

18,714

This report discusses the factors which affect human performance in tracking and watchkeeping tasks. In the first part closed loop systems and human transfer functions are described. Part II is devoted to the important design factors in such systems: pursuit and compensatory displays, intermittency, machine dynamics, aided tracking, and quickening. The third part provides detailed information about human time lags and the factors affecting them. Finally, specific recommendations are set forth for minimizing performance decrement in such activities. G. I. R 116

18,720

Tennenbaum, S., Nerode, A., Mehlberg, Josephine & Myhill, J. FUNDAMENTAL CONCEPTS IN THE THEORY OF SYSTEMS. Contract AF 33(616) 2797, Proj. 7060, WADC TR 57 624, Nov. 1957, 137pp. USAF Aeronautical Research Lab., Wright-Patterson AFB, Ohio. (System Research, University of Chicago, Chicago, Ill.).

18,720

This report was a precise treatment of the basic aspects of theory of systems. The approach to system problems accordingly presented constitute the different techniques which have been derived for systems analysis. The devices which were investigated and discussed included: digital processes, discrete linear mechanisms, continuous mechanisms, weighting functions and function spaces, finite automata, and the representation of events. T. G. I. R 18

18,743

Harbold, G.J. & O'Connor, M.F. EFFECTS OF VARYING MODE OF SIGNAL PRESENTATION ON HEARING THRESHOLDS OBTAINED WITH BEKESY-TYPE AUDIOMETER. Proj. NMO05.13 2005, Sub-task 1, Rep. 9, ca. 1959, 18pp. USM School of Aviation Medicine, Pensacola Air Station, Fla.

18,743

This was a systematic study of some of the characteristics of the Bekesy audiometer. All built-in stimulus variables were responded to in all combinations by 17 naval aviation cadets. The variables were speed (slow and fast); tone (steady and pulsed); and frequencies (ascending and descending). Mean hearing levels and their standard deviations were obtained. A six-dimensional (subjects, tones, ears, speed, pulse-steady, ascending-descending) analysis of variance was performed on these hearing levels as an aid in evaluating the instrument.

T. G. R 14

18,755

Lathrop, P.A. (Chm.). PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON HUMAN FACTORS IN SYSTEMS ENGINEERING. PHILADELPHIA, PENNSYLVANIA, DECEMBER 3-4, 1957. 117pp. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn.

18,755

This document contained all papers and addresses presented at the jointly sponsored Human Factors-IRE national symposium. The four sessions were: engineering approaches to systems synthesis, human factors approaches to systems synthesis, a panel discussion on synthesis of a control system for a manned space ship, and human factors data (source, form, and use). The individual papers have been abstracted separately.

T. G. I. R 30

18,756

Flickinger, D.D. MAN--THE ESSENTIAL FACTOR IN SYSTEMS. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 2-4. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (USAF Air Research and Development Command Headquarters, Andrews AFB, Washington, D.C.).

18,756

This address is aimed at defining the present state of human factors concepts and setting forth some objectives for the human factors researcher. The concepts include man's roles in systems, man's versatility of performance, factory designing, and testing environment versus operational environment. Some changes in human factors agencies and their programs are outlined.

18,757

Linville, W.K. SENSITIVITY OF SYSTEM DESIGN TO SYSTEM OBJECTIVES. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 5-8. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (Institute for Defense Analyses, Washington, D.C.).

18,757

This paper discusses the role of human factors in system engineering when the objectives of a system are examined to determine what its function is and to evaluate its performance of that function. Considering a system as being composed of various levels or layers, the objectives derive from the exterior system which, in turn, involves human factors assessments. The problem of design of a computer system is used to illustrate this type of analysis.

18,758

Drenick, R.F. AN APPROACH TO THE SYNTHESIS OF INFORMATION PROCESSING SYSTEMS. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 9-11. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

18,758

A mathematical model is proposed and briefly sketched which may aid in answering these questions in regard to information processing systems: what decision-making agencies should be created, what decisions should be turned over to them, what information should be channeled to them, and what aids should be supplied them to support their activities. The task of the system here considered is a strategic game which differs from the conventional game problem in that the aim is to determine game deterioration and manner of recouping same as a result of certain limitations placed on one or both players. The problem is formulated; solutions, however, are not yet ready to report.

18,759

Truxal, J.G. SYSTEMS ENGINEERING AS THE MATURATION OF CONTROL ENGINEERING. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 12-19. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (Polytechnic Institute of Brooklyn, Brooklyn, N.Y.).

18,759

This discussion has three parts: "the first section describes briefly the basic characteristics of control engineering--the techniques for determination and manipulation of a mathematical model for a physical situation--; and indicates the types of models which have been most highly developed by control engineers. The following section describes briefly the extension of these model concepts in systems engineering as necessitated by the modified requirements when the systems engineer must view the overall, and, often complex, system. The final section describes one specific area of recent work in control systems engineering as an illustration of current trends in this field."

I. R 3:

18,760

Beaunariage, D.C. AN APPROACH TO SYSTEMS INTEGRATION FOR MANNED SYSTEMS. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 22-24. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (Radio Corporation of America, Waltham, Mass.).

18,760

This paper presents a method for organizing and executing a typical systems development program which insures equal treatment for the man in accomplishing systems integration. The main components of the program are: preliminary studies, system analysis, subsystem development, system evaluation, product design, and manufacturing. The essential item emphasized throughout is the effective working together of the control systems engineers group and the human engineering factors group. Other important items include early specification of human performance requirements and feedback of task and equipment analyses to the proper groups.

I. R 1

18,761

Abrahams, I.C. THE ENGINEER-PSYCHOLOGIST TEAM IN SYSTEMS PLANNING. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 34-40. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (General Electric Company, Syracuse, N.Y.).

18,761

The organizational structure of a company is outlined with particular emphasis on the Systems Utilization group which is responsible for planning the use of the system in its operational environment. This responsibility is divided into several functional areas which include personnel studies, training requirements, operation studies, maintenance studies, and human engineering. The significant point is the over-all functional integration of the psychologist and engineer in the organization, and thus the effective communication between the two professions.

I.

18,762

Taylor, F.V. EQUALIZING THE SYSTEM FOR COMPONENT "H". From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 42-47. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (USN Research Lab., Washington, D.C.).

18,762

This paper describes "certain means of equalizing systems which contain one or more human operators as essential elements in the control loop." Four such means are discussed: appropriate transduction of information-bearing signals and the respective controls, informational coding of displays and controls, minimization of operational transformations required (task complexity), and desensitization of the performance of the system to human noise and to stochastic variations in the human transfer function (display quickening).

R 6

18,763

Krendel, E.S. & McRuer, D.T. HUMAN DYNAMICS AND SYSTEM SYNTHESIS. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 48-54. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (The Franklin Institute, Philadelphia, Penn. & Kelsey-Hayes Company, Los Angeles, Calif.).

18,763

The problem of facilitating the pilot's decisions on nonroutine problems is approached in terms of enabling the pilot to function with greater efficiency in routine tasks. The methods and techniques of synthesis in a pilot-airframe system are described for the compensatory or pursuit type tracking task by expansion of A. Tustin's linear plus remnant model of the human operator. An interim design procedure for such visual tracking tasks is then hypothesized.

I, R 13

18,764

Kraft, J.A. INDUSTRIAL APPROACH TO HUMAN ENGINEERING. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 55-58. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (Lockheed Aircraft Corporation, Marietta, Ga.).

18,764

Human engineering research programs in industry, with particular reference to the aircraft industry, are discussed under the following topics: how they originate, where they are located in the organizational structure, what kind of skills they use, what they do, and some of the advantages and disadvantages of selected approaches.

18,765

Sharkey, V.J. THE APPLICATION OF HUMAN FACTORS TO SYSTEM DESIGN. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 59-66. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (USAF Operational Applications Lab., AFRC, Bedford, Mass.).

18,765

Three phases of system design—conceptualization, development test, and prototype production—are each discussed in terms of the role played by human factors personnel. Important functions in the first phase revolve around providing human operator data, either already available or conducting research to obtain same. In the second, design of consoles, testing of capabilities, and identification of training requirements are essential. In the third, assistance in system specifications is the main function.

I.

18,766

Stapp, J.P. FROM HYPOTHESIS TO REALITY IN SPACE FLIGHT. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 82-83. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (USAF Aero Medical Field Lab., Holloman AFB, N.M.).

18,766

This address consisted of some introductory remarks on the unrealities, e.g., flying saucers, versus realities, e.g., Sputnik, in space flight and the showing of the motion picture film of Major D. Simon's balloon flight.

18,767

Grether, M.F. DATA ON SENSORY MECHANISMS (INPUTS). From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 85-88. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

18,767

The problem of defining the maximum capabilities of the human sense organs is discussed in terms of the two levels of sensory data: threshold data which "answer the question of whether or not a signal or stimulus can be seen, heard, felt, etc." and perceptual performance data which "answer the questions of how easily a signal or stimulus can be understood and translated into appropriate action." The difficulties in utilizing these data in the operational situation are indicated and a few recommendations given.

18,768

Edwards, W.D. HUMAN FACTORS DATA ON THE HIGHER MENTAL PROCESSES. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 89-93. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (USAF Personnel and Training Research Center, Lackland AFB, Tex.).

18,768

The problem of applying data on the higher mental processes to systems design is considered. Some experimental findings of a research program devoted to examining the nature of the decision-making process are discussed. Specifically, these findings are from experimentation on four classes of decision determiners: boundary conditions, values, probabilities, and strategies. Their implications for systems design are indicated.

18,769

Senders, J.W. SOME COMMENTS ON MOTOR SKILLS DATA. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 94-96. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.).

18,769

Those factors which limit the usefulness of the psychological data on motor skills and motor acts to the systems designer are discussed and illustrative studies are cited. The factors include: 1) inadequate engineering-type descriptions of experimental conditions; 2) lack of experimentation on multiple-channel-type tasks; 3) differences in performance criteria from laboratory to operational situations; and 4) lack of experimentation on coordination among components of a large task, i.e., interaction effects and loading factors.

18,770

Miller, R.B. PERSONNEL REQUIREMENTS AND OPTIONS IN SYSTEMS PLANNING. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 97-100. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (International Business Machines Corporation, Poughkeepsie, N.Y.).

18,770

This paper discusses the optimum allocation of functions to man versus machine, given that the system requirements have been completely identified and that human functions can be provisionally identified. The major options other than function allocation and job structure include training and training aids, human engineering, procedure design, and personnel selection. A format for specifying human as distinguished from system requirements is discussed.

18,771

Saul, E.V. HUMAN FACTORS DATA: THEIR ORIGIN, FORM, CLASSIFICATION AND AVAILABILITY. Report from: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 101-110. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (Institute for Psychological Research, Tufts University, Medford, Mass.).

18,771

This paper points out some significant problems encountered in providing documentation services to human factors specialists and presents some information intended to aid them in their literature searches. The topics thus discussed include: origins of human factors data, e.g., military and commercial, classified and unclassified; subject-matter classification and attendant terminology problems; form and availability of these data.
R 64

18,772

Licklider, J.C.R. SOME HUMAN FACTORS IN THE DESIGN OF A CONTROL SYSTEM FOR A SPACE SHIP. From: "Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957," 111-117. Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn. (Bolt Beranek and Newman, Inc., Cambridge Mass.).

18,772

An approach to the design of the control system for a manned space ship is outlined and relevant human factors are discussed. First, the mission is analyzed into 12 phases, e.g., departure, orbit acquisition, landing approach; the control requirements of each phase are considered. Next, alternative ways of handling the phase requirements are indicated. The man-machine control arrangements which are discussed include: attitude control, horizontal position control, braking control, and coordination of control actions. Also considered are capabilities and costs of alternative subsystems, subsystem simulation, and synthesis and evaluation of the over-all control system.
R 7

18,776

Javitz, A.E. HUMAN ENGINEERING IN EQUIPMENT DESIGN. *Electrical Manufacturing*, Oct. 1956, 108-126.

18,776

This review of the human engineering literature is realistically written for the comprehension and use of the design engineer. The material is organized to answer two basic questions: what are the design functions of human engineering and what are the associated techniques. The research, development, and applied categories of work are described and the general design stages indicated. The areas where human engineering techniques have been used are discussed and illustrated. They include data processing and systems analysis, discriminability of controls and displays, reliability and maintainability, automation, and civilian design. Finally, the function of the human engineer on the design team is considered.

T. G. I. R 40

18,778

Jones, F.P. F.M. ALEXANDER AND THE REEDUCATION OF FEELING. *Semantics Bull.*, 1951, (6 & 7), 78-81. (Tufts University, Medford, Mass.).

18,778

In this presentation to the Boston Society for General Semantics, the author points out the empirical nature of the F. M. Alexander technique, a method by which one is able to establish conscious control of the head-neck relationship, and attempts to describe this experience as a first step toward establishing the control through a systematic and complete awareness of the physical self. The kinaesthetic impressions and discriminations are dealt with in some detail.
R 11

18,788

Melton, A.W. MILITARY PSYCHOLOGY IN THE UNITED STATES OF AMERICA. *Amer. Psychologist*, Dec. 1957, 12(12), 740-746. (University of Michigan, Ann Arbor, Mich.).

18,788

Military psychology is defined here as being co-extensive with all psychology with its unique unifying characteristic merely the specific contexts of application. The requirements for a military psychologist are examined briefly. The principal trends and emphases of contemporary military psychology in the United States are then discussed.

18,791

Malhotra, M.S. & Wright, H.C. AIR EMBOLISM DURING DECOMPRESSION AND ITS PREVENTION. *RNP 60/996*, UPS 186, RNPL 9/59, Dec. 1959, 16pp. Royal Naval Personnel Research Committee, MRC, London, England. (Royal Naval Physiological Lab., MRC, Alverstoke, Hants, England).

18,791

Investigations were made into the causes of air embolism and methods of its prevention during simulated ascents at the constant rate of five ft./sec. in a compression chamber, on animals—mainly rabbits. In three series of experiments the animals were tracheotomized and the outlet from the trachea closed at a pressure equivalent to 60 ft. of water. In the first series, no control method was used; in the second, a firm binder was applied to the abdomen prior to ascent; and in the third, the chest was squeezed manually just before the trachea was closed. Various physiological measures were taken, including autopsies, to assess the results.
R 6

18,792

Miles, S. & Mackay, D.E. THE NITROGEN NARCOSIS HAZARD AND THE SELF CONTAINED DIVER. *RNP 60/995*, UPS 184, RNPL 4/59, May 1959, 5pp. Royal Naval Personnel Research Committee, MRC, London, England. (Royal Naval Physiological Lab., MRC, Alverstoke, Hants, England).

18,792

To investigate whether nitrogen narcosis may be affective in relatively shallow dives, simple tests involving memory and mental skill were carried out by 16 helmeted divers. The tests were performed in and out of the water, at the surface, and on the bottom during the latter part of a series of dives varying from 60 min. at 100 ft. to 25 min. at 180 ft. Performance was compared for these conditions and discussed in relation to the problem of expected narcotic effects upon divers wearing self-contained air breathing sets and thus not under the control of a surface unit.
T. R 4

18,793

Cornell University. HUMAN FACTORS BULLETINS. A COLLECTION OF HUMAN FACTORS BULLETINS SHOWING HUMAN ENGINEERING PRINCIPLES FOR IMPROVED SAFETY. 1959, 28pp. Daniel and Florence Guggenheim Aviation Safety Center, Cornell University, New York, N.Y.

18,793

A collection of Human Factors Bulletins is presented in order to acquaint engineers with the importance of using physiological, psychological, and related data in the design of aircraft. No claim is made that the field of human engineering is covered, but rather the importance of using information already available to improve safety is stressed. Illustrative bulletin topics are optimum allocation of tasks among men and machines, RT, some applications of body weight to design, hand operated control forces, instrument panels, and human requirements and performance limitations at various altitudes.
T. G. I. R 31

18,817
Lucier, O., Fischl, M.A. & Courtney, D. APPLICATION OF A SYSTEMS CONCEPT TO PERSONNEL RESEARCH: FINAL REPORT. Contract N0MR 2212(00), Proj. J, Rep. 22, Aug. 1958, 129pp. Courtney and Company, Philadelphia, Penn.

18,817
This is a first report in a project devoted to the development of information gathering and information analysis techniques to support and implement the general objectives of providing command with techniques and procedures for effective personnel decisions. The development of the techniques is based on considering the personnel organization as a system and applying the systems concept to it. Only the first stage is detailed here: determination of the feasibility of introducing the feedback concept into the Navy's personnel research system. This is done by sending men to the fleet to see kinds of data available there, to explore the possibility of additional data, and to obtain the general idea for a skeleton system for the flow of information to and from command. T. I. R 65

18,819
Woodson, W. HUMAN ENGINEERING SUGGESTIONS FOR DESIGNERS OF ELECTRONIC EQUIPMENT. Jan. 1955, 7pp. USN Electronics Lab., San Diego, Calif.

18,819
The importance of considering the human component in a system was discussed and the relationship between men and machines clarified by listing some functions in which each (man or machine) excels the other. Checklists of common faults and design suggestions were presented as background for good human engineering design. A selected list of "100 Human Engineering Considerations for Improving Man-Machine Effectiveness" was drawn from experience in actual application of human engineering principles to electronic equipment design. Topics dealt with were visual displays, panel layouts, console design, multiple layout, environment, and maintenance. R 3

18,822
Weston, H.C. THE EFFECT OF AGE AND ILLUMINATION UPON VISUAL PERFORMANCE WITH CLOSE SIGHTS. Trans. Amer. Acad. Ophthalm. Otolaryng., March-April 1949, 394-400. (Reprinted from Brit. J. Ophthalm., Sept. 1948, 32, 645-653).

18,822
The results of an experimental investigation in which 12 Ss performed a series of visual tasks, graded in difficulty, involving the perception of fairly small detail, were summarized. Each task in the series was performed at each of six values of illumination (from 0.5 to 500 ft.-c) so chosen as to form a geometric series in a range likely to be used in practical situations. Ratio of brightness of task to surrounding brightness was maintained. The 12 Ss ranged in age from 19 to 47 years and were distributed by age into five groups. The performance data were presented as functions of age and illumination for each task in the series. T. G. I. R 3

18,823
Wolf, E. EFFECTS ON VISUAL THRESHOLDS OF EXPOSURE TO THE RADIATION BELOW 4000 ANGSTROMS. Trans. Amer. Acad. Ophthalm. Otolaryng., March-April 1949, 400-413. (Harvard University, Cambridge, Mass.).

18,823
A study of the effect on visual sensitivity of ultraviolet emission of various fluorescent light sources was reported. The course of dark adaptation following exposure to the light source was the criterion measure. In one series, the Ss were exposed for ten min. to the radiation of a fluorescent "daylight" lamp with a crown glass screen permitting ultraviolet above 2,800 Angstroms to reach the eye or with Noviol-A passing only wavelengths above 4,100 Angstroms. Other series of tests used fluorescent "white," "softwhite," and "gold" lights. Finally, Ss were exposed to either one hour or ten min. of reading under these lights. The resulting dark adaptation data were discussed in relation to room lighting problems. G. R-9

18,824
Kuhn, H.S. CONTINUING BIBLIOGRAPHY ON INDUSTRIAL EYE PROBLEMS. Trans. Amer. Acad. Ophthalm. Otolaryng., March-April 1949, p. 414.

18,824
A short list of titles dealing with industrial eye problems was presented. All appeared in various journals in 1946, 1947, or 1948. R 12

18,829
Wever, E.G., Lawrence, Marie & von Békésy, G. A NOTE ON RECENT DEVELOPMENTS IN AUDITORY THEORY. Proc. Natl. Acad. Sci. Wash., June 1954, 40(6), 508-512. (Princeton University, Princeton, N.J.).

18,829
This note considered recent auditory research. Two approaches for study of the pattern of cochlear action were discussed: direct observation in fresh human temporal bones in which suitable exposures were made and the use of electrical potentials on anesthetized cats. The results were interpreted in terms of auditory theory. Further studies on the relation of the pattern of cochlear action and locus of stimulation were mentioned. The crucial problem now under consideration was how any given segment of the basilar membrane gets the energy that makes it vibrate—whether from neighboring parts of the membrane or from the cochlear fluid. G. I. R 7

18,830
Wilson, S.G., Jr. RADIATION-INDUCED CENTRAL NERVOUS SYSTEM DEATH. A STUDY OF THE PATHOLOGIC FINDINGS IN MONKEYS IRRADIATED WITH MASSIVE DOSES OF COBALT-60 (GAMMA) RADIATION. Rep. 59 58, April 1959, 18pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

18,830
A study of the pathologic findings in monkeys irradiated with acute doses of whole-body gamma radiation, ranging from 400 to 40,000 r, was made. Twenty of the 99 animals receiving from 400 to 40,000 r exhibited severe signs of central nervous system damage which persisted until death. Autopsies were made to study pathologic alterations of the central nervous system and on lesions occurring simultaneously in the remaining viscera, particularly in the gastrointestinal tract. The observed changes were compared to those described by other authors. The concept of "leukocyte devitalization" was introduced. T. G. I. R 11

18,832
Langendorf, Patricia M. THE PHILOSOPHY OF THE GENERAL PROBLEM OF SEARCH AND DETECTION. Proj. 4505, RADC TN 59 130, May 1959, 7pp. USAF Rome Air Development Center, Griffiss AFB, N.Y.

18,832
A study was conducted to discover the way a detection system should operate to maximize detection in the absence of information regarding the signal to be detected. The problem of search in detection was defined. The simplest possible distribution in frequency azimuth and transmitter time cycle and the pattern of search in successive blocks of $\Delta\theta$, Δf for Δt were assumed and interaction was emphasized. I.

18,833
LaRochelle, P.J. & Brescia, R.E. SOME PROBABILITY ASPECTS OF THE AIRCRAFT COLLISION PROBLEM. NRL Rep. 5289, April 1959, 45pp. USN Research Lab., Washington, D.C.

18,833
The general problem under consideration here is the aircraft collision problem. As one in a series of reports, this paper emphasizes that before an adequate approach to control can be chosen, a knowledge of both the random and ordered aspects of the air space environment must be known. Some conclusions are reached as to techniques for improving reliability of position data, suitable methods for accomplishing the necessary communications with desired reliability, and means to reduce disturbances in flight program due to collision avoidance maneuvers. Problems for further investigation are indicated. T. G. I. R 10

18,835

Otis, L.S. & Boenning, R.A. A TRANSISTORIZED CIRCUIT FOR RECORDING CONTACT RESPONSES. Contract NSORI 166, Task I & Contract NMR 248(55), Rep. 10, 1959, 3pp. Johns Hopkins University, Baltimore, Md.

18,835

A highly sensitive and reliable transistorized contact electronic switch is described. The switch can be used to control recording equipment used in any psychological problem in which the S can be trained to touch, or in fact does touch during the normal course of his behavior, selected regions of the behavioral space. The usefulness of the touch response is discussed.
I. R 1

18,839

Roy, S.N. & Roy, J. A NOTE ON A CLASS OF PROBLEMS IN 'NORMAL' MULTIVARIATE ANALYSIS OF VARIANCE. Contract AF 18(600) 83, AFOSR TN 57 749, Nov. 1957, 6pp. University of North Carolina, Chapel Hill, N.C.

18,839

This note considers some problems in "normal" multivariate analysis of variance. The model is as follows: let the columns of X (pxn) be independent, nonsingular, p-dimensional, normal variates with a common variance-covariance matrix and expectations given by $EX = A\xi$ where A (rpm) is a matrix of known constants and ξ (m x 1) is a matrix of unknown parameters. Under this model the hypothesis $H: \xi = B\eta$ where B (m x k) is a given matrix of constants and η (k x 1) is a matrix of unknown parameters is considered. It is shown that the hypothesis is completely testable only under certain conditions.

18,844

Tinker, M.A. BRIGHTNESS CONTRAST, ILLUMINATION INTENSITY AND VISUAL EFFICIENCY. *Amer. J. Optom. & Acad. Optom.*, May 1959, 36, 221-236. (Department of Psychology, University of Minnesota, Minneapolis, Minn.).

18,844

To evaluate speed of perception in reading versus visibility as techniques for determining the illumination requirements for adequate vision in reading under varying degrees of brightness contrast between print and paper, 367 Ss were tested on either a standard speed of reading test or on five-letter words from these tests, individually displayed. The test materials were printed on paper of different reflectances so that the brightness contrasts were 0.756, 0.591, 0.348, and 0.217. Illumination intensities used were 5, 25, 50, 100, 200, and 400 ft.-c. Visibility of print and speed of reading were measured under each condition of light intensity and brightness contrast. The findings were related to the problem of specifying illumination.
T. R 6

18,848

Shapley, L.S. COMPLEMENTS AND SUBSTITUTES IN THE OPTIMAL ASSIGNMENT PROBLEM. Res. Memo. 2240, Aug. 1958, 8pp. Rand Corporation, Santa Monica, Calif.

18,848

When studying a process that depends intricately on several input activities it is sometimes of interest to know whether two given activities are complements or substitutes--that is, whether they reinforce or interfere with each other's influence on the process as a whole. The optimal assignment problem is considered here to be such a process and the complementarity-substitutability relationships between its elements are established. It is shown that man-machine pairs are complementary while man-man and machine-machine pairs are substitutes.
I. R 1

18,928

Karnell, G.P. (Chm.). AN ANNOTATED BIBLIOGRAPHY OF SUBMARINE TECHNICAL LITERATURE 1557 to 1953. Contract N7CMR 29103, Proj. NR 267 001, Publ. 307, March 1954, 261pp. Committee on Undersea Warfare, National Academy of Sciences - National Research Council, Washington, D.C.

18,928

This bibliography brings together the mass of unclassified material available on submarine development. There are eight sections: 1) general and historical-nontechnical; 2) special types of submarines; 3) design and construction; 4) operations (other than warfare); 5) maintenance, repairs, and related facilities; 6) the submarine in war; 7) antisubmarine warfare; and 8) data books. There are subheadings under each classification and within these the material is arranged alphabetically by author. An author index is included.
R 3500 (approx.).

18,929

Gruber, H.E. & Clark, W.C. PERCEPTION OF SLANTED SURFACES. *Percept. Mot. Skills*, 1956, 6, 97-106. (University of Colorado, Boulder, Colo. & University of Michigan, Ann Arbor, Mich.).

18,929

To provide further data on factors influencing the perception of slant, especially distance of observation and size and density of the units of texture composing the stimulus surface, two experiments were conducted using actual slanted surfaces viewed through a reduction screen aperture. The S's task was to adjust a comparison variable (rod) so that it appeared to be in a plane parallel to the stimulus surface (white dots on black background). In the first experiment, 15 Ss made judgments of four surface textures, three slants, and four distances. In the second, unit size and stimulus slant were held constant and texture density was varied (three surfaces). An explanation of the findings was offered.
G. I. R 12

18,934

Clark, W.C., Smith, A.H. & Rabe, Ausma. RETINAL GRADIENTS OF OUTLINE AS A STIMULUS FOR SLANT. *Canad. J. Psychol.*, 1955, 2(4), 247-253. (Queen's University, Kingston, Ontario, Canada).

18,934

Seven observers were used to determine whether or not monocular gradient of outline convergence is, like surface texture gradient, a sufficient stimulus for the perception of slant and the relative stability or ambiguity of the related percepts. The observers recorded their perceptions of the slant of rectangular and trapezoidal film-forms produced under low illumination by white figures against a black background. Essential conditions were monocular vision and fixed head at a distance which minimized or eliminated accommodation. The stimuli were presented in the fronto-parallel plane and at angles of 20 degrees and 40 degrees with the background. The results were related to the theory of psychophysical correspondence.
T. R 8

18,950

Mead, L.C. THE TYPOGRAPHY OF TOMORROW. *Bookbinding and Book Production*, March 1954, 72-73. (Tufts University, Medford, Mass.).

18,950

The findings from a series of studies on typographic arrangements to promote improvement of comprehension and speed of reading of textbooks, tradebooks, and other printed materials of moderate complexity were summarized briefly. After demonstrating experimentally the close relation between oral-like stress factors and comprehension, a variety of formats were set up portraying the authors' oral stress in printed form: light and bold type, different line levels, and two-column balanced formats. The findings were discussed in relation to reader acceptability and eye-movement patterns.
I.

18,952

Morin, R.E. & Grant, D.A. LEARNING AND PERFORMANCE ON A KEY-PRESSING TASK AS FUNCTION OF THE DEGREE OF SPATIAL STIMULUS-RESPONSE CORRESPONDENCE. *J. exp. Psychol.*, 1955, 45(1), 39-47. (University of Wisconsin, Madison, Wisc.). (WADC TR 53 292).

18,952

To determine how learning and performance measures are influenced by changes in the degree of spatial correspondence between the stimulus elements and the response elements of a motor task, 81 Ss in nine groups practiced key-pressing responses to light stimuli under nine different degrees of spatial stimulus-response correspondence between lights and keys. The degree of correspondence was specified by Kendall's τ , a measure of rank correlation.
T. G. R 11

18,953

Ammons, R.B. PRESENT SCIENCE PLANNING IN THE UNITED STATES: HIGHWAY TO DISASTER. *Percent. Mot. Skills*, 1956, 8, 107-110. (Montana State University, Missoula, Mont.).

18,953

A program for obtaining more scientists and increased productivity of present scientists in the United States is presented. A series of propositions are presented with comments consisting mainly of supporting arguments and elucidation of possible implications. A number of specific suggestions are made to implement the program suggested.

18,954

Bennett, P.B. & Cross, A.V.C. THE FUSION FREQUENCY OF FLICKER AND NITROGEN SATURATION. RNP 60/999, UPS 191, RNPL 7/59, Dec. 1959, 16pp. Royal Naval Personnel Research Committee, MRC, London, England.

18,954

To measure the fusion frequency of flicker (FFF) of men exposed to raised pressures of compressed air, five Ss were exposed to various pressures on different days and the time recorded to a maintained change in FFF. The time of this change (nitrogen threshold) was analyzed as a function of pressure. Individual differences and reproducibility of results were discussed. The connection of the nitrogen threshold with gas saturation of the body and its theoretical implications were discussed.
T. G. R 8

18,959

Fritz, E.L., Grubmeyer, R.S. & Miller, R.S. A MATHEMATICAL ANALYSIS OF SOME PHASES OF THE CONTROL OF AIR TRAFFIC FLOW. Contract AF 33(616) 3613, Proj. 6 (7 431L), ARDC TR 58 57, July 1958, 56pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio. (Laboratories for Research and Development, Franklin Institute, Philadelphia, Penn.).

18,959

The problems associated with smoothing the flow of air traffic approaching the terminal phase of flight were investigated. The feasibility of smoothing by means of speed control (slow-down and speed-up) was of particular interest. The mechanics of flow control in the enroute area using speed-reduction control methods and a combination of speed-up and slow-down control methods were investigated and mathematically defined with suitable models. Paper-and-pencil simulation was used to validate the work. Navigation errors were also studied. Some details of the possible application of speed control to a specific area were outlined.
T. G. I. R 5

18,961

Bennett, P.B., Dosssett, A.N. & Kidd, D.J. PREVENTION IN RATS OF THE NARCOTIC EFFECT PRODUCED BY INERT GASES AT HIGH PARTIAL PRESSURE. RNP 60/998, UPS 190, RNPL 2/60, Oct. 1959, 7pp. Royal Naval Personnel Research Committee, MRC, London, England.

18,961

Preliminary investigations of the use of a new drug "Frenquel," i.e., alpha (-4 piperidyl) benzhydrol hydrochloride, in the control of inert gas narcosis were reported. A change in response to electrical stimulation to nitrogen at several different pressures was used on a series of 36 adult Wistar rats before and after administration of Frenquel. The protective effects of the drug were analyzed; side effects were noted.
T. G. R 13

18,966

Gordon, A.S., Frye, C.W., Miller, R.D. & Myant, G. ARTIFICIAL RESPIRATION METHODS FOR CASUALTIES WEARING GAS MASK. Contract DA-18 108 CML 2395, Rep. 43, Nov. 1954, 9pp. USA Chemical Corps Medical Lab., Army Chemical Center, Md. (Clinical Science Dept., College of Medicine, University of Illinois, Urbana, Ill.).

18,966

To determine whether manual methods (push-pull) of artificial respiration will satisfactorily ventilate casualties wearing a gas mask in a contaminated atmosphere, tests were conducted on totally apneic, anesthetized-curarized normal adults and warm, nonrigid corpses. Each of the three recommended manual methods (back-pressure arm-lift, hip-lift back-pressure, and arm-lift chest-pressure) as well as the prone and supine Eve rocking methods were used on the normal Ss, with and without gas masks and cannister, and on the corpses. Ventilatory values were obtained and analyzed.
T. I. R 15

18,967

Holaday, D.A. TEST OF MOUTH-TO-MASK RESUSCITATION APPARATUS. Spec. Rep. 53, Sept. 1954, 17pp. USA Chemical Corps Medical Lab., Army Chemical Center, Md.

18,967

To determine whether mouth-to-mask insufflation maintains arterial blood oxygen saturations and carbon dioxide tensions within satisfactory ranges in Ss who are apneic or whose ventilation is inadequate, surgical patients were anesthetized with thiopental and rendered apneic either by curarization or as a result of controlled respiration. Mouth-to-mask insufflation was maintained by a single operator for 90 min. or as long as could be tolerated by the S. Arterial blood samples were obtained intermittently for analysis of pH, carbon dioxide content, and oxygen capacity. Oxygen saturation and carbon dioxide tensions were calculated. Suggestions for improvement of the apparatus were made.
T. G. I.

18,969

Legg, J.C., Jr. AIRPORT SURVEILLANCE RADAR APPROACH STUDY. Task 64541, WADC TN 56 350, Jan. 1957, 9pp. USAF Directorate of Flight and All-Weather Testing, Wright-Patterson AFB, Ohio.

18,969

To evaluate the Airport Surveillance Radar (ASR) Approaches, the accuracies of this type of approach were determined. The test procedures and equipment used were as close to those of a normal radar approach control center as weather, safety, and traffic conditions would permit. Fifty-three ASR approaches were completed and recorded by photo theodolite. The results were analyzed for accuracy and graphs constructed which show the limits within which 95 percent of all approaches can be expected to fall. It was recommended that these results be used as criteria in determining requirements for an approach and landing system using ASR as the feeder element.
C.

18,970
Shenke, W. GLOSSARY OF PHOTOGRAPHIC AND RECONNAISSANCE TERMS. WADC TN 56 510, Nov. 1956, 60pp. USAF Aerial Reconnaissance Lab., Wright-Patterson AFB, Ohio.

18,970:
Definitions of photographic and reconnaissance technical terms are presented alphabetically. The glossary is intended as a desk-reference for use in laboratories that are active, mainly in the aerial reconnaissance field.

18,973
Masclanica, F.S. EFFECT OF METHOD OF SUPPORT UPON BALLISTIC PERFORMANCE OF FLEXIBLE PERSONNEL ARMOR. OO Proj. TM 10, DA Proj. 593 08 020, Rep. MAL 710/1045, Jan. 1956, 37pp. USA Watertown Arsenal Lab., Watertown Arsenal, Mass.

19,010
Blatt, S.J. & Stein, M.I. EFFICIENCY IN PROBLEM SOLVING. J. Psychol., 1959, 48, 193-213. (Psychosomatic and Psychiatric Institute for Research and Training, Michael Reese Hospital, Chicago, Ill. & Center for the Study of Creativity and Mental Health, University of Chicago, Chicago, Ill.).

19,010
The characteristics of processes involved in solving purely "rational" problems that consist solely of logical relationships and their relationships to efficiency were investigated. By means of an electromechanical apparatus S was presented with a series of logical relationships which he had to derive and then coordinate for the final solution. Efficiency was defined as one who asked the smallest number of unnecessary questions (redundant, nonabstract, or unique). Time for various phases of the task were recorded also. Ss were 35 Ph.D. chemists. Analysis of the data was related to the various hypotheses originally stated. Intelligence and personality variables were related to the findings.
I. R. 13

19,011
Sturtevant, J.V. PERCENT DIVERSION VERSUS MEASUREMENT LIMITS. Rep. 117, April 1952, 31pp. United States Steel Corporation, New York, N.Y.

19,011:
This working paper discusses the problem of quality control in manufactured products, each item of which should possess a certain measured value of one or more particular quality characteristics. Setting limits on measurement values on an economical basis for both producer and consumer is necessary. Tables of percentages for any set of measurement values are presented for normally distributed data and also for those that deviate from the normal. Limits for a product having two or more characteristics that must be controlled are also discussed with tabulation and interpretation procedures given.
T. G. I.

19,013
Woolman, M. EVALUATING FLIGHT PERFORMANCE. FINAL REPORT. Rep. 55 1, Aug. 1953, 63pp. USAF Air Training Command, Scott AFB, Ill.

19,013
Objective and subjective grading methods in use at McConnell Air Force Base for evaluating flight performance are presented. Objective grades (called Sensitive Indicators) are instrument readings taken at standard check points during flight maneuvers that reflect a complex pattern of previously learned responses. Reliability studies on these grades are given. A Performance Proficiency Scale is described and its use in subjective grading is discussed. Some training results obtained from these methods are presented.
T. G. I.

19,015
Bink, B. THE MEASUREMENT OF THE ENERGY EXPENDITURE AT VARIOUS TASKS. Acta Physiologica et Pharmacologica Neerlandica, 1958, VII(1), 1p. (Netherlands Institute for Preventive Medicine, Leiden, The Netherlands).

19,015
This was a brief summary of work comparing three open methods of indirect calorimetry for use in field surveys: Douglasbag, portable gasmeter according to Kofronyi-Michaels, and integrating motor-pneumotachograph. These were compared to the open circuit method used in the laboratory with respect to flow resistance, dead space, and apparatus weight.
T.

19,017
Educational Research Corporation. PLANNING DOCUMENT FOR RESEARCH ON SAGE OPERATOR PROFICIENCY EVALUATION. DRAFT. ERC Proj. 53, July 1959, 22pp. Educational Research Corporation, Cambridge, Mass.

19,017
This planning document was prepared after several months spent developing prototype proficiency measures for SAGE operators. Training research needs were indicated only as they are suggested by or affected by operator proficiency evaluation studies. Three types of items needed in proficiency evaluation were defined and recommendations were made concerning the research needed to develop them properly.

19,074
Haythorn, W.W. THE USE OF SIMULATION IN LOGISTICS POLICY RESEARCH. Rep. P-1791, Sept. 1959, 43pp. Rand Corporation, Santa Monica, Calif.

19,074
This paper is the initial form of one chapter in a book entitled Sequential Decisions and Simulation (editors, Rosenstiel and Ghouila-Houri) to be published in France by Dunod, Paris. The chapter reported here provides a short description of two large systems simulation experiments that were performed by the Logistics Systems Laboratory of the Rand Corporation, a nonprofit research corporation established to provide the USAF with scientific assistance in its long-range planning. Some discussion of the philosophy underlying the methodology used is followed by a methodological description of 1) an evaluation of proposed supply policies and procedures and 2) a support-planning study of a ballistic missile system.
T. I. R. 1

19,088
Bell Helicopter Corporation. HUMAN FACTORS QUARTERLY PROGRESS REPORT: ARMY-NAVY INSTRUMENTATION PROGRAM. Contract N6NR 1670(00), June 1959, 19pp. Bell Helicopter Corporation, Fort Worth, Tex.

19,088
This report is the first to be issued quarterly about the work of the Human Factors Group on a research program for instrumentation of the helicopter. The following areas are covered: 1) mission and systems analysis, 2) vertical display, 3) situation display, 4) controls, 5) motion thresholds, 6) Bendix Radar evaluation, 7) Research Helicopter-1 and -2 programs, and 8) obstacle identification and display.

19,102
Lott, D.N. \$14,172 SAVED IN EIGHT MONTHS WITH DVORAK TYPEWRITER KEYBOARD! Office Economist, 1946, XXVIII (4), 8-9.

19,102
The Dvorek Simplified Keyboard for the typewriter was discussed in terms of its advantages in increased speed and decreased errors. Proof of the efficiency was offered in terms of results on an experiment conducted by the USN in which typists were trained on the new keyboard.
I.

19,103

Lerner, R.M. A METHOD OF SPEECH COMPRESSION. Contract AF 19(604) 5200, Rep. 36 41, Aug. 1959, 121pp. Lincoln Lab., Massachusetts Institute of Technology, Lexington, Mass.

19,103

A study was undertaken to determine what improvements could be effected in the operation of Vocoder-type speech compression systems by properly making use of the structure introduced into the speech waveform by the period voicing of most sounds. Basic to the experimental work was the observation that the waveform of voiced speech sounds are quasi-periodic. The principles underlying the pitch-synchronous processing of speech were reviewed, and speech-processing systems were studied from a signal theory point of view. The experimental apparatus, a pitch-synchronous speech chopper, was built and its performance evaluated in terms of the intelligibility of words in its output and in terms of subjective quality.
G. I. R 40

19,121

Misbat, T.R. & Happ, W.M. FLOW-GRAPH ANALYSIS. A VISUAL FORM OF ENGINEERING MATHEMATICS. Rep. LMSD 48357, Dec. 1958, 36pp. Missiles & Space Div., Lockheed Aircraft Corporation, Sunnyvale, Calif.

19,121

A self-contained course in flow-graph analysis is designed. The value of this technique is shown to lie in its ability to provide both a general view of the interdependence of variables and a particular view of any required aspect. Rules are developed from the simplest possible mathematical structures. Although transistor engineering (to which flow-graph analysis is particularly suited) is employed in some specific examples, the main work is treated in general terms that are applicable in many branches of engineering. An analysis of the mechanical differential gear is appended.
T. I. R 8

19,146

Jones, F.P. PSYCHOPHYSICAL REEDUCATION AND THE POSTURAL REFLEXES. May 1953, 13pp. Institute for Psychological Research, Tufts University, Medford, Mass.

19,146

A method of re-education that is psychophysical in the sense that it brings about a change in the person as a whole by introducing a change in his total pattern of reaction is described. The basis of the method is control of a basic, reflex mechanism lying in the unconscious poise of the head to influence the way muscle tension (or tone) is distributed throughout the body. Studies of animal posture and human posture are cited as evidence for the physiological base on which the method operates. An hypothesis is presented requiring experimental testing to throw new light on this postural mechanism.
R 25

19,229

Adams, R.J. & Starnmeyer, W.R. ANTARCTIC 'DAY' OF A NAVAL DENTIST. J. Amer. Dent. Ass., Aug. 1959, 52, 322-326. (USN Medical Research Lab., New London Submarine Base, Conn.). (NRL Rep. 325).

19,229

The dentist's activities in the antarctic were recounted. His professional duties were to care for the routine and emergency dental needs of the personnel and to organize and conduct a study of the effects of the stresses of antarctic life on oral health; other activities included assisting in construction of office and quarters, assisting in shoveling snow into snowmelters to provide the water supply for the office, and washing the dental linen supplies. The oral health program consisted of periodic examinations to detect changes in soft tissue health, dental materials performance, and any other aspects of oral hygiene that might lead to more serious and general physical breakdown.
I. R 5

19,236

Osakpitan, H., Mohl, J.C., Grant, G., Folley, J.D., Jr., et al. HUMAN FACTORS IN MAINTENANCE. A PANEL REPORT OF ANNUAL MEETING OF HUMAN FACTORS SOCIETY AT UNIVERSITY OF CALIFORNIA, LOS ANGELES, 18 SEPTEMBER 1959. 50pp. USN Training Device Center, Port Washington, N.Y. (Grumman Aircraft Engineering Corporation, Bethpage, N.Y.).

19,236

The five papers contained herein represent a comprehensive approach to the maintenance problems of complex electronic equipment which takes into account the interrelationships of design, training, manuals, and general operating problems. The specific topics include an operations analysis of maintenance problems, design for maintainability, simplification of maintenance without automation, simplifying maintenance training, and the Polaris maintenance system.
T. G. I. R 21

19,237

Moser, H.M., Oyer, H.J. & Fotheringham, W.C. ORTHOGRAPHIC REPRESENTATIONS OF THE ENGLISH PRONUNCIATION AS AN AID IN TEACHING ILA. SUPPLEMENT NO. 1. Contract AF 19(604) 4575, AFRC TN 59 75, 1959, 12pp. Ohio State University Research Foundation, Columbus, Ohio.

19,237

This supplement is a list of Greek orthographic spellings of air traffic control words and phrases. It has not yet been evaluated experimentally.

19,253

Wierke, R.E. & Schwartz, I. EFFECT OF CONTACT LENSES ON THE RED/GREEN RATIO. Contacta, Nov. 1959, 3(11), 1-2. (USN Medical Research Lab., New London Submarine Base, Conn.). (NRL Rep. 328).

19,253

This study compared the effects of spectacles and contact lenses on the red/green ratio. Four Ss—two myopes, a hyperope, and an emmetrope—were tested using a MacAdam colorimeter with a ten-degree bipartite field, red and green on one side, yellow and blue on the other. Ss made 30 matches using spectacle lenses and 30 after a suitable period of acclimation to contact lenses. The refractive errors and red/green ratios for the right eye of all Ss were tabulated and compared for the two lens conditions. The findings were briefly discussed in terms of everyday color discrimination.
T. R 5

19,254

Schaefer, K.E. SELECTING A SPACE CABIN ATMOSPHERE. Astronautics, Feb. 1959, 4(2), 28-29, 104, 106. (USN Medical Research Lab., New London Submarine Base, Conn.). (NRL Rep. 323).

19,254

This summary of the multiple factors which must be considered in preparing a space cabin or "closed system" was compiled from experiences with submarines and aircraft. Three problems were examined specifically: the carbon dioxide problem, the role of trace substances of a toxic nature, and changes in man's normal diurnal cycle.
I.

19,255

Liebow, A.A., Stark, J.E., Vogel, J. & Schaefer, K.E. INTRAPULMONARY AIR TRAPPING IN SUBMARINE ESCAPE TRAINING CASUALTIES. US Armed Forces med. J., March 1959, 13(3), 265-289. (USN Medical Research Lab., New London Submarine Base, Conn.). (NRL Rep. 330).

19,255

Two casualties of submarine escape training are reported in detail. These cases both suffered interstitial emphysema and air embolism. The role of involuntary intrapulmonary air trapping in each case is discussed. Also, the problem of detecting persons liable to suffer involuntary air trapping when breathing air at supra-atmospheric pressure and subjected to the stress of rapid decompression is discussed. Several categories of such persons are indicated. It is felt that these findings should be of civilian interest due to skin diving with self-contained underwater breathing apparatus.
T. I. R 18

19,277

Shackel, E. & Sealey, M. A ZERO CORRECTING CIRCUIT FOR USE WITH D.C. AMPLIFIERS. *Electronic Engineer*, June 1967, 26(302), 284-286. (E.M.I. Electronics Ltd., Hayes, Middlesex, England).

19,277

This zero correcting device for use with direct current amplifiers was designed primarily to null drift voltages which develop in the external input circuitry. It also can null amplifier drifts. The main parts of the system are the trigger element and servo. Circuit diagrams and detailed descriptions are included.
T. R. 4

19,278

Farf, A. & Leonard, J.L. TECHNIQUES FOR RECORDING SURFACE BI-ELECTRIC CURRENTS. *Med. Res. Rep.* 809, May 1958, 21pp. (E.M.I. Electronics Ltd., San Diego, Calif.).

19,278

This paper describes the techniques for recording surface bioelectric d.c. which have been adopted at the E.M.I. Electronics Laboratory. Some of the remarks used for d.c. recording are indicated, e.g., ECG, EEG, SGC, as well as the problem of d.c. artifacts and bioelectric overlap. General principles for avoiding electrode artifacts, use of chlorided silver, and the detailed mechanics of electrode preparation are discussed, along with preparation of skin, methods of electrode placement, and effects of electrode area. Finally, the proper instrumentation for use with such electrodes is described.
G. I. R. 24

19,298

Neckwerth, J.F. & Neckwerth, R.H. EYE FIXATIONS RECORDED ON CHANGING VISUAL SCENES BY THE TELEVISION EYE-MARKER. *J. Opt. Soc. Amer.*, July 1958, 48(7), 437-445. (Applied Psychology Research Unit, MRC, Cambridge, England).

19,298

Improvements in the corneal reflection method of recording eye movements are reviewed and an improved procedure for analyzing eye movements during the viewing of motion pictures is described. Two closed-circuit television cameras are used together to produce one composite picture: one camera picks up the corneal reflection of light (spot magnified about 100 times) and a second one simultaneously provides the scene to the screen in front of S and to a second display where the corneal reflection or eye marker is superimposed. The composite eye-scene display may be recorded by a motion picture camera. The spot can be calibrated to the region of regard within one or two degrees. Areas for application of the technique are visual aiming, visual search, and thinking.
I. R. 23

19,301

Shackel, B., Sloan, R.C. & Marr, H.J.J. DETECTOR PLOTS. *Electronics*, Jan. 1958, 36-39. (E.M.I. Electronics Ltd., Hayes, Middlesex, England).

19,301

This paper discusses the eye movement recording technique, electro-oculography, and the major problems encountered in employing it successfully. A complete measuring apparatus built to overcome these difficulties: small size of potential, noise potential from skin and from electrodes, is described and illustrated. Basically, it is an electronic system with two identical channels to amplify and record eye movements separately in the horizontal and vertical planes of rotation. A pen recording and motion picture film of a crt display are obtained. Detailed descriptions of the amplifier, crt display, and electrodes are included. Examples of records obtained from the apparatus are shown.
T. G. I. R. 2

19,308

Levitt, F.L. & Angoff, W.L. HOMEOSTATIC THEORY OF SMALL GROUPS III. Contract NCE 454(12), Tech. Rep. 4, March 1959, 13pp. (The Group Psychology Branch, CNE, Washington, D.C. (Rutgers University, New Brunswick, N.J. & New Jersey State University, New Brunswick, N.J.)).

19,358

The homeostasis theory of small groups suggests that if a disturbance occurs which would tend to lower either Formal Achievement (FA) or the Group-based Satisfaction (GMS) some sort of compensatory effect will occur within conditions predicting FA or GMS so that these latter criteria will remain stable. This hypothesis was tested by an analysis of attitude survey data taken from telephone operators in 32 exchanges. Four predictors derived from these data were studied using a statistical model previously employed in the analysis of delivery truck drivers. Multiple correlations between the predictors and FA and GMS were computed. The implications of the findings for the hypothesis were discussed.
T. R. 2

19,466

Eisler, M. & Olson, Costa. A MEASUREMENT OF SUBJECTIVE SIMILARITY. *Scandinavian Journal of Psychology*, 1959, 11, 1-10 & *Acta Psychologica*, 1959, 16, 1-10. (University of Stockholm, Stockholm, Sweden).

19,466

The mechanism of perception of similarity in the dimension of pitch was investigated. A preliminary experiment was carried out to determine tones judged to be of equal loudness at various frequencies (50, 200, 500, 2,500, 5,000, 7,000, 10,000, and 13,000 cps). In a second experiment, similarity estimates were obtained for pairs of tones by having the S rate them on a ten-step scale. And finally, a third experiment was conducted to obtain a magnitude function of pitch from which scale values were found of the tones in the similarity experiment. The mathematical form of the similarity function was derived. The results were interpreted in terms of Nelson's concept of adaptation level.
T. G. I. R. 8

19,468

Olson, Costa. TWO GENERALIZED RATIO SCALING METHODS. *J. Psychol.*, 1958, 55, 287-295. (Psychological Lab., University of Stockholm, Stockholm, Sweden).

19,468

Two methods (ratio setting and ratio rating) for psychophysical ratio scaling are compared. Certain generalizations and simplifications of the methods are described and illustrated by application to experimental data.
T. I. R. 13

19,546

Kolinsky, Muriel. LITERATURE SEARCH RELATED TO SPACE POSITION VALUE. June 1954, 80pp. Research Information Service, John Crerar Library, Chicago, Ill.

19,546

An annotated bibliography of material affecting space position value which is of particular relevance to outdoor advertising was presented. Sources searched were *Psychological Abstracts*, 1951 and 1953, and *Engineering Index*, 1936 through 1952. The report was divided into two sections: 1) traffic, which includes material of a practical nature; and 2) theory and basic research, which includes psychological experiments in visual perception.
T. I. R. 166

19,558

Liberman, A.M., Ingemann, Frances, Lisker, L., Delattre, P., et al. MINIMAL RULES FOR SYNTHESIZING SPEECH. *J. Acoust. Soc. Amer.*, Nov. 1959, 31(11), 1490-1499. (Haskins Laboratories, New York, N.Y.).

19,558

A system of rules for synthesizing speech framed largely in terms of subphonemic dimensions is described with reference to an example. The rules are discussed in relation to some general aspects of the processes of speech production and perception.
T. G. I. R. 29

19,564

Lowenstein, G. & Goussard, Irene E. ELECTRONIC PUPIL-LOCATING. A NEW INSTRUMENT AND SOME CLINICAL APPLICATIONS. *A.M.A. Arch. Ophthalmol.*, March 1958, 59, 352-353. (Ophthalmology Dept., College of Physicians & Surgeons, Columbia University, New York, N.Y. & Institute of Ophthalmology, Presbyterian Medical Center, Columbia University, New York, N.Y.).

19,564

An electronic direct-writing instrument for accurate recording of the pupillary movements of the two eyes is described. The working principles of the instrument are discussed along with descriptive details and methods of use. Some clinical applications of the method are given. G. L. R 25

19,570

Marx, P., Clemens, W.W., MacEwan, Charlotte & Connors, J. AN ANALYTICAL AND EMPIRICAL EXAMINATION OF SOME PROPERTIES OF IPSATIVE MEASURES. Contract NMR 477(08) & Public Health Research Grant R 743 (C2), Oct. 1956, 91pp. University of Washington, Seattle, Wash.

19,570

The properties of the "ipsative" units in psychological measurement are examined in this paper. An ipsative matrix is defined and developed; an empirical example is discussed; and mathematical derivations or proofs are presented for the properties of the ipsative variables. T. R 14

19,639

Slivinske, A.J., Robertson, J.C., Ugeow, A. & Nello, Nancy K. VIBRATORY COMMUNICATION: FEASIBILITY AND APPLICATION. Contract NMR 656 (17), Proj. TACOM (0655), Oct. 1959, 164pp. Psychology Lab., Pennsylvania State University, State College, Penn.

19,639

This report described and interpreted the results of a series of studies concerned with the transmission of information by vibratory signals and the feasibility of this mode of communication in an applied situation. Four major issues were examined: feasibility--the effects of performance on a simulated pilot's task upon the reception of vibratory signals was assessed; cross-modality legibility--visual and auditory coded signal reception were compared with vibratory; detectability--detection of intermittent vibratory signals in a vigilance situation was compared with similarly obtained visual and auditory data; codability--the coding procedure that would best utilize the tactile modality was sought. The data were discussed in terms of information theory. T. G. I. R 83

19,678

Viteles, M.S. (Chm.). AN HISTORICAL INTRODUCTION TO AVIATION PSYCHOLOGY. Rep. 4, Oct. 1942, 71pp. US Civil Aeronautics Administration, Washington, D.C. (US Committee on Selection & Training of Aircraft Pilots, NRC, Washington, D.C.).

19,678

A review of the application of psychology in aviation prior to World War II is presented. Topics covered are speed of simple reactions, complex reaction tests, other psychomotor tests, measurement of emotional reactions, tests of intellectual processes, combinations of psychomotor and intellectual test scores, investigation of sensory processes, personality observations, measurement of psychological functions under low O₂ tension, and the decline and revival of aviation psychology. R 117

19,694

Killingham, W.V. INTERDEPENDENCE OF SUCCESSIVE JUDGMENTS. I. COMPARATIVE JUDGMENT. II. AFFECTIVE JUDGMENT. III. ABSOLUTE JUDGMENT. Proj. RM 14 02 11, Subtask 12, Rep. 2, July 1957, 17pp. US School of Aviation Medicine, Pensacola Air Station, Fla.

19,694

Interdependence of successive judgments was investigated in the context of comparative, affective, and absolute judgments. In the first case, Ss were presented with a series of 36 pairs of lines ranging from six to seven in. in length; the task was to indicate the longer line. In the second test, a series of 25 geometric designs with four test cards imbedded in the series in all possible permutations was shown to independent groups of Ss; the task here was to indicate a liking or disliking for each item. Finally, Ss were required to judge the population of 26 countries by assigning a rating to each according to where it should stand in relation to all countries in the world. Methodological and theoretical implications of the findings were discussed. T. G. R 33

19,696

Zaccaria, P.A., Bailey, J.T., Tejes, E.C., Stafford, A.R., et al. DEVELOPMENT OF AN INTERVIEW PROCEDURE FOR USAF OFFICER APPLICANTS. Proj. 7701, Task 7702, AFPMR TR 56 43, Feb. 1956, 29pp. USAF Personnel Research Lab., Lackland AFB, Tex.

19,696

This report describes the development and preliminary analyses of an interview procedure and report form suitable for use in all Air Force procurement programs where in selection is to be based to an extent upon the findings of an interview board. The procedure is suitable for use by three-man boards with little prior training and is designed to furnish a reliable estimate of officer potential but not of technical proficiency or any other area better measured by other means. The importance of the interview scores as predictors of officer performance remains to be determined. Recommendations for use of the procedure are made. T. R 7

19,708

Austin, F.H. PHYSIOLOGICAL INSTRUMENTATION OF PILOTS FOR TEST AND OPERATIONAL FLIGHTS IN NAVY HIGH PERFORMANCE JET AIRCRAFT. PHASE I - PRELIMINARY INVESTIGATIONS. AGARD Rep. 740, May 1959, 8pp. Advisory Group for Aeronautical Research & Development, NATO, Paris, France.

19,708

Research on pilot physiological and psychological reactions in flight which is being conducted at the Naval Air Test Center is described briefly. As a result of initial investigations, criteria are being developed for new equipment for inflight monitoring of the pilot. The goal is to have the test pilot as fully instrumented as the airplane itself.

19,719

Birnbaum, A. PROBABILITY AND STATISTICS IN ITEM ANALYSIS AND CLASSIFICATION PROBLEMS. EFFICIENT DESIGN AND USE OF TESTS OF MENTAL ABILITY FOR VARIOUS DECISION-MAKING PROBLEMS. Rep. 58 16, Nov. 1957, 25pp. USAF School of Aviation Medicine, Brooks AFB, Tex. (Teachers College, Columbia University, New York, N.Y.).

19,719

The application of the Neyman-Pearson and Wald theories of inference and statistical decision-making to problems of efficient design and use of tests of a single ability is described. It is shown that a number of mathematical difficulties that arise in the classical model can be overcome by representing the item characteristic curve by a logistic function rather than the usual normal ogive. R 11

19,715

Block, T. & Prochan, F. SPARE PARTS AT MINIMUM COST. Contract DA 36-039-SC-75012. Tech. Memo. EMC 1154. Dec. 1959. 33pp. Electronic Defense Lab., Sylvania Electric Products Inc., Mountain View, Calif.

19,720

An approach to spare parts policy and the means for implementing it are discussed. Part I covers the subject in a general way. Part II derives a mathematical statement of spare parts requirements where failure rates are exponential, solves the mathematical problem of optimization, and gives a concrete example. Part III is a non-mathematical evaluation of the approach outlined including indications of how it might be extended, and the policy implications for military spare parts procurement. T. G. R 14

19,771

Fox, H.M. PSYCHOLOGICAL AND PITUITARY-ADRENAL RESPONSES TO STRESS. PROGRESS REPORT. Contract DA 49 007 MD 213. Jan. 1959. 20pp. Harvard University, Cambridge, Mass.

19,771

This was a report from a long period research investigation of the pituitary-adrenal responses to psychological stress. In this report period analysis of variance was used to compare the effect of individual differences among 18 normal Ss with differences in the same individual from day to day for five weeks of daily observation. Differences in 17-hydroxycorticoid output, 17-ketosteroid output, and flicker fusion were studied. Some tentative correlations of relatively constant adrenal steroid levels, uropepsin, and personality structure were presented. T. R 17

19,772

Frankenhaeuser, Marianne. EFFECTS OF PROLONGED GRAVITATIONAL STRESS ON PERFORMANCE. Nordisk Psykologi, 1959 10, 48-64. (University of Stockholm, Stockholm, Sweden)

19,772

Effects of prolonged radial acceleration on performance were studied in a series of eight experiments. The types of performance measured were: 1) visual choice RT; 2) visual acuity; 3) accuracy of movement; 4) perceptual speed; 5) reading speed, color naming, and reactions to self-induced stress (the Stroop test); 6) ability to concentrate (100-3 Test) by counting backwards from 100 subtracting three each time; 7) ability to multiply one- and two-digit numbers; and 8) time perception (reproducing or halving durations between auditory signals). Results obtained during two- to ten-min. exposure to three g and under normal conditions before and after centrifugation were compared. T. R 18

19,810

Johnson, R.T. OPERATING AND MAINTENANCE PROCEDURES TRAINER T-26 COMPLEX FACILITIES CONSOLE. Contract AF 04(645) 4, Rep. AZE 27 441, April 1959, 41pp. Convair, General Dynamics Corporation, San Diego, Calif.

19,810

Operating and maintenance procedures for the Complex Facilities Trainer T-26 are presented. The Trainer provides indicators, controls, and systems simulating the operations of the Complex Facilities Console at the Launch Operations Building. It is designed to provide an accurate simulation of standby and launch configurations of checkout equipment. T. 1.

19,811

Jones, L.V. METHODOLOGY OF PREFERENCE MEASUREMENT: FINAL REPORT. Contract DA 19 129 QM 774, Rep. 4, Sept. 1957, 202pp. USA Quartermaster Food & Container Institute for the Armed Forces, Chicago, Ill. (Psychology Dept., University of Chicago, Chicago, Ill.).

19,811

As part of a project on the preparation of a monograph summarizing the current status of preference measurement theory and methods, this report forms a four-chapter manual. Three important psychological scaling methods are presented: the constant method, the method of paired comparisons, and the method of successive categories. An introductory section discusses the scaling model and generality of results, the scaling model and methods for data analysis, and the history of psychological scaling. T. R 70

19,816

Kulke, G.K. & Reed, H.J. INFORMATION CAPACITIES OF MANUALLY PLOTTED DISPLAYS. Contract NMR 45403, Proj. NR 145 088 & Contract NS CRI 16601, Proj. 145 089, Rep. 1953-494 03 03, 1953, 25pp. Tufts University, Medford, Mass.

19,818

An empirical study was made of the informational capacity of manually plotted vertical displays as used in Combat Information Centers of certain major combatant vessels of the USN. The display was operated by six plotters working from the rear of the board under various conditions of input load. The analysis procedure involved selecting a 50 percent sample of all positions plotted and analyzing these for accuracy in bearing and range. These data were then studied for effect of load and beginning or end of plotting period. Observations were made as to degree of physical interference encountered by the six plotters and appearance of the board under conditions of high load conditions. T. G. I. R 11

19,832

Lyman, J. HARNESSING—HERE AND HEREFTER. Artificial Limbs, Sept. 1955, 2(3), 1-3. (University of California, Los Angeles, Calif.).

19,832

Harnessing as used here meant the coupling between the human being and the inanimate mechanism of an artificial limb or protheses. The functions the harness serves are defined and discussed in relation to present day knowledge and usage. The inadequacies of present techniques in providing for sensory functions are discussed along with a forecast of future technological developments in this area.

19,837

Masiewicz, H.L. DESIGN SPECIFICATION FOR TRAINER T-6. LAUNCH CONTROL OFFICER'S CONSOLE ASSEMBLY. AFB 3020-592 6110 0 1005. Contract AF 04(645) 4, Rep. AZD 27 044, July 1959, 36pp. Convair, General Dynamics Corporation, San Diego, Calif.

19,837

This specification covers the requirements for design and construction of Trainer T-6, Launch Control Officer's Console Assembly. The trainer will be utilized to provide a training medium for instruction in the following specialties and courses: 1) guided missile operations officer, and 2) missile systems analyst technician. Functional practice in 1) equipment reaction during countdown and missile commit sequence through to antifire and coolants and 2) operational countdown of the missile and procedures to follow when confronted with malfunctioning of subsystems are provided. T. 1.

19,845

Mitchell, J.H. DISPLAYS I: CATHODE RAY TUBES. Contract NMR 494(03), Proj. NR 145 088, Rep. 1954 494 03 18, Feb. 1954, 47pp. Tufts University, Medford, Mass.

19,845

The theory, construction, current thinking, and research into the use of CRT as instruments for presenting information are collated. Designed for general duty line officers of the Navy and nonelectronic engineers, this report employs a nonspecialized vocabulary and a progressive development in subject complexity. Since it is the first of a series of handbooks upon devices for displaying information, the material is limited to those CRT methodologies about which the Department of Systems Analysis, Tufts College, has documented information and to data collected prior to December 28, 1953. I. R 182

19,868

Psychological Research Associates, Inc., Encino, Calif. HUMAN FACTORS PRINCIPLES AND SPECIFICATIONS IN THE DESIGN OF GROUND SUPPORT EQUIPMENT. Rep. R 1067. April 1959. 229pp. Rocketdyne Div., North American Aviation, Inc., Canoga Park, Calif.

19,868

This manual provides two different but important kinds of information for the design engineer: general principles and detailed specifications. The human factors principles consist either of general rules or of descriptions of design steps essential to insure that sound human factors practices are observed in the development of Rocketdyne ground support equipment. The human factors specifications consist of dimensions, tolerances, and other specific information to be used in implementing basic human factors design decisions. The several chapters deal with control, display of information, coding, labeling, panel layout, console design, maintenance, workspace and facilities, and environmental considerations.

T. G. I. R 100 (approx.)

19,892

Simons, F.B. MIDDLE EAR MUSCLE ACTIVITY AT MODERATE SOUND LEVELS. Ann. Otol. Rhinol. Laryngol. Dec. 1959. 62(4). 1126-1144. (Stanford University, Palo Alto, Calif.)

19,892

The effects of the middle ear muscles on cochlear microphonic were studied in awake and anesthetized cats by means of electrodes permanently implanted on their round windows. Continuous single- and swept-frequency tones were used to study frequencies between 0.2 and 7.0 kc at intensities from 20 to 25 db above human threshold. G. R 9

19,911

USAF Operational Applications Laboratory. JOB KNOWLEDGE TEST FOR SAGE DIRECTION CENTER GAP-FILLER DATA RADAR MAPPERS. TRIAL EDITION. Aug. 1958. 58pp. USAF Operational Applications Lab., Hanscom AFB, Mass.

19,911

This test is composed of three parts as follows: 1) general knowledge of the Radar Mapper, Gap-Filler Data position, with 25 multiple-choice questions; 2) actual pictures taken from the scope of a gap-filler mapping console from which the testee is required to map the excess data, permanent echoes, and weather returns; and 3) 13 problems presented for solution.

19,917

Vaggoner, J.H. NAVIGATION TECHNIQUES AND DISPLAYS FOR INTERPLANETARY SPACE FLIGHT. QUARTERLY PROGRESS REPORT. Contract AF 33(616) 5524, Proj. 9(610.6190) & OSURF Proj. 813, Task 50786, Rep. (813)-5 297, May 1959, 13pp. Mapping & Charting Research Lab., Ohio State University Research Foundation, Columbus, Ohio.

19,917

This is a progress report of work accomplished on a research study of navigation techniques and displays for interplanetary space flight. A literature survey on space navigation and related physical phenomena along with a search for detailed information on recent developments of sensing and measuring devices is being conducted. Investigations now underway are summarized. Two papers are included as appendices: "Preliminary determination of an improved value for the astronomical unit" by Walter Mitchell, Jr. and "General factors relating to space ship instrument panels" by Henry Rowe, M.D. R 4

19,918

Warren, R.E. PERSPECTIVE ANALYSIS OF APPROACH-LIGHT PATTERNS. Tech. Rep. 96, Aug. 1949, 115pp. US Airport Development Div., CAA, Indianapolis, Ind.

19,918

The perspective studies of eight different approach lighting systems are described. Twelve studies of each system were made showing how each pattern will appear to the pilot who is letting down on the proper approach path or on one of several erroneous paths. Four studies assume unlimited visibility while the remaining eight assume that the approach lights are visible for approximately 1,000 ft. only.

T. I.

19,978

Groth, Hilde & Lyman, J. RELATION OF THE MODE OF PROSTHESIS CONTROL TO PSYCHOMOTOR PERFORMANCE OF ARM AMPUTEES. J. appl. Psychol., April 1957, 41(2), 73-78. (University of California, Los Angeles, Calif.)

19,978

This study tested the hypothesis that a "voluntary closing" type of prosthesis control system will lead to superior psychomotor performance for arm amputees when compared with a "voluntary opening" type of system because of the closer "imitation of natural function" said to be provided by the former system. Comparisons of both types of control systems for hook and hand prosthetic terminal devices were made for 17 amputees, using performance time as a criterion measure on three simple manipulation tests: Minnesota Rate of Manipulation Placing Test, Table Setting Test, Cup Test. S's preference for various types of device was determined by a questionnaire. The differences among conditions were tested with the Nonparametric Signed Rank Test for Paired Observations. T. G. I. R 10

20,238

Olsen, G.S. MECHANIZATION RELIEVES A TEACHER SHORTAGE. Systems for Educators, Jan.-Feb. 1958, 4(3), 11-12. (Lyons Township High School, LaGrange, Ill.)

20,238

Mechanized student record-keeping as used in a large school system is described in this article. Most of the work formerly performed by the faculty in registration, grade recording, scheduling, etc. is now accomplished faster, more accurately, and more economically by punched-card methods providing the teacher with more time to spend directly with the students.

I.

20,239

Bogart, F.A. DIRECT COMPUTER COMMUNICATION. Systems, Nov.-Dec. 1958, XXII(6), 3-4. (USAF Air Materiel Command, Wright-Patterson AFB, Ohio).

20,239

The ways in which the Air Materiel Command, the logistic arm of the USAF, has used electronic data processing to improve its mission of providing the proper equipment at the right time and place, ready for instant use, were discussed. The current program was anticipated and basically charted in a plan conceived in 1954 and revised in 1956. A new feature of the recent innovations involved English-language programming.

I.

20,246

Miller, J.G. TOWARD A GENERAL THEORY FOR THE BEHAVIORAL SCIENCES. Amer. Psychologist, Sept. 1955, 10(9), 513-531. (Mental Health Research Institute, University of Michigan, Ann Arbor, Mich.)

20,246

This article presents general behavior systems theory as a series of related definitions, assumptions, and postulates about all levels of living systems from viruses through cells, organs, individuals, small groups, and societies. Specific terms in the theory, such as system boundary, subsystem, coding, and equifinality, are defined and the role of formal identity, analogy, and electronic models in theory development is discussed. The article concludes with the presentation of 19 specific theorems derived from the general theoretical framework and empirically testable at all levels of organization. T. G. I. R 12

20,247

Roby, T.B. AN OPINION ON THE CONSTRUCTION OF BEHAVIOR THEORY. Amer. Psychologist, March 1959, 14(3), 129-134. (Institute for Psychological Research, Tufts University, Medford, Mass.)

20,247

This paper discussed five aspects of theory construction which require increased emphasis on the behavioral sciences: 1) comprehensive, general theories on a par with miniature systems development; 2) genuinely speculative theories which are permitted to develop before being subjected to direct empirical test; 3) a more explicit determination of the sense in which theoretical models are rated in the real world; 4) a working language for theoretical expression based on simple common denominator terms and lending itself to symbolic manipulation; 5) a reciprocal interaction between behavior theory on the one hand and mathematics and logic on the other.

- 20,248
Lynn, D.B. A MODEL MAN FOR APPLIED PSYCHOLOGY. *Amer. Psychologist*, Oct. 1959, 14(10), 630-632. (School of Medicine, University of Colorado, Boulder, Colo.).
- 20,248
This article suggests that one of the methods for preparing to meet the ethical issues which will arise as psychologists gain the capacity to control human behavior is to develop descriptive models of "ideal man," i.e., "models of what we think people should be like and what we hope they some day will be like." Summaries of the model man as conceived by a few investigators with various theoretical approaches are presented.
S. B.
- 20,271
Good, I.J. KINDS OF PROBABILITY. *Science*, Feb. 1959, 129(3347), 443-447. (Admiralty Research Lab., Teddington, Middlesex, England).
- 20,271
The author discusses five types of probability: the classical definition, subjective probability, physical probability, inverse probability, and long-run frequency. He concludes with a presentation of his own views that all types of probability can be adequately defined in terms of subjective probability.
R. 10
- 20,272
Carran, A.B. RELIABILITY OF ACTIVATION LEVEL DURING ADAPTATION TO STRESS. *Science*, March 1959, 129(3351), p.784. (Experimental Psychopathology Lab., Longview State Hospital, Cincinnati, Ohio).
- 20,272
This study was designed to appraise the reliability of the basal skin resistance (BSR) level of mental patients during stress. Two groups of 16 patients each, one on tranquilizers and the other nondrugged, were instructed to look at a large field of flickering light. Readings of BSR, separated by one-half min. intervals, were made during the following periods: 1) 0.5 to 1.5 min., 2) 9 to 11.5 min., and 3) 16 to 17 min. After a three-day interval, the procedure was repeated. Two test-retest reliabilities were computed. As a subsidiary experiment, the BSRs of the drugged and nondrugged groups were compared to evaluate the validity of BSR measures of activation level.
G.
- 20,273
Garn, S.M. & Haskell, Joan A. FAT CHANGES DURING ADOLESCENCE. *Science*, June 1959, 129(3363), 1615-1616. (Physical Growth Dept., Fels Research Institute, Yellow Springs, Ohio).
- 20,273
To investigate changes in body fat during childhood and adolescence, outer fat on the lower thorax was measured by means of serial posteroanterior chest radiographs in 459 regular participants in the Fels longitudinal program. The age range of the group was from 6.5 to 17.5 years. Trends for both males and females were analyzed on a longitudinal basis, on the basis of physiological events, and on the basis of chronology. Discrepancies with other studies were noted.
G. R. 5
- 20,275
Loewe, S. RELATIONSHIP BETWEEN STIMULUS AND RESPONSE. *Science*, Sept. 1959, 130(3377), 692-695. (Pharmacology Dept., College of Medicine, University of Utah, Salt Lake City, Utah).
- 20,275
This article attempts to analyze the problems arising from the fact that with excitable biological systems, the task of quantifying the relationship between the excitatory stimulus and the biological response is complicated by the differences in excitability among the individuals studied. The disparity between "graded response" and "quantal response" is discussed with relation to the pharmacological problem of "potency" as evaluated by dose-effect curves.
G. I. R. 8
- 20,276
Greenberg, J.M. CURRENT TRENDS IN LINGUISTICS. *Science*, Oct. 1959, 130(3383), 1165-1170. (Center for Advanced Study in the Behavioral Sciences, Stanford University, Stanford, Calif.).
- 20,276
This theoretical article has three aims: 1) to distinguish the characteristic subject matter and methods of linguistic science; 2) to discuss a few of the analytic concepts and substantive results of linguistics which are likely to be of interest to the nonlinguistic scientist; and 3) to indicate certain recent developments, some of which concern areas of interdisciplinary interest, which give promise of ultimate expansion into major subfields, either of linguistics itself or of related sciences.
T. R. 12
- 20,347
Wilson, R.J. & Wilson, W.P. THE DURATION OF HUMAN ELECTROENCEPHALOGRAPHIC AROUSAL RESPONSES ELICITED BY PHOTIC STIMULATION. *EEG clin. Neurophysiol.*, Feb. 1959, XI(1), 85-91. (Henry Ford Hospital, Detroit, Mich. & Medical Branch, University of Texas, Galveston, Tex.).
- 20,347
This study was designed to investigate the normal response duration curve of the arousal response to photic stimulation, and to determine the effect of simultaneous sound stimuli and attention on the duration of the arousal response. The cortical arousal responses of 80 normal Ss to single flashes of constant intensity were recorded under various conditions of auditory stimulation, attention and motivational instruction. The duration of the arousal response was analyzed and discussed in terms of its consistency and sensitivity to extraneous stimuli.
T. G. I. R. 21
- 20,348
Libet, B., Feinstein, B. & Wright, E.W., Jr. TENDON AFFERENTS IN AUTOGENETIC INHIBITION IN MAN. *EEG clin. Neurophysiol.*, Feb. 1959, XI(1), 129-140. (Biomechanics Lab. & Physiology Dept., University of California, San Francisco, Calif.).
- 20,348
This study investigated the range of changes in the human EMG with different muscle lengths and analyzed the mechanisms for these changes. To test the hypothesis that the major factor producing the lower EMG in lengthened muscle is the initiation of inhibitory afferent impulses from tendon organs of the stretched muscle, the EMG of the anterior tibial and gastrocnemius muscle of 15 male Ss were taken before and after local anesthesia of the tendon with procaine. The EMG of eight patients with degeneration of afferent fibers from the muscles were taken also. The role of autogenetic inhibition in regulating some normal motor functions was discussed.
T. I. R. 30
- 20,349
San-Jacobsen, C.W., Nilseng, Ola, Patten, Charleen & Eriksen, O. ELECTROENCEPHALOGRAPHIC RECORDING IN SIMULATED COMBAT FLIGHT IN A JET FIGHTER PLANE. *EEG clin. Neurophysiol.*, Feb. 1959, XI(1), 154-155. (EEG Lab., Gaustad Sykehus, Vinderen, Oslo, Norway).
- 20,349
To study the effect of the various stresses which act upon jet fighter pilots under combat flying conditions, EEG recordings were taken during rough operational flights by means of an EEG transistor apparatus modified for use in a fighter plane. Preliminary data concerning changes in the level of consciousness of pilots during flight were discussed briefly.
I.
- 20,350
Stewart, P.A., Belcher, W.T. & Morris, J.W., III. AUDITORY ANALYSIS OF THE ELECTROENCEPHALOGRAPHIC ELECTROENCEPHALOPHONY. *EEG clin. Neurophysiol.*, Feb. 1959, XI(1), 161-164. (Physiology Dept., Basic Health Sciences Div., Emory University, Emory, Ga.).
- 20,350
This technical report discusses a technique which makes it possible to use the sense of hearing as a harmonic analyzer of patterns of activity in brain waves. The circuit of an AM-FM encephalophone, which involves combined frequency and amplitude modulation by brain waves, is described. The advantages of the procedure, including its utility as a tool for the investigation of concentration and attention, are noted.
I. R. 8

20,415

van Wulfften Palthe, P.M. PSYCHOLOGICAL CAUSES IN AIRCRAFT ACCIDENTS. *Aeromedica Acta*, 1958, VI, 69-80.

20,415

This article discusses human factors of a psychological character in aircraft accidents. Among the topics considered are emotional fainting, the mental influence of isolation, confusional states, emotional overbreathing, the effect of flicker, and vision in an empty visual field.

R 8

20,416

van Wulfften Palthe, P.M. SENSORY AND MOTOR DEPRIVATION AS A PSYCHOPATHOLOGICAL STRESS. *Aeromedica Acta*, 1958, VI, 155-168.

20,416

To investigate the effects of sensory and motor deprivation upon psychological and physiological functions, 25 Ss spent two to three hrs. in a totally dark and soundproof decompression chamber under conditions of total or partial isolation from communication with the experimenter. EEG, ECG, respiration, eye movements, and galvanic skin resistance were measured. Subjective experience and an auditory projective test were recorded. The effect of isolation on vegetative functions, consciousness, and subjective feelings were discussed.

20,417

Puister, G.J. THE INFLUENCE OF FLICKER ON THE LEVEL OF CONSCIOUSNESS. *Aeromedica Acta*, 1958, VI, 169-172.

20,417

To determine the effect of photic flicker on the level of consciousness, 26 Ss were tested on the Bourdon-Wiersma stipple test while their EEG were recorded. The experimental group was given photic stimulation at 9 and 17 cps on the second and third tests and performed the first and fourth tests without flicker. The control group performed without light interference throughout all four tests. Time, error, and omission scores were analyzed for differences within and between groups, and the results were discussed.

T.

20,882

Begbie, G.H. ACCURACY OF AIMING IN LINEAR HAND-MOVEMENTS. *Quart. J. exp. Psychol.*, May 1959, XI (Part 2), 65-75. (Physiology Dept., Edinburgh University, England).

20,882

To study the accuracy of aiming in a horizontal plane, when the direction and length of the path can be altered, six Ss were required to draw 128 lines of four different lengths in eight different directions from a starting point toward a target point. Half the trials were run with eyes closed, half with eyes open. Accuracy was recorded by examining whether the line went to the right or the left of the target point, and by how much. Performance as a function of length, direction, and bias of the lines, and of opening or closing the eyes, was discussed with relation to a theory of movement control.

T. G. R 20

20,885

Gregory, R.L. A BLUE FILTER TECHNIQUE FOR DETECTING EYE MOVEMENTS DURING THE AUTOKINETIC EFFECT. *Quart. J. exp. Psychol.*, May 1959, XI (Part 2), 113-114. (Psychological Lab., University of Cambridge, Cambridge, England).

20,885

This paper describes a simple inexpensive technique for detecting eye movements in the dark during the autokinetic effect. The method involves placing a small red filter in the center of a blue field filter which is bound in two-inches-by-two-inches cover glasses. Data on 50 Ss with this device is reported and discussed with reference to the role of eye movements in the autokinetic effect.

R 3

21,002

Besserer, C.W. & Besserer, Hazel C. (Eds.). GUIDE TO THE SPACE AGE. 1959. 320pp. Prentice-Hall, Inc., Englewood Cliffs, N.J. (Space Technology Laboratories, Inc., Los Angeles, Calif.).

21,002

This book aims to help standardize the specialized language associated with modern space technology and guided missileery and to present the material in a form valuable to technical and near-technical people and easily understood by the nontechnical reader. It is a complete compendium of terms currently in use; the terms are defined in layman's language, arranged alphabetically, and cover as broad an area as possible under the necessary bounds of national security. There is a cross-reference system for exactness; mathematical equations are kept to a minimum; and illustrative drawings and diagrams are used wherever possible for clarification.

T. G. I.

21,006

Davies, M. & Verhuist, M. (Eds.). OPERATIONAL RESEARCH IN PRACTICE. REPORT OF A NATO CONFERENCE. 1958, 201pp. Pergamon Press, New York, N.Y.

21,006

The papers and discussions on operational research (OR) in practice which are included in this book were given at a conference held in Paris during 1957. In general, an account is given of what OR can do and describes how the various techniques have been applied to specific problems and groups of problems. The papers and discussions tend to proceed from the military basis of OR to civilian and industrial applications and are directed primarily at high level administrators and executives in NATO countries. The international potentiality of OR is discussed.

T. G. I. R 60 (approx.)

21,014

Lion, K.S. INSTRUMENTATION IN SCIENTIFIC RESEARCH. ELECTRICAL INPUT TRANSDUCERS. 1959, 324pp. McGraw-Hill Book Company, Inc., New York, N.Y. (Massachusetts Institute of Technology, Cambridge, Mass.).

21,014

This volume offers research workers, engineers, and students a reasonably complete collection of the existing basic methods and systems used as input transducers in electrical instrumentation. Its use as a reference book should minimize literature search and should provide information on particular methods as well as criteria by which the relative merits of existing methods and systems may be evaluated. Chapter topics are as follows: 1) mechanical input transducers, 2) temperature transducers, 3) magnetic transducers, 4) electrical transducers, and 5) radiation transducers.

T. G. I. R 600 (approx)

21,017

Ordway, F.I., III. (Ed.). ADVANCES IN SPACE SCIENCE. VOLUME I. 1959, 412pp. Academic Press, New York, N.Y. (USA Ballistic Missile Agency, Redstone Arsenal, Ala.).

21,017

This volume records advances in those selected areas of space science that merit reviewing and assessing. It is designed for scientists and engineers working in the many related fields of astronautics to enable them to keep abreast of research and developments in these areas. The major topics included are interplanetary rocket trajectories, interplanetary communications, power supplies for orbital and space vehicles, manned space cabin systems, radiation and man in space, and nutrition in space flight. An appendix gives a decimal classification system for astronautics.

T. G. I. R 432

21,018

Spitz, A. & Gaynor, F. DICTIONARY OF ASTRONOMY AND ASTRONAUTICS. 1959. 439pp. Philosophical Library, Inc., New York, N.Y. (Smithsonian Astrophysical Observatory, Cambridge, Mass. & Encyclopedia Britannica, New York, N.Y.).

21,018

This dictionary contains concise definitions of over 2,200 terms and concepts related to astronomy and astronautics. There is a wide range of terms from earliest times to the present day.

21,037

McCrensky, E. SCIENTIFIC MANPOWER IN EUROPE, A COMPARATIVE STUDY OF SCIENTIFIC MANPOWER IN THE PUBLIC SERVICE OF GREAT BRITAIN AND SELECTED EUROPEAN COUNTRIES. 1958. 188pp. Pergamon Press, New York, N.Y. (USN Civilian Personnel and Services Div., ONR, Washington, D.C.).

21,037

The personnel practices for managing scientists and engineers in Great Britain, France, Germany, and several other major countries of Western Europe are described, compared, and evaluated. Among the topics discussed are the status and future of the scientist in government; recruitment and retention of scientists for public service; concepts, policies, and practices on determination of pay; the higher education of engineers; the organization of science; and a comparison of major personnel practices in Russia and the United States.

T. R. 86

21,041

Washburne, N.F. (Ed.). DECISIONS, VALUES AND GROUPS. Proceedings of the Second Behavioral Sciences Research Symposium, University of New Mexico, Albuquerque, New Mexico, June-August, 1958. 1962. 521pp. Pergamon Press, New York, N.Y.

21,041

This volume and the conference that gave rise to it were part of a movement toward approaching behavioral phenomena which is problem oriented and interdisciplinary in nature. Following the eight-week conference, composed of a group of young behavioral scientists, the authors devoted additional time in revising and refining the reports here published. Problems considered ranged widely: concepts of a behavioral science, quantitative methods, intelligence, cognition, culture, personality, status, communication, leadership, group performance, decision-making, learning, conflict, et al.

T. G. I. R 600 (approx.)

21,042

White, C.S., LoveJace, W.R., II & Hirsch, F.G. (Eds.). AVIATION MEDICINE, SELECTED REVIEWS. AGARDograph 25, 1958. 305pp. Pergamon Press, New York, N.Y. (Lovelace Foundation for Medical Education and Research, Albuquerque, N.M.).

21,043

Yockey, H.P., Platzman, R.L. & Quastler, H. (Eds.). SYMPOSIUM ON INFORMATION THEORY IN BIOLOGY, GATLINBURG, TENNESSEE, OCTOBER 29-31, 1956. 1958. 418pp. Symposium Publications Div., Pergamon Press, New York, N.Y. (Oak Ridge National Laboratory, Oak Ridge, Tenn.).

21,042

In the course of assessing recent advances in instrumentation and related methodology which might be of value to those interested in aviation medicine, 12 senior scientists prepared papers reviewing selected topics. These papers, reproduced here, covered the following topics: 1) spirometric methods, 2) high-speed motion picture photography, 3) measurement of atmospheric ozone, 4) methods and apparatus for study of stress reactions and metabolic changes, 5) dosimetry of ionizing radiations, 6) problems in pathology, 7) temperature measuring techniques, 8) analysis of respiratory gases, 9) aerosols, 10) pressure transducers, 11) spectrometric methods, and 12) sampling of expired air.

R 700 (approx.)

21,043

The articles composing this volume were either presented at or inspired by a conference on information theory in health, physics, and radiobiology sponsored by the Oak Ridge National Laboratory, Tennessee. The major topic divisions are storage and transfer of information, determination of information measures, destruction of information by ionizing radiation, aging and radiation damage, information networks, and the status of information theory in biology. A "primer" on information theory is included along with some ideas concerning its application in biology.

T. G. I. R 700 (approx.)

21,053

Advisory Group for Aeronautical Research & Development, NATO, Paris, France. ANTHROPOMETRY AND HUMAN ENGINEERING, A Symposium on Anthropometry, Human Engineering and Related Subjects. AGARD Aeromedical Panel, Scheveningen, The Netherlands, 3 and 4 May, 1954. AGARDograph 5, 1955. 123pp. Butterworths Scientific Publications, London, England.

21,053

The ten papers in this volume are grouped under three major topics: 1) anthropometry--body measurements in relation to work spaces in aircraft, elementary biometric statistics of French air force and army personnel, Sheldon types and success in flight performance; 2) human engineering--adapting the airplane to the pilot, instrument dials, arrangement, and cockpit design, and methodology for instrument display design; and 3) related subjects--factors affecting the validity and utility of aeromedical research data, establishment of a longitudinal study of medical and psychological aspects of the US naval aviator, somatotyping, and human factors in aircraft design.

T. G. I. R 70

21,054

Morant, G.M. BODY MEASUREMENTS IN RELATION TO WORK SPACES IN AIRCRAFT. Report from: "Anthropometry and Human Engineering. A Symposium on Anthropometry, Human Engineering and Related Subjects. AGARD Aeromedical Panel, Scheveningen, The Netherlands, 3 and 4 May, 1954." AGARDograph 5, 1955, 3-17. Butterworths Scientific Publications, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

21,054

This paper discusses the way in which information regarding body measurements may be used to insure that the dimensions of the spaces in aircraft in which personnel operate are as well suited to them as circumstances permit. The conclusions presented are based on research and its application in practice by the British Royal Air Force. The data and discussions are given under two headings: 1) the collection and reduction to convenient form of suitable body measurements for samples of community users; and 2) the use of this information in the design stage, or in modifying particular work spaces, or in selection of personnel.

R 9

21,055

Udassing, J. SHELDON TYPES AND SUCCESS IN FLIGHT PERFORMANCE. Report from: "Anthropometry and Human Engineering. A Symposium on Anthropometry, Human Engineering and Related Subjects. AGARD Aeromedical Panel, Scheveningen, The Netherlands, 3 and 4 May, 1954." AGARDograph 5, 1955, 31-35. Butterworths Scientific Publications, London, England. (Institute of Aviation Medicine, Copenhagen, Denmark).

21,055

An evaluation of Sheldon's constitution-typological method for evaluating physical fitness of applicants for aviation training was reported. During 1948 and 1949 the constitutional types of all applicants for aviation training as jet pilots in the Danish Air Force were made. A follow-up study in 1954 was made to determine the relation of body type to 1) those who failed or were accepted, 2) those still in the Air Force or who had left the service, and 3) the rated efficiency of those pilots still in service.

T. G. R 13

21,056

Stewart, W.K. ADAPTING THE AEROPLANE TO THE PILOT. Report from: "Anthropometry and Human Engineering. A Symposium on Anthropometry, Human Engineering and Related Subjects. AGARD Aeromedical Panel, Scheveningen, The Netherlands, 3 and 4 May 1954." AGARDograph 5, 1955, 41-46. Butterworths Scientific Publications, London, England. (RAF Institute of Aviation Medicine, Farnborough, Hants, England).

21,056

The program of research in adapting the airplane to the pilot as carried on in the United Kingdom is discussed. In particular, the efforts to standardize all aspects of interceptor fighter cockpits are mentioned. From these initial efforts, participation in early planning design and development stages has emerged. An assessment of the results of the program, some general rules on application of the results, and some future problems are discussed.

21,057

Grether, W.F. INSTRUMENT DIALS, INSTRUMENT ARRANGEMENT, AND COCKPIT DESIGN. Report from: "Anthropometry and Human Engineering. A Symposium on Anthropometry, Human Engineering and Related Subjects. AGARD Aeromedical Panel, Scheveningen, The Netherlands, 3 and 4 May 1954." AGARDograph 5, 1955, 47-62. Butterworths Scientific Publications, London, England. (USAF Aero Medical Lab., Wright-Patterson AFB, Ohio).

21,057

Some problems of human engineering (the cockpit for maximum efficiency and safety of human operations) are discussed with reference to work in the Psychology Branch of the USAF Aero Medical Laboratory at Wright Field. The problems chosen for discussion are 1) visibility of instrument markings; 2) selection of basic instrument type according to method of use; 3) control-instrument movement relationships; 4) design and arrangement of engine instruments for ease of checkreading; 5) arrangement of flight instruments; 6) standardization of design, location, and method of actuation of cockpit controls; and 7) warning lights.
T. G. I. R 16

21,058

Hoover, G.W. A METHODOLOGY FOR INSTRUMENT DISPLAY DESIGN. Report from: "Anthropometry and Human Engineering. A Symposium on Anthropometry, Human Engineering and Related Subjects. AGARD Aeromedical Panel, Scheveningen, The Netherlands, 3 and 4 May 1954." AGARDograph 5, 1955, 63-72. Butterworths Scientific Publications, London, England. (USN Office of Naval Research, Department of the Navy, Washington, D.C.).

21,058

An attempt is made to establish a methodology for display design for those flight instruments which provide data normally obtained from visual contact without permitting the design decisions to be influenced by personal opinion. An analysis is made of both operational requirements and psychophysiological requirements, and a program of design development is described.
T. I.

21,059

Whillans, M.G. HUMAN FACTORS IN AIRCRAFT DESIGN. Report from: "Anthropometry and Human Engineering. A Symposium on Anthropometry, Human Engineering and Related Subjects. AGARD Aeromedical Panel, Scheveningen, The Netherlands, 3 and 4 May 1954." AGARDograph 5, 1955, 113-123. Butterworths Scientific Publications, London, England. (Defence Research Medical Labs., Toronto, Ontario, Canada).

21,059

Some observations, criticisms, and suggestions related to human factors in aircraft design are offered. The topics selected for discussion are: 1) simplification of tasks, 2) visual problems, 3) heat, and 4) safety and escape.
T. G. R 9

21,075

Pierce, Jones, J. THE READABILITY OF CERTAIN STANDARD TESTS. Calif. J. Educ. Res., March 1954, 1(2), 1-3. (University of Oregon, Eugene, Ore.).

21,075

This report presents information concerning the readability of four standard tests which are employed in high schools, colleges, etc. Readability is measured by the Flesch method; only the "reading ease" scores were used in the present determinations. The four tests thus described are: Kuder Preference Record, the Bell Adjustment Inventory, the Minnesota Multiphasic Personality Inventory, and Judgments Characteristic of the Socially Competent Person.
T. R 7

21,078

Richardson, Bellows, Henry & Co., Inc., New York, N.Y. DEVELOPMENT OF EVALUATION PROCEDURES FOR PROTOTYPE DEVICES, SUPPLEMENT I: TO THE DEVELOPMENT OF AN EVALUATION PROCEDURE FOR TRAINING AIDS AND DEVICES. Contract N7 ONR 38302, Proj. NR 783 008, Proj. SDC 20 M 2, SDC TR 383 2 1, Feb. 1950, 76pp. USN Training Device Center, ONR, Port Washington, N.Y.

21,078

This report consists of several parts: 1) a review of background materials--a bibliography of literature sources, classification of training aids and devices, areas of evaluation of training accomplishment, and a list of business and industrial firms; 2) development of preliminary procedures for description and rating of training aids and devices (free answer, check-list description, and factor rating); 3) field trial of the free-answer and check-list procedures and their revision; 4) establishing a method for obtaining criteria for the training value of aids and devices; 5) pilot study for validation of the above procedures and their scoring; and 5) four different device evaluation blanks, each designed for determining effectiveness and usefulness of the device in question. T.

21,212

Dreyfuss, H. DESIGNING FOR PEOPLE, 1955, 240pp. Simon and Schuster, Inc., New York, N.Y.

21,212

In this book, Henry Dreyfuss, one of America's foremost industrial designers, tells how he has approached and carried out his work during the past 25 years. He discusses how the designer works, the importance of anthropometric information and of testing. His five-point formula includes utility and safety, maintenance, cost, sales appeal, and appearance. Applications of these techniques of design to many objects, from alarm clocks to destroyers, are discussed and illustrated. Some questions commonly asked by people unfamiliar with the field are included with Mr. Dreyfuss's answers. The book is illustrated with 32 pages of photographs.
I.

21,213

DuBois, P.H.; Manning, W.H. & Spies, C.J. (Eds.). FACTOR ANALYSIS AND RELATED TECHNIQUES IN THE STUDY OF LEARNING. A REPORT OF A CONFERENCE HELD AT WASHINGTON UNIVERSITY, SAINT LOUIS, MISSOURI, 19-20 FEBRUARY 1959. Contract N0NR 816(02), Tech. Rep. 7, Aug. 1959, 190pp. Psychology Dept., Washington University, St. Louis, Mo.

21,213

Nine papers presented at a conference on factor analysis and related techniques in the study of learning are presented with their accompanying discussion. Topics include an analytic approach to factor analysis; a bibliography of factor analytic studies of learning; the triangular method of factor analysis; computation of the inverse of a matrix of correlations; learning, prediction, and the simplex method; simplex theory in learning and training; abilities and the learning of psychomotor skills; determination of generalized learning curves by factor analysis; and learning and human ability--a theoretical approach.
T. G. I. R 96

21,281

Rudner, R.S., Gordon, E.S. & Gordon, Rachel. AN ESSAY ON THEORY CONSTRUCTION AND THE EFFECTS OF SOME TRAINING SITUATIONS ON GROUP PRODUCTIVITY. Contract NOMB 494(03). Proj. NR 145 088, Rep. 1954 494 03 22, Aug. 1954, 210pp. Tufts University, Medford, Mass.

21,281.

"...this essay progresses from a discussion of relatively abstract and general considerations involved in the logic of theory construction in empirical science, to concrete and detailed description of one particular experiment." Chapter I, "On the Logic of Theory Construction," deals with the formalization of a theory, problems of concept formation and introduction in such theories, and problems of partial formalization. Chapter II, "Effects of Some Training Situations on Small Group Productivity," contains a partial formalization of a segment of a theory of small groups. Chapter III describes the experiment. A series of eight appendices presents instructions, description of the laboratory, and descriptions of the design considerations and experimental runs. T. G. R 23

21,285.

Schutz, W.C. GROUP BEHAVIOR STUDIES, III: SCALING OF A PERSONALITY TEST FOR CONSTRUCTING COMPATIBLE GROUPS. Contract NOMB 494(03), Proj. NR 145 088, Rep. 1954 494 03 24, Aug. 1954, 36pp. Tufts University, Medford, Mass.

21,285

This study presented a refinement and extension of the original personality test. The technique of scale analysis with the intensity function was selected as the theoretically most defensible and practically most feasible method of objectifying the test. The original test was thereby expanded and given to 500 Ss. From the scale analysis of these data several scales were proposed and augmented with new items. This latter test was given to 200 naval and army Ss; 13 scales were developed on the naval Ss and validated on the army Ss. The foldover technique was used to determine the intensity function, and a zero point was determined for each scale. These new scales were related to the original test. T. G. R 7

21,309

Vitro Corporation of America. ELECTRONIC EQUIPMENT RELIABILITY PROGRAM. Contract NOMB 63389, Tech. Rep. 47, June 1953, 19pp. Silver Spring Lab., Vitro Corporation of America, Silver Spring, Md.

21,309

A method of measuring the "level of inherent reliability" of an electronic equipment is developed, and the guide lines by which the reliability of the equipment may be estimated in advance of actual production are determined. The major effort in the present phase is making necessary arrangements for early initiation of field observations and working out procedures for laboratory analyses of data from Vitro observation and other sources. At the present time, observers are accompanying two naval vessels and will soon be with a third. Observation also has begun at two shore facilities. Analysis of about 13,000 failure reports from the Bureau of Ships has been completed. Part and tube application analyses on several equipments also are in progress. T. I.

21,357

Eakin, G.J. & Campbell, G.F. HUMAN OPERATOR TRANSFER FUNCTION INVESTIGATION. Contract AF 33(038) 9204, Rep. TE 665 F 5, Oct. 1957, 99pp. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.

21,357

"The phase and amplitude ratio of r^{-1} transfer function used by a pilot in flying an aircraft with several different handling characteristics were obtained from flight test data. The transfer function obtained relates aircraft pitch angles (as the input to the pilot) to stick force (as the output...). This data was obtained during flight tests of an artificially stabilized F-94A aircraft. During the flight tests, three sets of short period pitch axis aircraft response characteristics were utilized. At each of the three sets of characteristics, several values of stick force/g and stick displacement/g were provided. Pilot transfer functions are presented for all of the combinations of response characteristics and stick force and stick travel/g." T. I. R 6

21,438

Backlund, F. & Bergstrom, S.-S. SUBJECTIVE SCALING BASED ON THRESHOLD MEASUREMENTS. Rep. 4, Feb. 1959, 11pp. Psychological Lab., University of Uppsala, Uppsala, Sweden.

21,438

This report presents a method of obtaining subjective scales by means of absolute threshold measurements. The application of the method to data on the perception of motion and time is described. G. R 11

21,440

Banet, L. & Hirschman, A. THE PROTECTION AFFORDED BY WINDOW SCREENING MATERIALS AGAINST INTERNAL THERMAL RADIATION. FINAL REPORT. Proj. 5046 3, Part 95, Tech. Obj. AM-7, Rep. AFSWP 952, June 1956, 18pp. USN Material Lab., Brooklyn Naval Shipyard, N.Y.

21,440

To evaluate the ignition and thermal responses of window materials under exposure to a nuclear detonation, the protective value of various window coating materials was evaluated by two methods: 1) field measurements utilizing passive paper thermal indicators and 2) laboratory spectrophotometric measurements of the transmittance of the materials. The results of the two methods were compared and conclusions presented. T. G. I. R 6

21,486.

de Lhery, G.P., Derksen, W. & Monahan, T.I. THE SPECTRAL REFLECTANCE AND TRANSMITTANCE OF STANDARD FABRICS FOR THERMAL RADIATION EFFECTS STUDIES. FINAL REPORT. Proj. 5046 3, Part 91, NS 081 001, AFSWP Rep. 957, Aug. 1956, 16pp. USN Material Lab., Brooklyn Naval Shipyard, N.Y.

21,486.

This report presented data on the radiant absorbance, spectral reflectance, and transmittance of standard fabrics employed in thermal radiation research. These cotton fabrics, varying in color from undyed to deep black, were measured for radiation of wave lengths from 0.40 to 2.7 microns. The spectral characteristics of white sheeting, olive green cotton sateen, and wind-resistant poplin were determined also. T. G. R 4

21,487

Derksen, W.L. & Bates, J.J. THE INFLUENCE OF AIR SUPPLY AND AIR FLOW ON BURNS BEHIND IRRADIATED FABRICS. FINAL REPORT. Proj. 5046 3, Part 100, NS 081 001, AFSWP Rep. 1000, June 1956, 10pp. USN Material Lab., Brooklyn Naval Shipyard, N.Y.

21,487

To investigate the protection afforded by fabric systems against burns caused by intense radiant energy, the influence of air flow on burns under a fabric was studied. A fabric mounted on a skin simulant was exposed to thermal radiation under three conditions of flow--zero air supply, air moving at 0.86 ft./sec., and air moving at 10 ft./sec. The temperature use of the skin simulant and the radiant exposure required for sustained ignition of the fabric were determined for each of the air velocities. The relevance of data on air supply in evaluating the protection afforded by uniform assemblies was discussed. T. R 2

21,489

Duntley, S.Q. NOMOGRAPHS FOR CALCULATING VISIBILITY BY SWIMMERS, I. NATURAL LIGHT. Contract NOMB 72039, Proj. NS 714 100, Task 3, Rep. 3 I, May 1958, 29pp. S.Q. Duntley, 1475 Virginia Way, La Jolla, Calif.

21,489

This report presents nomographic charts for calculating the limiting range at which swimmers can sight any flat horizontal object lying on the sea bottom. It includes directions for the use of the nomographic charts, as well as illustrative numerical examples. The charts cover nine adaptation levels, ranging from brightest day to darkest night. T. G.

21,595

Maggio, R.C. & Gilhooly, T.B. HEAT-REFLECTING TEXTILES AS PROTECTIVE BARRIERS AGAINST INTENSE THERMAL RADIATION. FINAL REPORT. Proj. 5046 3 Part 77, NS OSI 001, Rep. AFSMP 849, March 1955. 13pp. USN Optics & Nucleonics Branch, Brooklyn Naval Shipyard, N.Y.

21,595

This report investigated the relative effectiveness of four heat-reflecting fabrics--aluminum foil-on-fabrics, aluminum deposits, white organic coatings, and bleached goods--as protection against radiant heat. The fabrics were mounted on an epoxy-resin skin simulant and on human skin and irradiated with thermal energy. The maximum temperature rises, time of exposure, and thermal effects during and after exposure to radiation were noted. Critical radiant exposures to cause destruction were determined. Physical properties, including reflectance, transmittance, and absorptance were presented for each textile.

T. R 6

21,651

Silvernail, C.J. A VARIABLE-RANGE SIMULATOR. Contract N0BS 72039, Proj. NS 714 100, Task 1, Rep. 1 3, June 1958. 6pp. S. O. Duntley, 1475 Virginia Way, La Jolla, Calif.

21,651

This report describes a variable-range viewer which may be used with binocular and terrestrial telescopes to view small test charts in the laboratory under well-controlled, realistically simulated outdoor conditions. A variable magnification optical system covers object distances from 2 to 20 miles. Changes in the simulated range automatically introduce contrast attenuation by the atmosphere. Any meteorological range from 2 to 100 miles may be preset. Applications of the viewer to optical research are discussed.

1.

21,701

Altes, S.K. & Chu, J.H. FEASIBILITY STUDY, WIDE ANGLE TELEVISION DISPLAY. Contract 1928(00), NAVTRADEVEN TR 1507 1, Nov. 1956. 186pp. USN Training Device Center, ONR, Port Washington, N.Y. (Technical Products Dept., General Electric Company, Syracuse, N.Y.).

21,701

This study provides the simulation engineer with information on the means and methods of using television to present a wide angle, nonprogrammed visual display of a real world environment to a trainee. Relevant characteristics of the viewer, resolution requirements for such displays, and basic limitations of these systems are considered briefly. The techniques examined include Schmidt optical system, multiple tubes, light valve systems, dark trace tubes, direct view storage tubes, virtual image systems, light amplifying screens, and film intermediary projection systems. System characteristics and performance estimates are given as well as recommendations for further study.

G. I. R 70

21,796

Lindquist, O.H. & Gross, R.L. HUMAN ENGINEERING MACHINE STUDY OF A WEAPON SYSTEM. MH Aero Rep. R 5D 6094, Oct. 1958. 188pp. Aeronautical Div., Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

21,796

This report on methods of improving the effectiveness of weapon systems investigated the current air defense system employing broadcast control of F89 and F102 interceptors. On the basis of preliminary studies, an advanced study program of future manned interceptor requirements was formulated. System requirements as to information, accuracy, and pilot action, are discussed, and each mode of the future interceptor is studied. An extensive table of pilot workload in various flight modes is included.

T. G. I. R 33

21,889

Vernon, J.A. PROJECT HIDEAWAY. A PILOT FEASIBILITY STUDY OF FALLOUT SHELTERS FOR FAMILIES. Contract CDM SR 60 15, Dec. 1959. 36pp. Psychology Dept., Princeton University, Princeton, N.J.

21,889

To determine whether a family could remain confined in a family fallout shelter for a period of 14 days, a family of five members remained in a simulated fallout shelter for two weeks. The design of the shelter was described. Findings with respect to ventilation, heat, humidity, odor, illumination, cooking provisions, toilet facilities, refuse, activity schedules, attitudes and health were discussed. Recommendations for illumination, cooking equipment, recreation, shelter design, refuse disposal, and the art of taking shelter were made.

1.

21,901

Lueder, D.R. AERIAL PHOTOGRAPHIC INTERPRETATION. PRINCIPLES AND APPLICATIONS. 1959. 462pp. McGraw-Hill Book Company, Inc., New York, N.Y.

21,901

This volume on principles and applications of aerial photographic interpretation contains 24 chapters, organized into three sections: 1) principles and theories of photo interpretation, 2) a lexicon of geomorphology and landforms as seen by the aerial photograph, and 3) applications of aerial-photographic techniques to the various fields of earth science.

T. G. I. R 223

21,935

Bourne, C.P. BIBLIOGRAPHY OF THE MECHANIZATION OF INFORMATION RETRIEVAL: SUPPLEMENT 1. Feb. 1959. 25pp. Computer Techniques Lab., Stanford Research Institute, Menlo Park, Calif.

21,935

This addendum to the February 1, 1958 bibliography presents reports on the mechanization of information retrieval for the period until February 1, 1959. Included are references on 1) techniques of mechanization, 2) machine translation, 3) coding and classification, and 4) input-output relations.

R 336

21,952

Conklin, R.F. PROCESS CHARTING, THE BASIC APPROACH. 1959. 36pp. Manufacturing Engineering Service Dept., Plant Layout & Material Handling Service, Schenectady, N.Y.

21,952

This booklet on Process Charting discusses various types of diagrams and charts used in plan layout and material handling problems. Included are descriptions and explanations of assembly flow diagrams, operation flow diagrams, machine requirements formulae, master flow diagrams, flow process charts, flow process diagrams, multiprocess process charts, operation cross charts, sequence analyses, area calculation forms, and plant layout equipment record cards.

1. R 28

21,988

George Washington University. HUMAN RESOURCES RESEARCH OFFICE BIBLIOGRAPHY OF REPORTS AS OF 30 JUNE 1959. July 1959. 42pp. Human Resources Research Office, George Washington University, Alexandria, Va.

21,988

This bibliography lists publications of the Human Resources Research Office and associated units as of June 30, 1959. Topics covered include training, personnel selection, military equipment and performance, motivation, morale and leadership, and psychological warfare.

R 274

21,991

Gerall, A.A., Sampson, P.D., Green, R.F. & Spragg, S.D.S. PERFORMANCE ON A TRACKING TASK AS A FUNCTION OF POSITION, RADIUS, AND LOADING OF CONTROL CRANKS: II. MOVING TARGETS. *J. Psychol.*, 1956, 41, 151-156. (Psychology Dept., University of Rochester, Rochester, N.Y.).

22,087

Quastler, H. & Muff, V.J. HUMAN PERFORMANCE IN INFORMATION TRANSMISSION. PART I: GENERAL REMARKS. PART II: SEQUENTIAL TASKS (OVERLEARNED ACTIVITIES). Contract DA 36 039 SC 56695, Proj. DA 3 99 10 101 & 8 103A, Rep. R 62, March 1955, 70pp. Control Systems Lab., University of Illinois, Urbana, Ill.

21,991

Military trainees (153) served as Ss in this experiment to determine the effect of position radius and magnitude of loading of CONTROL CRANKS on performance in a following tracking task. Two different positions, three sizes of radii, and three magnitudes of loading of control cranks were used. Average time-on-target was analyzed and discussed.

T. R 7

22,087

In this report a series of studies of human performance in information transmission are presented. Estimates are made of the peak information rates that men can process under near-optimal conditions. The sequential tasks investigated were piano playing, typing, reading, and doing mental arithmetic. For piano playing, scripts of random music were sight read by three skilled musicians. Such factors as the number of keys used and the speed at which the music was played were varied. The typing experiments involved skilled typists who transcribed random sequences of equiprobable symbols. The information rates estimated for oral reading and mental arithmetic are based primarily on the data of previous studies.

T. G. R 42

22,017

Istituto Nazionale di Ottica. LIST OF PUBLICATIONS ON PHYSIOLOGICAL OPTICS, 1953-1958. Feb. 1959, 14pp. Istituto Nazionale di Ottica, Arcetri, Firenze, Italy.

22,141

USAF School of Aviation Medicine. SUBJECT INDEX OF SCHOOL OF AVIATION MEDICINE PUBLICATIONS, SUPPLEMENT NO. 1: TO INDEX OF JANUARY 1942 - MAY 1958. May 1959, 8pp. USAF School of Aviation Medicine, Brooks AFB, Tex.

22,017

This bibliography presents abstracts of publications on physiological optics for the years 1953-58 of the Istituto Nazionale di Ottica in Florence, Italy.

R 43

22,141

This supplement to the Subject Index of the School of Aviation Medicine publications covers the period from May 1958 to May 1959. Included are references on 1) aviation medicine, 2) dentistry, 3) internal medicine, 4) microbiology, 5) ophthalmology, 6) otolaryngology, 7) pathology, 8) pharmacology and biochemistry, 9) physiology, 10) preventive medicine, 11) clinical and experimental psychology, 12) radiobiology, 13) space medicine, 14) medical statistics, 15) veterinary sciences, and 16) aeromedical reviews.

R 170

22,056

Head, L.C. & Wulfeck, J.W. HUMAN ENGINEERING: THE STUDY OF THE HUMAN FACTOR IN MACHINE DESIGN. *Scientific Monthly*, Dec. 1952, LXXV(6), 372-379. (Institute for Psychological Research, Tufts University, Medford, Mass. & Dunlap and Associates, Inc., Santa Monica, Calif.).

22,147

USN Special Devices Center. BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS (UNCLASSIFIED). Rev. Jan. 1955, 13pp. USN Special Devices Center, ONR, Port Washington, N.Y.

22,056

This article discusses the problems of coordinating and integrating the differing capacities of men and machines. Design problems are categorized as either display or control problems. The function of pictorial and realistic displays are considered, and current research in the area is discussed. Available information concerning machine controls is summarized under two headings: 1) the design and layout of the work place, and 2) the use of the human body.

T. R 28

22,147

This bibliography of Human Engineering Reports from the ONR Special Devices Center at Port Washington, N.Y., covers the period to January 1, 1955. Citations are organized in terms of the following categories: 1) learning, 2) motor skills, 3) perception, 4) voice communications, 5) extreme environmental factors, 6) systems analyses, 7) controls and displays, 8) training devices, 9) research tools, and 10) human engineering.

R 373

22.168
Yaglou, C.P. & Borum, V.F. THE SUITABILITY OF SUBMARINE COMPRESSED AIR FOR USE IN THE SUBMARINE ESCAPE APPLIANCE. Proj. NM 002 015.08.02, Rep. 221, March 1953, 10pp. USN Medical Research Lab., New London Submarine Base, Conn.

22.586
Mertzan, M., Orlansky, J. & Seitz, C.P. PERSONALITY ORGANIZATION AND ANOXIA TOLERANCE. ca. 1943, 41pp. New York City College, N.Y.

22.168
To determine whether submarine compressed air contains any toxic substances which would affect its suitability as a respiratory medium for use in submarine escape appliance at great depths, samples of compressed air were taken from the tanks of ten submarines operating in the New London area. The samples were analyzed for oxygen, carbon dioxide, carbon monoxide, hydrogen sulfide, arsine, stibine, aldehydes, dusts, oil vapors, and odors. Results were discussed with reference to safety standards for submarine escape appliances.
T. R 5

22.586
The problem was to determine "whether there are differences in personality patterning as indicated by the Porschach test between persons who can adjust adequately to severe conditions of anoxia and those who cannot..." 40 male Ss in groups of 2 or 3 were given the group Porschach in the City College nitrogen dilution chamber at sea level and 18,500 ft. (conditions controlled at: 70°F, 58% humidity, .6% CO₂). Normal O₂ supply deprivation lasted about 50 min., of this about 30 min. was maximum deprivation. Pulse readings were taken before and during the session. Anoxia tolerance ratings and patterns of personality organization were analyzed in detail; areas of application are considered.
T. R 40

22.231
Irvine, T.F., Jr. & Gräber, K.R. ANALYSIS OF LIMITING THERMAL CONDITIONS ENCOUNTERED BY A MANNED SPACE SUIT IN ORBIT. Proj. 6301, Task 630104, AMRL TDR 63 102, Nov. 1963, 22pp. USAF Biomedical Lab., Wright-Patterson AFB, Ohio.

22.737
Tufts University. THE EFFECT OF GREEN FILTERS ON DETAIL VISION AND DEPTH PERCEPTION IN SUNLIGHT. Rep. 12, March 1943, 7pp. Tufts University, Medford, Mass.

22.231
In this study of an analytical space suit model, three thermal problems have been examined which occur in the design of space suits to be used when personnel are outside the parent vehicle. The first concerns the temperature variation of an infinite thermal conductivity suit exposed to extreme conditions of heating and cooling. The second is related to temperature differences which may occur from the top to the bottom of the suit, thereby causing physiological discomfort. Finally, the scheme whereby these temperature differences might be ameliorated by circulating a fluid in passages behind the suit material was examined.
G. R 3

22.737
The effect of the darker green lumarith 0-4403, manufactured by Celanese Celluloid Corporation, on acuity and depth perception was tested. A testboard consisting of nine rows of four E's, placed 200 ft. from the observer, was read both with and without the filter five times. Brightness of the E's varied between 3300 and 6700 ft.-L; size of the E's varied, the median row requiring a visual acuity of 1.66. Scores of the three observers are presented. The distance of simple objects was estimated for green-on-left and green-on-right conditions. This test also was conducted in sunlight. Constant error, critical ratio and standard deviation data are presented.
T. G. R 8

22.579
Harris, J.D. AN ATTEMPTED SYNTHESIS OF PSYCHO-ACOUSTIC TEST DATA IN THE AUDIOLOGICAL CLINIC. Laryngoscope, March 1958, LXVIII (3), 527-534. (USN Medical Research Lab., New London Submarine Base, Conn.).

22.756
Winsman, F.R. & Daniels, J., Jr. THE PHYSIOLOGY OF LOAD-CARRYING. X. PACK CARRYING IN THE DESERT. Proj. Ref. 7 64 12 004, EP Tech. Rep. 28, May 1956, 27pp. USA Environmental Protection Research Div., Quartermaster Research & Engineering Command, Natick, Mass.

22.579
This paper first discusses the usefulness of psycho-acoustic tests to the otologist in his diagnosis of hearing difficulties. A brief discussion of how some of the present tests have come to be suggested is followed by a presentation of one line of reasoning as to how a complete and mutually exclusive battery of such tests might be constructed and how a "profile" of test results may correlate higher with diagnosis than results from any one or two tests.

22.756
A study of the effects of various types of desert terrain (level hard surface, level sandy surface, and sand dune slopes) on the energy cost of carrying loads of different weights (25, 30, and 40 lbs.) representative of loads the combat soldier might be expected to carry was made. The energy cost of walking, climbing, and load carrying was determined by measurement of oxygen consumption. Pulse rates and rectal temperatures were also measured as indicators of stress. One study using nine Ss and one using four Ss in all conditions are reported. Recommendations are made as to limitations on man's capacity for physical work in the desert.
T. G. R 7

Security Classification

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13. ABSTRACT This bibliography is the first in a planned series of bibliographies of literature pertinent to the field of human factors engineering. It covers literature from the time period of 1940 through 1959. This bibliography consists primarily of: (1) an index to the human factors literature, and (2) the annotated bibliography.		

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